

(Corrected Document)\*

**BANGLADESH TELECOMMUNICATIONS COMPANY LIMITED  
(A GOVERNMENT OWNED COMPANY)**

**BIDDING DOCUMENT**

**FOR**

**International Tender for “Supply, Installation, Testing and Commissioning of Softswitch, Trunk Gateway, Access Gateway, GPON System & Power System and Supply of Optical Fibre, HDPE Duct etc. for the Replacement of Old Digital Telephone system of Dhaka City”**

**TECHNICAL SPECIFICATION**

**BOOK-2**

TENDER No. : DP/F-4/IR/2009-2010/2

Dated: 15-11-2009

**DIRECTOR PROCUREMENT  
BANGLADESH TELECOMMUNICATIONS COMPANY LIMITED  
TELEPHONE REVNU E BHABAN  
SHER-E-BANGLA NAGAR, DHAKA-1207**

\*corrected based on the queries received from bidders and BTCL’s own initiative. The updated word(s)/statement(s) are printed in ***bold italics***.

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## Book 2

### Chapter One

#### Instructions for the Preparation and Submission of the Bid

- 1.1 The bidding shall follow Open Tendering Method (OTM) with Quality and Cost Based Evaluation (QCBE). The bid shall consist of “*two folders*”. The first folder shall be titled as “**Technical Offer**” and the second folder shall be titled as “**Financial Offer**”. The “Technical Offer” shall be divided into two parts. The first part shall contain “**Mandatory Documents**” and the second part shall contain “**Detail Technical Documents**”. Each part of the “**Technical Offer**” shall be in a separate folder.
- 1.2 The Bidders “**Mandatory Documents**” shall comprise of the following documents in each set and a total of four (4) sets (one original, 3 photocopies) shall be submitted.
  - 1.2.1. Tender Document Purchase Receipt (original in “Original” set and copies in other sets).
  - 1.2.2. Forwarding of the bid (*as per “Annex A” attached in Book 1, duly filled up and properly signed*).
  - 1.2.3. Bid Bond / Bank Guarantee (*as per “Annex B” attached in Book 1, duly filled up and properly signed*).
  - 1.2.4. A “Bond for Spare Parts Guarantee” (*as per “Annex D.1.” attached in Book 1, duly filled up and properly signed*).
  - 1.2.5. A “Bond for Expansion Guarantee” (*as per “Annex D.2.” attached in Book 1, duly filled up and properly signed*).
  - 1.2.6. The “List of Attached Certificates” (*as per “Annex F” attached in Book 1, duly filled up and properly signed*).
  - 1.2.7. A “Declaration on Observance of Ethics” (*as per “Annex G” attached in Book 1, duly filled up and properly signed*).
  - 1.2.8. A “Declaration of Joint Liability” (*as per “Annex H” attached in Book 1, duly filled up and properly signed*) [*applicable only if the bid is submitted by a Joint Venture Company/Consortium*]
  - 1.2.9. The “Summary of the Bid”, (*as per format shown in “Form F” attached in Book 2, duly filled up*).
  - 1.2.10. Principal’s Letter of Authority (*if the bid is submitted by an entity other than the principal bidder*).
  - 1.2.11. The Letter of Authority of the manufacturer of Soft Switch, Trunk Gateways, NMS (Software), Access Gateways, GPON System, MDU, Optical Fiber and HDPE duct to participate in this bid (*if the bidder is not manufacturer of any of these items*).
- 1.3 Hard copies four (4) sets of the second part of the first folder of bid document i.e., the part titled “Detail Technical Documents” shall be submitted by the bidder, out of which two sets shall be in original print and two sets shall be photocopy. Also a soft copy shall be provided in CD (in MS Office & PDF format).

- 1.4 The folder titled “Detail Technical Documents” shall contain:
- 1.4.1 Documentary Evidences to Establish Equipment’s Performance
- 1.4.1.1 Certificates from at least 4 (four) commercial telecom operators of which at least one operator of overseas country for proving that the Soft Switch, Trunk Gateways and Access Gateways delivering Class V services is running in commercial network. The certificates shall be issued by licensed operator(s) of the respective country. In each certificate the following points must be clearly mentioned.
- (a) The date of putting the system into commercial operation.
- (b) The Soft switch is controlling gateways offering class V services having at least 150,000 subscribers.
- (c) The system is running satisfactorily for at least 2(two) years from the date of putting the system in commercial operation.
- 1.4.1.2 The certificates of satisfactory working record of the Optical Fiber Cable (OFC) from at least three customers, one of which must be from the customer outside the country of origin of the manufacturer. In each certificate, the following points must be clearly mentioned.
- a) The date of commissioning of the OFC system.
- b) The name of the manufacturer of the OFC.
- c) Supplied, installed & commissioned at least 600 Km of 24-core of Optical Fiber Cable.
- d) After commercial cut-over, the performance of the OFC is satisfactory.
- 1.4.1.3 Performance Test pass records of offered Optical Fiber Cable & Joint Closure issued by the National Standardization and Testing Institution of the Manufacturer’s country or any recognized International Testing related Institute.
- 1.4.1.4 The certificates of satisfactory working record of the GPON system from at least three commercial telecom operators of which at least one operator of overseas country. In each certificate, the following points must be clearly mentioned.
- a) The date of commissioning of the GPON system.
- b) After commercial cut-over, the performance of the GPON system is satisfactory.
- 1.4.1.5 The period of experience will be considered from the date of commercial operation of the system to the date of the opening of this tender. **Experience of pilot projects, field trial, laboratory test, field test, and document of purchase order etc. will not be considered for fulfillment of the above requirement.**
- The bidder can submit Provisional Acceptance Certificate and Final Acceptance Certificate issued by the telecom operators, if the above-mentioned information is available there.
- 1.4.1.6 If any bidder fails to submit certificate(s) required as per Clause-1.4.1.1 to 1.4.1.4, the bid shall be treated as “**Substantially Non-responsive**” and shall not be considered for further evaluation.
- 1.4.2 Documentary Evidence Establishing Bidder’s Experience
- 1.4.2.1 The bidder must provide a certificate from the relevant commercial telecom authority which should state that he has successfully installed and commissioned at least 1 (one)

NGN project on turn-key basis, outside the country of manufacture of the equipment. Failure to provide such certificate shall be treated as **“Change of Substance”**.

If the bidder is a marketing/trading/distribution firm, in that case the experience of the manufacturer/service provider will be considered as the experience of the bidder if he submits certificate from the manufacturer/ service provider to carry out designing, drawing, supplying, installing, testing and commissioning of the equipment.

- 1.4.2.2 If the offered Soft Switch and Trunk Gateways are already in operation in BTCL’s network, no experience certificate shall be necessary. In such cases the evaluation committee shall consider the performance record of the offered equipments in BTCL network.
- 1.4.3 Explanation of Redundancy (whether 1+1 or N+1) of various core elements such as control processor, back plane, storage device, power supply etc. of the soft switch, Trunk Gateway, GPON, Access gateway, Firewall, and LAN Switch. Absence of such information for each item shall be treated as **“Major Deviation.”**
- 1.4.4 Detail Bill of Quantity (BoQ) of all equipment (*up to the detailed level as far as possible*) and services as per formats shown in "Form B"s and “Form C”s **without mentioning prices**. Absence of any Form shall be considered as **“Change of Substance.”** If any form contains any price information, such price information for each item shall be treated as **“Major Deviation.”** If the bid price is however, visible in the submitted document, the bid will contain **“Change of Substance.”**
- 1.4.5 Detail lists of Spares as per formats shown in "Form D" (with minimum 1 quantity with replaceable items) **without mentioning prices**. Absence of such Form shall be considered as **“Change of Substance.”** If the form contains any price information, such price information for each item shall be treated as **“Major Deviation.”**
- 1.4.6 Detail breakdown of the DC power consumption (in Ampere) of various sub systems in busy-hour at the present equipped capacity.
- 1.4.7 Power consumption (in VA) of all equipment to be connected with Inverter, if any.
- 1.4.8 Detail method of expansion of the Softswitch, Trunk Gateway and Access Gateway equipment from its present capacity to its final capacity.
- 1.4.9 Brochure / Catalog of the Manufacturer, showing model name, country of origin, description and capacities etc., for major equipment namely Soft switch, Trunk Gateway, Access Gateway, Network Management System, GPON, MDU, ONT, SBU, Optical Fiber, HDPE duct and Power system. Downloaded documents from web site (address must be given) shall be acceptable provided that the documents contain the required information.
- 1.4.10 Brochure / Catalog of the Manufacturer, showing model name, country of origin, description and capacities etc., for other items namely LAN Switches, Coaxial Cable, ODF, DDF.
- 1.5. Bidder who will not give any document as per requirement stated in Clause 1.4.6 to 1.4.10 above, the bid shall earn penalty points equivalent to a **"Major Deviation"** for each of such absent document.
- 1.6. Each set of the “Detail Technical Documents” shall also contain the following

documents:

- 1.6.1. A “**Clause by Clause Compliance Schedule**” to all the clauses and sub-clauses of the Tender Document. The schedule shall be prepared as per format shown in Book 1 (**Annex C**) of the tender document. In the reference column of Annex-C (Book-1), the bidder must clearly mention the volume, chapter, and page number etc. to help TEC verify the tender requirement.
- 1.6.2. The Tender document purchased from BTCL and any clarification and/or corrections issued by BTCL duly signed (*in original*) and stamped in every page by an authorized representative of the bidder in the “Original” set.
- 1.6.3. If the bid is through a local agent, then, Local Agent’s Trade License (*updated for current year*).
- 1.7 Bidder who will not give any document as per requirement stated in Clause 1.6.1 to 1.6.3, the bid shall earn penalty points equivalent to a "**Critical Deviation**" for each of such absent document.
- 1.8 Hard copies four (4) sets of the second folder of bid document i.e., the folder titled “Financial Offer” shall be submitted by the bidder, out of which two sets shall be in original print and two sets shall be photocopy. Also a soft copy shall be provided in CD (in MS Office & PDF format).
  - 1.8.1 The “Financial Offer” of the Bidder shall include the following documents :
    - 1.8.2 A forwarding letter in the bidder's letter head/pad.
    - 1.8.3 All BoQ Forms showing items, quantity and prices.
    - 1.8.4 Future Order Formula to be used for future expansion
  - 1.9 The documents shall preferably be provided separately in separate Chapters of the technical document. But co-related items may be merged together or included in one single chapter. All the Chapters must be marked and numbered clearly and a list of contents must be provided on top of the technical document.
  - 1.10 Regarding Documents/Certificates, the Bidder should note the following items:
    - 1.10.1 The Documents/Certificates shall be in English or originally in any other language accompanied by “authorized translation into English.
    - 1.10.2 Authorized translation in English” shall mean a translated copy in English certified in original by the authorized official of the diplomatic mission representing Bangladesh in that certificate’s country of origin.
    - 1.10.3 If the manufacturer is producing the offered equipment by obtaining license from an original manufacturer, the experience of the original manufacturer shall not be counted as the experience of the manufacturer of the offered equipment.
    - 1.11 The bidder shall provide a list (as per Annex F attached in Book 1 and to be submitted with Mandatory Documents) of all the certificates. That list shall include detail name and address with telephone, email & fax numbers of the person signing each of those certificates (*including persons signing the authorized translation in English -where applicable*).

- 1.12 On completion of the opening formalities, as described in Book-1, the Procurement Office shall forward that statement along with 2(two) sets of **Technical** Bid to the "Tender Evaluation Committee" of BTCL.
- 1.13 The TEC of BTCL shall evaluate the **Technical** bids as per guidelines stated in different chapters of Book-1 and Book 2 of the tender document.
- 1.14 Eligibility of the Bidder
- The bidder must be an International firm engaged in either or both of the following fields:
- i) Manufacturing of Telecom and/or Data equipment; or
  - ii) Worldwide marketing, representation and / or distribution of Switching and/or Data equipment.
- 1.15 The bidder shall also submit necessary documents proving professional and technical qualifications and competence, financial resources, equipment and other physical facilities, including after-sales service where appropriate, managerial capability, experience in procuring object, reputation, and the personnel, to perform the contract. The documents will be used for "Post-qualification" purpose.
- 1.16 The bidder shall note that, during submission of the bid, if he does not comply and/or disagree to any or many specification, terms and/or conditions set forth in this document and/or proposes any alternate specification, terms and/or conditions; such non-compliance and/or disagreement and/or alternate specification, terms and/or conditions shall not be binding upon BTCL until and unless such non-compliance and/or specification and/or terms and/or conditions have been accepted by BTCL and has been incorporated in writing in the Purchase Contract and/or any other document which has been declared as part of the contract.

