

stor  
CA1  
EA909  
90C56  
ENG

Storage  
CA1 EA909 90C56 ENG  
Commercial prospects of Canadian  
companies in the telecommunication  
sector in Bangladesh : final report  
43270695

27CA

# COMMERCIAL PROSPECTS OF CANADIAN COMPANIES IN THE TELECOMMUNICATION SECTOR IN BANGLADESH

FINAL REPORT

FINAL REPORT

PREPARED FOR  
CANADIAN HIGH COMMISSION, DHAKA.

Dept. of External Affairs  
Min. des Affaires extérieures  
  
FEB 15 1995  
  
RETURN TO DEPARTMENTAL LIBRARY  
RETOURNER A LA BIBLIOTHÈQUE DU MINISTÈRE

PREPARED FOR : -  
CANADIAN HIGH COMMISSION, DHAKA.

BANGLADESH OILFIELD SERVICES LIMITED

146, NEW BAILY ROAD, DHAKA-1000 FAX: 02-832903 TELEX: 675 632 BIL BJ  
PHONES: 02-831187, 02-417932

FEBRUARY, 1990

**BANGLADESH OILFIELD SERVICES LTD**

146, New Baily Road, Dhaka-1000  
Fax : 02 832903 Telex : 675 632 BIL BJ  
Phones : 02-831187, 02-417932

FEBRUARY, 1990

43-270-695.

ACGO

REVISIONS TO THE...  
REVISIONS TO THE...  
REV. 12 1995  
MIR. das... extensiones  
Ded. ...

**COMMERCIAL PROSPECTS  
OF  
CANADIAN COMPANIES IN  
THE TELECOMMUNICATION  
SECTOR IN BANGLADESH**

**FINAL REPORT**

**PREPARED FOR :-  
CANADIAN HIGH COMMISSION, DHAKA.**

**BANGLADESH OILFIELD SERVICES LIMITED**

**146, NEW BAILY ROAD, DHAKA-1000**

**FAX : 02-832903 TELEX : 675 632 BIL BJ**

**PHONES : 02-831187, 02-417932**

*FEBRUARY, 1990*



## EXECUTIVE SUMMARY

There are good prospects for Canadian companies in the telecommunication sector of Bangladesh. In spite of pressing demands in other sectors, over US \$ 200 Million was provided as foreign funding for projects in this sector during the last nine years. The Government is determined to develop this sector on a priority basis, and different bilateral and multi-lateral donors are showing interest in assisting it in this task. While business in Bangladesh is competitive, the combination of Canadian expertise and off-shore financing provides attractive commercial opportunities in the next decade.

Development of this vitally important sector in Bangladesh is still in its nascent state. Presently telephone density is estimated to be only 0.2 per hundred persons, which is lower than even the average of the developing countries. Substantial part of the actual demand is suppressed by supply constraints. The recent process of decentralization of administration has further increased the demand in the sector, especially in the rural areas of the country. The Government is firmly committed to bring the entire country under its telecommunication network at the earliest.

Future demand in the sector consists of two distinct categories, namely growth induced demands and replacement of existing equipment with the state of the art. Both these two components of demand apply to all types of telecommunication equipment and services.

The Bangladesh Telegraph and Telephone Board, a government organization, is responsible for the development of the sector and is thus the focal point. There are many other organizations, like the defense forces, security forces, civil aviation, railway, navigation, which also procure telecommunication equipment and services regularly. Organizations of the entire sector are described in the report. Planning and procurement procedures followed by these organizations are also discussed.

Bulk of the projects in Bangladesh is implemented by the public sector. Projects are appraised by the Government through the Planning Commission and funds are allocated by it on the basis of annual cash flow shown in the project documents. The process of approval of projects and allocation of funds are discussed in the report.

Foreign assistance is an integral part of project implementation in the country. The past trend of financing by foreign donors and in local currency is analyzed to give an idea about priority attached to the sector and the donor focus on it.

Aims of the Government for development of this sector are analyzed and specific goals to be achieved in the Fourth Five Year Plan (1990-1995) are identified. This includes, among others, expansion of telephone lines by at least 300,000 lines, digitization of at least 60% of the existing transmission network (Microwave and UHF), digitization of 60% installed capacity of telephone exchanges, nation wide dialing facilities up to the level of Upazilla ( sub-districts - the lowest end of the administrative structure) telephone facilities in rural areas, modern-

ization of junction network by introducing optical fibre, and modernization of the existing telephone industry and the cable factory.

Future projects in the sector in short, medium and long term perspectives are identified. It is observed that more than US \$700 Million is proposed to be spent in foreign currency for implementing different projects in the Fourth Five Year Plan. The exact amount to be provided for the sector in that plan period will, however, depend on the commitments by different donors. Description of some of the projects, for which project documents have already been approved or are in the process of approval, are provided. Similar lists of projects in organizations, other than the BTTB, are also included in the report.

The process of calling for international bids and their evaluation is discussed. Local scopes of supplies and services are considered important in preparing a low cost bid. Some of local supplies and capabilities and also the anticipated problems in their inclusion in offers are identified.

The report provides a list of foreign companies which were involved in execution for various past projects in the sector. It is seen that participation of Canadian companies in the past hardly reflects their experience and capabilities in this field.

A specific case history is analyzed to show why a relatively weak offer for a bid was selected in place of more competent offers. This gives an idea about some specific weakness/ aggressiveness in marketing as applicable to projects in the sector.

Finance for many future projects of the sector is expected to be provided by multi-lateral sources and Canadian companies qualify for such projects. However, there is much to be expected from Canadian companies so far as their business promotion is concerned. A few strategies are proposed in the report which could improve their chances in procuring business in this sector.

The government has recently initiated to promote private sector to provide better telecommunication services to the subscribers. Two companies came forward; one is Gulf Bangladesh Joint Venture Funding Company who has collaboration with Mittel, Canada and the other is Bangladesh Telecom Private Limited where Motorola(USA) will supply hardware and expertise services.

This report will provide an overview of the telecommunication sector of Bangladesh, its growth potentials and business opportunities for Canadian companies. This was commissioned by the Trade Section of the Canadian high Commission in Dhaka.

<b><u>Table of Contents</u></b>	<b>PAGE</b>
<b>EXECUTIVE SUMMARY</b>	i
<b>CHAPTER 1</b>	1
<b>INTRODUCTION</b>	1
<b>CHAPTER 2</b>	4
<b>OVERVIEW OF TELECOMMUNICATION SECTOR IN BANGLADESH</b>	
2.1. PRESENT STATUS	4
2.2. HISTORY OF GROWTH OF TELECOMMUNICATION	4
2.3. NATIONAL, REGIONAL AND INTERNATIONAL LINKAGES	5
2.3.1. Relation with international organizations	6
2.3.2. Relation with regional organizations	6
2.3.3. Local organizations	6
2.4. Regulatory and Control activities and services	7
<b>CHAPTER 3</b>	9
<b>GOVERNMENT STRUCTURE AND ORGANIZATIONS RESPONSIBLE FOR THE SECTOR</b>	9
3.1. GOVERNMENT STRUCTURE	9
3.2 DESCRIPTION OF AGENCIES INVOLVED IN TELECOMMUNICATION ACTIVITIES OF BANGLADESH	10
3.2.1. The Bangladesh Telegraph And Telephone Board (BITB)	10
3.2.2 Private Participation in Telecommunication Sector under BITB	13
3.2.3. Civil Aviation Authority of Bangladesh (CAAB)	16
3.2.4. Bangladesh Rifles (BDR)	16
3.2.5. Defense Services	18
3.2.6. Police and other internal Security forces	20
3.2.7. Inland Water Transportation	20
3.2.8. Bangladesh Railway	20
3.2.9. National Broadcasting Authority (NBA)	21

<b>CHAPTER 4</b>	23
<b>EXISTING INFRASTRUCTURE AND FACILITIES</b>	23
4.1. EXISTING SERVICES	23
4.1.1. Telephone	23
4.1.2. Telex services	23
4.1.3. Telegraph Services	24
4.1.4. Other services	24
4.2. EXISTING TELEPHONE NETWORKS	24
4.2.1. Local network	24
4.2.2. Long-distance network	24
4.3. TELEX SERVICES	25
4.4. THE TOTAL TELECOMMUNICATION NETWORK	25
<b>CHAPTER 5</b>	27
<b>DEVELOPMENT OF THE SECTOR</b>	27
5.1. PRESENT STATUS	27
5.2. OVERALL STRATEGY	27
5.3. AIMS IN SHORT TERM PERSPECTIVE	28
5.4. FINANCING TRENDS	28
<b>CHAPTER 6</b>	33
<b>FUTURE PROJECTS IN TELECOMMUNICATION SECTOR</b>	33
6.1. PROJECT CLASSIFICATION	33
6.2. PROJECTS IN SHORT TERM PERSPECTIVE	33
6.2.2. Telephone in Union Levels	36
6.2.3. Expansion of Transmission Links	36
6.2.4. International Services	36
6.2.6. Data and Centrex Service	37
6.2.7. Modernization of Cable Network	37
6.2.8. Expansion of Training Facilities	37

6.2.9. Network Management and MIS System	37
6.2.10. Monitoring System	37
6.3.1. Installation of Telecommunication equipment and expansion of nation wide dialing system in Upazillas of Bangladesh	38
6.3.3. Telecommunication facilities in Chittagong Hill Tracts	39
6.3.4. Greater Dhaka Telecommunication Project	40
6.3.5. Expansion of Training Facilities of the Telecommunication Staff College, Gazipur, Bangladesh	40
6.3.6. Telecommunication equipment for VIPs	41
6.3.7. Standard 'A' Earth Station in Dhaka	42
6.3.8. Other projects proposed for financing by IDA	42
6.4. PROJECTS IN OTHER ORGANIZATIONS	43
6.4.1. Civil Aviation Authority of Bangladesh	43
6.4.2. Defense services	44
6.4.3. Bangladesh Rifles	45
6.4.4. Police	45
6.4.5. Inland Water Transportation	45
6.4.6. National Broadcasting Authority	45
<b>Chapter 7</b>	<b>46</b>
<b>PROJECT PLANNING AND IMPLEMENTATION</b>	<b>46</b>
7.1. PLANNING METHODOLOGY	46
7.2. PROJECT PROCESSING	47
7.3. PROJECTS FINANCED BY INTERNATIONAL DONORS	50
7.4. PROCEDURE FOR SELECTION OF CONSULTANTS, CONTRACTORS AND SUPPLIERS	50
7.4.1. International competitive bidding	50
7.4.2. Bids from short listed parties	50
7.5. LOCAL CONTENT	51
7.5.1. Manufacturing Capabilities	51

7.5.2. Quality Control And Standards	53
7.5.3. Local Contractors	53
7.5.4. Transportation	53
7.5.4. Problems of Management	54
<b>CHAPTER 8</b>	<b>55</b>
<b>PAST INVOLVEMENT OF FOREIGN COMPANIES IN THE SECTOR AND REASONS FOR THEIR SUCCESS</b>	<b>55</b>
8.1. INVOLVEMENT OF FOREIGN COMPANIES IN THE SECTOR	55
8.1.1. Supplies for BTTB	55
8.1.2. Supplies to CAAB	58
8.2. CASE STUDY OF SUCCESS/FAILURE OF FOREIGN COMPANIES	60
8.2.1. A specific case history	60
<b>CHAPTER 9</b>	<b>63</b>
<b>APPLICABLE RULES, REGULATIONS AND PROVISIONS</b>	<b>63</b>
9.1. BANGLADESH TELEGRAPH AND TELEPHONE ORDINANCE	63
9.2. FOREIGN TAX-CREDIT	63
<b>CHAPTER 10</b>	<b>64</b>
<b>HOW CANADIAN COMPANIES CAN GET INVOLVED</b>	<b>64</b>
10.1. OPPORTUNITIES FOR CANADIAN COMPANIES	64
10.2. GENERAL STRATEGIES FOR SUCCESSFUL PARTICIPATION	65
10.2.1. Supply, Contract and Services	66
10.2.2. Joint Venture/Revenue Sharing Projects	66
10.3. NEED FOR A LOCAL AGENT	67
10.3.1. Selection of the local agent	68
10.3.2. Check list for procuring business	69
10.3.3. Guidelines in case of investment projects	70
10.4. NEED FOR BUSINESS PROMOTION	71
10.5. ROLE OF THE CANADIAN HIGH COMMISSION	71

<b>CHAPTER 11</b>	<b>73</b>
<b>CONCLUSIONS AND RECOMMENDATIONS</b>	<b>73</b>
11.1.CONCLUSIONS	73
11.2. RECOMMENDATIONS	73
<b>ANNEXURE-I</b>	<b>75</b>
<b>ANNEXURE II</b>	<b>83</b>
<b>ANNEXURE III</b>	<b>84</b>
<b>INDEX</b>	<b>86</b>







## CHAPTER 1 INTRODUCTION

This Report provides an overview of the telecommunication sector in Bangladesh, its growth potential and trends of financing. Specific projects in short term perspective are identified, which Canadian companies could consider as a means to enter into the market. Strategies are discussed, which are expected to help the intending companies to be successful in procuring business.

This Report covers telephone, radio, satellite and other telecommunication technologies for civilian and military use. Identified projects and potential demands for equipment and services of Bangladesh Telegraph and Telephone Board (BTTB) as well as other organizations which have their own communication networks are described in this Report. On the average about US \$ 20-30 Million in foreign exchange were spent in the past on equipment and services annually in this sector. BTTB has identified projects in this sector for implementation during the Fourth Five Year Plan (1990-1995) and has sought an allocation of US \$ 1,289 Million, including a foreign exchange component of US \$ 724 Million for that plan period. This means that on the average US \$ 140 Million in foreign exchange could be spent annually during the next five years for projects of BTTB alone. This amount may increase further due to planned implementation of telecommunication projects by other organizations.

Role of telecommunication in the process of development of any country can hardly be over emphasized. This is more relevant for a developing country like Bangladesh where development of this sector is still in a nascent state. Present level of availability and diversity in utilization of various types of telecommunication facilities in the country calls for a rapid growth of this sector. Bangladesh Telegraph and Telephone Board (BTTB), the Governmental organization, which has a monopoly in this sector, was provided with more than US \$ 200 Million in the last nine years by different foreign donor agencies for implementation of various projects. About half of this committed fund is yet to be utilized. Other than BTTB, a number of organizations like, the defense services, border security forces, internal security, civil aviation, utility services, riverine navigation system, etc. also procured different telecommunication equipment during the same period. The amount allocated or spent for these purposes remain unspecified, because these expenditures are usually made out of block allocations, which do not show separate expenditure/allocation for their in-house telecommunication facilities. Donor focus on this sector has been in general favorable, which is expected to be intensified further in future. This sector in Bangladesh offers attractive business opportunities for the relevant Canadian companies.

Bangladesh is a riverine country and many of the remote areas are almost inaccessible. A reliable telecommunication network is essential both for administrative purposes and also for efficient management of disasters from frequent natural calamities.

Historically the Government policy has been to suppress demands in all sectors, including the one under review owing to resource constraints. The absorptive capacity of the telecommunication sector, as the real demand potentials suggest, is quite high. Real demand potential of this sector consists of three distinct components as follows:

- a. Natural growth in demand in keeping with the overall economic growth;
- b. suppressed demand, and
- c. replacement of older technology by comparatively newer technologies ( many of the existing technologies of this sector became obsolete in the past decade and it is becoming increasingly difficult to ensure spares or services for the older technologies).

Demand potentials indicate that there is a significant market for various telecommunication equipment and services in Bangladesh. Until recently, the entire supply was a monopoly by the German suppliers and also partly by the U.S. suppliers ( especially for catering the needs of the defense services). Recently others, notably suppliers from Japan, have taken initiatives to break this monopoly. Their aggressive marketing techniques proved to be effective and a time could come when these Japanese suppliers might monopolize this market.

Canadian companies, in spite of their vast experience, expertise and capability, are yet to make any significant effort to break the monopoly. It may be mentioned that Canadians had installed the Satellite Earth Station at Betbunia, first of its kind in the country. There is no evidence of any initiative to exploit even that advantage. An aggressive marketing strategy coupled with genuine interest to get themselves involved in this sector could help Canadian companies procure significant business in future.

This Report consists of 11 Chapters including the present one.

Chapter 2 provides an overview of the telecommunication sector of Bangladesh, including various services being provided now.

Chapter 3 describes organization of various Government agencies involved in the telecommunication sector.

Chapter 4 briefly discusses the present status of infrastructure and facilities in the sector.

Chapter 5 describes the development strategy of the sector , its demand potentials and trend of financing for projects.

Chapter 6 identifies future projects in the sector.

Chapter 7 provides information on planning and implementation of projects and the procedure for selection of suppliers and contractors.

Chapter 8 provides a description of past participation of foreign companies in various projects of the sector, including case studies of successes and failures in procuring business.

Chapter 9 gives a brief description of Government rules and regulation as applicable to this sector.

Chapter 10 provides an analysis of the techniques required for successful participation in bids. This also discusses strategies to be considered by intending Canadian companies.

Chapter 11 lists conclusion and recommendation of the study.

The Report also contains the following Annexures

Annexure 1 -Alphabetical list of Telecom-Product (Product Index) as are being used in the Telecommunication Sector of Bangladesh.

Annexure 2 - Bibliography

Annexure 3 - List of Organizations contacted in connection with the study.

## **CHAPTER 2**

### **OVERVIEW OF TELECOMMUNICATION SECTOR IN BANGLADESH**

This Chapter gives an overview of telecommunication sector of Bangladesh. A brief historical account of development of the sector is provided. This Chapter also provides a description of relation among the local, regional and international organizations involved in the sector. Different types of control and regulatory services provided by the sector are also briefly discussed.

#### **2.1. PRESENT STATUS**

Almost the entire range of activities in the field of telecommunication in Bangladesh is carried out by the public sector. Private sector plays a marginal role and until recently its involvement was largely restricted as end users. The Governmental organization responsible for this sector, the Bangladesh Telegraph and Telephone Board (BTTB), regulates import and use of almost all types of telecommunication facilities in the country. Even certain equipment, imported by the end-users, are considered as properties of BTTB on lease to the particular user. BTTB is often criticized for its non satisfactory services. This is partly explained by the monopoly it enjoys and partly by resource constraints which is forcing it to over utilize its existing exchange capabilities.

There is a growing private sector involvement. A private entrepreneur has recently been permitted to operate a Cellular communication network, initially in the capital city. The Government contemplated involving the private sector in different telecommunication activities. There is still a possibility that certain types of activities will ultimately be passed on to the private sector in phases. Another private entrepreneur has also recently been permitted to assemble certain types of digital PABX equipment and other facilities, like telex machines, telefax and modem in collaboration with a Canadian manufacturer (MITEL).

The phenomenal changes in telecommunication technology worldwide has partially influenced development of this sector in Bangladesh. In many cases age-old technologies continue to co-exist with the latest state-of-art. However, some of the obsolete technologies are forced out simply because of maintenance problems and non-availability of spares. Thus the combination of potential demand and replacement of older equipment indicates ample opportunities for fast growth of this sector.

#### **2.2. HISTORY OF GROWTH OF TELECOMMUNICATION**

Telecommunication activities in this sub-continent started with the introduction of telegraph services in 1853 in British India by the Telegraph Branch of Indian Post & Telegraph Department (IP&TD). With the enactment of Indian Telegraph Act, 1885, erection, provision, operation and maintenance of telegraph service inter alia telecom services were vested unto the Indian Post & Telegraph Department. The first Telephone Exchange, a small magneto exchange,

was installed in the Government House, New Delhi in 1892. Great strides have since been made in the development of both techniques and services.

In 1947 Pakistan Post and Telegraph Department came into existence in line with the IP&TD. The then East Pakistan inherited a few Central Office type Manual Telephone Exchanges, Rural Auto Exchanges for local telephone communication, few land-line carrier systems for long-distance telephone, VFT systems and instruments for Telegraph services and one coastal station at Chittagong with HF wireless transmitters and receivers for ship-to-shore communication. All the apparatus and plant were of UK origin from companies such as GEC, STC and Marconi.

In the early fifties, Siemens from FRG proved better in local exchanges, land-line multi-channel carrier and VFT Systems and captured the Pakistan market. All the GEC exchanges and STC carrier and VFT systems were replaced. The first auto exchange was installed in Dhaka in 1954. Siemens consolidated their position further by establishing two Telephone factories - TIP at Haripur, (now in Pakistan) and Telephone Industries Corporation (TIC) at Tongi (just outside Dhaka), now known as the Telephone Shilpa Shangstha Limited, and one cable factory at Khulna. However, HF Wireless Communication, vital for overseas and Dhaka - Karachi communication, continued to be dominated by Marconi and AWA from Australia. Siemens also came up with a multi-channel VHF terrestrial link for the then East Pakistan, first of its kind in this sub-continent, and installed it at Khulna - Barisal and Khulna - Mongla in 1956. But they could not sustain their ground in this field. RCA beat them with 72-channel VHF links, installed all over the then East Pakistan.

In 1962, the Pakistan P&T Department was bifurcated and a new Government Department known as Pakistan Telegraph and Telephone Department (PT&TD) was established for development, operation and maintenance of telecom services. Bangladesh inherited this Department in 1971 along with telecom systems of every kind - auto exchanges, manual exchanges, PABXs, PBXs, carrier and VFT systems, VHF systems, microwave systems, HF transmitters and receivers, etc. The sector was reorganized into Bangladesh Telegraph and Telephone Department. Siemens continued monopoly in exchange equipment. In other disciplines, manufacturers of every sort had entered the field. Later on, telecommunication sector was again reorganized by forming the Bangladesh Telegraph and Telephone Board (BTTB), which inherited assets and liabilities of all past organizations like, IPT&D and PT&T Department. BTTB is administered by the Ministry of Post and Telecommunication.

### **2.3. NATIONAL, REGIONAL AND INTERNATIONAL LINKAGES**

Telecommunication today is playing a vital role in fostering international understanding and goodwill. In view of the ever increasing development of technology world wide, it has become a necessity to establish appropriate forums on various aspects of development, control, regulation and co-ordination in national, regional and international levels. Bangladesh is Members of the relevant international and regional forums and discharges its obligations through dif-

ferent local agencies of the public sector. Relation with such forums are briefly discussed in the following paragraphs.

### **2.3.1. Relation with international organizations**

In the field of telecommunication Bangladesh has established relation with different international organizations like, the Asian Broadcasting Union, the European Broadcasting Union, the International Telecommunication Union and the Interpol. Related obligations under the respective Charters and Consultative Committees of these organizations are discharged through various Ministries and agencies of the Government. Telecommunication services and facilities of the BTTB are usually used for maintaining regular and emergency contacts with these organizations.

### **2.3.2. Relation with regional organizations**

Bangladesh is a Member of the South Asian Association for Regional Co-operation (SAARC). Telecommunication is identified as an important area of regional co-operation. Various meetings at expert level of the Member States, Workshops and discussions are taking place for identifying a common program for these countries under the overall charter of the SAARC. It is expected that an action program will soon be adapted by the SAARC Secretariat and funding will be provided by individual countries.

### **2.3.3. Local organizations**

BTTB is responsible for overall development and control of telecommunication sector in the country. However, many organization of the country are involved in this sector, some of which even participate in implementation of various telecommunication projects. Relationship among such organizations are complex as it involves various Ministries. Some of these organizations are listed below:

#### **a. Ministry of Information and Broadcasting**

Key organizations in this Ministry are the National Broadcasting Authority(NBA), Bangladesh Television, Radio Bangladesh, various news agencies and other mass media. Facilities and services of BTTB are utilized by these organizations.

#### **b. Ministry of Home Affairs**

Key organizations in this Ministry are Bangladesh police, Bangladesh Rifles and Special Branch of Police. Most of these organizations use BTTB facilities, especially for telephones. These organizations also possess certain types of long distance telecommunication facilities of their own.

#### **c. Ministry of Defense**

Key organizations of this Ministry include, Army, Navy, Air Force and the Directorate General of Forces Intelligence. These organizations utilize a combination of in-house and BTTB telecommunication facilities.

#### **d. President's Secretariate**

A few departments and organizations, which utilize telecommunication facilities of significant extent, belong to the President's Secretariate. This includes, among others National security Intelligence (NSI), special agencies, special political agencies, President's Security Force (PSF), etc. In addition to their role as users of telecommunication facilities, these organizations also participate in control and regulation of various activities of the sector.

#### **e. Others**

Local organization like, Bangladesh Railway, Civil Aviation Authority of Bangladesh (CAAB), Meteorological Department, Merchant Navy, Riverine Transportation services, various private sector enterprises and Non Government Organizations (NGO), like the Red Crescent Society and different voluntary agencies are also involved in the sector as users of various communication equipment.

#### **2.4. Regulatory and Control activities and services**

The following activities and services fall under the purview of the telecommunication sector of Bangladesh. Some of these Services are rendered as a part of international and regional obligations :

Radio Monitoring

Frequency Measurement

Radio detection

Field Strength Measurement

Radio Interference Measurements

Location and Direction Finding of unauthorized Transmitters

Aeronautical Services

Navigational Services

Broadcasting Services

Fixed Services

Land Mobile Services

Meteorological services

Radio Determination Services

Radio Location Services, etc.

A schematic diagram showing working arrangement of various organizations mentioned earlier can be seen in Figure 2.1.