:: End of Chapter ::

## Book 2

### Chapter Two

#### Scope of Works

- 2.1 Bangladesh Telecommunication Co. Ltd (BTCL) intends to replace the old digital telephone exchanges at Dhaka city. For this purpose, a project has been undertaken by BTCL for the procurement of Softswitch, Trunk Gateway, Access Gateway, GPON OLTE, DC Power system, Optical Fibre, HDPE Duct etc and related services.

To replace the old digital telephone exchanges at Dhaka city, this tender proposes to procure the following equipment/items:

- a) Two Soft Switches **to be operated at hot standby mode**, one *to be installed* at Sher-E-Bangla Nagar Telephone Exchange building and another at Ramna Telephone Exchange building, Dhaka. The present equipped capacity for each of the Soft Switch is presented in **Annex 3.1**.
- b) Seven Trunk Gateways (TGWs), at SB Nagar, Ramna, Nilkhet, Moghbazar, Gulshan, Mirpur and Uttara Telephone Exchange Buildings. The Bidder shall clarify the Bill of Quantities regarding TGW to be installed at these sites as per the dimensioning rules applicable for the offered system. The present equipped capacities of the proposed Trunk Gateways are presented in **Annex 3.2**.
- c) 188 (one hundred and eighty eight) Access Gateway will be installed in different places of Dhaka city of different equipped capacities shown in **Annex 3.3**.
- d) Seven GPON OLTE one per TGW site having present equipped capacities is shown in **Annex 3.4A**.
- e) Seven LAN switches, one LAN switches per TGW site having present equipped capacities as shown in **Annex 3.5A. and 3.5B. 105 numbers of LAN switch for AGW sites having** equipped capacities as shown in **Annex 3.5C**.
- f) Network Management System at SB Nagar, Dhaka together with three clients per TGW site. For the management of subscribers, the AGWs under a particular site shall be accessed via the operating consoles belonging to that particular TGW site only.
- g) **Firewalls to be installed at Sher-E-Bangla Nagar & Ramna and other ancillary items.**
- h) DC/AC Power equipments for the systems described above **and Tools & Testers for operation of the system.**
- i) Extension of Lawful Interception and Monitoring facilities at Law Enforcing Agency (LEA) premises as per License Guideline provided by BTRC in this regard. The connectivity with the LEA sites will be provided to the contractor. The successful bidder shall be responsible for proper interfacing with the transmission equipment and end to end testing and commissioning.
- j) Supply of Optical Fiber and HDPE duct with necessary ancillary items (Closures, Termination Box/ODF, pigtail, patch cord, etc.) requirement shown in Annex

3.4C. Installation and commission will be done through other tender.

- 2.2 Unless otherwise described in the Technical Specifications, the scope of provision shall cover survey, designing & drawing, manufacturing, supplying, installing, testing, commissioning of equipment and material and its related facilities.
- 2.3 The Bidder shall explain, in a separate and self-explanatory document with his offer, the process of expansion from the initial equipped capacities to the final capacities of the elements.
- 2.4 Detail Technical Specifications of various components of the required system/service are given in subsequent chapters of this document. The bidder shall note that, until and unless a specific work, equipment or service is defined as “Optional”, all the works, equipment and services listed in various chapters of this document shall be deemed to be “Mandatory”. ***If the bidder disagrees, to provide any or many items of mandatory works, equipment or services, its bid shall automatically become “Non-Responsive” and shall not be evaluated further.***
- 2.5 The Bidder shall note that, in addition to works related to the equipment, he has to complete, in each site, the following mandatory works. The bidder shall quote prices for such works and failure to quote for any of these works shall be treated as “**non-compliance**” and it shall be considered that the bidder proposes to complete these works completely “**free of charge**” to BTCL.

2.5.1 Raised Floor

Supply and Installation of ‘**Raised Floor**’ in all switch rooms. The average size of the switch room shall be:

- a) 40 (forty) Sq. Meter for SS site.
- b) 20 (twenty) Sq. Meter for other Media Gateway sites.
- c) 15 (fifteen) Sq. meter for OMC room for all sites.
- d) 10 (ten ) Sq. Meter for each AGW site.

Specification of The Raised Floor Tiles:

- a) Size: (60 cm \* 60 cm) ± 20% , bottom part shall be enclosed with metallic casing.
- b) weight: > 30 kg per sq. meter

The actual area shall be fixed-up during BoQ preparation.

2.5.2 False Ceiling

Supply and Installation of ‘**False Ceiling**’ in all switch rooms. The size of the switch room shall be:

- a) 40 (forty) Sq. Meter for SS site.
- b) 20 (twenty) Sq. Meter for other Media Gateway sites.
- c) 15 ( fifteen) Sq. meter for OMC room for all sites.
- d) 10 ( ten ) Sq. Meter for each AGW site.

The actual area shall be fixed-up during BoQ preparation.

### 2.5.3 Lighting Facility

Supply and installation of adequate '**Lighting Facility**' for equipment rooms (at least five lighting set), Battery rooms & power room (at least two lighting set). Each of the lighting set shall have at least two energy saving lamps.

### 2.5.4 Emergency lights

Supply and installation of adequate '**Emergency lights**' for equipments rooms and OMC room (at least two light points per switch room and one light per OMC room). The supplied batteries shall be used as back-up power for this purpose.

### 2.5.5 Alluminium-Glass partitions

Supply and installation of "**Alluminium-Glass partitions**" of adequate sizes to separate the equipment room from the OMC Room and for other purposes (if necessary) for all sites. ***This item will be applicable for TGW, SS and NMS sites only.***

### 2.5.6 Earthing Facility

Supply and installation of adequate and separate "Earthing Facility" at all TGW and AGW sites for

- a) all telecom equipment
- b) all AC & DC power equipment

Electrical resistance of the "Earthing" shall be less than 1(One) ohm in dry season.

### 2.5.7 Fire detection and fire fighting Facility

Supply and installation of adequate "**Fire detection and fire fighting Facility**" for all equipment.

### 2.5.8 Alarm Bell

Supply and installation of external high-dB level alarm bell in all sites. The bells are to be triggered by system's emergency alarms and are to be powered by exchange no-break power source. Each bell has to be fitted at a place from where sound can be heard easily from the building security duty-point.

### 2.5.9 Building Modification

If any modification of existing floor, walls and ceilings in different BTCL sites are required for installation of any of the equipment, the Contractor shall bear all related cost (including finishing works, painting, tiles work in floor & walls and proper cleaning etc.). ***Building modification will be applicable for TGW, SS and NMS sites only.***

### 2.5.10 Station AC Power Wiring with Low Tension Switchgear (LTS)

The Contractor shall install standard "**Station AC Power Wiring**" at all stations for all the equipment to be installed under this purchase. The wiring shall start from the station AC power, bus bar of BTCL, which will be connected to a LTS provided by the Contractor. The capacities of the wiring shall be at least 200% of the calculated present total requirement of power for all equipment. Necessary numbers of SDB Cabinets with

adequate circuit breakers shall be installed. The Bidder shall make necessary survey for this purpose.

- 2.5.11 Any other item of works not foreseen in this document, but essential for installation and proper operation of the offered equipment (the bidder shall specify, if necessary, quantity and quote unit price).

2.6 Spares and consumables to be used before end of Guarantee Period

The bidder shall supply, at his own cost, all necessary consumables to be used during installation, testing & commissioning and necessary spares for the smooth operation of the systems, up to the end of Guarantee Period. The bidder shall provide a probable list of spares and consumables in Form-D of this tender document. The successful bidder shall hand-over the spares to BTCL concerned personnel and will use the spares, as and when necessary, taking from the concerned BTCL maintenance personnel. Both parties shall keep record of using those spares. If additional spares are required for smooth operation of the system up to end of the performance guarantee period, the bidder shall supply those at its own cost.

2.7 Spare Parts Guarantee

The Bidder shall provide a separate guarantee (*as per format in Annex D.1 in Book 1*) to the effect that, he shall guarantee the flow and availability of all spare parts and units without major design changes for at least 5 (five) years from “the date of effect” of the Final Acceptance Certificate (FAC). If, within this period, there is any major design change or stoppage of production of supplied equipment, the bidder shall bear all the costs related to provision of alternate solutions.

If the bidder disagrees to the format of the guarantee, as shown in **Annex D.1.** in Book 1, the bid shall be considered having “**Critical Deviation**”

2.8 Maintenance Spares for buffer stock

- 2.8.1 The Bidder shall supply one separate list for essential “*Maintenance Spares*” to be maintained as a central buffer stock by BTCL for emergency purposes.

- 2.8.2 That list must include at least one unit of each replaceable card (including control & switching card, power card and all interfaces) for Soft Switch, Trunk Gateways, Access Gateways, LAN Switches, Firewall and NMS Equipment covered by this purchase. Number of units may be more depending upon the size of the Platform and MTBF of the critical equipments/components.

- 2.8.3 If the bidder fails to quote any such item in the list, each shortage will be treated as “**Major deviation**” and it shall be considered that the bidder proposes to supply those items “*free of charge*” to BTCL.

- 2.8.4 The submission of such list (*in Form D.1 in Book 2*) is mandatory and failure to submission shall be regarded as “**non-compliance**”.

2.9 Expansion Guarantee

The Bidder shall provide a separate guarantee (*as per format in Annex D.2. in Book 1*) to the effect that, he shall guarantee the flow and availability of all equipment, materials and services required for any subsequent expansion of its offered equipment for at least 5(five) years from “the date of effect” of the Final Acceptance Certificate (FAC). If, within this

period, there is any major design change or stoppage of production, the bidder shall bear all the costs related to provision of alternate solutions.

If the bidder disagree to the format of the guarantee, as shown in **Annex D.2.** in Book 1, the bid shall be considered having "**Critical Deviation**"

## 2.10 Maintenance Support

### 2.10.1 Maintenance Support up to Performance Guarantee Period

The bidder shall quote for Maintenance Support during the Guarantee Period to be provided as per format given in **Annex-1**, if the bidder disagrees to this clause, the bid shall be considered having "**Critical Deviation**".

### 2.10.2 Annual Maintenance Support after Guarantee Period

The Bidder shall quote for Annual Maintenance support after Guarantee Period to be provided as per format given in **Annex-2**. The Bidder shall provide, for a period of 1(one) year after completion of the Performance Guarantee Period, a blanket and unconditional Post Guarantee Maintenance Assistance program. This period may be extended for subsequent year(s) on mutual agreement. If the bidder disagrees to this clause, the bid shall be considered having "**Critical Deviation**".

## 2.11 Performance Guarantee Period

2.11.1 The bidder's offer shall include an overall "**Performance Guarantee Period**" for the whole equipment covered by this purchase. This period shall deem to have started from the cut-over of the first equipment into commercial service and last for 3 (three) calendar years from "**the date of effect**" of the last PAC of the contract.

2.11.2 During the period of this Guarantee, the bidder shall offer all material, equipment, services and Maintenance support as described in relevant clauses for Spare Parts and "**Maintenance Support up to Performance Guarantee Period**".

2.11.3 Bidders refusal to offering of the guarantee specified in this clause shall be treated as "**Change of Substance**".

## 2.12 Testing

### 2.12.1 Customer Proof of Concept (CPOC)

i) Testing and dummy operations at manufacturer's/Supplier's premises, to be termed as "Customer Proof of Concept (CPOC)", shall be carried out for all equipment to be supplied under this purchase. The procedure for such CPOC shall have to be approved by BTCL before such tests. A team comprising of the members of BTCL BoQ Committee will check the equipment to be ascertained the compliances with tender requirement, contract and BoQ specifications. The CPOC shall include all tests as per relevant recommendations of ITU-T and other related bodies.

ii) The details of test program shall be as follows. If the bidder does not agree to this basic minimum format, its disagreement shall be considered as a "Major Deviation".

a. For Softswitch and Media gateway

a)	Number of BTCL Engineers	3 (three)
b)	Number of working days	7 (Seven)
c)	Per diem charge to BTCL Engineers	US\$ 80 (Eighty) per day ( <i>including holidays in between and travel days</i> ) per person
d)	Other facilities	Local Transportation Standard Accommodation Medical Services ( <i>if required</i> ) Economy Class Return Air Ticket

b. For NMS, LAN Switch, Firewall and Session Border Controller

a)	Number of BTCL Engineers	2 (two)
b)	Number of working days	7 (Seven)
c)	Per diem charge to BTCL Engineers	US\$ 80 (Eighty) per day ( <i>including holidays in between and travel days</i> ) per person
d)	Other facilities	Local Transportation Standard Accommodation Medical Services ( <i>if required</i> ) Economy Class Return Air Ticket

c. For Optical Fiber, GPON, Power System and Access Gateway

a)	Number of BTCL Engineers	3 (three)
b)	Number of working days	7 (Seven)
c)	Per diem charge to BTCL Engineers	US\$ 80 (Eighty) per day ( <i>including holidays in between and travel days</i> ) per person
d)	Other facilities	Local Transportation Standard Accommodation Medical Services ( <i>if required</i> ) Economy Class Return Air Ticket

iii) The bidder may propose more number of such CPOC or may propose extended periods for such CPOC, if necessary.