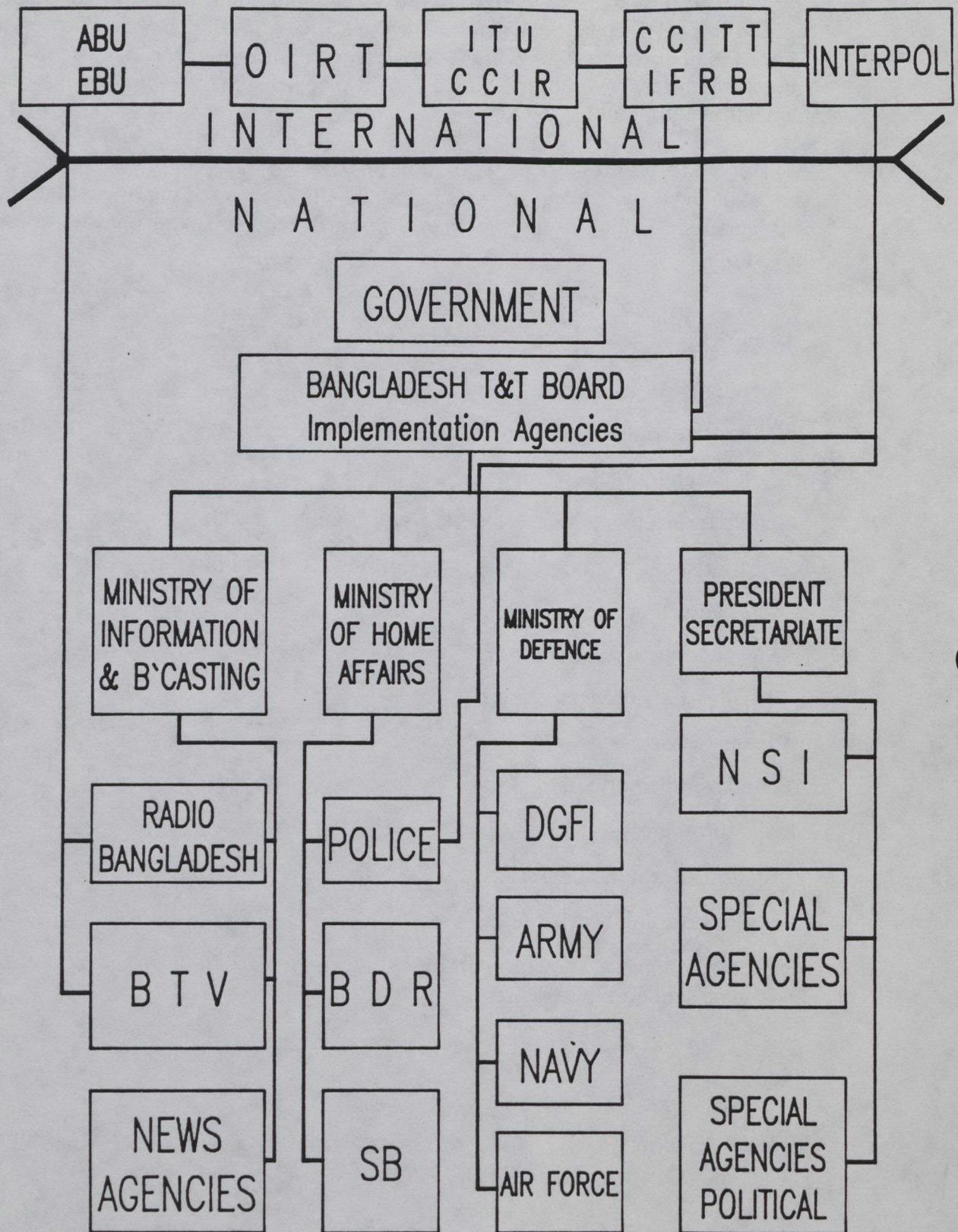


FIG. 2.1 WORKING ARRANGEMENT OF ORGANISATION

## **CHAPTER 3**

### **GOVERNMENT STRUCTURE AND ORGANIZATIONS RESPONSIBLE FOR THE SECTOR**

This Chapter gives an overview of the different Government agencies involved in the telecommunication sector of Bangladesh. Organograms of the key agencies are provided. This Chapter provides a summary of the potential customers for various telecommunication equipment.

#### **3.1. GOVERNMENT STRUCTURE**

The main stream of the telecommunication sector of Bangladesh is administered by the Ministry of Post and Telecommunication. Bangladesh Telegraph and Telephone Board (BTTB) is the focal point in the sector, which is responsible for planning, implementation, operation and maintenance of various telecommunication services and facilities. Other Ministries, Government agencies, NGO's and the private sector are involved in the sector, mainly as users of telecommunication services.

Key agencies of Bangladesh, which are engaged in different activities of telecommunication in Bangladesh, are as follows:

1. Defense Services
2. Law Enforcing Agencies
3. Bangladesh Telegraph and Telephone Board (BTTB)
4. Civil Aviation Authority of Bangladesh (CAAB)
5. Power & Water Development Authorities.
6. Water Transport and Shipping Authority.
7. Ministry of Information & Broadcasting.
8. National Broadcasting Authority.
9. Meteorological & Plant Protection Department.
10. Bangladesh Railway.

Of these agencies, the Bangladesh Telegraph and Telephone Board provides various telecommunication services to the nation as a whole, on public utility services-customer/subscriber basis. All other agencies operate their telecom installations for their own use only. In this context, all the agencies are, in turn, subscriber of BTTB for some of the comprehensive services. Agencies in the private sector, such as, Merchant Navy, News Agencies etc. and NGO's are either subscribers of BTTB or operate their installations under license from BTTB. Organizational structures and other relevant information about such agencies are discussed in the following paragraphs.

## **3.2 DESCRIPTION OF AGENCIES INVOLVED IN TELECOMMUNICATION ACTIVITIES OF BANGLADESH**

### **3.2.1. The Bangladesh Telegraph And Telephone Board (BTTB)**

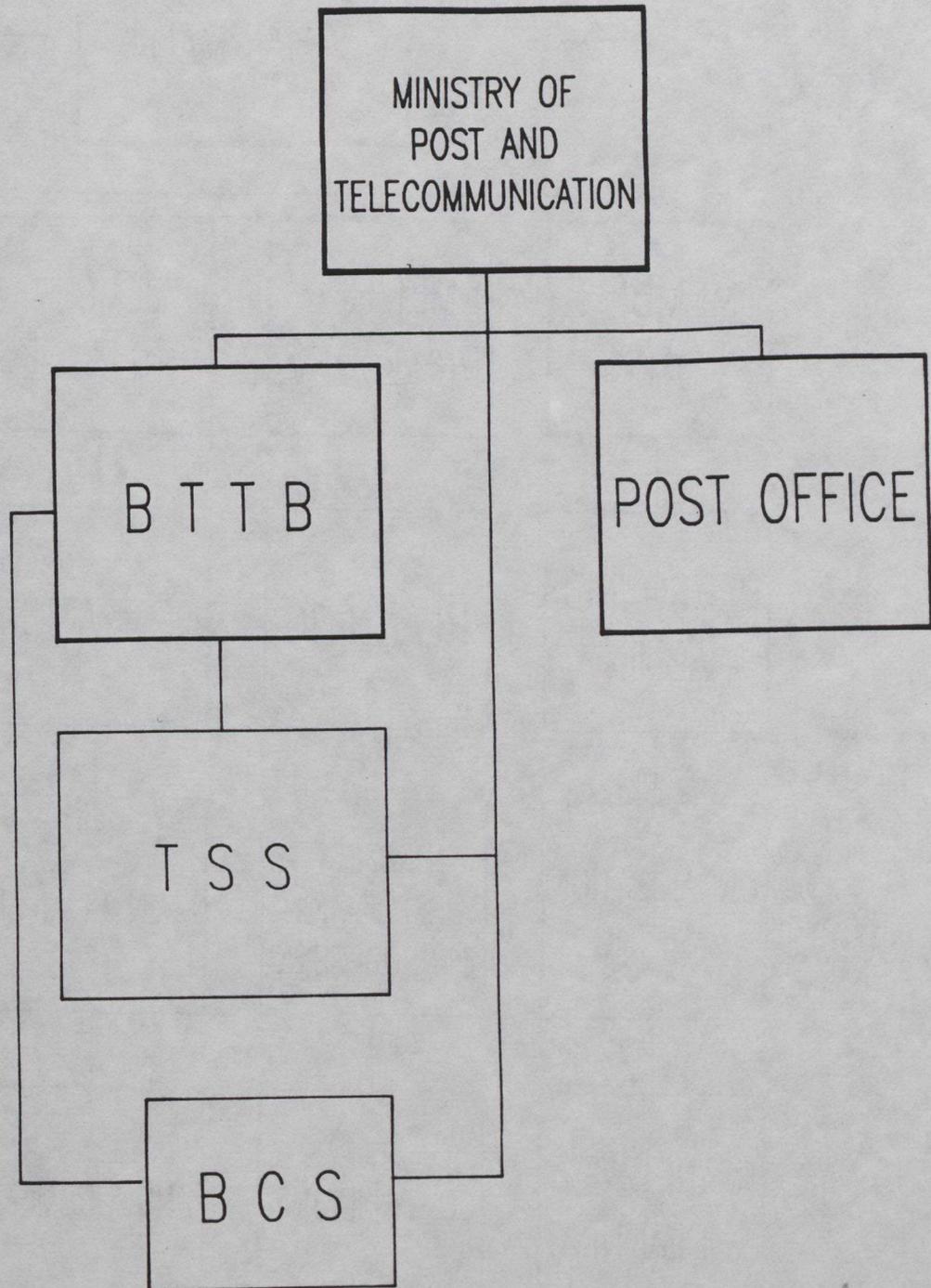
The World Bank, from 1969, had been pursuing the erstwhile Pakistan Telegraph and Telephone Department to reorganize the Department into an autonomous body, so as to provide the services on a commercial basis and achieve autarky in administration and finance. BTTB was converted into a Body Corporate in 1975, but, because of difficulties and complexities of Governmental financial and administrative regulations, the performance of this organization did not improve. Consequently, the present Bangladesh Telegraph and Telephone Board (BTTB) was constituted in April, 1979. Ownership and management of Telecom services is vested in BTTB. The Government through the Ministry of Posts and Telecommunications, appoints the Chairman, four full-time Members and three part-time Members and the Board functions as a Government organization. The set-up of the Ministry of Posts and Telecommunications and BTTB along with the two manufacturing installations, namely the Telephone Shilpa Sangstha Ltd. (TSS), previously TIC, and the Bangladesh Cable Shilpa Ltd. (BCS), is shown in **Figure 3.1**.

The Head Office of the BTTB is situated at Telejogajog Bhaban, 36/1 Mymensingh Road, Dhaka. The Board is divided into 4 (four) wings - Administration, Finance, Planning & Development and the Maintenance & Operation. Each wing is headed by a Member. The set-up of the BTTB is shown in **Figure 3.2**.

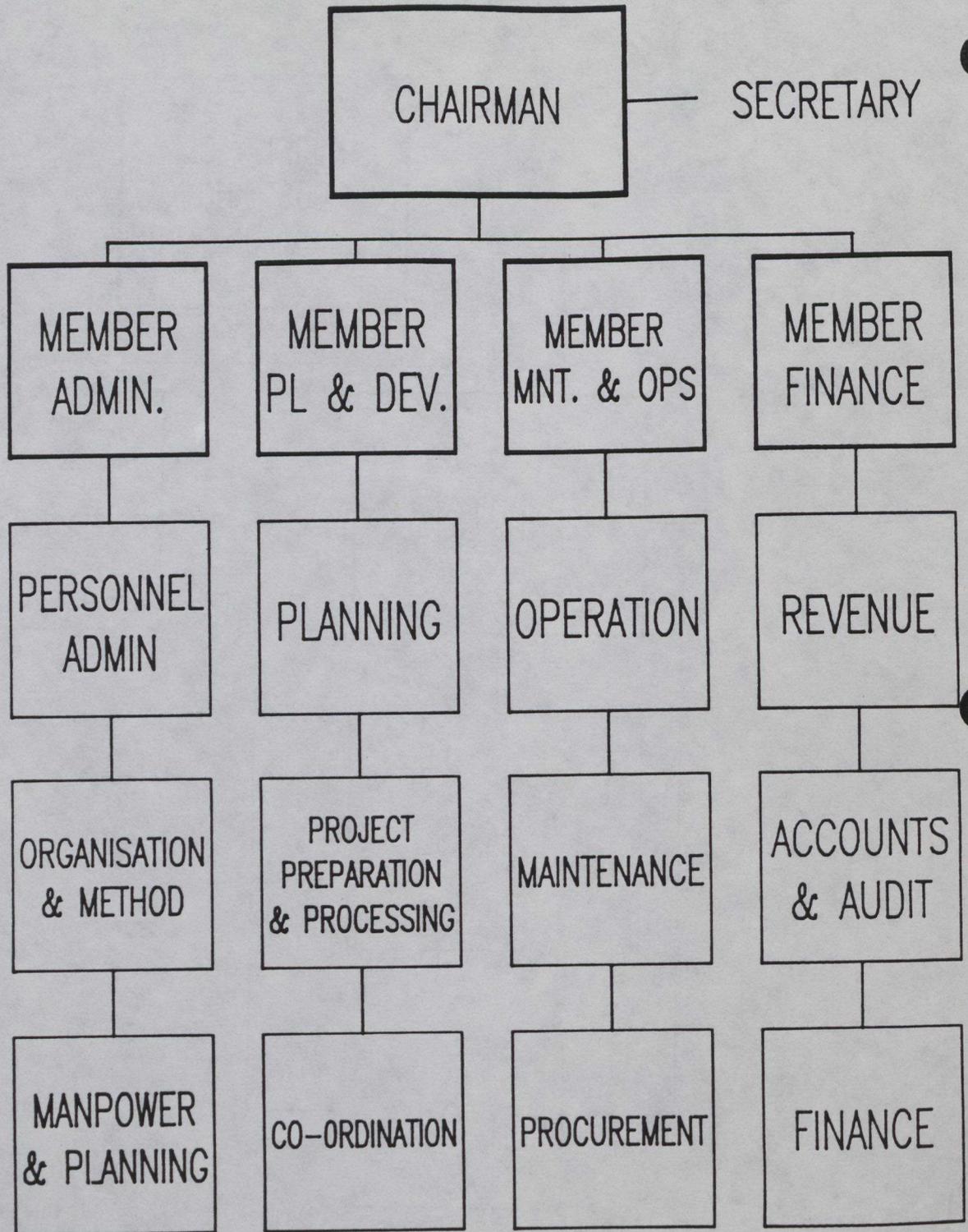
Canadian enterprises which are serious in participation in BTTB contracts, should meet with the individuals in the Planning and Development (P&D) wing and Procurement Division of the Maintenance & Operation (M&O) wing.

Keeping in line with the economic policies of the government, the P&D conceives various projects, makes feasibility studies and surveys, if necessary, on the basis of which the economic and financial analysis is made. The Board evaluates the project and, when it is found justifiable, the Planning and Development wing of BTTB prepares the Project Proforma in prescribed form of the Planning Commission. This is forwarded for approval by the appropriate authority through the Ministry of Posts and Telecommunication.

Approved projects are included in the government's Annual Development Program of the relevant financial year (July to June every year). The Planning and Development wing of BTTB undertakes the task of implementation of the project through the respective project division. Detailed specifications are prepared by the concerned project division, and actual procurement is done by the Procurement Division. Physical works, construction works, installation of equipment and machineries are performed under the direct supervision of the relevant Project Director. Installation, testing and commissioning of systems are usually done under turn-key contracts with the suppliers. In case of semi-turn-key contracts, all these works are performed by the BTTB personnel and the manufacturer/supplier provides the supervisory services for



**FIG. 3.1 ORGANISATION CHART OF THE MINISTRY OF POST AND TELECOMMUNICATIONS**



**FIG. 3.2 ORGANISATION CHART OF BTTB**

installation. Various supplies and services for the sector are procured on the basis of funds allocated by the Government for the particular fiscal year ( July to June). Usually the budget allocated for the year is released in four equal quarterly installment. Sometimes the last installments is readjusted, depending on the allocation revised by the Government in the last quarter of the fiscal year. Performance of the sector, utilizations of funds already released, yearly program, special circumstances (like, natural calamities and the need to bring about a change in priority of the Sector), etc., could change the fund to be released in the last quarter of the sector. The Planning Commission allocates fund as a combination of internal resources (mostly in local currency ) and external financing. The allocation is again divided into two Heads- the Revenue budget for O&M cost of completed projects and other revenue expenditure and the Development Head for implementation of projects. Self financing, if any, is also utilized for implementation of development projects.

The Project Control Cell in the P&D wing of BTTB monitors the progress of every project of the Board, reviews progress of implementation and maintains liaison with the Government.

The Co-ordination Cell maintains liaison with the Project Directors, Procurement Division and the Project Control Cell.

A completed project is handed over to the Maintenance and Operation (M&O) wing of the Board for offering services and maintaining the installation.

The whole country is divided into four Telecommunication Regions in order to facilitate operation and maintenance of the related facilities and to enhance the quality of local telephone and telegraph services to the customers. In addition there is a separate division for long-distance communication and another division for overseas and Telex services. Each Telecommunication Region is headed by a General Manager. These Regions are:

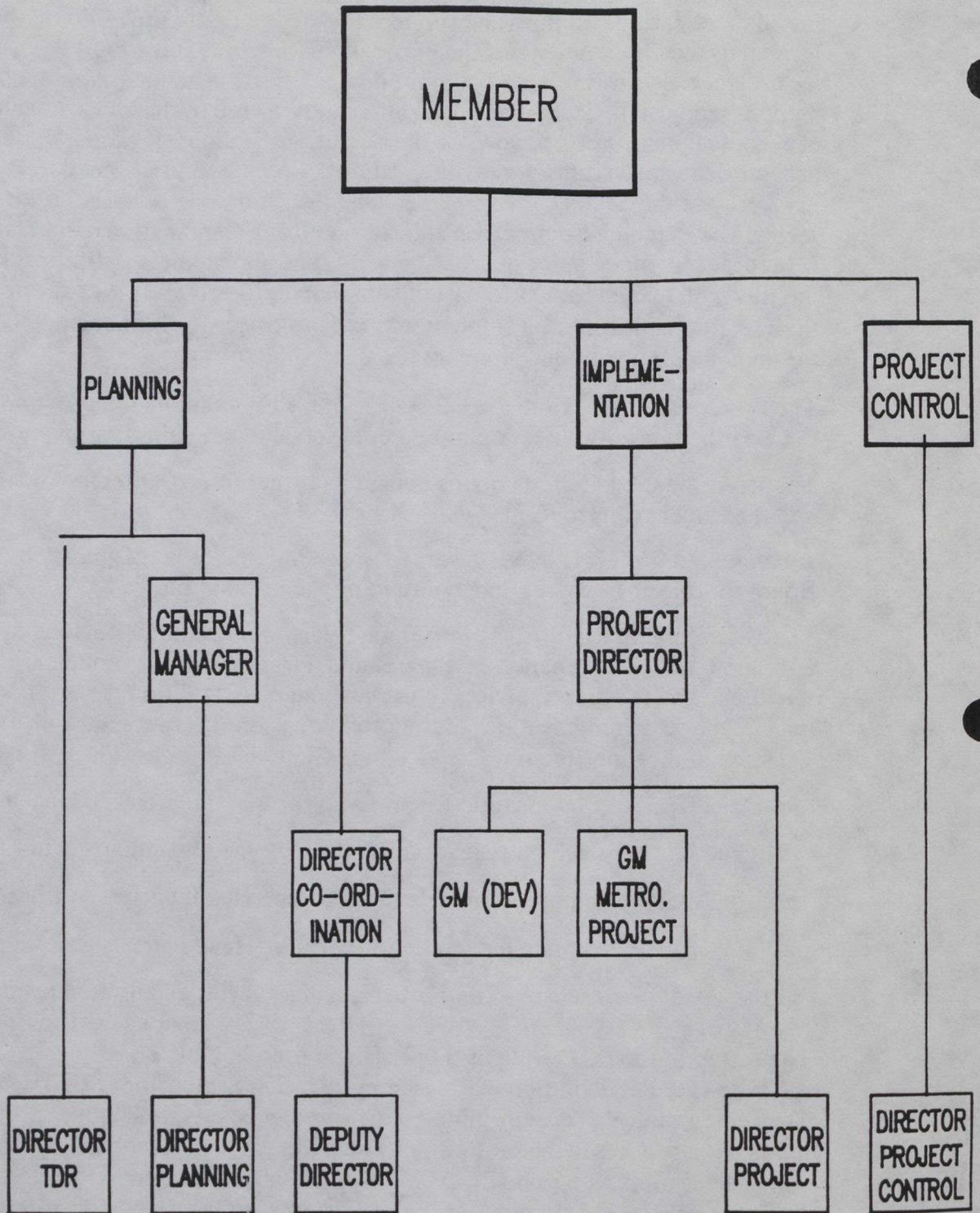
1. Dhaka Telecommunication Region with the Headquarters in Dhaka.
2. Chittagong Telecommunication Region with the Headquarters in Chittagong.
3. Khulna Telecommunication Region with the Headquarters in Khulna.
4. Rajshahi telecommunication region with the Headquarters at Rangpur.

All the telephone exchanges and other ancillary facilities are administered by the General Managers of the respective regions.

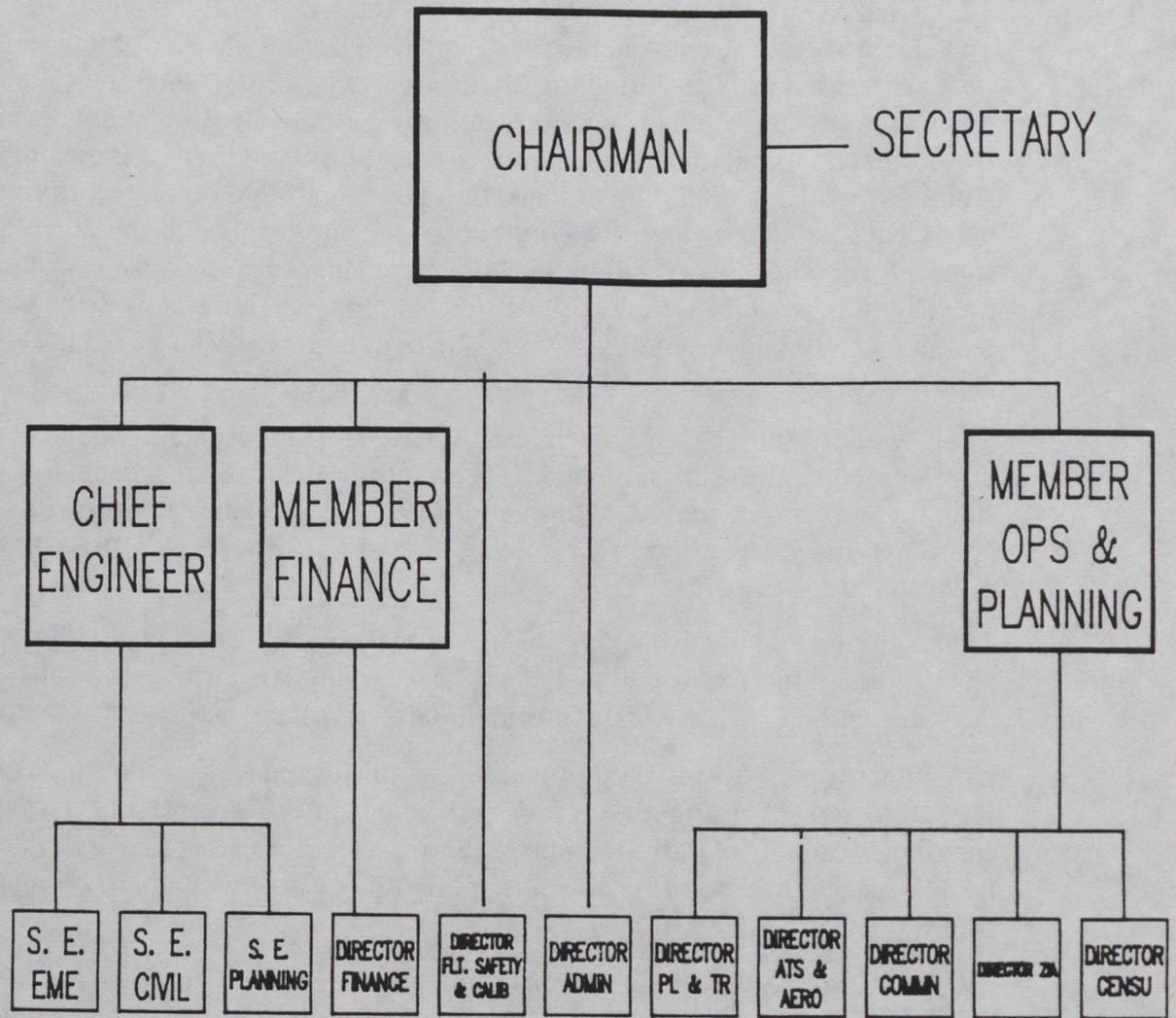
The set-up of the P&D wing of BTTB can be seen in **Figure 3.3**.

### **3.2.2 Private Participation in Telecommunication Sector under BTTB**

The government has recently initiated to promote the private sector to provide better telecommunication services to the subscribers. The government has ventured by floating a private company having minimum share of 40 % and pursuing investments from abroad. So far two companies came forward to invest in this sector; one is Gulf Bangladesh Joint Venture Funding Company who in collaboration with Mittel(Canada) has taken up 39 Upzilla to install telephone exchanges and connect them with BTTB network and second is Bangladesh Telecom Private Limited(BTPL) who are allowed to install exchanges for cellular telephone



**FIG. 3.3 ORGANISATION CHART OF THE P & D WING OF B T T B.**



**FIG. 3.4 ORGANISATION CHART OF CAAB.**

facilities. It is reported that BTPL has so far received 30,000 applications from subscribers. By the end of february'90, the capacity of the first telephone exchange will be determined. Motorola, USA will supply hardware and expertise services.

### **3.2.3. Civil Aviation Authority of Bangladesh (CAAB)**

The Department of Civil Aviation was neglected during the Pakistan period and its facilities were devastated in 1971 during the liberation war period. In 1982 the Civil Aviation Department was renamed as Civil Aviation Authority of Bangladesh and amalgamated the Airport Development Agency. In 1985, the Civil Aviation Authority of Bangladesh was given full Autonomy and as a result the organization now stands as a separate corporate body, headed by a Chairman and a Board of Directors at the top level. In order to run the organization smoothly the whole organization is decentralized into various Divisions, namely, Administration Division, Air Traffic Services Division, Communication Engineering Division and Works Division etc. Organogram of CAAB is shown in **Figure 3.4**. This Corporate Body is centrally controlled by Ministry of Civil Aviation and Tourism.

Civil Aviation Authority of Bangladesh (CAAB) is responsible in organization, management, development and construction of Airports/Aerodromes in Bangladesh. CAAB is also responsible for formulation and regulation of different bilateral agreements with other countries in coordination with Ministry of Civil Aviation and Tourism. CAAB also controls crew licenses in the country.

The main function of Civil Aviation Authority is to establish safety to all Airline Operators at all Airports in this country. Bangladesh has got eight Airports/Aerodromes out of which two are International, namely, ZIA International Airport and Chittagong International Airport.

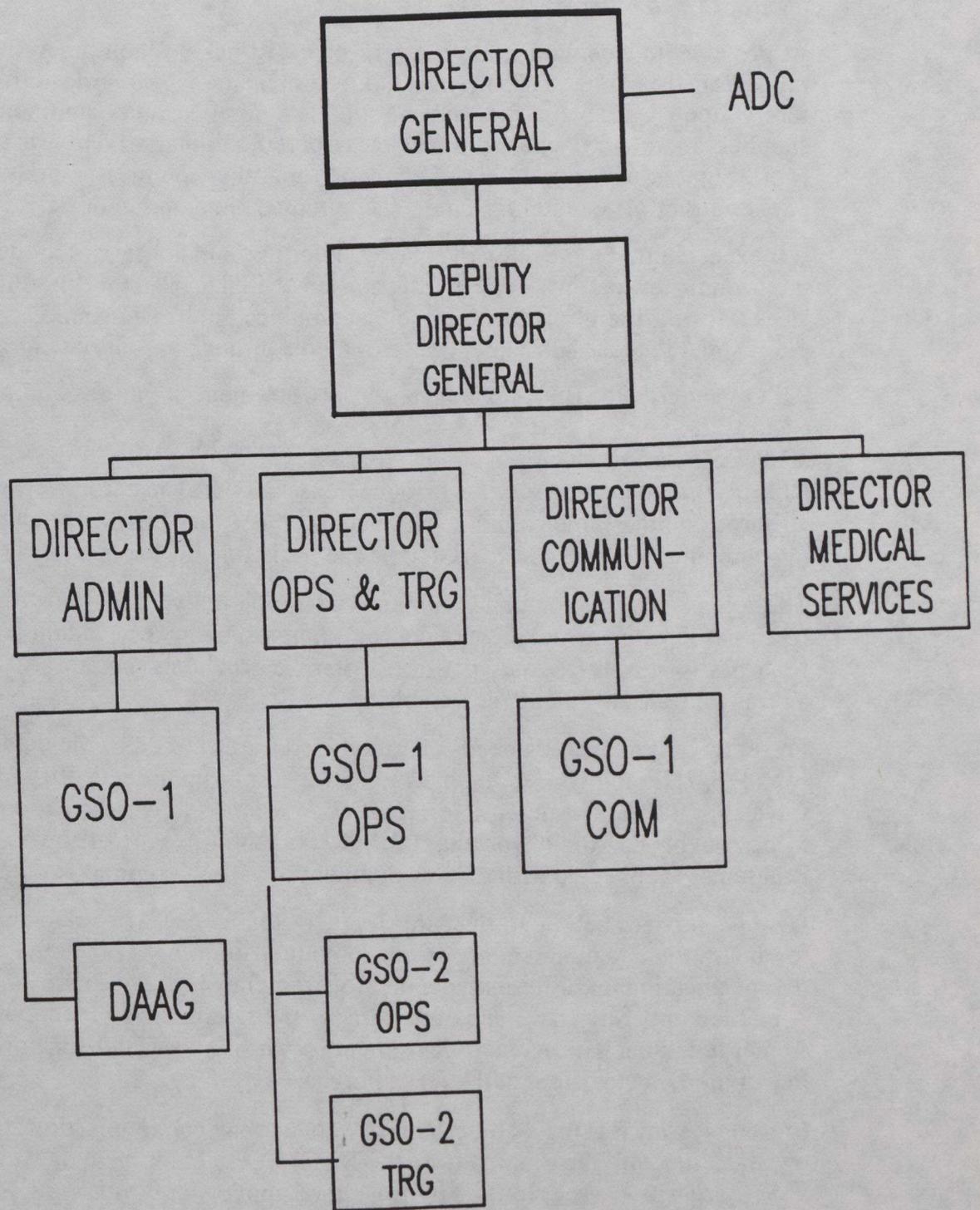
ZIA International Airport is equipped with sophisticated Navigational aids like Doppler VOR, ILS, NDB, RADAR, and various HF/VHF Transmitter/Receivers for the purpose of Homing, Instrument landing, Air traffic Control Service, etc. Chittagong International Airport, the next busy Airport of the country is also equipped with reasonably standard Navigation/communication system.

Like any other public sector organization, CAAB receives annual budget allocation from the Government as a combination of Revenue Head for operation and maintenance of all on-going projects and a Development Head for implementation of approved development projects. Budget consists of funds in local currency, while most of the foreign exchange are provided from foreign sources.

### **3.2.4. Bangladesh Rifles (BDR)**

East Bengal Rifles was formed by the then Pakistan Government based on the model of paramilitary forces (Frontier Rangers) of the North Western part of Pakistan. Following the war of liberation, this force was renamed as the Bangladesh Rifles, popularly known as BDR. This organization, under the Ministry of Home Affairs, is responsible for border security and anti-smuggling activities along the border of the country.

In the beginning, BDR did not have communication network of its own. A fresh program had to be initiated to build up the much needed communication facilities. BDR started with a High Frequency network with equipment procured from Motorola Corporation of U.S.A. Its



**FIG. 3.5 ORGANISATION CHART OF BDR.**

present communication network, comprising of VHF and HF links, is capable of covering a substantial part of the country. Initially a few telephone exchanges were also procured from India, most of which are still operative. BDR has now about 400 radio sets with capacity ranging from 1,5 to 6 Watts.

At present the communication network of BDR includes equipment with frequency in the range from 0.5 MHz to 1000 MHz. It has its own maintenance workshop. In fact, US manufacturers supply a sizable part of the overall telecommunication equipment of BDR. Japanese suppliers are now trying to capture at least a part of this market. This was started with the supply of a number of walkie-talkies. Suppliers from other countries are not known to have made any serious effort to enter into the telecommunication market of BDR.

It is expected that the BDR will have to undertake a major task of modernizing the telecommunication network in 1992. This offers a substantial market for different equipment and services. Most of the information on telecommunication of BDR are classified. Potential suppliers should pursue subsequent developments through appropriate local contact points.

An Organogram of BDR, as relevant to procurement of various equipment can be seen in **Figure 3.5.**

### **3.2.5. Defense Services**

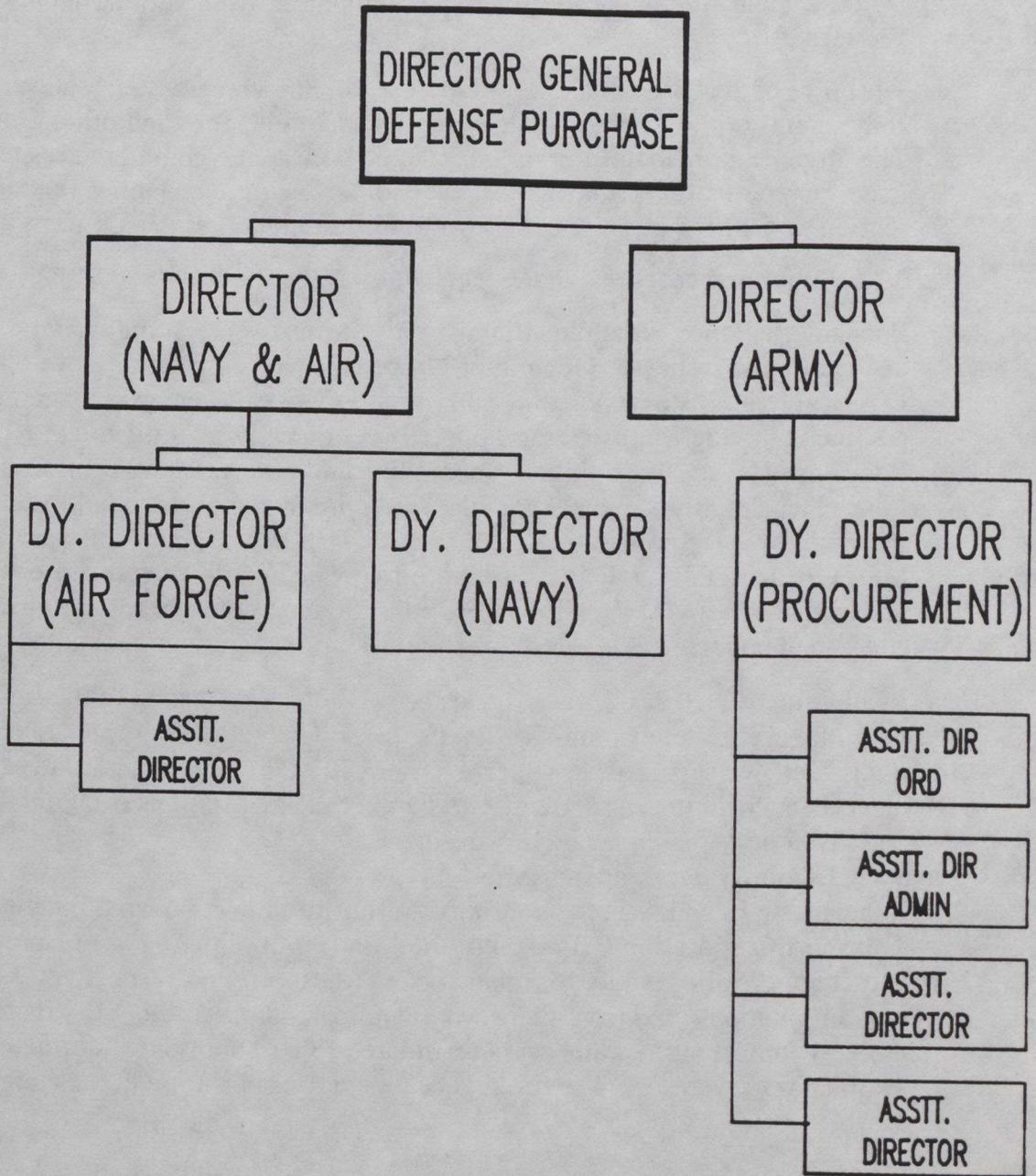
Role of communication services in the Defense Services can hardly be over emphasized. Land, airborne and maritime communication and the network linking the three distinct categories of communication are considered to be the backbone for the defense of the country.

The defense services comprise of about 100,000 voluntary troops and officers and about 30,000 reserve troops. There are eight major cantonments, four Naval and three Air Force bases. The Navy has 14 vessels (frigates, patrol crafts and patrol boats) and the Air Force has 30 combat aircraft, 4 transport planes and 6 helicopters.

Presently communication needs of armed forces are catered by the defense services themselves ( HF, VHF and UHF equipment) and for rest of their needs they have to depend on the services of BTTB. The defense services have a sizable share in the national budget ( estimated to be roughly 35 to 40% or about US \$ 700 Million). Part of their Annual Development Programs is connected with the development of various communication facilities.

Defense services belong to the Ministry of Defense. The Army Signals Corps is responsible for operation and maintenance of telecommunication services of the Army. They also make the specification for different types of procurement and are in charge of annual planning. The Air Force and Navy have separate units in their respective Headquarters for undertaking similar functions. The actual procurement for Army, Navy and Air Force is done by the Office of the Director General Defense Purchase (DGDP).

Presently Army is using VHF, HF in base and mobile communication stations. They use their own facilities with the support from the BTTB. VHF equipment of Motorola Corporation of U.S.A. are widely used. In the HF range the suppliers are Motorola, Radifon and Marconi-UK. The Navy uses telecommunication equipment of British origin to communicate with its 14 ships. As for the Air Force, they started with Russian equipment. Presently these are being



**FIG. 3.6 ORGANISATION CHART OF DGDP.**

replaced by suppliers from various countries in the Western Europe and U.S.A. to communicate with 30 combat aircraft, 4 transport planes and 6 helicopters.

Defense Field Intelligence units utilize equipment from various suppliers in America and Western Europe.

The office of the Director General, Defense Purchase receive yearly allocations from different components of the Army, including the Forces Intelligence and other Government agencies. This Organization floats International Tenders, evaluates commercial aspects of the offers and issues purchase orders. Like almost every other sector of economy, the military pays great attention to financial packages. A pictorial representation of this Office is given in **Figure 3.6**.

### **3.2.6. Police and other internal Security forces**

Bangladesh Police is administrated by the Ministry of Home Affairs. Police Directorate headed by the Inspector General of Police is responsible for all development projects. The Directorate has its own planning and procurement cells which manage the entire police forces, including the Metropolitan Police forces of Dhaka, Chittagong, Khulna and Rajshahi. Police use HF and VHF links for communication between different Police Stations and the Police Head quarters in Dhaka. Police has more than 600 Hand held Walkie-Talkie sets ( 1.5 Wt and 5 Wt) comprising of 300 from SHINWA, Japan and rest from YAESU and MOTOROLA. For VHF link, base stations police uses 25 Watt repeater stations of PYE, UK and sets of PYE, UK for HF base stations. So far as the telecommunication equipment are concerned police takes advice from the BTTB on selection of technology.

In addition, Bangladesh Ansar (local security force) belonging to the same Ministry is also a potential user of telecommunication facilities. The network of this organization which is administered by a separate Directorate ( The Ansar Directorate ), is quite extensive and is growing, especially in the rural areas. The number of such stations is about 500. The Directorate takes care of its planning and procurement .

### **3.2.7. Inland Water Transportation**

Bangladesh Inland Water Transport Authority (BIWTA) and Bangladesh Inland Water Transport Corporation (BIWTC) of the Ministry of Shipping are responsible for regulation and commercial operation of inland water transportation respectively. These organizations are autonomous and have their own planning and procurement units. These organizations are very important as water ways (estimated to be about 8433 kilometers of perennial and seasonal waterways ) is used for bulk of inland transportation in the country.

### **3.2.8. Bangladesh Railway**

Bangladesh Railways is another organization which procure telecommunication equipment from time to time.

The railway network, consisting of 1913 route Km rail road and 344 stations in the Meter Gauge lines in the eastern region and 979 route Km rail road and 161 stations in the Broad Gauge lines in the western region of the country, operate inter-city passenger services and also trains for carrying goods among different locations. Two regions of the country are connected by ferry boats, which are useful only for passenger movement or for small consignments. These regional networks provide connections of locations in the two zones with the important sea ports in Chittagong and Mongla.

Bangladesh Railway is administered by the Railway Division of the Ministry of Communication. All operations are entrusted with the Railway Board, which is an autonomous Government organization. Head quarter of the Railway Board is located in the port city of Chittagong. Bangladesh Railway was the pioneer in using fibre optics technology in the country. A dedicated communication network with fibre optics was installed for signaling and control of traffic movement in a particular section of its network. This was implemented with the financial/technical assistance of the Dutch government. It is expected that the Railway will undertake a major project extending similar network throughout the country.

### **3.2.9. National Broadcasting Authority (NBA)**

The National Broadcasting Authority was formed in 1983 by merging two organizations, namely the Bangladesh Radio and Bangladesh Television.

Bangladesh Television

Bangladesh Television (BTV) came into existence in 1964 as a pilot station. Initially equipment was supplied by NEC, Japan. This was the second TV station of the sub-continent and its engineers were trained in Japan. Presently BTV has its main station in Dhaka and relay stations at Chittagong, Khulna, Natore and Sylhet.

In 1980 BTV switched over to color broadcasting. Equipment for this were supplied by M/S Robert Bosch of West Germany. These include:

- FDL 60    CCD Telecines Chains
- BCN 40 & 50    Studio Recorders
- BCN 41 & 51    Recorders
- BCN 20    Portable Recorders
- KCA 100    EFU/EFP Cameras
- KCA 90    EFU/EFP Cameras
- KCP 60    Studio Cameras
- KCK 40    Studio Cameras

Audio Mixtures

Video Mixtures

Caption Scanners

VCR's U Matic High Band SONY

VCR's U Matic High Band JVC

Monitors NEC/Blankpunkt

Editing Console

35/16 mm Kinoton film projectors

The studios have acoustic materials from G + H Montage, West Germany.

Transmitters were supplied by NEC, each having 10 Kw x 2 in Dhaka, 5 Kw each in Chittagong and Natore, 2 Kw in Sylhet.

BTV plans to set up new relay stations at Comilla, Rajshahi and Sathkhira.

## **CHAPTER 4**

### **EXISTING INFRASTRUCTURE AND FACILITIES**

This Chapter provides a brief description of various telecommunication appliances and systems in use in the country. This information on existing infrastructural facilities will be helpful in forming an idea about the ancillary facilities and future prospects for improvement, modernization and replacement of various equipment.

#### **4.1. EXISTING SERVICES**

Telecommunication services in Bangladesh are classified in four broad headings:

1. Telephone
2. Telex
3. Telegraph
4. Others

##### **4.1.1. Telephone**

Telephone system is further sub-divided into the following types:

1. Local Telephone(area basis)
2. Long-distance Telephone through Toll exchanges
3. Long-distance Telephone through and auto- dialing(inter city)
4. Overseas Telephone through Toll exchanges and auto- dialing(ISD nondigital)
5. PBX and PABX
6. Public Call Offices in remote areas and Coin-box telephones in cities and other urban locations
7. Long Distance Exchange Telephones(ISD Digital).

##### **4.1.2. Telex services**

Telex services are offered in three categories:

1. Local
2. Long-distance
3. Overseas

All these three categories of services are provided through auto- dialing for the subscribers including Toll service. There is also a PCO Telex Service for overseas. This PCO offers services both in receiving and sending of Telex messages.

#### **4.1.3. Telegraph Services**

Telegraph services are provided through lines by Morse and Teleprinters through VFT systems.

#### **4.1.4. Other services**

BTTB also provides other services like, TV Relay Service, News Relay service, Ship-shore Communication Service, Facsimile Service, Data Relay Service, etc.

### **4.2. EXISTING TELEPHONE NETWORKS**

#### **4.2.1. Local network**

EMD and F1 type auto exchanges, CB manual exchanges and Magneto exchanges provide the local telephone facilities. Presently most of the urban areas are served by EMD and F1 type auto exchanges, while rural and other remote areas are served by CB Manual and Magneto exchanges. To keep pace with the technological advancements, a program is being implemented to replace all such exchanges by digital exchanges in phases. As a part of this a digital exchange of capacity of 26,000 lines is presently under installation in Dhaka Metropolitan area. Some of the inter exchange connections are also being replaced with optical fibre under this project. With the introduction of digital technology, all other connections will have to be replaced by optical fibre. It may be mentioned that all auto and CB exchanges in use in the country are produced in the Telephone Shilpa Shangstha at Tongi.

All cable networks necessary for providing telephone connections to the subscribers are produced locally by the Bangladesh Cable Factory in Khulna. The factory also produces other house wiring cables, drop wires and accessories necessary for such telephone connections.

The Telephone Shilpa Shangstha produces conventional dialing type telephone sets. Recently the factory has started producing digital sets in limited quantities.

#### **4.2.2. Long-distance network**

Long-distance telephone facilities are provided in five distinct ways as follows:

##### **a. Manual Toll Exchanges**

Manual Toll Exchange Boards are produced locally at the Tongi factory and provide the toll service in conjunction with both auto and manual exchanges. This network, consisting of over 800 boards, covers the entire country. This network utilizes traffic channels out of the long-distance network comprising of high capacity microwave, UHF and physical carrier systems. However, the facilities are so inadequate that almost 60% of booked trunk-calls do not mature.

##### **b. Nation-wide Dialing System**

This facility is provided with distinct auto exchanges, known as Trunk Auto exchanges (TAX), in conjunction with existing local auto exchanges. There are presently four District exchanges and 27 Sub-District exchanges to inter-connect 63 local exchanges. A total of 53 exchanges have so far been inter-connected and a subscriber of any of these exchanges can establish direct contacts with any other subscriber within this network. The network is served by analog microwave, UHF and physical multiplexing systems. However, due to low-speed computer coordination, rate of maturity of NWD calls is very low.

### c. Overseas Toll Service

The Central Overseas Exchange in Dhaka provides direct telephone contacts with subscribers in 21 countries, and connection through international transit facilities with other countries of the world. Other countries will be gradually brought under direct contact facilities subject to conclusion of bilateral/multi-lateral agreements. Subscribers of all the 53 exchanges of the NWD Network can book their calls with the Central Overseas Exchange. The network is served by two satellite earth stations- one at Betbunia ('A' type) using Canadian equipment and the other at Talibabad ('B' type). The Earth Stations are linked with the national networks through high capacity microwave system.

### d. International Subscriber Dialing (ISD) Service

A limited number of subscribers of Dhaka, Chittagong, Sylhet and Khulna are provided with direct access to the ISD Exchange at Dhaka. Such subscribers can dial and establish calls directly with overseas subscribers of any member country of INTELSAT. As in the case of Overseas Toll service, this exchange is linked with the Satellite Earth Stations.

### e. Telephone services in rural areas

Telephone services in rural areas are inadequate. They are connected to the national telecommunication network through exchanges located in some of the rural Upazilla headquarters. In some rural locations long distance Public Call Offices are provided. However, considering the distance that customers have to traverse for utilizing such facilities, often makes the use such facilities impossible.

## 4.3. TELEX SERVICES

There are three telex exchanges, one each at Dhaka, Chittagong and Khulna with a total capacity of 1100 connections. The Dhaka Exchange is of the digital type, while the other two are of conventional type. These Exchanges utilize the national and international telegraph circuits to help establish direct contacts between subscribers.

## 4.4. THE TOTAL TELECOMMUNICATION NETWORK

The telecommunication network of the country consists of the following physical facilities:

Existing telephone lines	200,000
Telephone lines under installation	30,000
Automatic Exchanges (Numbering 75), each with capacity	400 to 10,000 lines
Manual and Magneto type exchanges (Numbering 300), each with capacity	50 to 200 lines
Digital exchanges under installation	6
Telephones line under auto/magnetic exchanges to be replaced by connections from digital exchanges within next 5 years	100,000
Existing Telex lines	1,100

Telex lines under installation	6,000
Districts under Nation Wide Dialing	53/63 (NWD) System
Main Trunk Automatic Exchanges (TAX)	4
International Gate way Exchange	1
Satellite Earth Station	2

## **CHAPTER 5**

### **DEVELOPMENT OF THE SECTOR**

This Chapter describes the overall strategy of the Government for development of the telecommunication sector of Bangladesh. Targets in short term perspectives are given. Past trend of financing is analyzed with a view to providing an idea about the prospects of funding for this sector.

#### **5.1. PRESENT STATUS**

Present per capita availability of telecommunication facilities in Bangladesh is not significant. Telephone density per 100 population increased from 0.18 in 1985 (end of the Second Five Year Plan) to about 0.22 in 1989 (end of the Third Five Year Plan). Considering the rapid growth of population, this means that telecommunication facilities increased by about 30% over this period. The growth rate was in excess of the growth of economy over the same period. The entire administrative system of the country is in the process of decentralization. The aim of the Government is to bring all the rural Upazillas (Sub-Districts - the lowest stage of the administrative set up) under the telecommunication network in phases. As a part of this 322 (out of 402) rural Upazillas are now being connected to the respective District Headquarters by digital radio links. In addition to this four Trunk automatic Exchanges (TAX) at Dhaka, Khulna, Chittagong and Bogra are extending dialing facilities to all telephone subscribers up to the District level. This theoretically means that almost 83% of Telephone subscribers are covered by long distance dialing facility. The International Trunk Exchange at Dhaka provides Semi-automatic Trunk services (in the form of toll services and direct dialing from the subscribers' sets) to almost all countries of the world.

Digitalization of the telecommunication network started with the installation of digital Trunk automatic Exchanges and International Trunk Exchange. On the local network side, new digital exchanges with initial capacity of 30,000 lines, expandable up to 120,000 lines is now under installation in Dhaka. New digital Microwave links between Dhaka-Khulna, Dhaka-Sylhet, Dhaka-Mymensingh and Khulna-1-Barisal-Chittagong have been planned to replace the existing analog links.

#### **5.2. OVERALL STRATEGY**

The overall strategy for development of this sector includes the following key elements, among others:

- a. To provide suitable telecommunication networks throughout the country in order to facilitate efficient means of communication;
- b. To expand overseas telecommunications system ;
- c. To introduce latest technology and to undertake appropriate program on development of manpower in keeping with the requirements for absorbing such technologies;

- d. To replace, expand and modernize out-dated switching and cable systems with the state-of-art;
- e. To establish digital earth station(s) in order to cater for new satellite technology;
- f. To ensure rapid penetration of telecommunication facilities to the rural areas;
- g. To bring new facilities and services through liberalization of associated rules and provisions, including involvement of the private sector in various types of operations;
- h. To gear up research and development activities in keeping with the growth of the sector.

### **5.3. AIMS IN SHORT TERM PERSPECTIVE**

Aims in development of the sector in short term perspective ( Fourth Five Year Plan 1990-1995) include, among others :

- a. Expansion of local telephone by at least 300,000 , which will increase the density of availability of telecommunication facilities to about 0.435 per 100 people;
- b. Digitization of existing transmission network by 60 % (Microwave plus UHF);
- c. Digitization of installed capacity of telephone exchanges by 60 %;
- d. Introduction of data network and Centrex system;
- e. Expansion of Nation-Wide Dialing facilities up to Upazilla level;
- f. Telephone facilities in each Union Parishad ( elected local Government units. There are more than 4,300 Unions in the country. On the average a Union Parishad consists of 20 vil-lages);
- g. Modernization of junction network by introducing optical fibre;
- h. Expansion of duct system in main switching system;
- i. Modernization of Telephone factory and the Cable factory;
- j. Introduction of modern network management and Management Information Service sys-tem;
- k. Manpower development;
- l. Establishment of Monitoring station.

It may be mentioned that the strategy for the Fourth Five Year Plan has not yet been final-ized. It could become necessary to revise some of the above targets depending on the total allocation for this sector and also on the total size of the plan.

### **5.4. FINANCING TRENDS**

The telecommunication sector, according to the heads considered in the national budget, is composed of the Bangladesh Telegraph & Telephone Board (BTTB) and a small telecom-munications industry comprising of Telephone Shilpa Sangstha (TSS) and Bangladesh Cable Shilpa (BCS). All public telecommunication services in Bangladesh are state monopoly with BTTB having sole responsibility for developing, operating and administer-ing these services.

TSS and BCS are jointly owned by the government (82%) and M/S Siemens A.G. of FRG (18%). TSS manufactures local telephone switching equipment, telephone apparatus and small size PABX's. BCS manufactures local and junction telephone cables, drop wires and other accessories for providing telephone connections to the subscribers. As BTTB cannot provide adequate public services there are numerous private communication systems licensed by the Board on a yearly basis. The important licensees are Government Ministries, Departments and various government or private sector corporations.

Published data on financing of BTTB operations are readily available. However, it is not so in case of entities having license for their own communication systems. The data presented in this section relate principally to BTTB. However, as far as possible, these have been supplemented by the data available with respect to the other entities. According to informed sources, the overall financial situation is relatively accurate in spite of the lack of information.