2.12.2 Provisional Acceptance Test (PAT)

Before acceptance of the installed system/ equipment, BTCL representatives shall carryout, on site, detailed tests of all equipment to ascertain their inter-working ability with relevant equipment of the other manufacturers, working reliability, concurrence to agreed technical and other specifications, inventory checking of installed equipment etc. Such tests shall be termed as “**Provisional Acceptance Test (PAT)**”. Prior to commencement of such tests, the contractor shall submit a proposed procedure for the PAT to be subsequently passed by BTCL. The PAT, including **System Overload Tests** will be done by a joint team of BTCL Engineers and bidder’s Engineers.

On completion of installation and self-testing of any system/ equipment, the Bidder shall submit:

- a) 3(three) copies of self-test results to BTCL and offer that system/ equipment for Provisional Acceptance Test (PAT)
- b) 1(one) copy of the compliance statement (Book – 1 & Book – 2) of the Bidder submitted with the Bid Offer.
- c) 1(one) copy of the Original / Initial BOQ of the Bidder submitted with the Bid Offer.

BTCL shall start such tests within one month after receipt the request. The bidder may, upon agreement by the both party, offer PAT for any part or parts of the total system. Such request for partial PAT may also be asked for by BTCL.

The bidder shall be totally responsible for arrangement of all equipment, fuel for generators, consumables, test gears and measuring equipment required for the PAT. All costs for Materials and Services shall be quoted and failure to quote shall be considered that the bidder proposes to provide this service totally " **free of charge**" to BTCL.

In addition, the bidder has to provide per-diem costs to PAT engineers as per following:

**i) For the Soft Switches, NMS and Billing Sub-system:**

- a) Number of BTCL Engineers of PAT team : 5 (Five)
- b) Number of days allowed for per diem charge/person : 30 (Thirty) days
- c) Per diem charge to BTCL PAT members : TK. 1,500/-per day/person

**ii) For all equipment at each TGW site including GPON system:**

- a) Number of BTCL Engineers of PAT team : 5 (five)
- b) Number of days allowed for per diem charge/person : 10 (Ten) days
- c) Per diem charge to BTCL PAT members : Taka 1,500/-per day/person

**iii) For all equipment at each AGW site:**

- a) Number of BTCL Engineers of PAT team : 3 (three)
- b) Number of days allowed for per diem charge/person : 5 (five) days
- c) Per diem charge to BTCL PAT members : Taka 1,500/-per day/person

However, the bidder shall note that, if necessary, any or all PAT can continue for more than the above scheduled period; but, in such cases, the bidder shall not be liable to pay per-diem for those additional days. The bidder shall provide local transportation to the PAT Team to conduct the PAT.

### 2.12.3 Issuance of Provisional Acceptance Certificate (PAC)

- i) The PAT team shall check the compliance statement of the bidder and the contract. Compliance statement of the bidder & the contract conditions shall be implemented/fulfilled with full satisfaction to BTCL.
- ii) PAT team shall check the quality of the installation materials which must be standard & world class and with full compliance to technical specification. If non standard installation materials are used, the bidder shall be penalized by 3(three) penalty points for each separate item which shall be considered only for PAC issuance purpose.

- iii) PAT team shall check the quality of the installation works which shall be standard and with full satisfaction to BTCL. If the overall installation work is considered to be non standard & not satisfactory to the committee, the bidder shall be penalized by 5 (five) penalty points which shall be considered only for PAC issuance purpose.
- iv) Penalty points as per the technical specification shall be imposed to the bidder for each of the incomplete or partially completed works listed during PAT for PAC issuance purpose.
- v) If the total penalty point scored by the bidder is equal or more than 30, PAC shall not be issued.
- vi) The bidder will be given 20 working days for completion of the works pointed out by PAT team.
- vii) The bidder shall take all necessary actions for cut over of the system on the date fixed up by BTCL irrespective of PAC, whether issued or not.
- viii) After such kind of cut over, if the bidder improve / complete the pending works, the penalty points regarding issuance of PAC will be recalculated accordingly. If the total penalty point becomes less than 30, PAC shall be issued at the earliest in favour of the Bidder by BTCL.
- ix) If PAC is not issued within thirty (30) working days in spite of the penalty points regarding issuance of PAC is less than 30, then the Provisional Acceptance Certificate (PAC) will be deemed to have been issued by BTCL and shall be equivalent in all respect to a Certificate issued by BTCL.
- x) For clause or clauses which is declared as ‘ non-complied ’ by the bidder in its bid offer , the bidder shall not be penalized any penalty points for that clause or clauses unless it has been agreed by the bidder in the final contract.
- xi) Non compliance of any the above clause/sub clause shall be treated as ‘**Change of Substance.**’

2.12.4 For avoiding any complexity regarding issuance of PAC, the bidder shall carefully and sincerely fill up the compliance statement keeping in mind the technical ability of the offered system to meet the requirements of the technical specification.

#### 2.12.5 Final Acceptance Test (FAT)

- i) After completion of the PAT and cut-over of the system, the Engineers of the Bidder will take prompt necessary steps to remove all types of faults and replace all types of faulty equipment at the cost of the supplier. At the end of the “Performance Guarantee Period for the Contract”, the overall performance of all equipment will be reviewed and this review shall be termed as “Final Acceptance Test (FAT)”.
- ii) The review shall include (but not limited to) the required working reliability and performance standards of the equipment to meet tender specifications, the bidder’s responsiveness to resolve all shortcomings mentioned in PAT reports and the bidder’s removal of all pending & outstanding faults or shortages encountered during the Performance Guarantee Period for the Contract. When this FAT becomes due, the bidder shall make an official request to BTCL for starting of the FAT and BTCL shall

start the FAT within one month after receipt the request from the bidder.

- iii) The bidder shall be responsible for arrangement of all equipment, consumables, test gears and measuring equipment required (if any) for such review tests.
- iv) In addition, the bidder has to provide per-diem costs to FAT engineers as per following :

**For the Soft Switch, NMS and BSS:**

- a) Number of BTCL Engineers of FAT team : 5 (five)
- b) Number of days allowed for per diem charge/person : 5 (five) days
- c) Per diem charge to BTCL FAT team members : Taka 2,000/-  
per day/person

**For all equipment at each TGW site including GPON system:**

- a) Number of BTCL Engineers of FAT team : 3 (three)
- b) Number of days allowed for per diem charge/person : 3 (three) days
- c) Per diem charge to BTCL FAT members : Taka 2,000/-  
per day/person

**For all equipment at each AGW site:**

- a) Number of BTCL Engineers of FAT team : 3 (three)
- b) Number of days allowed for per diem charge/person : 3 (three) days
- c) Per diem charge to BTCL FAT members : Taka 2,000/-  
per day/person

However, the bidder shall note that, if necessary, any or all FAT can continue for more than the above scheduled period; but, in such cases, the bidder shall not be liable to pay per-diem for those additional days. The bidder shall provide local transportation to the FAT Team to conduct the FAT.

2.13 Foreign Training and Appreciation Course

The Bidder shall provide the training to BTCL Engineering personnel and appreciation course for Executives. The training curriculum shall be enough to facilitate transfer of technology for planning, designing, expanding and proper operation & maintenance of all the systems covered by this purchase to BTCL engineering personnel. The appreciation course shall provide general overview of the NGN technology and the services to be provided by the supplied network at present and in future. The Bidder shall include in his offer unit price (*per person basis*) for the Training and Appreciation course. Failure to quote shall be considered that the bidder proposes to provide this service totally "**free of charge**" to BTCL. If the bidder does not agree to this basic minimum format, its disagreement shall be considered as a "**Major Deviation**".

2.13.1 Foreign Training

Following generic areas should be included in all training program. Actual content for each group of trainees, however, be customized based on the specific equipment.

This course module will cover at least the following broad topics: NGN Technologies, Network Design and Configuration, NGN Protocols, Signaling System and Issues, Network Management Systems and Tools, NGN Service features and provisioning, Network convergence, Security issues in the conversed network, PON technology etc.

The details of this course module are given below:

**Group-A:** Training on Softswitch and Trunk Gateways, NMS and Billing Sub-system.

a)	Number of BTCL Graduate Engineers	12(twelve)
b)	Number of minimum working days	20 (twenty)
c)	Per diem charge to BTCL Engineers	US\$ 80 (Eighty) per day ( <i>including all holidays in between and travel days</i> ) per person
d)	Other facilities	a) Local Transportation b) Standard Accommodation c) Medical Services ( <i>if required</i> ) d) Economy Class Return Air Ticket e) Other institutional facilities applicable for Trainees

**Group-B:** Training on Firewall, Session Border Controller, LAN Switch, and Lawful Interception facility.

a)	Number of BTCL Graduate Engineers	6 (six)
b)	Number of minimum working days	20 (twenty)
c)	Per diem charge to BTCL Engineers	US\$ 80 (Eighty) per day (including all holidays in between and travel days) per person
d)	Other facilities	a) Local Transportation b) Standard Accommodation c) Medical Services (if required) d) Economy Class Return Air Ticket e) Other institutional facilities applicable for Trainees

**Group-C:** Training on Optical Fiber, GPON System and Mux Equipment

a)	Number of BTCL Graduate Engineers	12 (twelve)
b)	Number of minimum working days	20 (twenty)
c)	Per diem charge to BTCL Engineers	US\$ 80 (Eighty) per day (including all holidays in between and travel days) per person
d)	Other facilities	a) Local Transportation b) Standard Accommodation c) Medical Services (if required) d) Economy Class Return Air Ticket e) Other institutional facilities applicable for Trainees

**Group-D:** Training on Access Gateway equipment and different service provisioning

(e.g. ADSL, Ethernet)

a)	Number of BTCL Graduate Engineers	20 (twenty) preferably in two batches
b)	Number of minimum working days	20 (twenty)
c)	Per diem charge to BTCL Engineers	US\$ 80 (Eighty) per day (including all holidays in between and travel days) per person
d)	Other facilities	a) Local Transportation b) Standard Accommodation c) Medical Services (if required) d) Economy Class Return Air Ticket e) Other institutional facilities applicable for Trainees

The bidder shall submit detail training proposal including place of training in its offer.

#### 2.13.2 Appreciation Course

The details of the appreciation course for BTCL Engineers/Higher Executives/Officials on Overall technology and offered system/equipment in the Manufacturer's Premise/training center are as follows:

- a) Number of BTCL Engineers/ Executives : 10 (ten)
- b) Number of minimum working days : 7 (seven)
- c) Per diem charge to BTCL Trainee : US\$ 100 (One hundred) per day (including all holidays in between and travel days) per person
- d) Other facilities : Local Transportation  
Standard Accommodation  
Medical Services (if required)  
Both way Full-fare Air Ticket

The bidder may propose to increase the duration of the training and/or number of trainee, if necessary.

#### 2.13.3 Local Training for BTCL personnel

The Bidder shall provide training in Bangladesh at BTCL premises on the operation and maintenance of the system. The details of the local training shall be as follows:

**For all equipment:**

- a) Number of BTCL Engineer/Officials : 40 (Forty) in four batches
- b) Number of minimum working days : 15 (fifteen)
- c) Per diem charge to BTCL Executives : BDT 1,500 (one thousand five hundred) per day per person including Holidays

#### 2.14 Inter-connection between different ODF/DDF

- i) The Bidder shall be responsible for making inter-connection facility (including supply of all required material, optical fiber cables, coaxial cables, connectors & tag blocks

at both ends of inter-connecting cable and related service) between its own system ODF/DDF and BTCL's existing Switching/Transmission ODF/DDF in the same building (if applicable).

- ii) Probable requirements of the connectors, optical fiber cables, coaxial cables, cable tray etc. should be checked during the survey by the bidder.

#### 2.15 Inter-works with the Existing Systems

The Bidder shall be responsible to ensure that all the system covered by this purchase shall be able to inter-work with all the existing systems of BTCL. The bidder shall make necessary survey and shall also be entirely responsible to solve any mismatch, if encountered.

#### 2.16 Installation Material

The Bidder shall provide all installation material for all of the equipment covered by this purchase. The material shall include all type local material like fuel, power etc necessary to be used during installation and testing functions.

#### 2.17 Installation and Commissioning Services

The Bidder shall be responsible to provide all services related to installation, testing, commissioning and cut-over services for all equipment covered by this purchase.

#### 2.18 Survey, Network Planning & Design Services

- i) As part of its turn-key responsibility, the **successful bidder** shall be responsible to provide all services related to installation survey, planning & design for all equipment/ system covered by this purchase.
- ii) A report shall be submitted to BTCL's relevant office after completion of that work.

#### 2.19 Documentation

The **successful bidder** shall supply at least (but not limited to) the following documents before PAT of each site.

Technical on line documentation for all equipment of each site in the operating console and 1(one) set in CD ROM. Such on line document in control console shall include (but not limited to) the following:

- i) System description
- ii) Input/ command manual & output manual (including on line help menu) with detail explanation of each parameter
- iii) Alarm dictionary with detail explanation
- iv) Fault / Malfunction dictionary with detail explanation.
- v) Maintenance manual.
- vi) As-built installation drawings for all equipment: 2 (two) set in hard copy; per site.
- vii) Station AC power wiring diagrams: 2 (two) set in hard copy per site.
- viii) Detail technical document for NMS: 1 (one) set in CD and 1 set in hard copy.
- ix) PAT documents for each site
- x) Earthing diagram, 2 (one) set per site

## 2.20 Mentioning additional equipment

If the bidder thinks that any additional equipment, not listed in this document, is needed for proper implementation and subsequent O&M of the proposed equipment, he shall mention such equipment in the relevant form.

## 2.21 Possibility of change in Scope of Work and BoQ

The Bidder shall consider that, the capacity, number and location of nodes and other equipment and subsequently the total BoQ may change, depending upon the actual requirement during BoQ preparation with the successful bidder.

## 2.22 Prevalence of different Clauses, Chapters and Books

If, for any item, the contents of a Clause of any Book contradict with the contents of any other Clause of the same or other Book of the Tender Document, the prevalence of the Clause shall be as follows:

- a) In case of different Books, Book Two shall supersede Book One;
- b) In case of same Book, later Chapter shall supersede previous Chapter;
- c) In case of same Chapter, later Clause shall supersede previous Clause.
- d) In case of later corrections by BTCL, corrections will prevail with its due position.

## 2.23 Unit Price for Future Orders

- i) The unit prices for all future orders for all equipment and services covered by this purchase shall be equal to or below the prices quoted in the original contracted offer.
- ii) The Bidder shall quote, with his offer, a detailed '**Future Order Formula**' separately for equipment and services in Form E and submit in the Financial Documents.
- iii) The new prices as per quoted future order formula shall become effective only for orders placed after Guarantee Period and up to the life time of all equipments/items and services as per BOQ under this purchase.
- iv) All parameters of the quoted formulae must be described clearly.
- v) The effective unit price for any future order will be the lower one between the contract unit price for this tender and the price calculated on the basis of offered Future Order Formula.

Any disagreement/deviation/non-quotation will be treated as "**Change of substance**".

:: End of Chapter ::

## Book 2

### Chapter Three

#### Proposed Network Architecture

##### 3.1 Brief Description of the Network

Under this Procurement, NGN Platform shall have two Softswitches to be installed at Sher-E-Bangla Nagar and Ramna Telecom Buildings. To interconnect existing PSTN exchanges 7 Trunk Gateways (TGW Node) will be installed at Sher-E-Bangla Nagar, Gulshan, Uttara, Mirpur, Moghbazar, Ramna and Nilkhet. Each of the TGW nodes shall have necessary equipment to complete the network. BTCL owns an IP core network consisting of Huawei L3 Switches (Model S8512, S8508 and S6506R). There are enough GE (optical) ports available in the switches. The proposed network shall use this IP core network. A centralized Network Management Systems (NMS) shall be installed at Sher-E-Bangla Nagar Telecom Building but there shall have required number of terminals in seven TGW nodes to run operation & maintenance activities locally. *An overall network architecture is given in Diagrams at the end of this chapter.*

##### 3.2 Traffic Matrix

STM-1 and E1 traffic matrix for the TGWs are as follows:

###### A. Connectivity Matrix of SB NAGAR Trunk Gateway

Name of exchange	No. of STM-1	No. of E1	No. of CCS7 Sig. terminals	No. of GE <sub>o</sub>
Alcatel Tandem	3	8	12	-
E-10 Local	-	36	2	-
DMS Local	-	16	2	-
ZTE Local	-	16	2	-
Huawei Local	-	10	2	-
Huawei Savar	-	10	2	-
N Ganj ZTE	-	10	2	-
PMO ZTE	-	10	2	-
Alcatel TAX	1	8	4	-
NEC Tandem	-	50	4	-
ANS Gateway	-	-	-	2
IP Backbone	-	-	-	2
<b>Grand Total</b>	<b>4</b>	<b>174</b>	<b>34</b>	<b>4</b>

###### B. Connectivity Matrix of GULSHAN Trunk Gateway

Name of exchange	No. of STM-1	No. of E1	No. of CCS7 Sig. terminals	No. of GE <sub>o</sub>
E-10 Local	-	28	4	-
DMS Local	-	14	2	-
ZTE Local	-	10	2	-
ZTE Cant	-	12	2	-
DMS Cant	-	12	2	-
S-12 Gazipur	-	8	2	-
C&C Gazipur	-	12	2	-

C&C Tongi	-	10	2	-
Baridhara ZTE	-	20	2	-
Alcatel TAX	1	8	4	-
ANS Gateway	-	-	-	2
IP Backbone	-	-	-	2
<b>Grand Total</b>	<b>1</b>	<b>210</b>	<b>46</b>	<b>4</b>

### C. Connectivity Matrix of Ramna Trunk Gateway

Name of exchange	No. of STM-1	No. of E1	No. of CCS7 Sig. terminals	No. of GE <sub>o</sub>
Chawk AXE	-	12	2	-
Chawk ZTE	-	6	2	-
Zinjira ZTE	-	10	2	-
Ramna E-10	-	30	2	-
Raman DMS	-	20	2	-
Ramna AXE	-	20	2	-
Ramna huawei	-	10	2	-
Ramna Tandem	-	40	8	-
Ramna TAX	-	20	2	-
N Ganj ZTE	-	12	2	-
Fakirapool Huawei	-	12	2	-
Syedabad Huawei	-	8	2	-
Gandaria Huawei	-	10	2	-
Siddhir Ganj ZTE	-	8	2	-
Alcatel TAX	1	8	4	-
ANS Gateway	-	-	-	2
IP Backbone	-	-	-	2
<b>Grand Total</b>	<b>1</b>	<b>226</b>	<b>38</b>	<b>4</b>

### D. Connectivity Matrix of Moghbazar Trunk Gateway

Name of exchange	No. of STM-1	No. of E1	No. of CCS7 Sig. terminals	No. of GE <sub>o</sub>
Alcatel TAX	2	8	8	-
E-10 Local	-	32	2	-
DMS Local	-	12	2	-
ZTE Local	-	8	2	-
NGN TAX	-	-	-	2 FE/GE
Khilgaon AXE	-	12	2	-
Khilgaon DMS	-	8	2	-
Goran Huawei	-	10	2	-
ANS Gateway	-	-	-	2
IP Backbone	-	-	-	2
<b>Grand Total</b>	<b>2</b>	<b>90</b>	<b>20</b>	<b>4 GE+2FE/GE</b>

### E. Connectivity Matrix of Mirpur Trunk Gateway

Name of exchange	No. of STM-1	No. of E1	No. of CCS7 Sig. terminals	No. of GE <sub>o</sub>
E-10 Local	-	16	2	-
DMS Local	-	8	2	-
ZTE Local	-	8	2	-
ANS Gateway	-	-	-	2
IP Backbone	-	-	-	2
<b>Grand Total</b>	<b>-</b>	<b>32</b>	<b>6</b>	<b>4</b>

### F. Connectivity Matrix of Nilkhet Trunk Gateway

Name of exchange	No. of STM-1	No. of E1	No. of CCS7 Sig. terminals	No. of GE <sub>o</sub>
E-10 Local	-	20	2	-
DMS Local	-	8	2	-
Huawei Local	-	12	2	-
ANS Gateway	-	-	-	2
IP Backbone	-	-	-	2
<b>Grand Total</b>	<b>-</b>	<b>40</b>	<b>6</b>	<b>4</b>

### G. Connectivity Matrix of Uttara Trunk Gateway

Name of exchange	No. of STM-1	No. of E1	No. of CCS7 Sig. terminals	No. of GE <sub>o</sub>
DMS Local	-	12	2	-
ZTE Local	-	8	2	-
Huawei local	-	10	2	-
ANS Gateway	-	-	-	2
IP Backbone	-	-	-	2
<b>Grand Total</b>	<b>-</b>	<b>30</b>	<b>6</b>	<b>4</b>

### 3.3 Completion of Interconnection works.

- i) The Bidder shall be entirely responsible for completing the inter-connection works in accordance with the above traffic matrix for all sites before start of PAT (including supply of all required material, optical fiber cables, coaxial cables, connectors & tag blocks at both ends of inter-connecting cable and related services). The bidder shall interconnect its own system ODF/DDF to BTCL's existing Switching/Transmission ODF/DDF and also the DDF of existing exchanges mentioned in the above traffic matrix to BTCL's existing Switching/Transmission ODF/DDF. BTCL will only provide the Transmission media. Probable requirements of the connectors, optical fiber cables, coaxial cables, cable tray etc. should be checked during the survey by the bidder.
- ii) The interconnection works shall be done as per the traffic matrixes A to G of clause no. 3.2 above. All the E1s of existing exchanges mentioned in these tables shall have to be connected with the proposed trunk gateways. The Bidder shall quote necessary number of MUXes to get these E1s to be connected with the Trunk gateways. That means these MUXes shall have necessary number of STM-1 and E1 interface to connect the Trunk Gateways with existing exchanges as mentioned in the tables. The bidder may quote necessary E1 interfaces in the Trunk gateway as per requirement.

### 3.4 Factors for Dimensioning of Equipment

#### 3.4.1 Traffic Data

- Average Holding Time : 60 sec
- Average Traffic per Trunk : 0.75 erlang
- Average CCS7 Signaling load : 0.2 erlang
- IP VPN/VLAN traffic : 5 Mbps/port
- ADSL2+ traffic : 2 Mbps/port
- IP Multimedia traffic per line : 0.05 erlang
- ***Average traffic of voice calls for AGW POTS: 0.12 Erlang***

#### 3.4.2 Overload Condition

The overload condition in the equipment shall be defined as follows:

- a) Traffic in erlang: 125 % of normal busy hour traffic load
- b) BHCA : 135 % of normal busy hour traffic load

#### 3.4.3 Grade of Service

The loss probability in busy-hour shall not exceed the following values at:

	<u>Normal load</u>	<u>Overload</u>
a) Incoming calls	1.0 %	5.0 %
b) Outgoing calls	0.1 %	3.0 %

#### 3.4.4 Probability of Delay

##### a) *Incoming Response*

- For normal load: Greater than 1.0 sec shall not exceed 1.0 %
- For over load: Greater than 1.0 sec shall not exceed 5.0 %

##### b) *Switching Time*

- For normal load: Greater than 1.0 sec shall not exceed 1.0 %
- For over load: Greater than 3.0 sec shall not exceed 5.0 %