The Second Five Year Plan (1980-85) allocated US \$ 96 Million for telegraph and telephone. This was 1.9 % of the total plan outlay (US \$ 5100 Million). This investment target was fulfilled. In addition to this investment outlay from government exchequer, BTTB also undertook investment out of its own revenue surplus which stood at US \$ 48 Million in 1984-85.

During the Third Five Year Plan ( 1985-90) allocation for telecommunication (including BTTB and the telecommunications system for the Ministry of Foreign Affairs ) was US \$ 110 Million. In addition, this sub-sector was given a (unspecified) share out of US \$ 19 Million block allocation to finance the Upazilla Tele-communication Project, Upazilla Post Office Project and Special Tele-communication Project in the Chittagong Hill Tracts. It is important to note that a major share of the planned investment outlay under the Third Five Year Plan (TFYP) was for completion of projects undertaken under the Second Five Year Plan ( please see table 5.1).

**Table 5.1 Allocation for telecommunication sub-sector under the Third Five Year Plan**

(In US \$ Million)

Sponsoring Agency	Allocation		
	Ongoing	New	Total
BTTB	89	21 (19.1)	110
Ministry of Foreign Affairs	0.22	0.16(42.1)	0.38
Total	89.22	21.16(19.2)	110.38

Note : Figure within parentheses indicate percentage of row total .

Furthermore the allocation for telecommunication sub-sector in the TFYP declined to 0.89 % of total plan allocation compared to 1.9% under the SFYP.

Plan allocations are made for 5 years period. Investment outlay for individual years are set out in the Government's Annual Development Programs (ADP). Allocations in the ADP

are made under three main heading namely, main ADP ( financed almost entirely by donors), debenture/ self finance and Annual Technical Assistance Program. Table 5.2. presents allocations for the telecommunications sector in the ADP under the TFYP. Annual foreign expenditures are in the range of US \$ 25 Million for the next several years.

**Table 5.2. Allocation for telecommunication sub-sector(BTTB) in TFYP**

(In US \$ Million)

Fiscal Year	Local Currency	Foreign Exchange	Total Investment	Share of Foreign Exchange in total
1985-86	7.50	7.00	14.50	48.30%
1986-87	9.25	3.60	12.85	28.20%
1987-88	8.90	17.10	26.00	65.80%
1988-89	13.20	26.10	39.30	66.35%
1989-90	15.30	22.70	38.00	40.30%

**Note**

a. Revised allocations. ADPs are prepared at the beginning of each fiscal year ( July to June ) and revised midway through the fiscal year for adjustment dictated by resource availability condition.

b. Original allocation, i.e. allocation made in June,1989. Table 5.2. reveals that the share of foreign assistance in this sub-sector is larger and fluctuates from year to year.

Table 5.3. presents a comparative picture of foreign aid disbursement in the communications sector vis-a-vis the overall economy. The communications sector include telecommunication and postal services. However, the share of the latter is not sufficiently significant to have any influence on conclusions regarding foreign aid in the telecommunications sub-sector.

Table 5.3. Project Aid Disbursement (1980-87)

(In US \$ Million)

Fiscal year	Communication Sector	All Sectors	Share of Communications Sector
1980-81	9.6	559.9	1.7%
1981-82	22.2	588.9	3.8%
1982-83	9.4	468.8	2.0%
1983-84	7.4	552.8	1.3%
1984-85	8.2	590.9	1.4%
1985-86	18.9	709.9	2.7%
1986-87	9.3	967.2	0.9%
1987-88	24.5	830.5	2.9%

Table 5.3. show that project aid disbursement in the telecommunications sub-sector has been very uneven. This indicates the trend of implementation problems in this sector. This conclusion is substantiated by the degree of year to year fluctuation in the communication sector's share in total project aid disbursement (standard deviation is over 46% of the mean).

Table 5.4. presents a picture of the project aid pipeline for this sub-sector.

As of March 1989 the foreign project pipeline to be spent over the next few years for Telecommunication sub-sector was US \$ 105.22 Million. About 44.6% of this pipeline consisted of grant and 55.4% consisted of loans. The major donors are Japan (34% of pipeline), FRG (22.5%), Finland (19.2%) and IDA (18.6%). Canada has a very low-key presence in this pipeline. Except for the IDA credit all the procurement from this pipeline is mostly source tied.

The two joint venture telephone industries (TSS & BCS) receive allocations from the Government against various commodity aid. Table 5.5. below show year-wise, between 1985-86 and 1989-90 the two telecom industries received US \$ 13.69 Million as commodity aid from Japan (35.9%), FRG (40.6%), Canada (10.5%), IDA (10.6%) and Sweden (2.3%).

Among the entities that have their own telecom system, Bangladesh Railway (BR) and Civil Aviation Authority (CAAB) are the major importers of telecom systems. BR has been allocated in 1985 a Norwegian grant of 150 Million Kroner for import of goods and services for its telecom network. Out of this amount 110 Million Kroner have been spent. CAAB has an allocation of US \$ 9.9 Million for import of communication equipment, of this US \$ 7.3 Millions have been spent.

**Table 5.4. Project Aid Pipeline for Telecommunication**  
**(as of March, 1989)**  
(In US Million \$)

Source	Grants	Loan	Total
Belgium	-	1.34	1.34
FRG	23.65		23.65
Finland	20.22	-	20.22
France	0.90	1.61	2.51
Japan	-	35.75	35.75
Sweden	0.62	-	0.62
IDA	-	19.54	19.54
UNDP	1.52	-	1.52
<b>Total</b>	<b>46.91</b>	<b>58.24</b>	<b>105.15</b>

**Table 5.5. Fiscal year-wise allocation out of commodity aid to TSS and BCS**  
(In US \$ Million)

Fiscal Year	TSS	BCS
1985-86	0.95 ( Japan 0.95 )	0.63 ( Japan 0.31 & Sweden 0.32 )
1986-87	1.18 ( IDA 1.18 )	1.10 ( Canada 1.10 for Aluminum )
1987-88	1.59 ( Japan 0.79 & FRG 0.80 )	1.27 ( Canada 0.36, FRG 0.63 & IDA 0.28 )
1988-89	1.27 ( Japan 0.63 & FRG 0.64 )	1.27 ( Japan 0.63 & FRG 0.64 )
1989-90	2.54 ( Japan 0.95 & FRG 1.59 )	1.90 ( Japan 0.63 & FRG 1.27 )
<b>Total for 1986-90</b>	<b>7.53</b>	<b>6.16</b>

## CHAPTER 6

### FUTURE PROJECTS IN TELECOMMUNICATION SECTOR

This Chapter describes projects of telecommunication sector, which are expected to be taken up for implementation in short, medium and long term perspectives. Indicative scope of work, time schedule, estimated cost and sources of financing for the projects are described. This chapter is expected to help intending Canadian companies to identify business opportunities in Bangladesh.

#### 6.1. PROJECT CLASSIFICATION

Bangladesh Telegraph and Telephone Board is the only organization which deals exclusively with projects in the telecommunication sector of the country. This organization has long term goals and objectives for development of this sector. Other related organizations described in Chapters 2 and 3 consider telecommunication as one of their peripheral activities. Projects of interest of the present study do not fall in the perview of the main stream of their activities. As such it is difficult to identify specific telecommunication projects in the context of long term planning. In this study the potential demands for various related supplies are identified and specific projects are mentioned where the project formulation has attained a definite level of maturity.

#### 6.2. PROJECTS IN SHORT TERM PERSPECTIVE

It is worthwhile to note that demand for telecommunication facilities in Bangladesh is largely suppressed by supply constraints. Financing is easily identified as the main reason for the conservative estimation of demand. Priority to be attached to particular project also does not depend on the Government alone. Sometimes financing conditions, imposed by different international development financial institutions, exclude possibility of taking up some important projects of the sector. It has been observed that some less important projects in cases had to be undertaken on a priority basis because of donor financing conditions. Major types of projects in short term perspective are described in the following paragraphs. These types of projects have been identified by the BTTB for the Fourth Five Year Plan.

#### 6.3. PROJECTS PROPOSED FOR FOURTH FIVE YEAR PLAN

##### 6.3.1. New Projects

Cost in US \$ Million Project	Total	Foreign EXchange
1. Replacement of Analog Microwave system and establishment of new digital microwave links	41	24

Project	Cost in US \$ Million	
	Total	Foreign EXchange
2. Replacement of Analog UHF links digital links	14	8
3. Expansion of local telephones by 300,000 lines	514	286
4. Balancing and expansion of trunk Automatic Exchanges at Dhaka, Chittagong, Khulna nd Bogra and International Trunk Exchange at Dhaka	8	4
5. Expansion of NWD facilities up to Upazilla level- First Phase	127	64
6. Establishment of a digital satellite Earth Station in Dhaka	22	14
7. Establishment of national data Network	6	3
8. Expansion of cable duct system in main switching centers	48	6
9. Completion of flood rehabilitation program	48	26
10. Expansion of public call offices and telegraph offices in rural areas	19	13
11. Balancing and modernization of cable factory at Khulna	10	6
12. Diversification and modernization of telephone factory at Tongi	16	10
13. Provision of VVIP telecommunication system	3	2
14. Modernization of ship to shore communication	17	11
15. Establishment of Telecom research Center	5	2
16. Procurement of Mobile Telephone Exchange (Container Exchange)	7	5
17. Introduction of Topnet system for Dhaka & Network management system in the country	16	10
18. Procurement of 6 Centrex system of capacity 1000-2000 lines	6	3
19. Emergency communication system by domestic satellite	10	6

Project	Cost in US \$ Million	
	Total	Foreign EXchange
20.Replacement of all F-1 Exchanges in Bangladesh	51	32
21.Establishment of a monitoring station		6      3
Sub-total	994	538

### 6.3..2. Projects spilled over from the Third Five Year Plan

1. Expansion of Greater Dhaka Telecom system by 50,000 lines	31	13
2. Expansion of Telex Network	13	1
3. Expansion of Telecom. services to Upazillas	22	10
4. Expansion of local telephones by 100,000 lines	147	115
5. Additional 89 Radio links for Upazillas and other places	20	10
6. Installation of Microwave link Between Dhaka-Bogra/Mymensingh and Dhaka-sylhet	43	24
7. Dhaka-Khulna Microwave link	19	13
Sub-total	295	186
TOTAL	1,289	724

### 336.2.1. Expansion of Telephone System

It is expected that at the end of the ongoing plan period (1985- 90), the total installed capacity would be about 240,250 lines as follows

Digital	30,000
EMD	146,250
FI	34,750
Manual	29,350

Exchanges at Upazilla or lower levels, being mostly of Manual type, can not provide satisfactory services. As such demand for telephone services is not growing as expected. Digital UHF links between Upazillas and District Headquarters are being established, which as expected to accelerate the growth of demand for telephone connections. Nation Wide Dialing facilities are expected to be extended to all the Upazillas during the Fourth Five Year Plan .

A combined local-cum-trunk Digital Exchanges are planned to be installed at District and Upazilla Headquarters. Other towns and growth centers are expected to be connected by RSU and digital Multiplex according to demand.

#### **6.2.2. Telephone in Union Levels**

During the Fourth Five Year Plan (1990-1995) at least one telephone is planned for each Union, while at least one telephone in each village is envisaged for the Fifth Five Year Plan (1995- 2000). For this purpose Digital multi-access Base Stations are planned in each Upazilla, from which connections over radio are to be provided for telephones in the Unions and the villages.

#### **6.2.3. Expansion of Transmission Links**

##### **a. Microwave**

Except for Dhaka-Khulna, all the present back-bone microwave links are of analog type. Due to increased demand for channels and in order to connect all the new digital exchanges without additional cost of interfaces, it is proposed to replace them by digital microwave links. The links to be replaced in the Fourth Five Year Plan are:

Dhaka- Sylhet, and Dhaka- Mymensingh- Bogra.

New Microwave links for providing alternative routing are necessary for ensuring security of back bone network . This is envisaged to be installed on the following routes:

Sylhet-Sunamgonj-Mymensingh-Jamalpur-Rangpur, and Khulna-Barisal-Chittagong-Cox's Bazar.

##### **b. UHF Links**

The work of connecting 300 Upazillas by digital UHF links to respective district Headquarters is in progress now. Remaining 102 rural Upazillas are planned to to be provided with similar links in course of the Fourth and the Fifth Five Year Plans. Moreover analog UHF links, connecting some of the Districts Headquarters with back bone Microwave network, are to be replaced with 120 channel Digital UHF links.

#### **6.2.4. International Services**

Satellite Earth Stations at Bethunia and Talibabad are found to be inadequate due to the growth of international telecommunication. Difficulties in transmission between Dhaka and Bethunia and changes in technology necessitates establishment of a new satellite earth station in Dhaka based on digital technology. The international trunk exchange is also needed to be expanded to cater for the increased traffic.

#### **6.2.5. Nationwide Trunk Dialing**

The four Trunk Automatic Exchanges (TAX) at Dhaka, Chittagong, Khulna and Bogra cater for subscribers dialing up to the District level. These trunk exchanges have to be expanded in order to handle requirements for the additional 300,000 telephone connections, that have been envisaged in the Fourth Five Year Plan. However, increase in the capacity

of TAX's will not be strictly proportional to the increase in subscriber lines due to installation of combined exchanges in the District Headquarters. These combined exchanges will carry trunk traffic between Upazillas and also between adjoining districts.

#### **6.2.6. Data and Centrex Service**

Data service on limited scale are planned to be introduced during the Fourth Five Year Plan to cover requirements up to the District level. New digital microwave and UHF lines will be used for this purpose.

Centrex service is envisaged initially for commercial districts of Dhaka and Chittagong and subsequently at other places like Khulna, Rajshahi and Sylhet.

#### **6.2.7. Modernization of Cable Network**

New Optical Fibre links on duct system have been introduced in Dhaka Metropolitan telephone network for inter-exchange connections. New duct routes are planned to cover all junctions and primary network on some specific areas of Dhaka, Chittagong, Khulna, Sylhet, Comilla, Rajshahi and Rangpur during the Fourth Five Year plan. Other important load centers will be provided with similar network in the Fifth five Year Plan.

#### **6.2.8. Expansion of Training Facilities**

Considering the growth envisaged in the Fourth Five Year Plan, total strength of BTTB is expected to increase by about 25% over the present manpower of about 20,000. Training and orientation of new and existing technical manpower is essential for improving operation and maintenance of the total system. This is more important due to incorporation of Digital communication facilities and optical fibre and other new technology in the network. The existing training facilities is envisaged to be strengthened and a new facility for mid and senior level personnel is planned to be established in Chittagong.

#### **6.2.9. Network Management and MIS System**

Computerized Network Management Centers are envisaged to be set up for better maintenance and operation and to enhance the efficiency of the overall, and especially long distance telecommunication network. Computerized data base, data dictionary, data base management as well as remote supervision of the transmission network are deemed essential for better control of the total system. Signal acquisition and distribution techniques and an intelligent Management Network are also included in the Fourth Five Year Plan. A Computer network, consisting of Micro Computers and a Main Frame Computer, are envisaged to be established during the Next Five Year plan.

#### **6.2.10. Monitoring System**

The present facility available for monitoring of different frequency bands is found to be inadequate. Need for improvement of this facility is dictated by the addition of a large number of radio links and multi-access systems in the country. A centralized frequency monitoring system has been proposed to be set up in Dhaka during the Fourth Five Year Plan.

It may be mentioned that the integrated approach to the development of Telecommunication sector, outlined above, will provide an infrastructure on a country wide basis. This will stimulate demands for telephone connections all over the country. It is expected that demand in this Sector will rise sharply as these programs are implemented. As such it will be needed to expand the capabilities of the sector during the Fifth Five Year Plan (1995-

2000). Some of the specific projects and components are likely to be carried over from the Fourth Five Year Plan.

#### 6.4. APPROVED PROJECTS IN SHORT TERM PERSPECTIVES

It may be mentioned that the above program appears to be ambitious, when compared with the past trends of financing. On the other hand, this list represents the projects which may be considered as the bottom line for a desired level of development of this sector. Specific projects to be selected for implementation will depend on availability of funds particularly the foreign exchange component. The BTTB has prepared project profiles for some of the projects of this list. These are at different levels of approval of the Government. In some cases the projects have already been discussed with various donors. There is a good possibility that these projects will be taken up for implementation in course of next 1-2 years. The following list identifies such projects. Projects listed below are thus open for all suppliers, including those from Canada. Possible sources of funding are various bilateral donors, multilateral sources, like IDA and ADB. Bilateral donors will likely tie their funds, while multilateral funding will be open to international competitive bidding.

##### 6.3.1. Installation of Telecommunication equipment and expansion of nation wide dialing system in Upazillas of Bangladesh

###### **Objective of the project**

Bangladesh is in the process of decentralizing its overall administrative structure into 64 Districts composed of 460 Upazillas (Sub-districts). Almost all the District head quarters are now under the nation wide dialing (NWD) system. The Government has the policy to provide similar facilities to the rural areas in phases. When completed this would provide a convenient and reliable communication network in the entire country. The links established in the Upazilla head quarters will serve the consumers in the respective rural areas.

###### **Major Components of the project**

District Rural Exchange		64
Trunk call Exchange(TAX) in district head quarters		4
Upazilla exchanges (Rural Upazillas)		402
Small power plants/ Solar Panels		402
Power plants		64
Telephone sets		45,000
Cable Net work	About	10,000 Km
Motor Vehicles		5
Motor Bikes		128
Building		12.550 Sq.Meters

###### **Project Schedule Five Years**

**Total Cost :** \$ 127 Million including a foreign exchange component of \$ 60 Million.

Note: Some of the Upazillas located near urban centers are not necessarily rural locations.

Very conservative estimates for demand for telephone connections have been considered. An Upazilla has on the average of about 55,000 house holds, for which 100-400 telephone connections have been envisaged. (depending on size of Upazillas concerned and other economic conditions).

It is believed that actual demand will be well in excess of the projected demand.

### 6.3.2. Expansion of local telephone by 30,000 lines

It is estimated that already more than 170,000 applications for new telephone connections in the metropolitan Dhaka are pending. Population of the city is growing steadily and it is estimated that demand of telephonenumber will reach one million mark by the turn of the century. This project aims at a temporary relief to the increasing demand for telephone connections by providing 30,000 (26,000 digital switching and 4,000 EMD ) new connections in the northern area of the city.

#### **Major components of the project**

Digital Switching System Tandom Exchanges	26,000 lines
Push Button Telephone Sets (including spares)	27,3000 Nos

Transmission system including MUX for PCM, Optical fiber, etc.

Junction network including PCM, optical fiber, etc.

Operation, Maintenance Center for Switching System

Power equipment

#### **Total Cost**

\$ 39 Million, including a foreign exchange component of \$ 33 Million.

### 6.3.3. Telecommunication facilities in Chittagong Hill Tracts

#### **Objective**

The South Eastern part of the country consists of hilly terrain inhabited by different ethnic tribal peoples. This area is now in the center of a political turmoil due to acute insurgency problems. The Government plans to address the problems of the area including the elevation of life style and economy of this area. The population in this area is concentrated in remote and isolated pockets. The terrain and pattern of population distribution makes it difficult to provide appropriate telecommunication facilities. It is envisaged that Multi Channel Radio Links on hill tops will be provided to replace the existing HF links.

### **Major Project Components**

60 Channel Radio System	3 Links
3 Channel UHF Radio Systems	23 Links
Central Maintenance facility	

The three links will connect three District headquarters of the Hill Tracts with the NWD Trunk Exchange at Chittagong.

#### **Total Cost**

\$ 6 Million, including a foreign exchange component of \$ 3 Million.

### **6.3.4. Greater Dhaka Telecommunication Project**

#### **Objective**

The southern part of the metropolitan consists of older areas of the city. These parts of the capital is densely populated and include many important residential and business centers, including the twin city of Narayanganj and the other side of the Buriganga river. The project envisages providing 25,000 additional lines of digital exchanges at Dhaka(central), Narayanganj, Chowkbazar, Faridabad, Zinzira and Savar. The project will provide junction circuits between exchanges by using optical fiber transmission system.

#### **Main components of the project**

25,000 lines Digital Switching System  
Tandom system  
Power plants  
Expansion of TAX-ITX, Telephone sets  
Digital Microwave System with MUX, Testing equipment,  
Link Cable  
Optical Fiber  
Container Exchange  
Cable laying, etc.

#### **Total Cost**

\$ 68 Million including a foreign exchange component of \$ 38 Million.

**Implementation Schedule**      Three Years.

### **6.3.5. Expansion of Training Facilities of the Telecommunication Staff College, Gazipur, Bangladesh**

#### **Objective**

Objective of the project is to impart training to the freshly appointed engineers of the BTTB in the form of orientation to the need of operation and maintenance of the projects in the sector. This has become more important in view of the import of new technologies like digital switching. The project envisages modernization of the existing training facility of BTTB.

## **Main Project components**

Various training equipment and other instructional gadgets.

### **Total Cost**

\$ 14.5 Million, including a foreign exchange component of \$ 12.5 Million

### **6.3.6. Telecommunication equipment for VIPs**

#### **Objectives**

A portable Mobile Station Communication system for VIPs is felt essential for the country. The system should have the capability to provide communication inside Bangladesh from any place within the country or from any other place in the world. Presently dignitaries have to take the help of a stand by 'hot line' for communicating with different personalities. This is unreliable, inefficient and very costly. The proposed system is envisaged with a view to solving these problems.

#### **Project Components**

- a. The system should have adequate facility ensuring reliable and secured mode for communication from any part of the country and from any place in the world.
- b. The system should be transportable by and be able to be fitted with helicopter, jeep/pick-up, ship, airplane, etc.
- c. The system should be able to operate in all weather and move by any means.
- d. The system should be compatible with existing network in Bangladesh as well as be able to function independent of national network.
- e. The system should have the capability to communicate with subscribers of a particular digital PABX ( 5 + 50 lines) to be installed in a designated security area. This digital PABX is a part of the total system and should have direct dialing-in and dialing-out facility for communication with the portable sets of the main system.

#### **Mode of Communication**

The system should have the following modes of communication:

Full duplex voice channel  
Telex/Teleprinter  
Facsimile  
TV transmission facility  
Data transmission facility

**Cost** Not yet decided. Will depend on the merits of technical offer.

**Schedule** The project will be implemented as soon as possible.

### 6.3.7. Standard A Earth Station in Dhaka

**During finalisation of this report, this project is awarded to WIRELES, UK P.L.C.**

#### **Objective**

It is necessary to install a standard 'A' Digital Satellite Earth Station in Dhaka in order to meet the ever increasing demand of overseas telecommunication in the Global Digital system. The existing analog satellite is being replaced by a Digital Satellite, due to which the present Earth Station will become ineffective. The Proposed Ground Station will have a capacity of 600 Channels Telephones and one TV receiving/transmitting channel. The new ground station will provide access to all member countries of ITU.

#### **Major Components**

Antenna System, Radio Control System, Test equipment, Functional buildings, etc.

**Cost** US \$ 34.4 Million including a foreign exchange component of US \$ 23.4 Million

**Schedule for implementation** : The project is planned to be completed during 1990-91.

### 6.3.8. Other projects proposed for financing by IDA

IDA had committed a sum of \$ 10 Million for projects in the telecommunication sector, which was originally earmarked for installation of digital exchanges. Subsequently, it was recommended that this amount could not be used for digital switching systems. As such the External Resources Division of the Ministry of Finance in consultation with the BTTB and the Ministry proposed the following alternate list of projects to be implemented out of this committed fund.

1. Miscellaneous equipment for telecommunication (like Multi-meters, close circuit TV, Camera for Exchange metering, Coin Box, etc.)	\$ 1.5 Million
2. Container Exchanges	\$ 1.5 Million
3. Extension of Junction system and other equipment for pressurization, etc.	\$ 2.0 Million
4. Air-filled and Jelly-filled cables and equipment for manufacturing Jelly-filled cables	\$ 3.0 Million
5. Portable Micro-wave/ Satellite System, Walkie-Talkie	\$ 2.0 Million

---

<b>Total</b>	<b>\$ 10.0 Million</b>
--------------	------------------------

### 6.3.9. Additional Projects cleared by the Project Evaluation Committee

The Inter Ministerial Project Evaluation Committee, convened by the Planning Commission, has cleared some additional projects in telecommunication sector. The External Resources Division of the Ministry of Finance has been requested to explore finance for following projects of this category.

Project	Cost in \$ Million	
	Total	Foreign Exchange
1. Extension of Telephone line by 1,000,000	282	134
2. Telecommunication facilities at strategic locations and 89 Upazillas	21	11
3. NWD connections to rural areas	8	4
4. Modernization of TSS for repair and manufacturing of digital Switching Exchanges	129	60
5. Microwave links between Dhaka Mymensingh, Bogra and Sylhet	39	22
Total	479	231

#### 6.4. PROJECTS IN OTHER ORGANIZATIONS

##### 6.4.1. Civil Aviation Authority of Bangladesh

At present there is mainly only one International Airport in Bangladesh, namely Zia International Airport (ZIA) in Dhaka. It was felt during the unprecedented flood of 1988, that the whole country was isolated from the outside world as the Runway was partly submerged. This not only hampered communication, but also seriously disrupted relief and rehabilitation work. As such it was decided to upgrade the Airport at Chittagong into an International airport to facilitate both normal air passage and for the emergency purposes. For this communication equipment of the Chittagong Airport will have to be changed/upgraded. In view of the financial constraints it was decided that in the first phase, the communication and aircraft handling facilities of ZIA will be completely refurbished and the old equipment will be installed at the Chittagong Airport. In the second phase the communication equipment of Chittagong Airport will be replaced. The first phase of this project will be taken up during the Fourth five Year Plan. Project Profile for this work is under preparation presently, based on which financing sources will be contacted in near future. It is not possible to provide a budget for this project at this stage. However, equipment likely to be procured as a part of this project, is as follows:

1. Very high Frequency Omni-directional Radio Range (VOR)
2. Distance Measuring Equipment (DME)
3. Instrument Landing System - Localizer ( ILS-LOC)
4. Instrument Landing System - Glide Path ( ILS-GP)
5. Instrument Landing System - Outer Marker (ILS-OM)
6. Outer Locator
7. Non Directional Beacon ( NDB)

8. Primary Radar
9. Secondary Radar
10. Very High Frequency Air to Ground Transmitter/Receiver
11. Very high Frequency Surface Movement Control Transmitter/Receiver
12. High Frequency Air to Ground Transmitter/Receiver
13. High Frequency Inter Tower Radio Telephone Transmitter/Receiver

#### **6.4.2. Defense services**

The Army has decided to procure 40 units of HF/SSB links as a part of the program to refurbish its telecommunication network. It is in process of procuring samples from different suppliers. Technical and economic features of such samples will be evaluated before a decision on the selection of technology is taken. In the next phase, VHF equipment of the telecommunication network will be replaced. It may be mentioned that presently all the VHF links were supplied by Motorola Corporation of the U.S.A. Active interest and business promotion activities will have to be undertaken, initially through a local lobby, in order to break this monopoly.