#### 3.4.5 System Occupancy

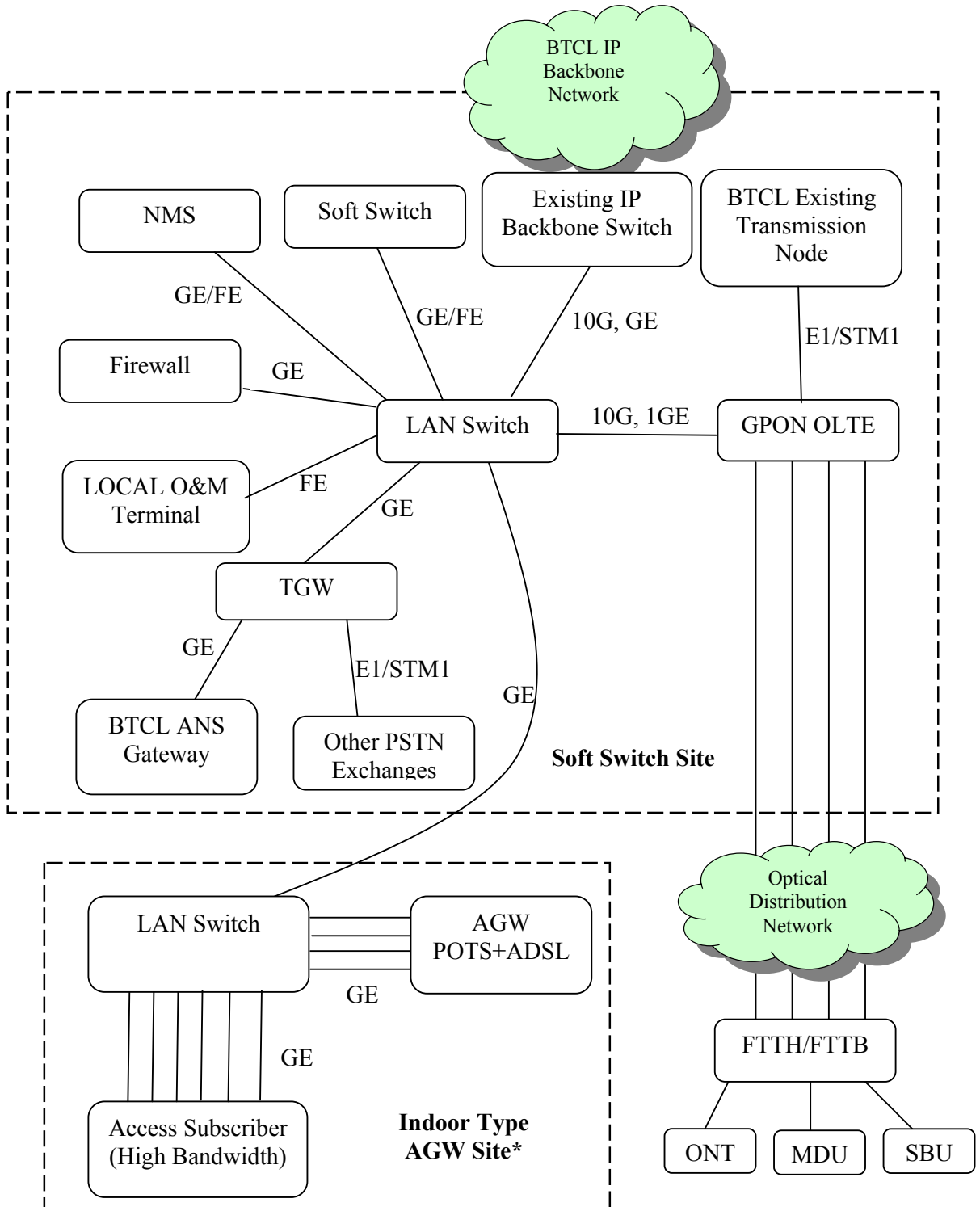
The average occupancy of any common control equipment, processors and main memory ***shall not exceed 60%*** under normal load and ***80%*** under overload condition.

3.5 The bidder shall note that, if for inter-connections of its different modules, there is requirement for additional resources, the quantities of such additional resource elements will be considered as extra to the requirements stated in the relevant quantities of items of the Annexes; and the bidder shall add those extra requirements in the relevant parts of the BoQ.

3.6 Redundant Firewall will be installed with the Softswitch to protect Operation Support System and Billing Support System and other equipment and also to provide secure access/connectivity for the remote user.

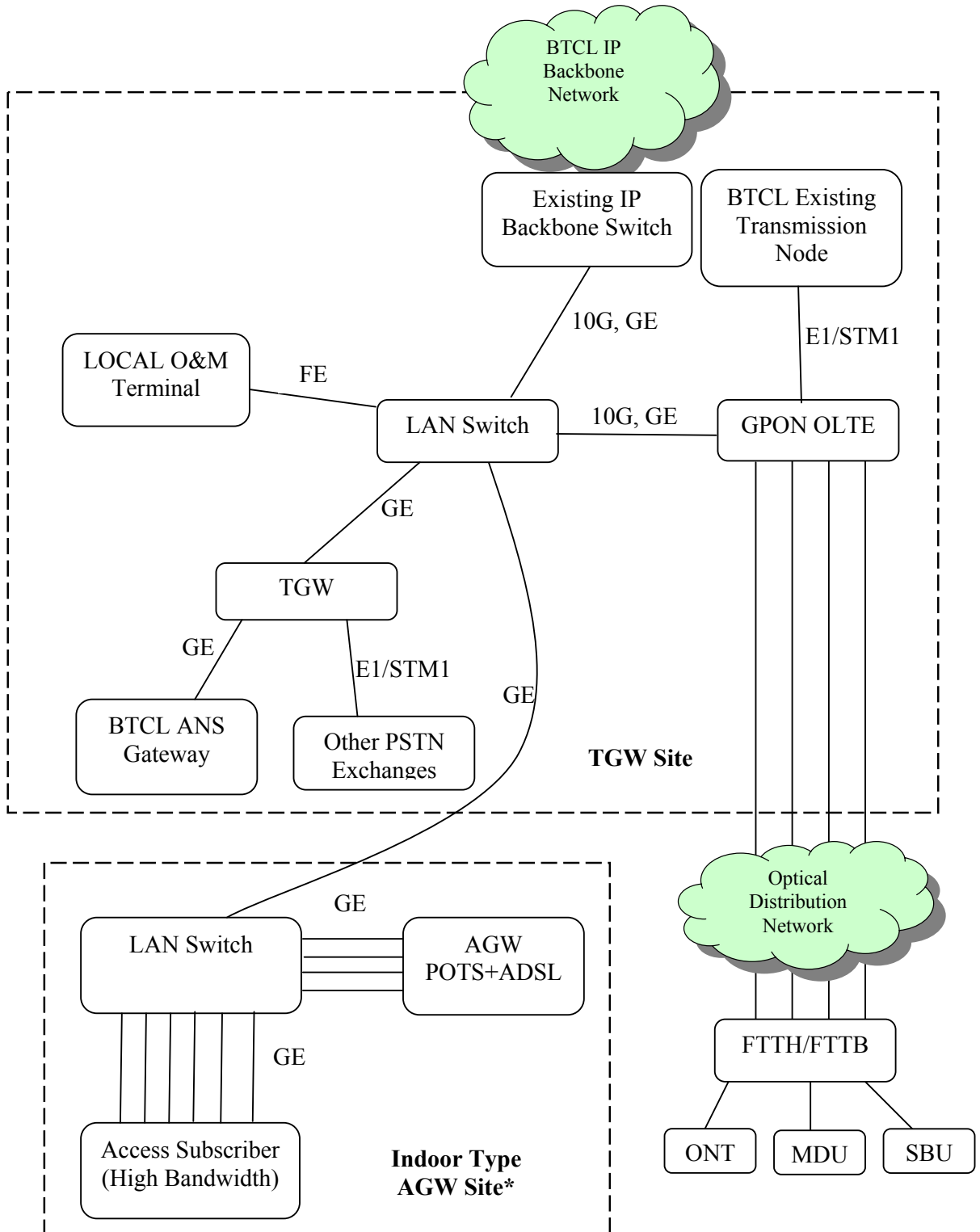
3.7 For Lawful Interception solution, Trunk Gateway at Sher-E-Bangla Nagar and at Gulshan shall work as Interception Gateway and should be connected to the Lawful Interception Gateway (common platform in NMC) separately.

**Diagram-1 : The overview of Network Architecture at a typical Soft Switch site**



\* Outdoor Type AGWs will be directly connected to the LAN Switch at Soft Switch site by GE link

**Diagram-2 : The overview of Network Architecture at a typical TGW site**



\* Outdoor Type AGWs will be directly connected to the LAN Switch at Soft Switch site by GE link

:: End of Chapter ::

**Book 2**  
**Chapter Four**

**Environmental and Other Requirements**

4.1 Climatic Condition

Bidder shall bear the full responsibility to ensure that all of the supplied equipment is capable of operating in Bangladesh environment without degradation. All of the supplied equipment must work satisfactorily under the following environmental conditions. Deviation from these values shall be considered as “**Major Deviation**”.

Temperature		Relative humidity	
Working for a long duration	Working for a Short duration	Working for a long duration	Working for a short duration
+5 °C to +45°C	0°C to +55°C	5% to 85%	5% to 95%

4.2 Physical Requirement

All components of all of the equipment shall be of highest possible quality design and fully tropicalized to be used for continuous operation. The metal surface shall either be galvanized or painted by spray or plated with surface treatment. There shall be no sharp edges or projections. All power equipment and cables shall be protected with fuses of proper ratings. All equipment racks, sub-racks and slots shall be clearly marked in English letters for proper recognition. All equipment racks, sub-racks and slots shall also be provided with proper earthing and shall be protected against any surge and should follow OSTA or any other telecom standard platform (2.2 m Height, 0.6 m width rack). The deviation shall be considered as “**Major Deviation**”.

4.3 Operating Voltage

The Soft switch, Trunk Gateway, Access Gateway and LAN switch equipment must operate satisfactorily on the nominal voltage of -48V DC and within a voltage range of -40 to -57 Volts DC. Deviation from these values shall be considered as “**Critical Deviation**”.

4.4 Guarantee for Hardware

The Bidder shall guarantee that, the hardware of the system will run without any **major** technical hazard for at least up to 5(five) years after the date of issuance of FAC. Deviation shall be considered as “**Major Deviation**”.

4.5 Guarantee for Software

The Bidder shall guarantee that, all the Operating and Application Software of the system will run without any technical hazard for at least up to 5(five) years after the date of effect of FAC. If any fault and/ or bug is detected within this period, the bidder shall correct these faults and debug the software at his own costs and at “free of charge” to BTCL. Bidder’s refusal to agree to this guarantee shall be considered as “**Critical Deviation**”.

4.6 License for Software

BTCL prefers that the license of all the software for all equipment shall be for unlimited time. However, the bidder may propose the licensing renewal process in the bid. If no renewal process is mentioned in the offer, it will be considered that the license of all the

software for all equipment is offered for unlimited time.

#### 4.7 Language of Software

The language of the instructions of the software shall be in English. Deviation shall be considered as “**Critical Deviation**”.

#### 4.8 Guarantee for Introduction of new Features

4.8.1 The bidder shall guarantee that, if BTCL requests for introduction of any new/ additional system features in the supplied system, the bidder shall try its best to do so.

4.8.2 The price for such new/ additional features shall be logical and realistic and shall be fixed up by mutual discussion.

#### 4.9 Guarantee for up-gradation of Software Version

4.9.1 The Bidder shall guarantee that it will inform BTCL of all subsequent up-grades of the software version of the supplied system.

4.9.2 If the upgrade becomes mandatory for any expansion of the supplied system or addition/ modification of any prevalent feature, such software upgrades shall be done “**free of charge**” to BTCL.

4.9.3 If such upgrade becomes mandatory for proper operation & maintenance of the network in its present configuration and form, such upgrades, including supply of new software and hardware, shall be done “**free of charge**” to BTCL.

4.9.4 If any non-mandatory upgrade is done on request from BTCL, but does not involve any change or addition in hardware, the bidder, upon request from BTCL, shall install such upgraded software “**free of charge**” to BTCL.

4.9.5 But, if any non-mandatory software upgrade, to be done at the request of BTCL, involves any hardware change and/ or additional hardware, charges will be incurred for prices for the changed and/ or additional hardware and the new software. In such cases, the prices for such new and/ or additional hardware and software shall be fixed on mutual agreement and in consistent with the market prices prevalent at the time of such request.