The Army is contemplating to set up a network of Service facilities for their telecommunication equipment. Such centers will be provided in all the eight army Cantonments.

In addition to the stationary facilities, the Army is also planning to replace all its mobile telecommunication equipment in phases. Technical specification for some of the projects, mentioned above, are being prepared now.

As far as the Navy is concerned, almost the entire communication network ( ship to ship and ship to shore) was of British origin. Recently, Rhodes and Schwarz of West Germany succeeded in supplying some test and measurement equipment. This has helped to break the monopoly. Navy is now planning to refurbish its telecommunication network. This will offer an opportunity to supply a complete range of various telecommunication equipment.

The Airforce has better expertise on telecommunication compared to the other two components of the Armed Forces of Bangladesh. However, traditionally it has been infamous for its indecisions. It started with telecommunication equipment from the Russians immediately following the liberation of the country. Most of these equipment has reached the end of useful life. The Air Force is gradually replacing these with the state-of-art facilities. This also includes establishment and modernization of various base Workshops. The Radar Section, popularly known as the 71 Squadron, is planning to replace the old Radar at Dhaka.

The Office of the Directorate General of Forces Intelligence also procure different telecommunication equipment. These are generally done through the Bangladesh Embassies in various developed countries. The Canadian High Commission has taken lead in introducing Canadian suppliers of such equipment for the Army.

It may be mentioned that defense accounts for about 40 % of the national budget of the Government. Their procurement procedure is simpler than any other organization of the country as a single window, namely the office of the Director General, Defense Purchases, is used for all the procurement. The Army projects also do not have to go through the

lengthy project evaluation procedure, which is common for projects in any other sector. Such purchases are beyond control of the public auditing and accounting procedures. In fact the Army procurement are almost immune from the normal financial procedures, like acceptance of lowest financial offer. Therefore, supplies to the Defence services are in general lucrative. Proper attention to such purchases are highly recommended.

#### **6.4.3. Bangladesh Rifles**

Importance of the Bangladesh Rifles (BDR) has now increased many fold due to the important role it is playing in both securing the border and also in the anti-smuggling and anti-drug activities along the entire border of the country. BDR is now in the process of preparing a comprehensive plan on improvement of its telecommunication network, which will include replacement of the bulk of the present facilities. It is expected that the main procurement drive will be initiated towards the end of 1991.

#### **6.4.4. Police**

The Police has now Radio and High Frequency links with its stations and other out-lying places. The Police does not have adequate expertise on telecommunication equipment and it, in the past, procured different equipment in consultation with the BTTB. The Police is now planning to bring its entire force under one common communication network. This is likely to be taken up during the Fourth Five Year Plan, probably towards the end of that plan period.

#### **6.4.5. Inland Water Transportation**

The Inland Water Transport Authority regulates the movement of riverine traffic in the country. The organization urgently needs a network of communication facilities for efficient discharge of its responsibilities and also to provide help in navigation. The Bangladesh Inland Transport Authority, which commercially operates river vehicles of the public sector, has a network of Radio Communication linking its vehicles with land stations at various locations. This network needs complete refurbishing. Also efforts are under way to make availability of two-way communication network mandatory for all the river vessels of the country, both in the public and the private sectors. Implementation of this is expected to take some time due to opposition from the owners of private vessels. Once such a provision is made mandatory, there will be a tremendous demand for two-way telecommunication links for the river vessels.

#### **6.4.6. National Broadcasting Authority**

The National Broadcasting Authority is planning to take up the following projects for implementation during the Fifth Five Year Plan.

##### **a. Extension of the existing Television Station of Dhaka**

Initially a second TV Station was envisaged. However, due to financial constraints it was subsequently decided that the present station would be extended and new facilities added. This includes the followings:

- News Studios
- Two Audio Studios
- Production Studio with three cameras

**Make-up facilities  
Design Section**

Cost of above equipment is estimated to be US \$ 3 Million. Civil construction is expected to be completed by the first quarter of 1990, after which the equipment will be procured.

**b. Extension of facilities of Chittagong TV Relay station**

The objective of this project is to provide facilities for transmitting out-door productions and news to Dhaka via Microwave links.

**c. Establishment of Radio Monitoring facilities in all Radio stations.**

The project envisages procurement and installation of Radio- monitoring equipment for various regional stations of Radio Bangladesh.

## **Chapter 7**

### **PROJECT PLANNING AND IMPLEMENTATION**

The Chapter outlines how projects are selected by the Government of Bangladesh, and informs the various steps of approval required. Canadian companies who are serious in obtaining contracts should consider becoming involved in the early steps of the project in order to influence the scope, nature and design of the proposals. The processes usually adopted for selection of consultants and contractors are discussed briefly. Local capabilities that could be considered in preparation of bid are identified. Such local supplies and services, if found suitable, could help the bidder to minimize its cost and thus make its financial offer more attractive.

#### **7.1. PLANNING METHODOLOGY**

The supreme body of planning in Bangladesh is the National Economic Council (NEC), which is headed by the President of the country and includes all members of the Council of Ministers. Functions of NEC include:

- guidance on Five Year Plans, Annual Development Programs and economic policies;
- approval of plans, programs and policies;
- review of progress of implementation, etc.

The Executive Committee of the National Economic Council (ECNEC) has the following responsibilities, among others,

- approval of development projects of certain types;
- approval of investment projects in the private sector exceeding an investment of US \$ 5 Million;
- review of progress of implementation of projects;
- consideration of proposal for companies with participation of expatriate parties.

Different Ministries, the Planning Commission, Executing Agency are required to attend the meeting of ECNEC for according approval to any project recommended by the Planning Commission. The Chairman of the ECNEC is usually represented by the Vice President, Prime Minister or a Senior Minister nominated by him.

The Planning Commission is responsible for , among others, sectorial planning, budget allocation , review, approval of projects, recommendations on approval by ECNEC. Each sector of the economy is headed by a Member, who is in charge of all policies and programs relevant to the sector including determination of priority, guidance for national plans, and evaluation of performance, formulation of policies etc. Each Member of the Planning Commission is as-

sisted by a number of planning personnel belonging to the categories of Division Chief, Joint Chief, Deputy Chief, etc.

## 7.2.PROJECT PROCESSING

Projects are classified into three categories depending on the size of investment. Authority responsible for according approval to such projects are described in Table 7.1.

**TABLE 7.1. AUTHORITIES RESPONSIBLE FOR DIFFERENT TYPES OF PROJECTS**

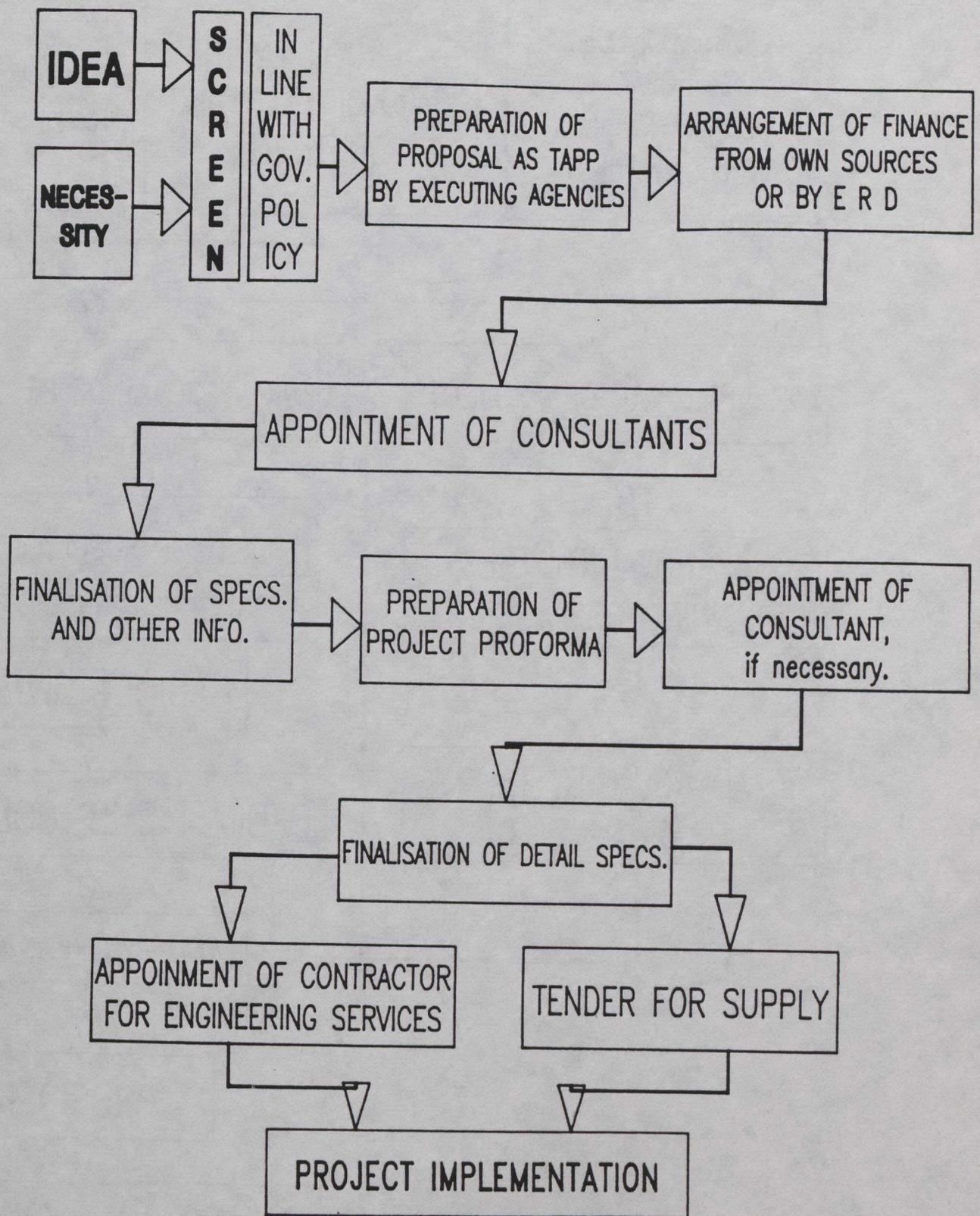
CATEGORY	INVESTMENT	AUTHORITY
A' Category	Up to US \$ 0.7 Million	Concerned Ministry
'B' Category	US \$ 0.7 - 1.7 Million	Minister for Planning
'C' Category	US 1.7 Million and more	ECNEC

The Executing Agency ( Bangladesh Telegraph and Telephone Board for projects in the present sector) has the responsibility to conceive projects in keeping with the strategies, policies and the long and short term perspective plans of the Government for the telecommunication sector of the country. The executing agency prepares the necessary documents for approval by the competent authority as described above. Usually a separate document (PC-II Form) is formulated in case a feasibility study is needed for a proposed project. A detailed document, known as the Project Proforma, is prepared on the basis of the results of the Feasibility Study. Detailed economic and financial analysis are included in the project proforma in order to justify its implementation. The document is then forwarded to the concerned Ministry ( Ministry of P T & T for projects in the present sector) for approval or for forwarding the same to the Planning Commission for approval, depending on the size of the project.

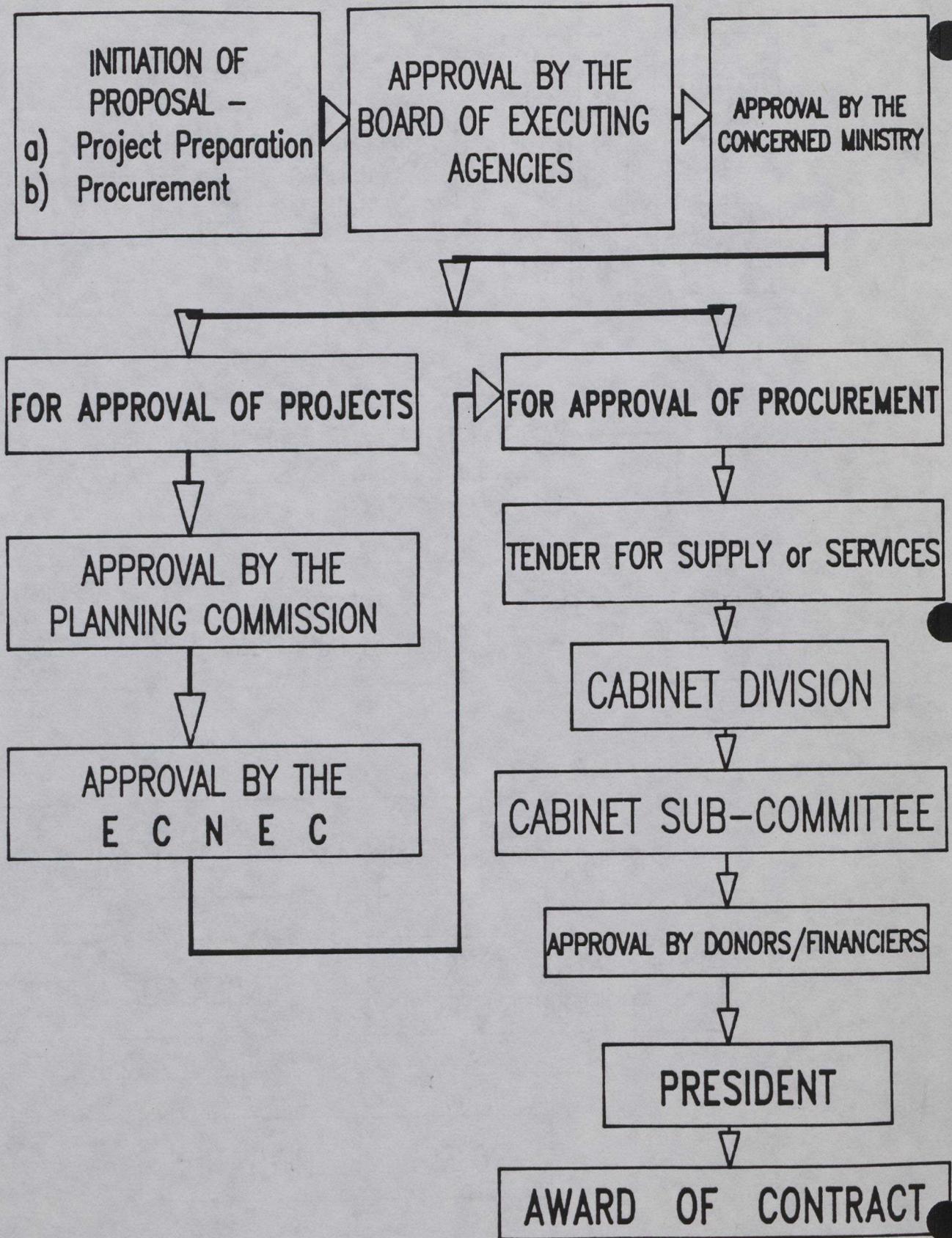
The Ministry has a Planning Cell of its own where projects are first examined and processed. The Departmental Project Evaluation Committee recommends projects for approval by the Minister or by the Planning Commission according to the size of the project.

There are sectorial Project Evaluation Committees in the Planning Commission which recommend projects for approval by the Planning Minister or by the ECNEC, whichever is applicable.

Figures 7.1 and 7.2 show complete flow charts for processing of projects for approval in Bangladesh. The Canadian companies may become involved in the process of project conceptualization and processing. Usually projects are selected from the list of aid-worthy projects, prepared by the Government every year. Projects which are likely to get support from the donors are usually given preference. Intending companies should try to accelerate prepara-



**FIG. 7.1 STEPS IN PREPARATION OF PROJECTS.**



**FIG. 7.2 APPROVAL PROCEDURE**

tion and approval of projects of interest to them. This may best be achieved through their local agents.

### **7.3. PROJECTS FINANCED BY INTERNATIONAL DONORS**

Ideas for projects funded by foreign aid could originate anywhere, either by the Government or by the donor. The implementing agency or the Ministry may pass a request to the External Resources Division (ERD). The ERD, in effect, arranges and regulate inflow of all foreign assistance for any project in the country. The Planning Commission also prepares a list of Aid Worthy Projects and updates it from time to time and asks donors for funding. The same procedure for approval of projects is also followed in case of aided projects.

### **7.4. PROCEDURE FOR SELECTION OF CONSULTANTS, CONTRACTORS AND SUPPLIERS**

Once a project has been identified, and international funding has been secured, the implementing agency starts preparing the terms of reference, scope and technical specification for the job. Invitation to bid by the implementing agency can follow two distinct trains as described below. One important aspect is for the intending companies to get in on "ground floor" in order to know the project from the start.

#### **7.4.1. International competitive bidding**

Intending parties are invited by the implementing agency ( BTTB) to offer bids according to bid documents prepared by the implementing agency. Tender notices are issued in the press. Offers (in cases of supplies) are to be accompanied by earnest money at a fixed rate or as a percentage of amount of bid. The earnest money is refundable in case of unsuccessful bidders and adjustable with bills/ performance guarantee etc. in case of the successful bidder.

#### **7.4.2. Bids from short listed parties**

Suppliers/ consultants are pre-qualified/according to a pre- qualification (PQ) document. In the event, when the project schedule is tight, bids could also be invited from the suppliers/ consultants enlisted with the international development financing institutions like ADB , IDA , etc. or short listed by the implementing agency.

In both the cases technical and financial proposals could be invited in a single envelope or in two separate envelopes. In case of a single envelope, technical and financial aspects of the offer are examined concurrently and the proposal with the lowest financial offer is accepted provided it responds fully to the technical requirements of the job. All offers not responding to technical requirements are rejected . In many cases, proposals which surpass the requirements are rejected because they are difficult to compare with the list of criteria. Presently most of the jobs of BTTB are awarded on the basis of this particular procedure.

In case of the 'two envelope' system all the technical offers are evaluated first and ranked according to their merit. The commercial offer of the best bidder is then opened and negotiations are carried out on the scope of work leading to acceptance of offer. Negotiation with other bidder ranked lower are undertaken if the negotiation with the higher ranked bidder fails. This procedure is more common to consultancy and when the budget is small. In most

cases, however, commercial offers of all technically qualified bids are opened and the contract is awarded to the lowest bidder, subject to negotiations on the contract.

Selection of a firm for a job through the process of evaluation can not be totally impartial. Experts involved in evaluation process are often open to lobbying. Often they need additional information or strong points for justifying selection of a particular party. This necessitates involvement and follow up action of the firm and its local agent.

The donor agency also at times influence the decision on selection of a firm for a particular job. As such the evaluation team should have sufficient reasons justifying selection of the firm for the job. Lobbying in Bangladesh and also with the donor agencies is, therefore, considered to be very important for obtaining contracts.

In case a suitable consultant / supplier cannot be identified, the job can go for a retender. The entire flow chart of the selection procedure can be seen in **Figure 7.3**.

## **7.5. LOCAL CONTENT**

Part of preparing a lowest cost bid often involves the use of local procurement and services than the offshore procurement and services. Capabilities of Bangladesh supplies and services in the telecommunication sector are outlined in this section.

### **7.5.1. Manufacturing Capabilities**

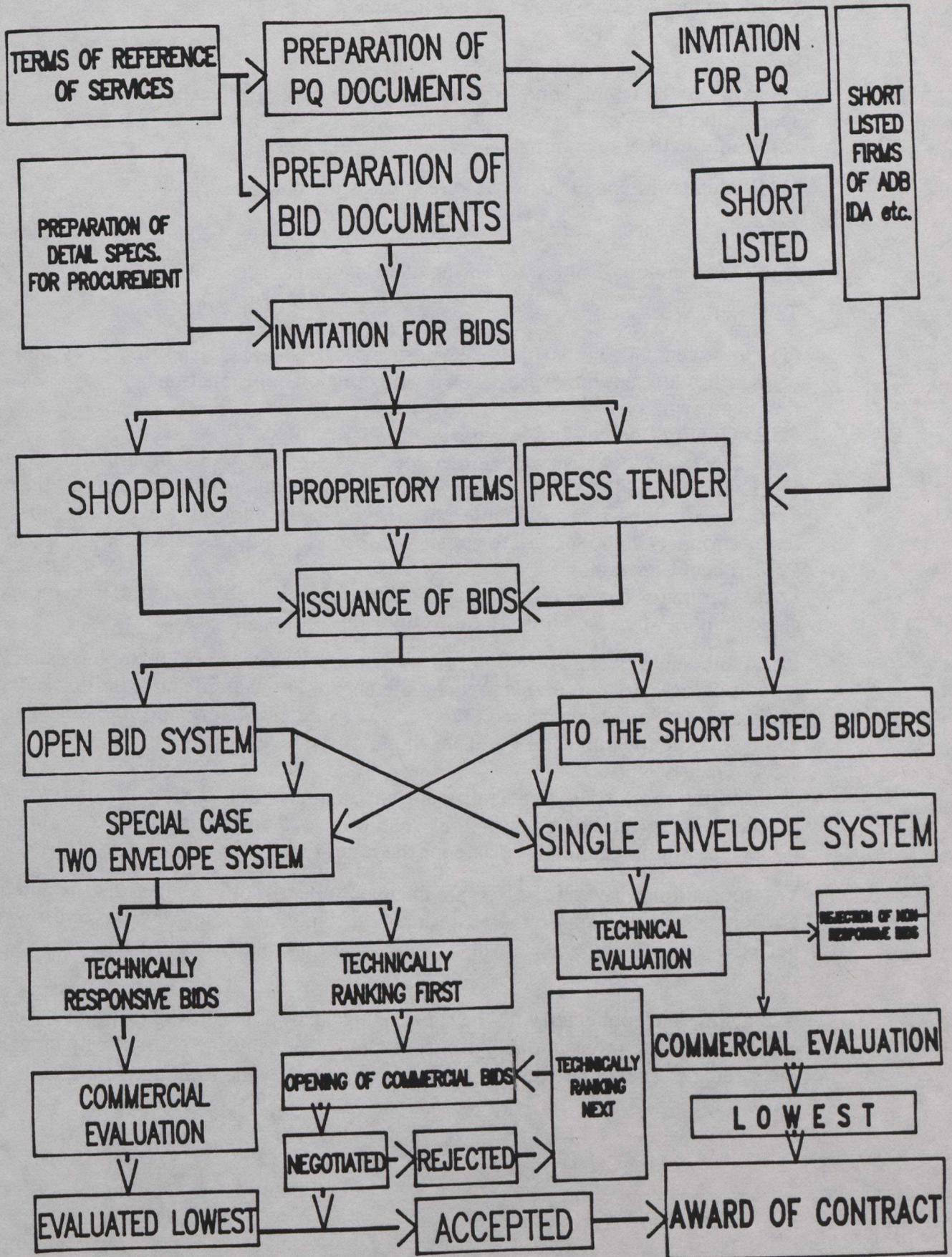
Local capabilities in machine shops and fabrication, as related specifically to the present sector, are very limited. BTTB has a workshop equipped with some machinery, which are more relevant for the older technology now in use in the system. Local capabilities in the private sector has not also grown as most of the projects of this sector in the past was implemented on turn key basis.

The Bangladesh Cable Shilpa (BCS) at Khulna produces telephone cables, drop wires, and other accessories for providing connections at subscribers' premises. However, in future telephone cables of this installation might become useless as fibre optics are now replacing such cables.

The Telephone Shilpa Sangstha at Tongi produces non-digital telephone exchanges of various capacities. Efforts are under way to modernize this factory in order to assemble digital exchange equipment locally. The factory also produces conventional dialing type telephone sets. The modernization project incorporates facilities for manufacturing digital telephone sets as well. Products of these two units are mentioned below.

#### **TSS :**

- (1) Produce hardware for public exchanges, distribution frames, PABXs, PBXs and telephone Sets.
- (2) Produce 20,000 line units of public exchange including distribution frames, accessories, installation materials etc., annually.
- (3) Produce small capacity PBXs & PABXs in limited quantity.
- (4) Produce 36,000 telephone sets annually.



**FIG. 7.3 PROCUREMENT PROCEDURE**

(5) Install test and commission all public exchanges.

**BCS :**

(1) Produce UG multiconductor Telephone cables of all gauges and sizes as per VDE specification.

(2) Produce all cable jointing materials.

(3) Produce twin-conductor drop wire along with all accessories.

(4) Galvanized iron wire of all gauges.

(5) Produce indoor - cables for wiring of exchange equipments and subscriber premises.

**Telegraph Workshop :**

(1) Produce all kinds of Posts, post materials, accessories for lines and wires etc.

(2) Can produce any hardware necessary for erection or installation of any system. MS fabrication plant available.

**7.5.2. Quality Control And Standards**

Bangladesh does not have well defined quality control programs. International Standards like IEEE, ASME, ASTM, different British, German and Japanese Standards or other Standards, Codes and Guides, acceptable internationally, can be followed in executing jobs. Use of different products in the sector are not standardized to any particular/fixed specification.

**7.5.3. Local Contractors**

Local contractor can be relied upon for the works like cable laying. BTTB has experienced cable jointers whose services are utilized for this purpose.

Local companies can also be employed for management of camps and for local supplies. Usually rates of local supplies and manpower are cheap. For example an experienced cable jointer could be hired for less than \$ 10 per day and an experienced foreman and a mid-level engineer could be hired for \$ 300 and \$ 500 per month respectively.

**7.5.4. Transportation**

Transportation of equipment and materials inland is not expected to pose any particular problem. These can be transported by road using 3, 5 and 7 ton trucks or by higher capacity trailers. Limitation on load per axle for the latter type is 10 tons.

Transportation by riverine vessels are cheaper and most of the cities, district and up-zillalahs are connected by rivers. In the eastern part of the country, major cities and towns are connected by meter gauge railway where in the western part, there is broad gauge railway connections.

Major cities are connected with the capital, Dhaka, by domestic flights (typical round trip fare is \$ 30 - 40 ). The International Airport in Dhaka connects the country with cities in Europe, the Middle East and the Far East by flights operated by the local and foreign airlines.