4.9.6 Bidder’s refusal to agree to any sub-clauses 4.9.1 to 4.9.5 shall be considered as “**Critical Deviation**”.

4.10 The NGN to be installed under this tender must meet LI compliance according to ETSI TS 101 331, ES 201 158, ES 201 671, TR 101 943, TR 101 944. Any deviation shall be considered as “**Substantially Non-Responsive.**”

:: End of Chapter ::

## Book 2

### Chapter Five

#### Requirement of Soft Switch

- 5.1 The Soft switch (SS), also called Media Gateway Controller (MGC), is the equipment principally responsible for call control functions and also provides the control of the Gateways such as Trunk/Media Gateways. The SS shall handle call control and the spectrum of features offered to the network and to both TDM subscribers and IP subscribers.
- 5.2 Design Criteria

The Soft Switch (SS) shall have to fulfill at least (but not limited to) the following essential design criteria:

- (a) The SS should be highly reliable and highly stable with all the card level redundancy (Active- Standby/ Hot-Swappable/Load-Sharing). It should be built around a hardware platform delivering carrier grade service.
- (b) *The Soft Switch shall be capable of working at mirror mode/hot backup mode during working in a pair in the network. The pair of soft switches shall be installed in two different locations (Sher-e-Bangla Nagar and Ramna) having the same hardware configuration, software configuration, and configuration data etc. These two Soft Switches will be interconnected by a heartbeat link to check whether the peer Soft Switch works normally.*

*In normal operating condition, the active SS will control and manage all the Trunk Gateways, Access gateways and other network elements (if any) to provide services to the subscribers. When the active Soft Switch becomes faulty, the standby Soft Switch will not receive any heartbeat signals from the active Soft Switch. In this situation, the standby Soft Switch will be automatically instantly activated and takes over the entire control without affecting the connected calls. Soft Switch supporting hot backup mode may operate either as active/standby or load sharing mode.*

- (c) The critical components such as main processor board, communication board, power supply, etc., must follow redundant design philosophy, and be able to support insertion/ removal of components in 'power on' condition with no effect impact to Call Server performance. The Bidder has to describe in detail, in his offer, to confirm design redundancy.
- (d) The main call processing card/ board shall have 1+1 redundant configuration.
- (e) Change-over from main to standby processor should not affect connected calls and calls under processing.
- (f) Fast Ethernet or Gigabit Ethernet ports must be in redundant configuration.
- (g) Should support NTP message trace and explanation for the operation and maintenance of the NTP. It is convenient to check the status of the NTP or to determine the cause of the NTP fault.

- (h) The Soft Switch should be able to check the memory of all boards periodically. If it detects a reading and writing error in a section of a memory, it sends a fault alarm, along with the location of the board with memory fault, to the background. Software is used to control whether to enable this function.
- (i) The proposed system shall have full functionality for ‘tElephone Number Mapping (ENUM)’. Bidder shall explain in detail this functionality available in the offered system.
- (j) Any deviation of the above requirement shall be treated as “**Critical Deviation**”.

### 5.3 Signaling Protocols

- (a) As a minimum the SS shall affect call set-up control using MGCP and ITU-T H.248.1, 2, 7, 14, 23 signaling to:
  - i) Media Gateways
  - ii) Others (bidder has to specify)
- (b) The SS shall provide ISDN signaling using IUA over the packet network to Trunk or Access Gateways supporting connection of ISDN PRI services.
- (c) The Bidder shall specify all protocols supported by their solution and shall indicate which standards and/or RFCs (and which versions) their solution complies to.
- (d) SS shall be able to affect call set-up and tear down between any of the following network elements:
  - i) IP phones or VoIP Soft clients with H.323 and SIP protocols
  - ii) ISUP Trunks supported on Media Gateways with recommendation of ITU Q.762, Q.763 and Q.764
  - iii) PRI Trunks supported on Media Gateways
  - iv) Tones/ announcements recorded on Media Gateways
- (e) The SS shall support, and be compliant to, White Book ITU-T Recommendations E.164 addressing schemes.
- (f) Each of the deviation of the above requirements shall be treated as “**Major Deviation**”.

### 5.4 Synchronization

#### 5.4.1 External Clock Synchronization

The SS shall support external clock synchronization either from dedicated 2 MHz clock signal or from a secondary signal (2 Mb/s). The secondary source shall be at least duplicated.

#### 5.4.2 Clock Accuracy

The internal clock used by the system shall be compliant to G.813 ITU-T standards.

#### 5.4.3 Network Time Protocol

Soft-switch should have the capability to keep time synchronization with the NTP server via NTP protocol following the standard IETF, RFC1305.

5.4.4 Each of the deviation shall be treated as “**Change of Substance**”.

5.5 Other Requirement

5.5.1 Protocol Processing Capability: The SS shall provide capability of handling minimum 16 (sixteen) local signaling point codes. The deviation shall be treated as “**Critical Deviation**”.

5.5.2 The Bidder must mention the BHCA capacity of individual Voice Processing Cards on the Soft Switch. The deviation shall be treated as “**Major Deviation**”.

5.5.3 **Voice Activity Detection (VAD)** with silence suppression (transmission of silence packets) and insertion of comfort noise at far end should be supported, if required. The deviation shall be treated as “**Minor Deviation**”.

5.5.4 Tones and Announcements

The SS shall have the following capabilities:

- i) Provide embedded tones and announcement functions
- ii) Register announcements to be played.
- iii) Capability to broadcast the supported announcements.
- iv) Request the gateways to play tones and announcements.

Each of the deviation shall be treated as “**Major Deviation**”.

5.5.5 Class 5 Services

5.5.5.1 SS must be able to analyze, manipulate and modify specific B numbers or number ranges (up to 24 digits) for call routing purposes.

5.5.5.2 For a specific PSTN address, the SS must be able to apply the following manipulations on the dialed digit string (‘translations’). Translations must provide:

- a) The ability to add or delete digit strings at specified positions,
- b) Specify number ranges with minimum and maximum digit length,
- c) Index different translation entry points,
- d) Invoke the generation of a billing record, as well as to specify a code (i.e. “Call Code”) against the billing record generated,
- e) Manipulate the Calling Line Identifier (CLI) for either signaling or billing purposes,
- f) White List/Black List screening – that is, invoke screening on the incoming call CLI; the capability of specifying at least 1 million CLI’s for either blacklist or white-list screening,
- g) Ability to control the application of an echo canceller via translations on a per call basis.

5.5.5.3 The SS shall provide routing facilities as follows:

- a) Overflow routing
- b) Alternative routing
- c) Proportional routing
- d) Even distribution of traffic within a trunk group
- e) Bearer traffic routing (i.e. different routing for voice and data calls)
- f) Different routing based on the class of service of the trunk or line on

- which the call originates
- g) Different translations / routing before and after IN triggering
- 5.5.5.4 The option of splaying traffic onto different trunk routes based on percentages. One must be able to specify the percentage value in the range of 1% - 100% (in increments of 1%).
- 5.5.5.5 Each of the deviation shall be treated as “**Major Deviation**”.
- 5.6 Intelligent Network (IN) Capability
- 5.6.1 The offered Softswitch shall provide IN functionality as per ITU-T Intelligent Network Application Protocol (INAP) interfaces.
- 5.6.2 *The IN capability shall be based on the conceptual model issued by ITU-T and adopted by ETSI. The system shall provide ITU-T’s INAP CS-1+ or CS - 2 capabilities.*
- 5.6.3 The INAP interface shall be able to connect to any third-party platform providing the following services/ nodes:
- 1) Service Control Point (SCP)
  - 2) Service Management - Access Point (SM-AP)
  - 3) Service Creation Environment Point (SCEP)
  - 4) Service Switching Point (SSP)
  - 5) Intelligent Peripherals
  - 6) Equipment and Peripherals for Support Node
- 5.6.4 The bidder shall propose the details of the IN functionality and quote accordingly. Absence of IN functionality in bidder's proposed SS shall be considered as “**Critical Deviation**”. The quotation is optional but shall be included with the total quoted price and evaluated accordingly. Non-quotation of any item mentioned above shall be treated as “**Critical Deviation**.”
- 5.7 Media Resource Service to provide the play tone and announcement which should be uniform with the soft switch hardware platform. The bidder shall configure the service as per network requirement and give clarification in the offer based on the following facility.
- a) There shall be provision with necessary Hardware and Software for giving pre-recorded announcements to subscribers. The device for such facility will have the following characteristic. Deviation from these characteristics shall be considered as “**Critical**”.
  - b) Facility (including supply of necessary Hardware & software) to record, erase and modify one or all announcements by O & M personnel on site (with out depending on the Vendor) and with normal microphone or 8 ohms audio input jacks from external recorders.
  - c) Minimum number of announcement messages will be 25.
  - d) Duration of any or all the messages will vary from 5 to 60 seconds.
  - e) Of endless recording type and with automatic start-stop control.
  - f) Automatic access from the system by software controlled events.
  - g) The memory elements will be semi-conductor type with protection against erasure by system shutdown, power failure, electro-magnetic interference, optical interference, electrical & lightning surges and fault conditions.
- 5.8 Initially it is considered that 15% of the total calls would be TDM –TDM, 40% would be IP-TDM or TDM-IP calls and IP-IP calls would be 45%. The supplier shall provide

functionalities accordingly. The deviation shall be treated as “**Major Deviation**”.

5.9 Present capabilities of Softswitch

The present capabilities of Soft switch are mentioned in Annex-3.1. Each shortage of quantity offered only for the present equipage of each item in each site as in Annex-3.1, shall be treated as “**Major Deviation**”.

:: End of Chapter ::

## Book 2

### Chapter Six

#### Requirements of Trunk Gateway

- 6.0 The Trunk Gateways (TGW), also known as Media Gateways, act as gateways between the IP network and the TDM (Time Division Multiplexing)-based PSTN/PLMN. They are controlled by the SS or MGC through the H.248 and/ or MEGACO protocol. The TGW shall have the following capabilities:
- 6.1 Scalability
- The bidder should demonstrate an ability to supply a range of Trunk Gateways of scalable capacity to meet a range of deployment situations. The range should encompass Trunk gateway sizes from minimum requirement to maximum final requirement for any sites. The deviation shall be treated as “**Major Deviation**”.
- 6.2 TDM Interfaces
- The Bidder shall clearly specify that at least the following interfaces are supported by offered TGWs to narrowband TDM networks:
- Standard E1
  - Standard STM-1
- Any deviation shall be treated as “**Critical Deviation**”.
- 6.3 Packet Interfaces
- 6.3.1 The Bidder shall clearly specify that the Gigabit Ethernet interfaces are supported by the offered TGWs . Any deviation shall be treated as “**Critical Deviation**”.
- 6.3.2 All packet interface cards shall have 1+1 redundancy. Any deviation shall be treated as “**Critical Deviation**”.
- 6.3.3 In addition to TDM trunk, the bidder shall have to consider IP trunk according to the inter gateway traffic for the offered system. For this IP trunk , the bidder shall have to quote all necessary licenses / hardware etc. both in Soft Switch and trunk gateway.
- 6.4 Signaling
- 6.4.1 The TGW shall provide IETF MGCP and / or ITU-T H.248 signaling from the SS to effect voice path connection across the core packet (IP) network.
- 6.4.2 The TGW shall provide IUA (ISDN User Adaptation) to carry ISDN channel signaling information from connecting E1 PRI to the SS.
- 6.4.3 ***The TGW shall provide V5.2 interface from connecting E1 to the SS.***
- 6.4.4 The TGW shall provide M2UA or M3UA or MPUA or other protocols if necessary.
- 6.4.5 Any of the above deviation shall be treated as “**Major Deviation**”.
- 6.5 Voice Processing

- 6.5.1 TGW shall provide (as a minimum) G.711 A-law, 723.1 and G.729 or G.729a, for the conversion of TDM voice to packet. The Bidder should indicate what packet sizes are supported with which codec and what other codec are supported with what packet sizes.
- 6.5.2 The Bidder must provide the BHCA capacity of individual Voice Processing Cards on the TGW.
- 6.5.3 Voice Activity Detection (VAD) with silence suppression and insertion of comfort noise at far end (e.g. G.729a Annex B).
- 6.5.4 The TGW shall provide Fax tones detection and transmission (T.38).
- 6.5.5 The TGW should be able to deliver tones and announcements to connected TDM trunks under instruction from the SS.
- 6.5.6 Each of the deviation shall be treated as “**Major Deviation**”.
- 6.6 Interface timing/clocking
  - 6.6.1 The TGW shall have stable and accurate clock. The stability and accuracy of the clock shall be as follows.

Item	Specifications	
Network access parameters of the clock	Minimum frequency accuracy	Stratum-3 clock: $\pm 4.6 \times 10^{-6}$
	Pull-in range	Stratum-3 clock: The precision can be synchronized to $\pm 4.6 \times 10^{-6}$ .
	Maximum frequency offset	Stratum-3 clock: $5 \times 10^{-10}/\text{day}$
	Initial maximum frequency offset	Stratum-3 clock: $< 2.5 \times 10^{-8}/\text{day}$

- 6.6.2 Interface timing or clocking on TGWs shall have the flexibility to extract clock from external sources.
- 6.6.3 The internal clock used by the system shall be compliant to G.813 ITU-T standards.
- 6.6.4 Each of the deviation of the above requirements shall be treated as “**Major Deviation**”.
- 6.7 Reliability specifications

Item	Specifications
System availability in typical configuration	$\geq 99.999\%$
MTBF	$\geq 100000$ hours
MTTR	$< 0.8$ hours (excluding the preparation time)
Downtime	$< 5$ minutes/year
Restart time	$< 10$ minutes

Each of the deviation of the above requirements shall be treated as “**Major Deviation**”.