#### **7.5.4. Problems of Management**

Foreign companies, who are awarded contracts in Bangladesh, should have good organizational capabilities for completing their contract in time. Procurement, clearing of imported equipment and materials from the customs authorities and their transportation to the site, especially during the monsoon are identifiable as the critical steps. The selected firm should appoint an efficient Clearing and Forwarding agent to facilitate timely clearance of imported materials and equipment. The local agent could help select such an agent. The local agent and the Clearing and Forwarding agent should be capable of obtaining necessary clearance from the Revenue authorities in Dhaka. Usually the implementing agency undertakes to provide assistance for such official clearance. But the process can be expedited only by the local firms mentioned above. Project Manager designated by the selected firm should have experience of handling similar matters in developing countries. The time schedule for completion of the contract, to be agreed upon between the selected firm and the implementing agency, should take the above mentioned uncertainties into account. The local Canadian High Commission and the local agent could help the firm in drawing up a realistic time schedule for the work.

## CHAPTER 8

### PAST INVOLVEMENT OF FOREIGN COMPANIES IN THE SECTOR AND REASONS FOR THEIR SUCCESS

This Chapter provides a list of foreign companies that were involved in various past projects of the sector. Representative case studies on failure/success of foreign companies are discussed. This is intended to help identify reasons of specific companies' success and failure in procuring business in Bangladesh.

#### 8.1. INVOLVEMENT OF FOREIGN COMPANIES IN THE SECTOR

The history of growth of telecommunication sector in Bangladesh, described in Chapter 2 of the Report, shows that various foreign companies have supplied equipment and services to the sector. Even though at times certain company(ies) enjoyed monopoly in the market, other companies could not be totally excluded due to conditions of financing by different sources. Principal suppliers are identified in the following paragraphs.

##### 8.1.1. Supplies for BTTB

1. **LENKURT, U.S.A.:** Installed 960 channel Microwave links of :

- (a) Dhaka- Manikganj- Faridpur- Magura- Jessore-Khulna ;
  - (b) Magura- Jhenaidaha- Kushtia ;
  - (c) Dhaka- Hajiganj- Begumgonj- Sitakund- Chittagong ;
- Siemens, FRG, supplied the MUX equipment for the links.

2. **NEC, JAPAN :** Installed 300-channel Microwave link along with MUX equipments between Khulna-Mongla.

1800-channel Microwave link between Dhaka-Chittagong replacing Lenkurt system.

1920-channel Microwave link between Dhaka-Khulna replacing lenkurt system (now under installation).

Other urban areas, not linked by microwave links are linked by UHF links and patched with the main Microwave links. Such as :

Dhaka - Savar, Dhaka - Narsingdi - Bhairab, Dhaka - Narsingdi, Dhaka - Jaydevpur (Gazipur), Mymensingh - Jamalpur, Mymensingh - Kishorganj, Mymensingh - Netrokona, Faridpur - Rajbari, Faridpur - Gopalganj, Faridpur - Madaripur, Faridpur - Shariatpur, Jessore - Jenaidah, Jessore - Satkhira, Barisal - Patuakhali, Barisal - Chandpur, Sylhet - Sunamganj, Sylhet - Habiganj, Rangpur - Nilphamari, Rangpur - Kurigram , etc.

NEC, Japan also installed :

- (a) the computer-controlled digital Trunk exchange for overseas trunk calls.

- (b) the semi digital Trunk Automatic exchange for international Subscriber Dialing system.
- (c) Trunk automatic Exchanges 4 main and 27 sub, for nation-wide dialing system.
- (d) 26,000 line Digital Exchange for local telephones at Dhaka, using fibre optics as local networks.
- (e) 1000 line Digital Telex Exchange at Dhaka.

**3. TOSHIBA, JAPAN :** Installed 960-Channel Microwave links of :

- (a) Dhaka-Narsingdi-Brahmanbaria-Shahaji Bazar-Moulvi Bazar-Sylhet;
- (b) Dhaka-Manikganj-Tangail-Madhupur-Mymensingh;
- (c) Tangail-Sirajgonj-Bogra.

The MUX equipments was supplied by NEC, Japan.

**4. GTE, Italy :** installed 960-channel Microwave link of

Chittagong-Satkania-Chiringa-Cox's Bazar, with MUX equipments from Siemens, FRG. Installed 300-channel Microwave link between Betbunia-Rangamati;

**5. FUJITSU, Japan :** 960-channel Microwave links of ;

- (a) Bogra-Jaipurhat-Phulbari-Rangpur;
- (b) Bogra-Naogaon-Natore-Rajshahi;
- (c) Natore-Pabna-Kushtia-Chuadanga;
- (d) Khulna-Pirojpur-Barisal.
- (e) 300-channel microwave link of Hajiganj-Comilla.
- (f) Phulbari-Thakurgaon-Dinajpur

**6. RCA, Canada** installed the "A" type Earth Station for Satellite communication at Betbunia along with the single-hop Microwave link between Betbunia-Chittagong.

With the change of satellite configuration from INTELSAT V to INTELSAT VII A, they even modernized the Earth Station. But with the introduction of Digital Satellite system this Earth Station would become inoperative.

**7. THOMPSON-CSF FRANCE :** Installed the "B" type Earth Station at Talibabad including the single-hop Microwave link between Talibabad-Dhaka.

**8. PHILIPS, Holland :**

- (a) Supplied 5000 telephonesets, dialing type
- (b) HF/VHF Transmitters and Receivers and ancillary equipments for maritime mobile communication at Chittagong and Mongla.

**9. LM Ericsson Sweden :**

- (a) Supplied PABXs Cross-Bar system
- (b) Supplied 30 line magneto Board.

**10. Gold Star, South Korea :**

Supplied 2000 line and 400 line EMD PABXs.

**11. CITESSA, Spain :**

Supplied low-capacity X-Bar PABXs.

**12. Siemens FRG :**

- (a)Soft-ware for Public Exchanges.
- (b)Soft-ware for PBX & PABXs.
- (c)Soft-ware for telephonesets.
- (d)Soft-ware for Distribution frames.
- (e)Soft-ware for Cable jointing materials.
- (f)Semi-electronic PABXs.
- (g)Teleprinter & Telex machines.
- (h)Telex exchanges.
- (i)12 channel physical Carrier systems.
- (j)High-capacity MUX systems.
- (k)VFT System.

**13. MITEL, CANADA :**

39 Upazilla telecom exchange operation by Gulf Joint Venture Funding Private.

Also under the Cyclone Rehabilitation project, the entire southern belt of the country was linked through 24-channel UHF links. The UHF links for the main land were supplied by :

- (a)OKI, Japan
- (b)Motorolla, U.S.A.

The UHF links under Cyclone Rehabilitation project were supplied by:

- (a)GTE, Italy
- (b)OKI, Japan.

Under this project and also under Rural Telecom project, long- distant VHF PCOs were established in the base + mobile configuration, with 1 Base and 6 Mobile Units (PCOs).

These VHF Base + PCOs were supplied by:

- (a)NEC, Japan
- (b)FUJITSU, Japan,
- (c)MOTOROLA, U.S.A.

Due to supply constrains, many places were linked by land-line 12-channel Carrier Systems. Suchas:

- (a)Z12F System, supplied by Siemens, FRG
- (b)OS1 System, supplied by NEC, Japan.

Under the Chittagong Project, the 3 district Headquarters are inter-linked by 60/120-channel UHF links and the sub-district by 6/12-channel UHF links. All the equipments are supplied by MOTOROLA, U.S.A.

Now, under the Upazilla (sub-district) project, all the 460 sub- districts would be brought under UHF network. Presently, NOKIA, Finland, is supplying and installing 165 and BTMC, Belgium, is supplying and installing 135 links using Digital technique.

### 8.1.2. Supplies to CAAB

FACILITY	FREQUENCY	EQUIPMENT	COUNTRY
DVOR	112.7 MHz	THOMSON CSF-512D DUAL EQUIPMENT	(FRANCE)
D.M.E.	116.1 MHz	THOMSON CSF-721 DUAL EQUIPMENT	(FRANCE)
ILS-LOC	109.5 MHz	THOMSON CSF-LS371 DUAL EQUIPMENT	(FRANCE)
ILS-GP	332.6 MHz	THOMSON CSF-LS374 DUAL EQUIPMENT	(FRANCE)
ILS-OM	75 MHz	NARADUEX N318 DUAL EQUIPMENT.	( - )
OUTER	375 MHz	SPILSBURY LWX-100 DUAL EQUIPMENT.	( - )
LOCATOR			(CANADA)
N.D.B.	298 MHz	S. S-1000 DUAL EQUIPMENT	(U.S.A)
PRIMARY RADAR		THOMSON CSF-TR23K DUAL EQUIPMENT	(FRANCE).
SECONDARY RADAR		THOMSON CSF-RS870 DUAL EQUIPMENT	(FRANCE).
VHF/A/G		RX. TELERAD FC680	(FRANCE).
VHF/A/G		TX. EDYSTONE E-667/P	(U.K.)
VHF/A/G(S/BY)		TX./RX. JULLIET ER 360	( - )
VHF A/G(S/BY)		TX./RX. TELERADIO 225MA4	(U.K.)
VHF A/G(S/BY)		TX./RX. PAE 1600	(U.K.)
VHF/SMC		RX. TELERAD FC680	(FRANCE)
VHF SMC		TX./RX. AWA TR 235	(U.K.).
VHF SMC		TX./RX OLYMPIC.	( - )
VHF SMC		TX./RX. DYMAR 931	(U.K.)
VHF/SMC		TX./RX. PAE 50Z/SS	(U.K.)
HF A/G		RX. EDYSTONE EC'964/7	(U.K.)
HF A/G		RX. RF. 505 A.	( - )
HF AFS		RX. RACAL RA-1217	(U.K.).
MET		RX. RACAL RA-1217	(U.K.).
AFS		TX. RADIFON	(U.K.).
		TX. SST-400	(U.K.).
		TX. RACAL TTA-1253B	(U.K.).
		RX. CR-301A	(SWEDEN).
		RX. CR-302A	(SWEDEN).
		RX. CR-499A.	( - )
RX.R-1001		(ENGLAND).	
		RX. RADIFUSION R 10001	(U.K.).
		RX. DOVERTON MPC-1000C	( - )
		RX. RACAL RA-1217	( - )

FACILITY	FREQUENCY	EQUIPMENT	COUNTRY
		RX. RACAL RA-1217	
HF IT/RT (S/BY0		TX./RX. RACAL 4550S	(U.K.)
V.O.R.	113.0 MHz	WILCOX 585B DUAL EQUIPMENT	(U.S.A.)
D.M.E.	116.8 MHz	WILCOX 596 DUAL EQUIPMENT	(U.S.A.)
N.D.B.	287 MHz	SPILSBURY LWX-100A DUAL EQUIPMENT	(CANADA)
VHF A/G (MAIN & S/BY)		TX. PARK AIR 125X	(U.K.)
VHF A/G (S/BY)		TX. PARK AIR 125X	(U.K.)
VHF A/G (MAIN)		RX. PARK AIR 100A/4	( - )
VHF A/G (S/BY)		RX. CAI CR 78	( - )
VHF A/G (MAIN)		TX./RX. PAE AM1600	(U.K.)
VHF SMC (MAIN & S/BY)		TX. WILCOX 409A	( - )
VHF SMC (S/BY)		RX. PARK AIR 1000A/4	( - )
VHF SMC (S/BY)		RX. CAI CR 78	( - )
VHF SMC		TX./RX. DYMAR 931	( - )
HF IT/RT		TX./RX. RACAL 4550S	(U.K.)
V.O.R.	114.6 MHz	WILCOX 585B DUAL EQUIPMENT	(U.S.A.)
N.B.D.	228 MHz	SPILSBURY LWX-100A DUAL EQUIPMENT	(CANADA)
VHF A/G (MAIN)		TX./RX. PAE 1600	(U.K.)
VHF A/G (S/BY)		TX./RX. AWA TR 235	( - )
VHF SMC		TX./RX. PYE MF 5 AM	( - )
HF IT/RT (MAIN)		TX./RX. RACAL 4550S	( - )
HF IT/RT (S/BY)		TX./RX. CANADIAN-MARCONY CH 101	( - )
V.O.R.	116.4 MHz	WILCOX 585B DUAL EQUIPMENT	(U.S.A.)
N.B.D.	372 KHz	SPILSBURY LWX- 100A DUAL EQUIPMENT	(CANADA)
VHF A/G		TX./RX. PAE 1600	(U.K.)
		TX./RX. TELE RADIO 235MA4	(U.K.)
		TX./RX. PAE 50Z/SS	(U.K.)
VHF SMC		TX./RX PYE MF5AM	(U.K.)
HF IT/RT		TX./RX. CANADIAN MARCONI CH 101	( - )
		TX./RX RACAL 4550S	(U.K.)
V.O.R.	112.2 MHz	WILCOX 585B DUAL EQUIPMENT	(U.S.A.)
N.B.D.	350 KHz	SPILSBURY LWX-100A DUAL EQUIPMENT	(CANADA)
HF IT/RT	3660-6814 KHz	TX./RX. RACAL 4550S	(U.K.)
V.O.R.	115.5 MHz	WILCOX 585B DUAL EQUIPMENT	(U.S.A.)
N.B.D.	330 KHz	AEROCOM 100XLA DUAL EQUIPMENT	(U.S.A.)
HF IT/RT	6826 KHz	TX./RX. CANADIAN-MARCONI CH 101	( - )
V.O.R.	115.8 MHz	WILCOX 585B DUAL EQUIPMENT	(U.S.A.)
N.B.D.	268 KHz	SPILSBURY LWX-100A DUAL EQUIPMENT	(CANADA)
VHF A/G (MAIN)		TX./RX. PAE 1600	(U.K.)
VHF A/G (S/BY)		TX./RX. PAE 50Z/SS	(U.K.)

FACILITY	FREQUENCY	EQUIPMENT	COUNTRY
HF IT/RT		TX./RX. RACAL 4550	(U.K.)
N.B.D.	280 KHz	AEROCOM 31L DUEL EQUIPMENT	(U.S.A.)
VHF A/G		TX. PARK AIR 125X	(U.K.)
VHF A/G		RX. PARK AIR 100A	(U.K.)
VHF SMC		TX./RX. DYMAR 931	(U.K.)
VHF SMC		TX./RX. COMCO 733	(U.K.)
HF IT/RT		TX./RX. RACAL 4550	(U.K.)
N.B.D.	396 KHz	SPILSBURY LWX-100A DUEL EQUIPMENT	(CANADA)
VHF A/G		TX./RX. PAE 1600	(U.K.)
VHF A/G		TX./RX. PAE 50Z/SS	(U.K.)
VHF SMC		PYE MF 5 AM	(U.K.)
VHF SMC		TX./RX. COMCO 733	(U.K.)
HF IT/RT		TX./RX. RACAL 4550	(U.K.)
HF IT/RT (S/BY)		TX./RX. MARCONI CH101	(CANADA)

## 8.2. CASE STUDY OF SUCCESS/FAILURE OF FOREIGN COMPANIES

It was observed in the past that reputable foreign supplier often failed to procure business on the basis of international tenders. At the same time often obscure or less experienced companies succeeded in obtaining the same business. In other cases firms enjoying monopoly in the sector was preferred to better offers from other companies. This happened solely due to discrimination of the authority, because strings attached to financial packages can also interfere with the selection of an offer received through international competitive bids. However, it is not always possible to exclude sound technical and financial offers. A representative case history would help clarify such situations.

### 8.2.1. A specific case history

In Bangladesh, Siemens from FRG had a complete monopoly in public exchange equipment, especially auto exchanges. Manufacturers from other countries, specially from Japan were trying very hard to break this monopoly, but could not succeed.

In 1975, BTTB initiated a project to establish a nation-wide-and international dialing systems The Planning Commission approved the project. In collaboration with Siemens and Bundespost, one Consultant was appointed. The Report of the Consultant was accepted by the Government. The Consultant was entrusted with the responsibility to prepare detailed specification , using digital technology.

IDA agreed to finance the project and international bids were invited. The following suppliers responded:

- a. NEC from Japan
- b. SIEMENS from FRG

- c. LM Ericsson from Sweden
- d. Thompson-CSF from France
- e. GTE from U.S.A./Italy

Ranking of the proposals on the basis of response to the technical parameters were as follows:

- a. NEC less than 15%
- b. SIEMENS 50 %
- c. Ericsson 85 %
- d. Thompson-CSF 85 %
- e. GTE 95 %

Ranking on the basis of commercial offers (price ) were as follows:

- a. NEC Lowest
- b. SIEMENS Second lowest
- c. Thompson-CSF Third lowest
- d. Lm Ericsson Fourth lowest
- e. GTE Highest

The contract price, quoted by NEC, was almost half of that quoted by GTE. However, only the offers of GTE and Thompson-CSF were complete in all respects. Moreover, NEC and SIEMENS did not have past experience in similar projects, which was one of the pre-conditions for financing by IDA.

It is interesting that SIEMENS enjoyed the advantage of favor from the Consultants, had past experience in the country and was a partner of a joint venture telephone industry in Bangladesh. In spite of these advantages, their offer could not be found acceptable. NEC proposal was far from being acceptable. It was natural that Thompson-CSF or GTE would be awarded the contract.

However, the reality was otherwise and unexplainable under normal circumstances. NEC, through their local agents and contacts, succeeded in influencing BTTB and other officials to their favor. Sources like, pay offs and political lobby were utilized in ensuring the support of local decision makers. NEC also convinced the World Bank to accept the recommendations of the client on the NEC offer. It was revealed later on during implementation that NEC had not included in their commercial offer certain items like, interface equipment for inter-connecting public exchanges and newly installed NWD exchanges. Ironically, when these cost were included, their Contract price became higher than the offer of Thompson-CSF.

Encouraged by such a success, NEC later on arranged tied Japanese funds for " Digital Exchange for Dhaka Metropolitan city". Originally, IDA had committed funds for this project, who were persuaded by the Japanese supplier to withdraw this commitment. It is also reported that the Japanese Prime Minister had made specific request to the President of

Bangladesh on this project. It was also given to understand that other projects under Japanese finance could suffer if this project did not materialize. As such Bangladesh was compelled to request the World Bank to re-allocate the committed fund for some other projects of this sector. NEC is presently 'proudly' implementing the Digital Telephone project with 26,000 lines in the capital Dhaka. They are also in the lookout for similar successes in procuring business in this sector.

## **CHAPTER 9**

### **APPLICABLE RULES, REGULATIONS AND PROVISIONS**

This Chapter outlines the legislative framework which covers the telecommunication sector of Bangladesh. Salient features of such framework as outlined here is expected to provide an idea about the relative advantages and disadvantages of involvement of foreign companies in different activities. Part of the Income-tax law, as applicable to the foreign companies is also provided. Such information is useful as background material for Canadian companies.

#### **9.1. BANGLADESH TELEGRAPH AND TELEPHONE ORDINANCE**

The Government promulgated an ordinance named " Bangladesh Telegraph and Telephone Ordinance " in 1979 (partly amended in 1985) for efficient management of different operations of telecommunication in the country. Salient features of the Ordinance are as follows:

- a. The Board consists of a Chairman, four full-time Members, appointed by the Government and three part-time Members.
- b. The Board is responsible for control, management, development and operation of telephone and telegraph services in the country.
- c. Functions of the Board include, among others;
  - . preparation and execution of all development plans;
  - . association with any international organization in connection with activities of the sector;
  - . operation and maintenance of all facilities, their renewal and repair;
  - . Purchase and procurement of plant, machinery and stores;
- d. Borrowing of funds from internal and external sources with approval of the Government;

#### **9.2. FOREIGN TAX-CREDIT**

The Bangladesh side will provide the Contractor with documentary evidence about payment of income-tax on behalf of the Contractor. The evidence of payment of income-tax on behalf of the Contractor could be used for obtaining Foreign Tax credit in the Contractor's home country. Such a protocol between the Governments of Bangladesh and Canada already exists.

## **CHAPTER 10**

### **HOW CANADIAN COMPANIES CAN GET INVOLVED**

This chapter summarizes types of projects in Telecommunication Sector of Bangladesh that are likely to be implemented in the future. Weaknesses in the approach of Canadian companies, which are felt to have deprived them of business in the past, are analyzed. General strategy for successful participation of Canadian companies in Bangladesh are provided. Check lists for selection of local agent and for procuring business are also given. Other related informations, which are considered helpful in procuring business are also mentioned.

#### **10.1. OPPORTUNITIES FOR CANADIAN COMPANIES**

Foregoing Chapters of this Report provide a description of the growth of the Telecommunication Sector of Bangladesh and business opportunities for Canadian companies.

Future projects in this sector can be classified into the following broad groups:

##### **A. Bangladesh Telegraph and Telephone Board**

1. Different Types of Exchanges ;
2. VHF, UHF, MW and other long distance links;
3. Rural Telecommunication Network ;
4. Trunk Exchanges ;
5. Local networks (fibre optics);
6. Satellite Communication ;
7. Training , technology transfer and telecommunication production facilities ;
8. Telex and teleprinter, etc.
9. Ship-shore telecommunication facilities
10. Cellular telephone network.

##### **B. Other users**

1. Telecommunication equipment, network for other organizations ;
2. Radar and other facilities for air traffic control and handling;
3. Communication facilities of defense services and internal security purposes;
4. Communication network for inland and off-shore navigation.

Developing countries, development of any sector is dependent on availability of funds, both in local and foreign currencies. The analysis already presented in this report shows that the at-

titude of international donors towards this sector has been positive and it is expected that the trend will persist in the future.

Analysis of financing trends shows that about 20% of the funds for the sector under review was untied, offering equal opportunities for all nations to participate in execution of projects through international open bids.

Available information shows that involvement of Canadian companies in this sector was less than companies from other countries. The extent of their involvement, in fact, hardly reflects their varied experience, expertise and availability of the range of products which could be accepted in various projects. It has been possible to identify some of the underlying weaknesses in marketing techniques as follows:

1. Canadian companies are not as aggressive as the companies from other countries.
2. Canadian companies are not fully aware of the potential opportunities in Bangladesh Telecom sector and in general with the background information about the country.
3. Canadian companies do not make serious effort to make the relevant authorities in Bangladesh aware of their technical capabilities, products and services.
4. Canadian companies do not seriously follow the development of projects in Bangladesh from project inception, nor do they try seriously to motivate the concerned authorities to their favour.
5. Interested companies did not appoint good and capable local agents or contact points in the past to help them follow and pursue projects in Bangladesh.
6. Canadian Bilateral financial assistance to Bangladesh did not give adequate attention to the projects in this sector.

Some guidelines and general strategies are suggested in the following paragraphs. It is the considered opinion of the Consultants that such recommendations will be helpful in expanding the business of Canadian Companies in the Telecommunication sector of Bangladesh.

## **10.2. GENERAL STRATEGIES FOR SUCCESSFUL PARTICIPATION**

It is to be recognized that the Canadian companies can participate in projects in Bangladesh in two distinct ways, namely:

1. as supplier, contractor and by providing other services such as consultancy, and
2. as investors in the sector for installation of various facilities and their operation and maintenance on revenue sharing basis.

The above types of participation will have some features in common. There are, however, specific issues relevant to individual types of operations. Some salient features of related strategies are elaborated in the following paragraphs.

### **10.2.1. Supply, Contract and Services**

These types of business are probably the most difficult to obtain, as business has to be procured through open competitions with contenders from different countries.

Many organizations and agencies of the Government, and also bilateral donors and international development finance institutions, are involved in conceptualization, project formulation and approval, financing, preparation of bid- documents/specifications, prequalification of bidders, evaluation of bids, award of contract and implementation of any project in Bangladesh. Often even the conceptualization of a project can be formulated in a way that can be satisfied by only one particular supplier. Similarly, a prequalification criteria may be incorporated at an early stage to give preference and advantage to or to penalize a particular party. Similarly an unfavorable criterion could go against the interest of an otherwise competent company. As such it is advisable that intending firms should take interest and try to shape the intermediate steps to its advantage. It is worthwhile to note that many companies, especially those from Japan, follow this procedure in procuring business even in the case of an open international bid.

The financial offer of a bid plays a vital role in procuring business in Bangladesh. An offer, attractive and appropriate on technical merits, could lose all its advantages if its commercial offer is not the lowest or, at least, close to it. It is to be understood that according to the financial regulations of Bangladesh financial conditions of an offer should get prominence in selection of a party for a job. If the financial and the technical offers, taken together, is not found suitable, then fresh bids can be invited. In such a situation there remains a possibility that all the competitors become aware of merits and demerits of technical and financial offers of all the bidders. It is not uncommon that in such a situation, the best proposal in the original bidding loses some of the advantages.

One way to reduce the cost is to include local supplies and services, including manpower in the offer. The local scope is not very significant for the sector under review. Nevertheless, local content, however small it could be, is expected to be helpful in preparation of a low cost offer. On the other hand, unless selected properly, the local content could have a detrimental effect, especially on the contract schedule. Mixture of local and expatriate contents of the offer should be optimized in order to dispense with this disadvantage.

### **10.2.2. Joint Venture/Revenue Sharing Projects**

The Government is now encouraging foreign participation in all sectors of economy either as partners in joint venture or in the form of revenue sharing with local counterparts. Relevant rule, regulations and procedures are being liberalized and rationalized in order to attract intending investors. One export processing zone is already in operation in Chittagong. Another one, concentrating on electronics and light industries, is being organized at Savar, about 40 Km from Dhaka. Joint venture industries can be set up at these locations, or elsewhere in the country in collaboration with private entrepreneurs or with the public sector. So far most of the foreign investment has been in light industries, especially assembly from complete knock down (CKD) components. This has the advantage of using cheap local labor. It may be mentioned that a number of local manufacturers produce similar operations for producing items of amusement electronics for domestic market under license from foreign companies. Recent-

ly a local firm has started producing PBX equipment, MODEM, FAX with technical collaboration with MITEL, Canada both for domestic and export to Nepal, Vietnam, Pakistan etc. Joint Venture for production of tele-communication equipment could, therefore, be considered by the intending companies.

So far as revenue sharing projects are concerned, operations are expected to be complicated. One conceivable problem is with the tariff structure. Commercial factors are not always considered in fixing the tariff by the Government, because many social factors are taken into consideration and cost is sometimes subsidized by the Government. Such subsidy might not be applicable to private sector operators. Realization of dues from individual customer is also difficult. These points should be clarified with the Government before any project on revenue sharing basis is taken up by the foreign companies.

### **10.3. NEED FOR A LOCAL AGENT**

It is imperative that the Canadian Companies, interested in expanding their business operations in telecommunication or any other sector, should have competent local agents in Bangladesh with the following specific and well defined responsibilities, which among others are :

1. keep track of developments by keeping liaison with the relevant agencies and key personnel;
2. to identify possible future projects of interest at an early stage for their principal and to follow up the progress and development;
3. to inform the principal about the projects, which could be undertaken if finance is available, so that its principal could try to arrange total or partial finance;
4. to help accelerate processing of projects identified by the principals;
5. to keep liaison with country offices/ resident representatives of various international development finance institutions;
6. to inform the principals about the bottlenecks and the contact points abroad ( for example Head Office of a particular donor agency) that have to be approached in removing such bottlenecks;
7. to provide the principal with advance information on prequalification, scope of work, specifications, etc.
8. to try to direct the project criteria, to the maximum extent possible, to make these compatible with the principal's products and services;
9. to collect information about other competitors taking interest in the project;
10. to inform the principal about various important target dates to be met ;
11. to inform the principal about background data and information which are deemed essential in preparation of technical and financial offers for the job;

12. to inform the principal about the specific and obligatory requirements to be fulfilled in preparation of an offer;
13. to help the principal select local counterpart, supplies and services which may be considered by the principal in preparing a low cost bid;
14. to represent principal during bid opening and closing;
15. to purchase bid documents for principal.

#### **10.3.1. Selection of the local agent**

Intending companies should be extremely careful in selecting their local agents. Exploratory visits may be undertaken to identify and appoint such agents. The Company should try to assess the capability of its local agents based on its capability to undertake the above mentioned functions efficiently. A local agent could be selected based on factors like, data bank and information it has in its possession on this sector, contacts and influence with the important officials and decision makers; size of the company, its technical expertise, financial position, past experience in handling projects in the sector, and communication and logistic support the local company can offer. Commercial section of Canadian High Commission, Dhaka can provide valuable advise in this matter.

#### **CHECK LIST FOR SELECTION OF LOCAL AGENT**

1. Is the local firm conversant with the development strategy of the sector?
2. Has the firm in-house expertise on subjects related to the sector?
3. Is the firm able to introduce the principal to the key personnel of the sector( to be proved during the exploratory visit of the principal) ?
4. Has the local firm adequate data base on the sector?
5. Past experience in handling projects of the sector
6. Financial soundness and credibility of the firm (to be verified from the bankers)
7. Whether any reference about the firm is available with the High Commission?
8. Communication and logistic support available to the firm
9. Is the firm able to prove its capability to tie up appropriate lobby to influence the ultimate decision makers?

Assessment of capability of the local agent to look after the interest of its principal should be made based on the above criteria. It is the considered opinion that the local agent should have good connection with different political parties and should not be necessarily dependent on any particular lobby. Such a local agent could serve the cause of its principal efficiently for a longer time.

### **10.3.2. Check list for procuring business**

Intending Canadian companies should follow the following check list for different stages:

#### **CHECK LIST DURING BIDDING**

1. Are the documents and specifications included in the offer ?
2. Does the quotation show separate prices as follows:
  - a. Ex-work
  - b. FOB at port of export
  - c. C & F ( Chittagong, Mongla ) Bangladesh
3. Is Contract price fixed and firm?
4. Is the country of manufacture shown ?
5. Is guarantee period shown ?
6. Is delivery date shown ?
7. Are shipping weight and dimensions indicated ?
8. Is validity of bid shown ?
9. Has consideration been given to the following items ?
  - a. Liquidated damages
  - b. terms of payment
10. Is the confidentiality undertaking signed and enclosed with the bid ?
11. Are certificates in line with the relevant Clause ?
12. Are all relevant drawings / catalogues enclosed ?
13. Are the cash receipts as bid document purchased properly enclosed ?
14. Is the Bid Bond enclosed to the bid ?
15. Is the eligibility certificate enclosed ?
16. Is the original tender document duly signed and sealed by the bidder enclosed ?
17. Are the conditions of purchase accepted ?
18. Are all other conditions specified in the bid totally fulfilled ?
19. Are all other documents specified in tender document enclosed?

## IMPORTANT POINTS CONSIDERED DURING EVALUATION OF BIDS

1. Tender Number
2. Closing date
3. Validity of quotation
4. Delivery schedule
5. Terms of payment
6. Source and availability of fund
7. Procedure for submission of tender
  - a. Double envelope system
  - b. Single offer ( technical + commercial )
8. Currency in which price is to be quoted
9. Bid bond
10. Commission of Local agent
11. Liquidated damages
12. Insurance
13. Inspection (pre-shipment)
14. Warranties , guarantees and related certificates
15. Other certificates mentioned in the tender document
16. Power Of Attorney ( if applicable )
17. Check list ( if mentioned in tender document )
18. Catalogues and leaflets as per tender document
19. Money receipt(s) to be enclosed

### **10.3.3. Guidelines in case of investment projects**

Most of the guidelines and strategies mentioned earlier would be, in general, applicable in case of participation by the Canadian Companies. In case of an investment project, many of the terms and conditions could be negotiated with the Government of Bangladesh. Appointment of a Company Lawyer and a Contract Lawyer is advisable to help the Company's Attorneys on contractual issues.

Special attention should be paid to the Clauses concerning Accounting Procedure, Recovery of Cost and Sharing of profit. Force Majeure Clause should clearly distinguish between a real

'force Majeure' and an inability which could be avoided with reasonable measures of the Government. In case there is undue interference from local population in carrying out operation in accordance with the provisions of the Agreement then the Government should agree to make good not only the cost incurred by the Contracting Party but also the cost of that money (interest) and at least a part of the profit the Contracting Party would have otherwise expected from its involvement in the relevant operation.

#### **10.4. NEED FOR BUSINESS PROMOTION**

Relevant agencies in Bangladesh are not well aware of the capabilities, products and services of Canadian companies in telecommunication sector. In fact the satellite ground station supplied in 1974 is the only significant Canadian supply for this sector. Other countries, notably Japan, Belgium, the U.K., FRG, South Korea, Finland, U.S.A. etc., have quite significant business promotional activities in Bangladesh. These are carried out in the following forms:

- a. Regular business promotion trips by representatives of various companies ( these are done mostly as a part of their trips to other countries in this region);
- b. Mailing of information, brochures, technical description/journals on products and services of such companies;
- c. Seminars, workshop, product exhibition, etc. ( these are often arranged jointly by a number of companies).
- d. Establishment of contacts with key personnel of the sector;
- e. Invitation of key personnel to the production facilities of different companies.

#### **10.5. ROLE OF THE CANADIAN HIGH COMMISSION**

The Canadian High Commission in Dhaka should be considered as a contact point for the Canadian Companies intending to expand their business or to participate in bidding for a work in Bangladesh. The High Commission can provide such companies with background information about the particular job, funding situation, contact points in the implementing agency, work schedule, future opportunities and their phasing and related programs of the Government. The High Commission can also provide background information of potential local agents and advise on the selection of agent.

The High Commission may also play an important role in redressing genuine grievances of the Canadian Companies through discussions with the relevant agencies in Bangladesh. Help to the private sector through the diplomatic channel is not uncommon in Bangladesh and such requests are usually considered seriously by the local authorities.

Canadian Companies , intending to introduce themselves to the local authorities, should preferably utilize the good offices of the High Commission. Such an introduction is expected to have a better impact on the authorities concerned.

It is the considered opinion of the Consultants that different facilities, assistance and services offered by the Canadian High Commission in Dhaka should be utilized to the fullest extent possible by the intending firms.

## **CHAPTER 11**

### **CONCLUSIONS AND RECOMMENDATIONS**

This Chapter summarizes important conclusions of the Report and gives a set of recommendations on successful participation of Canadian companies in the projects of the sector.

#### **11.1. CONCLUSIONS**

1. Telecommunication sector of Bangladesh is in its nascent state and thus the future growth is expected to be high.
2. The Government attaches top priority to the sector and foreign donors are interested in assisting the Government in its aim to bring the entire country under telecommunication network at the earliest.
3. Bangladesh Telegraph and Telephone Board (BTTB) is the focal government organization responsible for development of the sector. Some other organizations, like the defense, internal security, civil aviation, radio, television, railway and inland water navigation procure telecommunication equipment and services on a regular basis.
4. In the past nine years about US \$ 200 Million was provided by bi-lateral and multi-lateral donors. About 20 % of this was untied, for which Canadian companies qualified to procure business.
5. More than US \$ 700 Million is estimated to be spent in foreign exchange for identified projects of this sector during the period 1990-95. A part of this is expected to be provided by un-tied multi-lateral sources of financing ( i.e., IDA, ADB and others).
6. Canadian participation in past projects of this sector does not reflect their capabilities and expertise.
7. Weakness in marketing techniques, lack of interest and inefficient local agent are identified as the main reasons why Canadian participation in this sector leaves much to be expected.
8. Some companies from West Germany and Japan enjoy monopoly in certain types of equipment and services. This monopoly can be broken, as proved by the success of Japanese companies in breaking the monopoly of German companies.
9. Bangladesh Telecommunication sector is gradually upgrading its technology to digital and optics from present analogue and others.

#### **11.2. RECOMMENDATIONS**

1. Canadian companies should take active interest in the projects of the sector.
2. Serious companies should follow up the development of projects of interest right from their conceptualization.

3. Canadian companies should make themselves and their products and services known to the key organizations and personnel of the sector in Bangladesh.
4. Canadian companies should undertake business promotional trips to Bangladesh.
5. Individual or joint promotional exhibition(s) of products and services should be arranged in Dhaka.
6. CIDA and EDC should be motivated to provide tied-finance for identified projects in the sector. Such financing in the beginning will help Canadian firms to establish their initial credibility.
7. Canadian companies should appoint suitable local agents to look after their interest in Bangladesh. Local agents should be selected based on the criteria given in Chapter 10 of this Report.
8. Intending companies should be aggressive in their marketing activities.
9. Companies should try to prepare a low cost bid, because local financial rules give prominence to cost.
10. Local supplies and services should be included in offers to the extent possible in order to facilitate cost effectiveness of offers. Care should be taken in determining the extent and sources of such local supplies and services.
11. Formation of joint venture companies may be considered for producing different equipment for local and export markets. Assembly lines from CKD conditions are recommended because of the cheap rates of local labor and the liberal Government rules for foreign investment in production activities.
12. Services of the local Canadian High Commission should be utilized for safeguarding interest of Canadian companies and for various business promotional activities and collection of information of potential projects of the sector.

## PRODUCT INDEX

<u>PRODUCT NAME:</u>	<u>Used by the Organisation</u>
A-SCUC of BSWF for NEDAX Digital Telex Exchange	BTTB
A-SCUSofBSWFforNEDAXDigitalTelexExchange	BTTB
AFS	CAAB
A GROUP AMPLIFIER for UHF Station	BTTB
ALARM UNIT FOR UHF STATION	BTTB
ANM of MF for NEAX Digital Telephone Exchange	BTTB
ASC for NEAX Digital Telephone Exchange	BTTB
BASE BAND COMBINER for UHF Station	BTTB
BASE BAND COUPLER FOR UHF STATION	BTTB
BASE BAND INPUT	BTTB
BASE BAND OUTPUT	BTTB
BC of CMF for NEAX Digital Telephone Exchange	BTTB
BDTM of MISCF for NEAX Digital Telephone Exchange	BTTB
'B' GROUP AMPLIFIER FOR UHF STATION	BTTB
BMC of CMF for NEAX Digital Telephone Exchange	BTTB
BRANCHING CIRCUITFOR MICRO-WAVE SYSTEM	BTTB
CARRIER AMPLIFIER FOR UHF STATION	BTTB
CC of CPF for NEAX Digital Telephone Exchange	BTTB
CC of CPF for NEDAX DigitalTelex Exchange	BTTB
CHANNEL CARDS FOR UHF STATION	BTTB
CHANNEL COUPLER UNITS FOR UHF STATION	BTTB

<b>PRODUCT</b>	<b>USED BY</b>
	<b><u>ORGANISATION</u></b>
CHECK UNIT FOR UHF STATION	BTTB
CHEK UNIT FOR UHF STATION	BTTB
CIRCULATOR IN RF BRANCHING NETWORK	BTTB
CIRCULATORS TO TRANSMITTER AND RECEIVERS IN RF BRANCHINGN	BTTB
CLKM of MF for NEAX Digital Telephone Exchange	BTTB
CMC of CMF for NEAX Digital Telephone Exchange	BTTB
CMIM of CMF for NEAX Digital Telephone Exchange	BTTB
CONTROL UNIT FOR UHF STATION	BTTB
DCH of CPF for NEAX Digital Telephone Exchange	BTTB
DCH of CPF for NEDAX Digital Telex Exchange	BTTB
DEMULATOR	BTTB
DIPLEXER IN RF BRANCHING NETWORK	BTTB
DISTRIBUTION UNIT FOR UHF STATION	BTTB
DKC of IOCF for NEDAX Digital Telex Exchange	BTTB
DKU of IOCF for NEDAX Digital Telex Exchange	BTTB
DME	CAAB
DPU of POS for NEDAX Digital Telex Exchange	BTTB
DTC of MTF for NEDAX Digital Telex Exchange	BTTB
DTIC of DTLF for NEAX Digital Telephone Exchange	BTTB
DTIM of DTLF for NEAX Digital Telephone Exchange	BTTB
DTITM of DTLF for NEAX Digital Telephone Exchange	BTTB
DUPLEXER FOR UHF STATION	BTTB
DVOR	CAAB

<u>PRODUCT</u>	<u>USED BY ORGANISATION</u>
E-TSTM of MF for NEAX Digital Telephone Exchange	BTTB
ELLIPTICAL WAVE GUIDE	BTTB
EQUALIZER AMPLIFIER	BTTB
EXPRESS ORDER WIRE FOR MICRO-WAVE SYSTEM	BTTB
F-TSTM of MF for NEAX Digital Telephone Exchange	BTTB
FMTC of MISCF for NEAX Digital Telephone Exchange	BTTB
FMTC of MTF for NEDAX Digital Telex Exchange	BTTB
FS Rack for EMD Exchange	BTTB
Function Tester for EMD Exchange	BTTB
Fuse Strip with Re-soldering device for all Racks of EMD-	BTTB
FUSE UNIT FOR UHF STATION	BTTB
GASF Rack for EMD Exchange	BTTB
HARMONIC PRODUCER FOR UHF STATION	BTTB
HF/AFS	CAAB
HF/AG	CAAB
HF/ITRT	CAAB
HF/ITRT MAIN	CAAB
HF/ITRT S/BY	CAAB
HYBRID UNIT FOR MICRO-WAVE STATION	BTTB
HYBRID UNIT FOR UHF STATION	BTTB
IDF for EMD Exchange	BTTB
IF AMPLIFIER	BTTB

<b>PRODUCT</b>	<b>USED BY ORGANISATION</b>
IF LEVEL METER	BTTB
IGS Rack for EMD Exchange	BTTB
IIGS Rack for EMD Exchange	BTTB
IIIGS Rack for EMD Exchange	BTTB
ILSGP	CAAB
ILSLOC	CAAB
ILSOM	CAAB
IVGS Rack for EMD Exchange	BTTB
KEY BOX FOR MICRO-WAVE SYSTEM	BTTB
LCU of ASWF for NEDAX Digital Telex Exchange	BTTB
LCU of BSWF for NEDAX Digital Telex Exchange	BTTB
LEVEL METER FOR MICRO-WAVE SYSTEM	BTTB
LF Rack for EMD Exchange	BTTB
Link Tester for EMD Exchange	BTTB
LOC of LTF for NEAX Digital Telephone Exchange	BTTB
LPC of MTF for NEDAX Digital Telex Exchange	BTTB
LP for NEDAX Digital Telex Exchange	BTTB
MASTER OSCILLATOR FOR UHF STATION	BTTB
MCNM of MISCF for NEAX Digital Telephone Exchange	BTTB
MCSL for NEAX Digital Telephone Exchange	BTTB
MCSL for NEDAX Digital Telex Exchange	BTTB
MD Ffor EMD Exchange	BTTB
MDULATOR	BTTB

<b>PRODUCT</b>	<b>USED BY <u>ORGANISATION</u></b>
MEC of MF for NEAX Digital Telephone Exchange	BTTB
MET	CAAB
Meter for EMD Exchange	BTTB
METERING UNIT	BTTB
MM of CMF for NEAX Digital Telephone Exchange	BTTB
MM of CPF for NEAX Digital Telephone Exchange	BTTB
MM of CPF for NEDAX Digital Telex Exchange	BTTB
MODU of ASWF for NEDAX Digital Telex Exchange	BTTB
MPAM of CPF for NEAX Digital Telephone Exchange	BTTB
MPC of MISCF for NEAX Digital Telephone Exchange	BTTB
MSDC for NEAX Digital Telephone Exchange	BTTB
MSDIM of MF for NEAX Digital Telephone Exchange	BTTB
MTB of LTC SL for NEDAX Digital Telex Exchange	BTTB
MTC of MISCF for NEAX Digital Telephone Exchange	BTTB
MTC of MTF for NEDAX Digital Telex Exchange	BTTB
MTTY for NEDAX Digital Telex Exchange	BTTB
MTU of MTF for NEDAX Digital Telex Exchange	BTTB
NDB	CAAB
NOISE FIGURE METER	BTTB
Ohm Meter for EMD Exchange	BTTB
OMNI BUS ORDER WIRE	BTTB
OUTER LOCATOR	BTTB
OW UNIT FOR UHF STATION	BTTB

PRODUCT	USED BY <u>ORGANISATION</u>
PCH of CPF for NEAX Digital Telephone Exchange	BTTB
POSX of POS for NEDAX Digital Telex Exchange	BTTB
POWER SUPPLY CONTROL	BTTB
POWER SUPPLY UNIT FOR MICRO-WAVE SYSTEM	BTTB
POWER SUPPLY UNIT FOR UHF STATION	BTTB
PRE CARRIER AMPLIFIER FOR UHF STATION	BTTB
PRIMARY RADAR	CAAB
PSC of MISCF for NEAX Digital Telephone Exchange	BTTB
PSIM of MISCF for NEAX Digital Telephone Exchange	BTTB
RADIO FREQUENCY AMPLIFIER	BTTB
RBDC of RBD for NEDAX Digital Telex Exchange	BTTB
RBDP of RBD for NEDAX Digital Telex Exchange	BTTB
RECEIVE LOCAL CONTROL	BTTB
RECEIVE LOCAL OSCILLATOR	BTTB
REC MIXTURE	BTTB
Rectifier and Battery Sets for EMD Exchange	BTTB
REMOTE SUPERVISOR FOR MICRO-WAVE SYSTEM	BTTB
RF FREQUENCY COUNTER	BTTB
RF POWER METR	BTTB
RF SIGNAL GENERATOR	BTTB
RSM for EMD Exchange	BTTB
RX UNIT MAIN FOR UHF STATION	BTTB
RX UNIT SBY FOR UHF STATION	BTTB

PRODUCT	USED BY
SECONDARY RADAR	CAAB
SOUND COMBINER	BTTB
SOUND SEPERATOR	BTTB
SPBM of CPF for NEAX Digital Telephone Exchange	BTTB
SPBM of CPF for NEDAX Digital Telex Exchange	BTTB
SPC of TSF for NEAX Digital Telephone Exchange	BTTB
Speed Tester for EMD Exchange	BTTB
SRD of IOCF for NEDAX Digital Telex Exchange	BTTB
SRP for all Racks of EMD Exchange	BTTB
SRTM of TSF for NEAX Digital Telephone Exchange	BTTB
SSM of TSF for NEAX Digital Telephone Exchange	BTTB
STC for NEAX Digital Telephone Exchange	BTTB
STU of IOCF for NEDAX Digital Telex Exchange	BTTB
SVTM of MF for NEAX Digital Telephone Exchange	BTTB
TBB UNIT FOR UHF STATION	BTTB
TC of CPF for NEDAX Digital Telex Exchange	BTTB
TC of MF for NEAX Digital Telephone Exchange	BTTB
Test Lamps for EMD Exchange	BTTB
TJM of MISCF for NEAX Digital Telephone Exchange	BTTB
TMIU of ASWF for NEDAX Digital Telex Exchange	BTTB
TM of LTF for NEAX Digital Telephone Exchange	BTTB
TM of MF for NEAX Digital Telephone Exchange	BTTB
Tool Kits for EMD Exchange	BTTB
TPGofLTCSLforNEDAXDigitalTelexExchange	BTTB
TRANS LOCAL OSCILLATOR	BTTB

PRODUCT	USED BY
	<u>ORGANISATION</u>
TRANSMISSION MIXER	BTTB
TRANSMISSION MULTIPLIER	BTTB
TRAVELLING WAVE TUBE AMPLIFIER	BTTB
TSM of TSF for NEAX Digital Telephone Exchange	BTTB
TTY for NEAX Digital Telephone Exchange	BTTB
TX UNIT MAIN FOR UHF STATION	BTTB
TX UNIT S/BY FOR UHF STATION	BTTB
VERY HIGH FREQUENCY AMPLIFIER	BTTB
VHF/AG/MAIN	CAAB
VHF/AG/S/BY	CAAB
VHF/SMC	CAAB
VHF/SMC/MAIN	CAAB
VHF/SMC/S/BY	CAAB
VOR	CAAB
VTVM FOR MICRO-WAVE SYSTEM	BTTB
WAVE GUIDE :CO-AXIAL CABLE FOR UHF STATION	BTTB
WHITE NOISE MEASURING SET	BTTB

**List of organizations contacted for the study**

1. Bangladesh Telegraph and Telephone Board
2. Ministry of Post, Telegraph and Telephone
3. Planning Commission
4. External Resources Division, Ministry of Finance
5. National Broadcasting Authority
  - a. Bangladesh Television
  - b. Radio Bangladesh
6. Bangladesh Inland Water Transport Authority
7. Bangladesh Inland Water Transport Corporation
8. Bangladesh Civil Aviation Authority
9. Bangladesh Railway Board
10. Police Directorate
11. Ansar Directorate
12. Bangladesh Rifle
13. Directorate of Defense Purchase

**BIBLIOGRAPHY**

1. Statistical Year Book, 1988 Bangladesh Bureau of Statistics
2. Fourth Five Year Plan, Planning Commission, Government of Bangladesh
3. MIS Monthly Bulletin, BTTB, January-Sept, 1989
4. Budget Government of Bangladesh-Demands For Grants on BTTB for 1987-88 and 1988-89.
5. Brief Outline of 4th Five Year Plan, BTTb, August, 1989
6. Annual Report of BTTB, 1986-87, 1987-88 and 1988-89(draft)
7. Position Paper for Inauguration of Two Telex Exchanges- A Gift From The Royal Government of Saudi Arabia, February, 1989
8. BTTB Internal Document on VVIP Telecommunication Facility
9. Paper on Digital Switching in Rural Areas, SAARC Technical Committee Meeting on Telecommunications, Dhaka, July, 1989
10. Rural Telecommunication, ITU Publication, 1988
11. Khabiruzzaman, S.M. and Haque, M, Dhaka Telephone by 2000 AD, Dhaka 2000 A.D., Seminar organized by the Institution of Engineers, Bangladesh, June, 1988
12. Annual Development Program of BTTB for 1989-90, BTTB, July, 1989
13. Bangladesh Telegraph and Telephone Ordinance, 1979, Government of Bangladesh
14. Conceptual M&O Structure for BTTB's TELECOM Network, DETECON, August, 1989
15. Development and Achievements of Seven Years of BTTB, SAARC Seminar on Transition from Analog to Digital, Dhaka, July, 1989
16. Annual Development Program, 1975-76 to 1989-90, Planning Commission, Government of Bangladesh
17. Organizational Restructuring, Report of Enam Committee, Government of Bangladesh, 1983

18. Annual Report of NBA, 1987-88
19. Ministry of Home Affairs, Seven Years of Development, 1982-89
20. Annual Report, Civil Aviation Authority, 1987-88
21. Annual Report BIWTA, 1988-89 (Draft)
22. Annual Report BIWTC, 1988-89 (Draft)
23. Ministry of Port and Shipping, Seven Years of Development, 1982-89
24. Railway Budget, 1989-90, Address of Communication Minister in the National Assembly, July, 1989
25. Aid Worthy Project, Planning Commission, Government of Bangladesh, 1982-83 to 1989-90.