- 6.8 Present and Final capabilities of Trunk Gateway

The present capabilities of Trunk Gateways are mentioned in Annex-3.2. The Final capability should be 100% more than that of the specified present capacities. Each deviation shall be treated as “**Major Deviation**”.

6.9 Performance Monitoring

The TGW shall offer real time reporting of performance related information. Any deviation shall be treated as “**Major Deviation**”.

6.10 TGW shall support

- a) VoIP Trunking for transiting voice traffic
- b) TDM Hair pinning for avoiding burdening the IP network with local calls.
- c) Virtual Media Gateways implementation according to ITU-T H.248.1 *latest version*
- d) Content Duplication for interception of telecommunications by Law Enforcing Agencies (LEAs) and intelligence services.

Deviation shall be treated as ‘**Critical Deviation**’ for each above item.

6.11 Video Processing

TGW shall provide (as a minimum) H.261, H.263, H.264 video codec to perform video calls from the date of putting the system in commercial service. The Bidder should indicate what packet sizes are supported with which codec and what other codec are supported with what packet sizes. At the same time the bidder should declare the compression techniques to reduce the packet size available in their system and compare the bandwidth requirement for different transport technologies (like FR, Ethernet, PPP etc.). Deviation shall be treated as “**Minor Deviation.**”

:: End of Chapter ::

## Book 2

### Chapter Seven

#### Requirements of Network Equipment

##### 7.1 LAN Switch

There shall be 7 (Seven) **Layer-3** LAN switches at seven TGW sites for connecting local equipment like TGW, GPON OLT, Local Maintenance Console, Softswitch (in concerned site), Firewall (in concerned site), NMS (in concerned site) etc., and connecting this network with existing BTCL IP Backbone network.

##### 7.1.1 General Features

The LAN switch shall support the following general features. Any deviation shall be treated as “**Major Deviation**”.

- a) Spanning Tree Protocol (IEEE 802.1d)
- b) Rapid Spanning Tree Protocol (RSTP) (IEEE 802.1w)
- c) Logical Link Control (IEEE 802.2)
- d) Flow control (IEEE 802.3x)
- e) TFTP (RFC 783), Telnet (RFC 854) f) it shall support Jumbo Frames
- f) SNMP v1/v2/v3
- g) Support for 802.1x
- h) Multicast IGMP v2 snooping as per RFC 2236
- i) Multicast group and source port filters
- j) Rate limiting per port
- k) Traffic Shaping per port
- l) IPv6 ready from day one**

##### 7.1.2 Network Protocol Feature

The LAN switch shall support the following network protocol features. Any deviation shall be treated as “**Major Deviation**”.

- a) All ports shall work on either half or Full duplex. The System shall support manual or auto negotiation feature for defining the half or Full Duplex mode of operation.
- b) Shall generate Syslog and SNMP trap for all the events.

##### 7.1.3 VLAN Features

The Core LAN switch shall support the following VLAN features. Any deviation shall be treated as “**Major Deviation**”.

- a) IEEE 802.1Q tagging and 802.1p traffic priority
- b) IEEE 802.1w VLAN RSTP and IEEE 802.1s
- c) VLAN shall be possible to be created among ports of different types
- d) 4K VLANs (as per IEEE 802.1Q) shall be supported
- e) Shall allow MAC/IP Address bound to a port/VLAN.

##### 7.1.4 Routing Feature

The LAN switch shall support the following routing features. Any deviation shall be treated as “**Major Deviation**”.

- a) Static Route and Default Route
- b) Open Shortest Path First (OSPF)
- c) RIP version-1 and 2
- d) Intermediate System- Intermediate System (IS-IS)
- e) Border Protocol (BGP) *version 4*
- f) Multicast Features
- g) Internet Group Management Protocol (IGMP) Snooping Version-1, Version-2 and Version-3 shall be supported.
- h) Protocol Independent Multicast-Sparse Mode (PIM-SM)

#### 7.1.5 Security Features

The LAN switch shall support the following security features. Any deviation shall be treated as “**Major Deviation**”.

- a) Hierarchical management over the users and password protection
- b) Supports the supplicant authentication compliant with IEEE 802.1x protocol
- c) Support local and remote authentication dial-in user service (RADIUS) Authentication, Authorization and Accounting (AAA) schemes.
- d) Supports only port based packet filtering
- e) Support the simple text authentication and MD5 encrypted text authentication for routing protocols.
- f) Support SNMP v3 encrypted authentication
- g) Terminal Access User Security mechanism
- h) Packet filter
- i) The switch should supports identification authentication over the supplicants with standard Radius Server or local identification authentication.
- j) Secured Shell (SSH)

#### 7.1.6 Hardware Configuration and Performance Requirement

The LAN switch shall support the following capacity and configuration features. Any deviation shall be treated as “**Critical Deviation**”.

- a) The switch shall support minimum of 30000 MAC address
- b) ***The switch shall support minimum of 200 Gbps full duplex (400 Gbps half duplex) of switch capacity and 100 million packets per second forwarding performance.*** The switch shall be supplied with 1+1 hot-standby redundant control and switching. Module and 1+1 hot-standby redundant DC (-48V) power supply modules.
- c) The switch shall be supplied with minimum of ***512 MB RAM*** and ***256 MB*** Flash memory
- d) The processing and interface capabilities of the switch should be able to be upgraded to the final capacity with same chassis offered which is at least double of the present requirement. Present capacities are mentioned in the relevant clause(s) and ***Annex-3.5A&B.***

#### 7.1.7 Present and Final interface capacities of Switches

The present interface capacities of LAN switches are mentioned in ***Annex-3.5A&B.*** The Final capacity should be 100% more than that of the present capacity. Final capacities shall be achieved by inserting additional relevant cards/units and “in operation software

up-gradation” Shortage of quantities only for the present offered capacities of each category of interface for each site as in **Annex-3.5A&B**, shall be treated as “**Major Deviation**”.

## 7.2 Firewall

7.2.1 The Bidder has to provide firewall equipment to protect the NMS, BSS and other network elements and should also provide secure access/ connectivity for the remote users. The firewall shall be supplied with 1+1 redundancy to avoid single point of failure.

7.2.2 The firewall shall support the following features.

- a) The equipment shall provide failover port connectivity between Primary and Secondary Firewall.
- b) The Firewall shall protect systems from virus, worm, spy ware, spam and possible other threats. The system should have dynamic intrusion detection and prevention capability.
- c) The firewall shall support IPSEC.
- d) The firewall shall support SSL in addition to IPSEC based VPN.
- e) The system shall support DC Power Supply
- f) The firewall shall support robust stateful inspection firewall services
- g) The firewall shall support 802.1q-based VLAN support on the LAN Ports.
- h) The system shall provide flexible access-control capabilities for more applications, services, and protocols, with the ability to define custom applications and services.
- i) The firewall shall support inbound/outbound ACLs for interfaces, time-based ACLs, and per-user/per-group policies.
- j) The firewall appliance shall support in a secure Layer 2 bridging mode, providing rich Layer 2-7 firewall security.
- k) The system should support AAA services via RADIUS, with support for redundant servers for increased AAA services resiliency.
- l) The vendor shall provide unlimited license for the VPN Client over Windows 97, ME, NT, 2000, XP, Sun Solaris; Intel-based Linux distributions for remote management and access requirement.
- m) Should support OSPF dynamic routing.
- n) The Firewall shall support load balancing across equal-cost multipath routes
- o) The firewall shall also support native IPv6 network environments and applications.
- p) The firewall shall support SSHv2, telnet, HTTP/HTTPS, and ICMP-based management.
- q) The system shall support dynamic, static, and policy-based NAT, and PAT services
- r) The system shall support SNMP MIB for VPN flow statistics including tunnel uptime, bytes/packets transferred, etc.
- s) The system shall support H.323 NAT Traversal.

Each deviation shall be treated as “**Major Deviation**”.

7.2.3 The present capabilities are mentioned in **Annex-3.6**. The final capacity shall be at least double of the present capacity. Final capacities shall be achieved by inserting additional cards/units and “**in operation software up-gradation**”. Shortage of quantities offered only for the present capabilities of each item as in **Annex-3.6**, shall be treated as “**Major Deviation**”.

:: End of Chapter ::

Book 2  
**Chapter Eight**

**Requirements of Charging Facilities**

- 8.1 The proposed Soft switch shall perform the charging of the voice traffic (for all types of calls) passed through each of the circuit in any or all circuit groups of Trunk Gateways and through *AGWs/MDUs/ONTs/SBUs*. The system shall generate Call Detailed Records (CDR) and shall provide complete and comprehensive software and hardware facilities for supporting Charging and Accounting functions.
- 8.2 Call Detailed Recording (CDR) facility in Circuit
- 8.2.1 The System must be capable of generating CDRs and recording detail data of all completed calls (both incoming and outgoing) for each of the circuit in any or all circuit groups. The following call-related data (not limited to) shall be generated and recorded in the system. Absence of each of the following data shall be treated as “**Major Deviation**”.
- a) Node Identity
  - b) Route/ Circuit Group Identity by name and/or number
  - c) Calling Subscriber’s National Number
  - d) Re-directing subscriber’s National Number
  - e) Called Subscriber’s Number (*all of the digits dialed*)
  - f) Charging Status of the call (*Chargeable or Non-chargeable*)
  - g) Charging Category of the call (*Local/ NWD/ ISD/ Service*)
  - h) Date and Time of call connection and/ or disconnection
  - i) Chargeable Duration of the call
- 8.2.2 Absence of the CDR facility in the system shall be treated as “**Change of Substance**”.
- 8.2.3 Activation of the above records shall not be by default for any circuit or circuit group. The system shall have the capability to activate or deactivate the above recording in any circuit and/ or circuit group by commands. Deviation shall be treated as “**Minor Deviation**”.
- 8.2.4 The language of these records shall be English. Deviation shall be treated as “**Critical Deviation**”.
- 8.2.5 The records will be continually saved in the central storage device (Hard Disk) by the system in a pre-fixed regular period and sequence. Sufficient buffer space shall be reserved in the Hard Disk for saving at least **20 million** of such individual records. Negative deviation of this value up to 50% shall be treated as “**Minor Deviation**”, negative deviation above 50% shall be treated as “Major Deviation” and absence of such buffer shall be treated as “**Change of Substance**”.
- 8.2.6 The system shall be configured to generate a “major alarm” when 80% of such buffer has been filled. Deviation shall be treated as “**Major Deviation**” but the absence of such alarm facility shall be treated as “**Critical Deviation**”.
- 8.2.7 The records will be specially protected (from erasure or corruption) against system shutdown, power failure, electro-magnetic interference, electrical & lightning surges, fault conditions, illegal access and wrong commands. Deviation shall be treated as “**Critical Deviation**”.

- 8.2.8 Facilities shall be provided to dump the contents (up to any or many number of records) of such records anytime to the back-up devices by command. Such dump may be titled as “**Circuit CDR Dump**”. Multiple dumping of the same records shall be allowed. Absence of dumping facility shall be treated as “**Critical Deviation**”.
- 8.2.9 After confirmation of the completion of such dump, all the dumped records are to be automatically deleted from the storage devices (Hard Disks) in order to create space for new entries. Deviation shall be treated as “**Major Deviation**”.
- 8.2.10 The bidder shall also provide Windows-based software in any of the Control Console for reading and/or de-coding (if required) of the Circuit CDR Dump and printing outputs (*for any, many or all circuits/ circuit groups*) in tabular formats. Failure to provide such facility shall be treated as “**Critical Deviation**”.
- 8.3 Call Detail Record (CDR) facility for subscribers
- 8.3.1 The system shall be capable of recording detail data of all completed calls for each of the subscriber. The following data (but not limited to) shall be recorded; any deviation shall be treated as “major” and absence of this CDR facility shall be treated as “change of substance” of the bid.
- a) Short name of the Office/Node
  - b) Calling Subscriber’s National Number
  - c) Called Subscriber’s Number (*all of the digits dialed*)
  - d) Charging Status of the call (*chargeable or Non-chargeable*)
  - e) Charging Category of the call (*Local/ Inter-Operator/ Premium/ISD/ Service/ Facility*)
  - f) Date and Time of call connection and/ or disconnection
  - g) Chargeable Duration of the call and number of meter pulses generated
- 8.3.2 The language of these records shall be English. Deviation shall be treated as “**Critical**”.
- 8.3.3 The records will be continually saved in the system’s primary back-up memory (Hard Disk) by the system in a pre-fixed regular period and sequence. Sufficient buffer space shall be reserved in the system Hard Disk for saving at least **20 million** of such individual records. Negative deviation up to 25% of such value shall be treated as “**minor**”, negative deviations above 50% shall be treated as “**major**” and absence of such recording facility shall be treated as “**change of substance**”.
- 8.3.4 The attribution of CDR facilities, to any or many or all subscribers and to any or many types of calls, shall be field-designable by MML command.
- 8.3.5 The system shall be configured to generate a "minor alarm" and a "major alarm" when 75% and 85% respectively of such buffer has been filled. Deviation shall be treated as “major” but the absence of such alarm facility shall be treated as “**Critical Deviation**”.
- 8.3.6 The records will be specially protected (from erasure or corruption) against system shutdown, power failure, electro-magnetic interference, electrical & lightning surges, fault conditions, illegal access and wrong commands. Deviation shall be treated as “**Critical Deviation**”.
- 8.3.7 Facilities shall be provided to dump the contents (up to any or many number of records) of such records anytime to the secondary back-up devices by MML command.. Multiple dumping of the same records shall be allowed. Absence of dumping facility shall be treated as “Major Deviation”.