## INDEX

Acceptable, 53, 61  
Acceptance, 44, 50  
Accepted, 50, 60, 65, 69  
Acoustic, 22  
Acquisition, 37  
Act, 4  
Activities, 4, 6, 7, 9, 10, 16, 28, 33, 43, 44, 63, 71, 74  
ADB, 38, 50, 73  
Adequate, 29, 41, 44, 65, 68  
Administrative, 1, 10, 27, 38  
ADP, 30  
ADPs, 30  
Advantage, 2, 61, 66  
Advantages, 61, 63, 66  
AEROCOM, 59  
Aerodromes, 16  
Aeronautical, 7  
AFS, 58  
Agencies, 1, 2, 6, 7, 9, 10, 51, 66, 67, 71  
Agency, 16, 29, 46, 47, 50, 51, 54, 67, 71  
Agent, 51, 54, 64, 67, 68, 69, 70, 71, 73  
Agents, 50, 61, 65, 67, 68, 71, 74  
Agreement, 71  
Agreements, 16, 25  
Aid, 30, 31, 32, 47, 50  
AIMS, 28, 39

Air, 6, 16, 18, 20, 43, 44, 53, 59, 64  
Air-filled, 42  
Airborne, 18  
Aircraft, 18, 20, 43  
Airforce, 44  
Airline, 16  
Airlines, 53  
Airplane, 41  
Airport, 16, 43  
Airports, 16  
Allocation, 1, 13, 16, 28, 29, 30, 31, 32, 46  
Allocations, 1, 20, 30, 31  
Aluminum, 32  
AM, 59, 60  
America, 20  
Analog, 24, 27, 33, 34, 36, 41  
Analogue, 73  
Ansar, 20  
Antenna, 41  
Appointed, 40, 60, 63  
Appointment, 71  
Appoints, 10  
Appropriate, 5, 10, 18, 27, 39, 66, 68  
Approval, 10, 38, 46, 47, 50, 63, 66  
Approved, 10, 16, 38, 60  
Army, 6, 18, 20, 43, 44  
ASME, 53  
Assembly, 66, 74

Assistance, 21, 30, 50, 54, 65, 72  
ASTM, 53  
Attorney, 70  
Attorneys, 71  
Audio, 21, 45  
Australia, 5  
Autarky, 10  
Authorities, 9, 47, 54, 65, 71, 72  
Authority, 6, 7, 9, 10, 16, 20, 21, 31, 43, 45, 47, 60  
Auto, 5, 23, 24, 25, 60  
Automatic, 25, 26, 27, 34, 36, 56  
Autonomous, 10, 20, 21  
Autonomy, 16  
Aviation, 1, 7, 9, 16, 31, 43, 73  
AWA, 5, 58, 59  
Award, 66  
Awarded, 36, 50, 51, 54, 61  
  
Band, 21, 22  
Bands, 37  
Bangladesh, 1, 2, 3, 4, 5, 6, 7, 9, 10, 13, 16, 20, 21, 23, 24, 27, 28, 31, 33, 35, 38, 40, 41, 43, 44, 45, 46, 47, 51, 53, 54, 55, 60, 61, 62, 63, 64, 65, 66, 67, 69, 70, 71, 73, 74  
Barisal, 5, 55  
Barisal-Chittagong, 27  
Base, 18, 20, 36, 37, 44, 57, 68  
Bazar, 36, 56  
BCN, 21  
BCS, 10, 28, 29, 31, 32, 51, 53

BDR, 16, 18, 44  
BDUEL, 59  
Beacon, 43  
Begumgonj, 55  
Belgium, 32, 58, 71  
Bengal, 16  
Betbunia, 2, 25, 36, 56  
Betbunia-Chittagong, 56  
Betbunia-Rangamati, 56  
Bhaban, 10  
Bhairab, 55  
Bid, 46, 50, 51, 66, 68, 69, 70, 74  
Bidder, 46, 50, 51, 69  
Bidders, 50, 66  
Bidding, 38, 50, 66, 69, 71  
Bids, 3, 50, 51, 60, 65, 66, 70  
Bilateral, 16, 25, 38, 65, 66  
BIWTA, 20  
BIWTC, 20  
Blankpunkt, 22  
Bogra, 27, 34, 36, 42  
Bogra-Jaipurhat-Phulbari-Rangpur, 56  
Bogra-Naogaon-Natore-Rajshahi, 56  
Bosch, 21  
Bottlenecks, 67  
BR, 31  
British, 4, 20, 44, 53  
BTMC, 58

BTPL, 16  
BTTB, 1, 4, 5, 6, 9, 10, 13, 18, 20, 24, 28, 29, 30, 33, 37, 38, 40, 41, 44, 50, 51, 53, 55, 60, 61, 73  
BTV, 21, 22  
Budget, 13, 16, 18, 28, 43, 44, 46, 50  
Bundespost, 60  
Buriganga, 40

CAAB, 7, 9, 16, 31, 58  
Cable, 5, 10, 24, 28, 34, 37, 38, 40, 51, 53, 57  
Cables, 24, 29, 42, 51, 53  
CAI, 59  
Camera, 42  
Cameras, 21, 45  
Canada, 13, 31, 32, 38, 56, 57, 58, 59, 60, 63, 67  
Canadian, 1, 2, 3, 4, 10, 25, 33, 44, 46, 47, 54, 63, 64, 65, 67, 68, 69, 70, 71, 72, 73, 74  
CANADIAN-MARCONI, 59  
CANADIAN-MARCONY, 59  
Cantonments, 18, 43  
Catalogues, 69, 70  
Categories, 18, 23, 47  
Category, 42, 47  
CB, 24  
CCD, 21  
Cellular, 4, 16, 64  
Centrex, 28, 34, 37  
CH, 59, 60  
Chairman, 10, 16, 46, 63  
Chandpur, 55

Channel, 5, 36, 39, 41, 55, 56, 57, 71  
Channels, 24, 36, 41  
Chittagong, 5, 13, 16, 20, 21, 22, 25, 27, 29, 34, 36, 37, 39, 43, 45, 55, 56, 57, 66, 69  
Chittagong-Satkania-Chiringa-Cox's, 56  
Chowkbazar, 40  
CIDA, 74  
CITESSA, 57  
CKD, 66, 74  
Clauses, 71  
Clearance, 54  
Client, 61  
Coastal, 5  
Codes, 53  
Coin-box, 23  
COMCO, 59, 60  
Comilla, 22, 37  
Communication, 1, 4, 5, 7, 13, 16, 18, 20, 21, 24, 27, 29, 31, 34, 37, 38, 40, 41, 43, 44, 45, 56, 64, 68  
Communications, 30, 31  
Companies, 1, 2, 3, 5, 13, 33, 46, 47, 50, 53, 54, 55, 60, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74  
Company, 13, 55, 66, 68, 71  
Company's, 71  
Compatible, 41, 67  
Competitive, 38, 50, 60  
Competitors, 66, 67  
Completion, 29, 34, 54  
Component, 1, 38, 39, 40, 41  
Components, 2, 20, 38, 39, 40, 41, 44, 66

Computer, 24, 37  
Computer-controlled, 55  
Computerized, 37  
Computers, 37  
Conclusion, 3, 25, 31  
Conclusions, 30, 73  
Configuration, 56, 57  
Console, 22  
Consultancy, 50, 65  
Consultant, 51, 60  
Consultants, 46, 50, 61, 65, 72  
Consultation, 41, 44  
Consultative, 6  
Contract, 51, 54, 61, 66, 69, 71  
Council, 46  
Counterpart, 68  
Counterparts, 66  
Coupled, 2  
Criteria, 50, 66, 67, 68, 74  
Criterion, 66  
Critical, 54  
CSF, 58  
CSF-LS, 58  
CSF-RS, 58  
CSF-TR, 58  
  
Data, 24, 28, 29, 34, 37, 41, 68  
Debenture, 30

Defense, 1, 2, 6, 9, 18, 20, 43, 44, 64, 73  
Delhi, 5  
Demerits, 66  
Department, 4, 5, 7, 9, 10, 16  
Departments, 6, 29  
Development, 1, 2, 4, 5, 6, 9, 10, 13, 16, 18, 20, 27, 28, 30, 33, 37, 38, 46, 50, 63, 64, 65, 66, 67, 68, 73  
DGDP, 18  
Dhaka, 5, 10, 13, 20, 21, 22, 24, 25, 27, 34, 35, 36, 37, 39, 40, 41, 42, 43, 44, 45, 53, 54, 55, 56, 61, 62, 66, 68, 71, 72, 74  
Dhaka-Bogra, 35  
Dhaka-Chittagong, 55  
Dhaka-Khulna, 27, 35, 36, 55  
Dhaka-Manikganj-Tangail-Madhupur-Mymensingh, 56  
Dhaka-Mymensingh, 27  
Dhaka-Narsingdi-Brahmanbaria-ShahajiBazar-MoulviBa, 56  
Dhaka-sylhet, 35  
Diagram, 7  
Dial, 25  
Dialing, 23, 24, 25, 26, 27, 28, 35, 36, 38, 51, 56; 60  
Dialing-in, 41  
Dialing-out, 41  
Dialingtype, 56  
Digital, 4, 23, 24, 25, 27, 28, 33, 34, 35, 36, 37, 39, 40, 41, 42, 51, 55, 56, 58, 60, 61, 62, 73  
Digitalization, 27  
Digitization, 28  
Diplomatic, 71  
Division, 10, 13, 16, 21, 41, 42, 47, 50  
DME, 43

Document, 47, 50, 69, 70  
Donor, 1, 33, 50, 51, 67  
Donors, 30, 31, 38, 47, 50, 64, 66, 73  
Doppler, 16  
DOVERTON, 58  
DUAL, 58  
DUEL, 59, 60  
Duplex, 41  
Dutch, 21  
DVOR, 58  
DYMAR, 58, 59

Earth, 2, 25, 26, 28, 34, 36, 41, 56  
EC, 58  
ECNEC, 46, 47  
Economic, 2, 10, 39, 43, 46, 47  
Economy, 20, 27, 30, 39, 46, 66  
EDC, 74  
EDYSTONE, 58  
Efforts, 45, 51  
EFP, 21  
EFU, 21  
Electronics, 66, 67  
Embassies, 44  
EMD, 24, 35, 39, 57  
Engineers, 21, 40  
ENGLAND, 58  
Enlisted, 50

Enterprises, 7, 10  
Entrepreneur, 4  
Entrepreneurs, 66  
Envelope, 50, 70  
Envelopes, 50  
Equipment, 1, 2, 4, 5, 7, 9, 10, 18, 20, 21, 23, 25, 29, 31, 38, 39, 40, 41, 42, 43, 44, 45, 51, 53, 54, 55, 58, 59, 60, 61, 64, 67, 73, 74  
Equipments, 53, 55, 56, 57  
ER, 58  
ERD, 50  
Ericsson, 56, 61  
Ethnic, 39  
Europe, 20, 53  
European, 6  
Evaluated, 43, 50  
Evaluates, 10, 20  
Evaluation, 42, 44, 46, 47, 51, 66, 70  
Ew, 39  
Exchange, 1, 4, 5, 16, 23, 24, 25, 26, 27, 30, 33, 34, 35, 36, 38, 39, 40, 41, 42, 51, 53, 55, 56, 57, 60, 61, 73  
Exchanges, 5, 13, 16, 18, 23, 24, 25, 26, 27, 28, 34, 35, 36, 37, 38, 39, 40, 41, 42, 51, 53, 56, 57, 60, 61, 64  
Expatriate, 46, 66  
Expertise, 2, 16, 44, 65, 68, 73  
Experts, 51  
  
Fabrication, 51, 53  
Facilities, 1, 2, 4, 6, 9, 13, 16, 18, 20, 23, 24, 25, 27, 28, 33, 34, 35, 37, 38, 39, 40, 42, 43, 44, 45, 51, 63, 64, 65, 71, 72  
Facility, 24, 27, 37, 39, 40, 41, 58, 59

Facsimile, 24, 41  
Factory, 5, 24, 28, 34, 51  
Faridabad, 40  
Faridpur, 55  
FAX, 67  
FC, 58  
FDL, 21  
Feasibility, 10, 47  
Ferry, 21  
FI, 35  
Fiber, 39, 40  
Fibre, 21, 24, 28, 37, 51, 56, 64  
Figure, 7, 10, 13, 16, 18, 20, 29, 51  
Figures, 47  
Finance, 10, 29, 30, 41, 42, 60, 62, 66, 67  
Financed, 30, 50  
Financial, 10, 20, 21, 29, 33, 43, 44, 45, 46, 47, 50, 60, 65, 66, 68, 74  
Financing, 1, 2, 13, 27, 28, 29, 33, 38, 41, 43, 50, 55, 61, 65, 66, 73, 74  
Finland, 31, 32, 58, 71  
Flood, 34, 43  
FOB, 69  
Force, 6, 16, 18, 20, 44, 71  
Forces, 1, 6, 16, 18, 20, 44  
Foreign, 1, 2, 16, 29, 30, 31, 33, 34, 35, 38, 39, 40, 41, 42, 50, 53, 54, 55, 60, 63, 64, 66, 67, 73,  
74  
Foreman, 53  
France, 32, 56, 58, 61  
Frequency, 7, 18, 37, 43, 44, 58, 59

FRG, 5, 29, 31, 32, 55, 56, 57, 60, 71

Frigates, 18

Frontier, 16

FUJITSU, 56, 57

Funding, 6, 13, 27, 38, 50, 57, 71

Funds, 13, 16, 38, 61, 63, 64, 65

Gadgets, 40

Galvanized, 53

Gate, 26

Gauge, 20, 53

Gauges, 53

Gazipur, 40, 55

GEC, 5

German, 2, 53, 73

Germany, 21, 22, 44, 73

Gopalganj, 55

Government, 2, 3, 4, 5, 6, 7, 9, 10, 13, 16, 20, 21, 27, 28, 29, 31, 33, 38, 39, 44, 46, 47, 50, 60, 63, 66, 67, 70, 71, 73, 74

Government's, 10, 30

Governmental, 1, 4, 10

Governments, 63

GTE, 56, 57, 61

Guarantee, 50, 69

Guarantees, 70

Gulf, 13, 57

Habiganj, 55



Hajiganj, 55

Hajiganj-Comilla, 56

Haripur, 5

HEAD, 1, 4, 5, 6, 7, 9, 10, 13, 16, 18, 20, 21, 23, 24, 25, 27, 28, 29, 30, 31, 33, 36, 37, 38, 39, 40, 41, 43, 44, 45, 46, 47, 50, 51, 53, 54, 55, 58, 60, 63, 64, 65, 66, 67, 68, 69, 70, 71, 73

Headquarters, 13, 18, 25, 27, 35, 36, 37, 39, 57

HED, 6, 7, 21, 24, 25, 36, 51, 53, 69, 70

Helicopter, 41

Helicopters, 18, 20

HF, 5, 16, 18, 20, 39, 43, 56, 58, 59, 60

Holland, 56

IDA, 31, 32, 38, 41, 50, 60, 61, 73

IEEE, 53

Ies, 55

ILS, 16

ILS-GP, 43, 58

ILS-LOC, 43, 58

ILS-OM, 43, 58

Implementation, 1, 2, 6, 9, 10, 13, 16, 31, 33, 38, 40, 41, 45, 46, 47, 61, 66

Implemented, 21, 24, 37, 41, 51, 64

Implementing, 50, 54, 62, 71

Import, 4, 31, 40

Importers, 31

In-house, 1, 6, 68

Income-tax, 63

Incorporated, 66

Incorporation, 37

Index, 3  
India, 4, 18  
Indian, 4  
Industries, 5, 31, 66  
Information, 2, 6, 9, 18, 23, 28, 29, 51, 63, 65, 67, 68, 71, 74  
Infrastructural, 23  
Infrastructure, 2, 23, 37  
Inland, 20, 45, 53, 64, 73  
INTELSAT, 25, 56  
Inter-city, 20  
Inter-connect, 24  
Inter-connected, 24  
Inter-connecting, 61  
Inter-exchange, 37  
Inter-linked, 57  
Interface, 61  
Interfaces, 36  
International, 4, 5, 6, 7, 16, 20, 25, 26, 27, 33, 34, 36, 38, 43, 50, 53, 56, 60, 63, 64, 65, 66, 67  
Interpol, 6  
Investors, 65, 66  
IP, 4, 5  
IPT, 5  
ISD, 23, 25  
Italy, 56, 57, 61  
ITU, 41  
  
Jamalpur, 55  
Japan, 2, 20, 21, 31, 32, 55, 56, 57, 60, 66, 71, 73

Japanese, 2, 18, 53, 61, 62, 73

Jaydevpur, 55

Jenaidah, 55

Jessore, 55

Jessore-Khulna, 55

Jhenaidaha, 55

JULLIET, 58

JVC, 22

Karachi, 5

KCA, 21

KCK, 21

KCP, 21

Khulna, 5, 13, 20, 21, 24, 25, 27, 34, 36, 37, 51

Khulna-Mongla, 55

Khulna-Pirojpur-Barisal, 56

KHz, 59, 60

Kinoton, 22

Kishorganj, 55

Korea, 57, 71

Kroner, 31

Kurigram, 55

Kushtia, 55

Labor, 66, 74

Law, 9, 63

LENKURT, 55

Lines, 20, 24, 25, 27, 34, 35, 37, 39, 40, 41, 53, 62, 74

Link, 5, 20, 35, 40, 55, 56

**LINKAGES, 5**

Links, 5, 18, 20, 27, 33, 34, 35, 36, 37, 38, 39, 42, 43, 44, 45, 55, 56, 57, 58, 64

LM, 56, 61

Lobby, 43, 61, 68, 69

Lobbying, 51

Local, 4, 5, 6, 7, 13, 16, 18, 20, 23, 24, 27, 28, 29, 30, 34, 35, 39, 43, 46, 50, 51, 53, 54, 56, 61, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74

Local-cum-trunk, 36

Logistic, 68

Long-distance, 5, 13, 23, 24

LWX, 58, 59, 60

MA, 58, 59

Madaripur, 55

Magnetic, 25

Magneto, 4, 24, 25, 56

Magura, 55

Maintenance, 4, 5, 9, 10, 13, 16, 18, 37, 39, 40, 63, 65

Manikganj, 55

Marconi, 5, 60

Marconi-UK, 18

Maritime, 18, 56

Marketing, 2, 65, 73, 74

Matic, 21, 22

Media, 6

Medium, 33

MET, 58, 67

Meteorological, 7, 9  
METHODOLOGY, 46  
Metropolitan, 20, 24, 37, 39, 40, 61  
MF, 59, 60  
MHz, 18, 58, 59  
Micro, 37  
Micro-wave, 42  
Microwave, 5, 24, 25, 27, 28, 33, 35, 36, 37, 40, 42, 45, 55, 56  
Military, 1, 20  
MIS, 37  
MITEL, 4, 13, 57, 67  
Mm, 22  
Monsoon, 54  
Morse, 24  
Motorola, 16, 57  
MPC, 58  
MS, 53  
Multi-access, 36, 37  
Multi-channel, 5  
Multi-lateral, 73  
Multi-meters, 42  
Multiconductor, 53  
Multilateral, 38  
Multiplex, 36  
Multiplexing, 24  
MUX, 39, 40, 55, 56, 57  
MW, 64  
Mymensingh, 10, 35, 36, 42, 55

NARADUEX, 58  
Narayanganj, 40  
Narsingdi, 55  
Nationwide, 36  
Natore, 21, 22  
Natore-Pabna-Kushtia-Chuadanga, 56  
Naval, 18  
Navigation, 1, 16, 45, 64, 73  
Navy, 6, 7, 9, 18, 20, 44  
NBA, 6, 21  
Nd, 34  
NDB, 16, 43  
NEC, 21, 22, 46, 55, 56, 57, 60, 61, 62  
Nepal, 67  
Netrokona, 55  
Network, 1, 4, 13, 16, 18, 20, 21, 24, 25, 27, 28, 31, 34, 35, 36, 37, 38, 39, 41, 43, 44, 45, 58, 64, 73  
Networks, 1, 21, 24, 25, 27, 56, 64  
NGO, 7  
NGO's, 9  
Nilphamari, 55  
NOKIA, 58  
Nominated, 46  
Non-digital, 23, 51  
Norwegian, 31  
NSI, 6  
NWD, 24, 25, 26, 34, 38, 39, 42, 61

Off-shore, 64  
Offer, 41, 44, 46, 50, 60, 61, 66, 68, 69, 70  
Offers, 1, 18, 20, 23, 50, 51, 60, 61, 66, 68, 74  
OKI, 57  
OLYMPIC, 58  
Omni-directional, 43  
Optical, 24, 28, 37, 39, 40  
Optics, 21, 51, 56, 64, 73  
ORDINANCE, 63  
Organization, 1, 2, 4, 6, 7, 10, 16, 20, 21, 33, 44, 45, 63, 73  
Organizational, 9, 54  
Organizations, 1, 3, 4, 5, 6, 7, 9, 20, 21, 33, 43, 64, 66, 73, 74  
Organogram, 16, 18  
Organograms, 9  
OS, 57  
  
PABX, 4, 23, 41  
PABX's, 29  
PABXs, 5, 51, 57  
PAE, 58, 59, 60  
Pakistan, 5, 10, 16, 67  
Para-military, 16  
Parishad, 28  
PARK, 59  
Patuakhali, 55  
PBX, 23, 57, 67  
PBXs, 5, 51

PC-II, 47  
PCM, 39  
PCO, 23  
PCOs, 57  
PHILIPS, 56  
Phulbari-Thakurgaon-Dinajpur, 56  
Pilot, 21  
Pipeline, 31, 32  
Posts, 10, 53  
PQ, 50  
Pre-qualified, 50  
Pre-shipment, 70  
Prequalification, 66, 67  
Project, 10, 13, 21, 24, 29, 31, 32, 33, 34, 35, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 50, 51, 54, 57, 58, 60, 61, 62, 65, 66, 67, 70  
Projects, 1, 2, 6, 10, 13, 16, 20, 29, 33, 35, 38, 40, 41, 42, 43, 44, 45, 46, 47, 50, 51, 55, 61, 62, 64, 65, 66, 67, 68, 70, 73, 74  
PSF, 6  
PT, 5  
PYE, 20, 59, 60  
  
Quotation, 69, 70  
Quoted, 61, 70  
  
RA, 58, 59  
RACAL, 58, 59, 60  
RADAR, 16, 43, 44, 58, 64  
Radifon, 18, 58  
RADIFUSION, 58

Radio, 1, 6, 7, 18, 21, 27, 35, 36, 37, 39, 41, 43, 44, 45, 59, 73

Rail, 20

Railway, 7, 9, 20, 21, 31, 53, 73

Railways, 20

Rajbari, 55

Rajshahi, 13, 20, 22, 37

Rangpur, 13, 37, 55

RCA, 5, 56

Retender, 51

Revenue, 13, 16, 29, 54, 65, 66, 67

RF, 58

Rhodes, 44

Rifles, 6, 16, 44

Robert, 21

RSU, 36

RT, 59, 60

Russian, 20

Russians, 44

RX, 58, 59, 60

SAARC, 6

Sangstha, 10, 28, 51

Satellite, 1, 2, 25, 26, 28, 34, 36, 41, 42, 56, 64, 71

Sathkhira, 22, 55

Savar, 40, 55, 66

Scanners, 21

Schwarz, 44

Sector, 1, 2, 3, 4, 5, 6, 7, 9, 13, 16, 20, 27, 28, 29, 30, 31, 33, 37, 38, 40, 41, 42, 44, 45, 46, 47, 51, 53, 55, 60, 62, 63, 64, 65, 66, 67, 68, 71, 73, 74

Security, 1, 6, 16, 20, 36, 41, 64, 73

Semi-automatic, 27

Semi-electronic, 57

Semi-turn-key, 10

SFYF, 30

Shangstha, 5, 24

Shariatpur, 55

Shilpa, 5, 10, 24, 28, 51

SHINWA, 20

Siemens, 5, 29, 55, 56, 57, 60, 61

Signal, 37

Signaling, 21

Signals, 18

Single-hop, 56

Sitakund, 55

SMC, 58, 59, 60

Soft-ware, 57

Solar, 38

SONY, 21

Spain, 57

Spares, 2, 4, 39

SPILSBURY, 58, 59, 60

Squadron, 44

SS, 58, 59, 60

SSB, 43

SST, 58

STC, 5  
Studios, 22, 45  
Sub-District, 24, 57, 58  
Sub-sector, 29, 30, 31  
Subscriber, 9, 24, 25, 37, 53, 56  
Subscribers, 9, 13, 16, 23, 24, 25, 27, 29, 36, 41, 51  
Suchas, 57  
Sunamganj, 55  
Sweden, 31, 32, 56, 61  
Sylhet, 21, 22, 25, 27, 36, 37, 42, 55  
Sylhet-Sunamgonj-Mymensingh-Jamalpur-Rangpur, 36  
System, 1, 16, 23, 24, 25, 26, 27, 28, 29, 31, 33, 34, 35, 37, 38, 39, 40, 41, 42, 43, 50, 51, 53, 55, 56, 57, 70  
Systems, 5, 10, 23, 24, 28, 29, 31, 37, 39, 41, 57, 60  
  
Talibabad-Dhaka, 56  
Tandom, 40  
Tangail-Sirajgonj-Bogra, 56  
Tariff, 67  
TAX, 24, 26, 27, 36, 38, 63  
TAX-CREDIT, 63  
TAX-ITX, 40  
TD, 4, 5  
Technology, 2, 4, 5, 20, 21, 24, 27, 28, 36, 37, 43, 51, 60, 64, 73  
TELE, 59  
Tele-communication, 29, 30, 43, 67  
Telecines, 21  
Telecom, 4, 5, 9, 10, 16, 31, 34, 35, 57, 65

Telecom-Product, 3

Telecommunication, 1, 2, 3, 4, 5, 6, 7, 9, 10, 13, 18, 20, 23, 25, 27, 28, 29, 30, 31, 32, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 47, 51, 55, 63, 64, 65, 67, 71, 73

Telecommunications, 10, 27, 28, 29, 30, 31

Telefax, 4

Telegraph, 1, 4, 5, 9, 10, 13, 23, 24, 25, 28, 29, 33, 34, 47, 53, 63, 64, 73

Telejogajog, 10

Telephone, 1, 4, 5, 9, 10, 13, 16, 18, 23, 24, 25, 27, 28, 29, 31, 33, 34, 35, 36, 37, 38, 39, 40, 42, 43, 47, 51, 53, 61, 62, 63, 64, 73

Telephoneline, 39

Telephones, 6, 23, 25, 34, 35, 36, 41, 56

Telephonesets, 56, 57

Teleprinter, 41, 57, 64

Teleprinters, 24

TELERAD, 58

TELERADIO, 58

Television, 6, 21, 45, 73

Telex, 4, 13, 23, 25, 35, 41, 56, 57, 64

Tendom, 39

TFYP, 29, 30

THOMPSON-CSF, 56, 61

THOMSON, 58

TIC, 5, 10

Tied-finance, 74

TIP, 5

Toll, 23, 24, 25, 27

Tongi, 5, 24, 34, 51

TOSHIBA, 56

TR, 58, 59

Transmitter, 16, 43  
Transmitters, 5, 7, 22, 56  
Transmitting, 41, 45  
Trunk, 24, 26, 27, 34, 36, 37, 38, 39, 55, 56, 64  
TSS, 10, 28, 29, 31, 32, 42, 51  
TTA, 58  
Turn-key, 10  
TV, 21, 24, 41, 42, 45  
Twin-conductor, 53  
TX, 58, 59, 60

UG, 53  
UHF, 18, 24, 28, 34, 35, 36, 37, 39, 55, 57, 58, 64  
UHFlinks, 57  
UK, 5, 20, 36  
Un-tied, 73  
UNDP, 32  
Union, 6, 28, 36  
Unions, 28, 36  
Up-zillalahs, 53  
Upazilla, 25, 28, 29, 34, 35, 36, 38, 39, 57, 58  
Upazillas, 27, 35, 36, 37, 38, 39, 42  
USA, 16

VCR's, 21, 22  
VDE, 53  
Vehicles, 38, 45  
VFT, 5, 24, 57

VHF, 5, 16, 18, 20, 43, 56, 57, 58, 59, 60, 64

Via, 45

Video, 21

Vietnam, 67

VII, 56

Village, 36

Villages, 28, 36

VIPs, 40

VOR, 16, 43

Walkie-Talkie, 20, 42

Walkie-talkies, 18

WICOX, 59

WILCOX, 59

Wireless, 5, 36

Wires, 24, 29, 51, 53

Wt, 20

X-Bar, 57

XLA, 59

YAESU, 20

ZIA, 16, 43

Zinzira, 40

LIBRARY E A/BIBLIOTHEQUE A E



3 5036 20039658 1

Storage

CA1 EA909 90C56 ENG

Commercial prospects of Canadian  
companies in the telecommunication  
sector in Bangladesh : final report  
43270695