- 8.3.8 After confirmation of the completion of such dump, all the dumped records are to be automatically deleted from system's primary back-up devices (Hard Disks) in order to create space for new entries. Deviation shall be treated as “major”.
- 8.3.9 The bidder shall also provide a Windows-based software in any of the Control Console for reading of the CDR dump and printing outputs (*for any, many or all subscribers*) in tabular formats. **Failure to provide such facility shall be treated as “Critical Deviation”.**
- 8.4 The Bidder, in its technical proposal, will give detail of its standard format of the Call Data Record (CDR) dump in the CD and will also provide sample printout of such data. Failure to provide the format or printout. Deviation shall be treated as “**Major Deviation**”.
- 8.5 Adaptability with BTCL billing Centre

The bidder shall be responsible for financing any required adaptation and / or amendments to the Hardware / Software of BTCL’s billing centre in order to read the data in the CD dump and to print these data to prescribed bill formats. The bidder shall make necessary survey for this purpose. Deviation shall be treated as “**Critical Deviation**”.

:: End of Chapter ::

## Book 2

### Chapter Nine

#### Requirements of Signaling, Protocols and Interfaces

##### 9.1 Inter-Node Signaling

The following inter-node signaling capabilities will be provided in the system. Absence and deviation (*both*) shall be considered as “**Change of Substance**”.

##### 9.1.1 Common Channel Signaling No. 7 (CCS7)

The CCS7 Signaling shall be based on ITU-T White Book or later version of recommendations. Moreover, it shall be backward compatible with Blue Book variants prevailing in Bangladesh. The prospective Bidder shall make his own survey about versions or sub-sets used, if any, in BTCL.

##### 9.1.2 ISDN PRA Signaling

The system shall support full version of ISDN Primary Rate Access (PRA) Signaling on ITU-T E1 as per ITU-T recommendation.

##### 9.2 NGN Protocol

The system must support the following protocols:

- a) H.248/ MEGACO protocol for communication between Soft Switch and Gateways, according to the following standards:
  - i) ITU-T H.248 Gateway Control Protocol (identical to IETF RFC3015 updated with RFC3525 : MEGACO Protocol)
  - ii) RFC2327 : Session Description Protocol (SDP)Any deviation shall be considered as “**Change of Substance**”
- b) SIP-I protocol for interworking with other Soft Switch, according to the ITU-T Recommendation Q.1912.5 standard  
Any deviation shall be considered as “**Change of Substance**”
- c) SIP protocol for the control of the residential gateways, according to the following standards:
  - i) IETF Recommendation RFC 3261
  - ii) IETF Recommendation RFC 3262Any deviation shall be considered as “**Change of Substance**”
- d) SS7 over IP based on SCTP (SIGTRAN) according to the following standards.
  - i) IETF Recommendation RFC 3331 – (M2UA) or RFC 3332 – (M3UA)
  - ii) IETF Recommendation RFC 3057 – (IUA)

Any deviation shall be considered as “**Change of Substance**”

- 9.3 The system should be able to support ISUP variants of different countries. During operation if it is found that any common variant is not available in the system, the bidder has to adopt the variant free of charge. Any deviation shall be considered as “**Critical Deviation**”
- 9.4 Packet based Multi media communication system H.323 Full Featured Terminals Protocol suite. Any deviation shall be considered as “**Critical Deviation**”

:: End of Chapter ::

## Book 2

### Chapter Ten

#### Requirements of System Functions, Facilities and Supervisions

##### 10.1 Switching System Functions

The system shall have the flexibility to use for switching purpose the following functions. The system shall allow changes to be done by commands.

##### 10.1.1 Translation Function:

Any deviation (*each of them*) shall be treated as “**Critical Deviation**”.

##### a) Digit Storing Capacity

The system shall have the facility to receive, store and send digit information of:

- i) 5(five) to 8(eight) digit for local calls
- ii) Maximum 10(twelve) digits for NWD calls, excluding trunk prefix “0”
- iii) Maximum 15(fifteen) digits for ISD calls, excluding trunk prefix “00”

##### b) Analysis of Dialed Number

The system shall be capable of analyzing mixed number length for various types of calls. The inter-digit pause may be as high as 5 secs. The maximum and minimum digits required for routing and charging shall be programmable on site conditions and changeable by commands.

##### c) Digit Re-translation

The system shall be capable of changing all of the received digits to a completely re-translated number, to be sent forward for further processing. The re-translation digits shall be programmable on site and changeable by commands.

##### d) Partial Digit Re-translation

The system shall be capable of changing any number of digits (*both or either leading or last digits*) from the received digits, to re-translate as a new number, to be sent forward for further processing. The re-translation digits shall be programmable on site and changeable by commands.

##### e) Digit Deletion

The system shall be capable of deleting any number of digits (*both or either leading or last digits*) from the received digits, to be sent forward for further processing. The number of digits to be deleted shall be programmable on site and changeable by commands.

##### f) Digit Insertion

The system shall be capable of inserting any number of digits (*both or either at front or after*) to received digits, to be sent for further processing. The digits to be inserted shall be programmable on site and by commands.

g) Digit Re-generation

The system shall be capable of re-generate any number of received digits, to be sent forward for further processing. The number of digits to be regenerated shall be programmable on site and changeable by commands.

h) Flexibility to adapt to changed numbering plan

The system shall have the flexibility to easily adapt to any change in the present national numbering plan.

10.1.2 Traffic Routing Functions

The system shall have the flexibility to route outgoing, incoming and transit traffic on analysis of variations in calling line identity, numbering and subscriber category. Any deviation shall be treated as “**Critical Deviation**”.

10.1.3 Alternate Routing Functions

a) Overload Alternate Routing

The system shall have the possibility to provide automatic alternate routing in traffic overload conditions.

b) Load-Sharing Alternate Routing

The system shall have the capability to provide automatic alternate routing for traffic by load-sharing mode.

c) Incoming Route Alternate Routing

The system shall have the capability to provide automatic alternate routing for transit traffic by identification of the incoming route of the call.

d) Time-dependant Alternate Routing

The system shall have the capability to provide automatic alternate routing for traffic by identifying the day of the week and time of the day both independently and in conjunction.

e) Calling Line Identity Alternate Routing

The system shall have the capability to provide automatic alternate routing for calls to same called number by identification of the calling party number.

Any deviation (each of them) shall be treated as “**Major Deviation**”.

10.1.4 Rejection of Incoming Calls

The system shall have the capability to reject termination and/or block processing of incoming calls via any route by:

- a) Identifying the incoming route number
- b) Identifying the Number of the Calling party
- c) Identifying whether the call is transit or not

d) Identifying the called party number

Any deviation (*each of them*) shall be treated as “**Major Deviation**”.

#### 10.1.5 Rejection of Transit Calls

The system shall have the capability to reject termination and/or block processing of incoming calls via any route by:

a) Identifying the called party number

b) Identifying leading digits of the destination number

c) Identifying the outgoing route number

#### 10.1.6 Tones and Announcements

The system shall have the following capabilities:

Provide embedded tones and announcement functions

Register announcements to be played.

Capability to broadcast the supported announcements.

Request the gateways to play tones and announcements.

Any deviation (each of them) shall be treated as “**Major Deviation**”.

10.2 The system shall be capable to provide (but not limited to) at least the following facilities. The system shall have the capability to flexibly assign a combination of various system facilities to any or all of the subscribers. Initiation, activation, withdrawal or changes in assignment shall be done through specific commands.

#### 10.2.1 Wrong Number Processing

The system shall have the capability of routing wrong dialed numbers or prefixes to dedicated announcements. This shall be a default feature to all of the subscribers. The calls to the announcement will be non-charging. Relevant backward signals shall be sent in case of incoming calls from other exchanges. Deviation shall be treated as “**Critical Deviation**”.

#### 10.2.2 Local Interception Service

The system shall have the possibility to divert all incoming calls to a subscriber or group of subscribers to any local interception number. Deviation shall be treated as “**Minor Deviation**”.

#### 10.2.3 Trunk Barred Access

The system shall have the possibility to put call barring discriminations on any incoming circuit group or on any subscriber to access any specified outgoing routes. Deviation shall be treated as “Major Deviation”.

#### 10.2.4 Call Gapping

The system shall have the possibility to put the function of limiting the number of calls to any outgoing route or destination. Deviation shall be treated as “**Minor Deviation**”.

#### 10.2.5 Non Chargeable Line

The system shall have the possibility, upon receipt of relevant backward signals, to suppress charging on calling subscriber.

#### 10.2.5 Reverse Chargeable Number

The system shall provide possibility to assign parameters to any or many subscribers so that, for any incoming call to that number(s), the system will send relevant backward signals to the originating exchange for non-charging the originating number and shall generate charge meter pulses on the terminating number. The generation of charge meter pulses shall depend upon analysis of the A-number received.

#### 10.2.6 Shared Traffic Loading

The system shall have the possibility to provide sharing of traffic load to a particular destination. The sharing shall be activated in any or both of the following modes and deviation shall be treated as “**Minor Deviation**”.

a) Load Sharing Routing b) Call Sharing Routing

#### 10.2.7 Switching System Supervision

The system shall be provided with the following (but not limited to) supervision services. Absence of any such facility shall be treated as “**Critical Deviation**”.

##### 10.2.7.1 Fault Detection and Recognition

The system shall have the provision of automatic detection of abnormal operation and shall be able to recognize the causes to divide into definite “error” (for degradation of software performance) and “fault” (for degradation of hardware). Deviation shall be treated as “**Major Deviation**”.

##### 10.2.7.2 System Reconfiguration

The system, upon detection and recognition of error and/ or fault, shall be able to automatically reconfigure itself in order to:

- a) switch the faulty equipment out of service
- b) generate a fault message with detailed physical location of the faulty equipment
- c) start the automatic diagnosis protocol
- d) record and print the results of the diagnosis test
- e) switch the stand-by equipment into service
- f) generate relevant alarm message

Deviation shall be treated as “**Major Deviation**”.

##### 10.2.7.3 Fault/ Error Reporting

The system, upon detection and recognition of error and/ or fault, shall generate relevant alarm message giving the exact date & time, reason and probable location of the fault. The software shall provide facilities for simultaneous recording of such messages in system’s primary memory and in any or many printers/ consoles. Deviation shall be treated as “**Major Deviation**”.

#### 10.2.10 Trunk Supervision

The system shall be equipped with appropriate software to continually supervise operational condition of trunks. On detection of failures and faults, relevant trunks will be automatically blocked. Minor and Major alarm conditions will be triggered when pre-set threshold levels of blocked circuit numbers are crossed. These thresholds shall be pre-set, for individual trunk circuit groups, by commands. Deviation shall be treated as “**Major Deviation**”.

#### 10.2.11 Traffic Supervision and Control

The system shall be equipped with appropriate software to continually supervise at least the following aspects of traffic conditions:

- a) Abnormal increase in originating and incoming calls
- b) Heavy traffic congestion on any trunk circuit group
- c) Overload in call processing equipment

Overload control procedures shall be automatically activated and relevant alarm messages shall be generated. Deviation shall be treated as “**Major Deviation**”.

#### 10.3 Fault Diagnosis Protocol

The system shall be equipped with necessary software programs to test all the software and hardware packages of the system. The testing can be initiated:

- a) Automatically, on periodic intervals to test all the packages, and
- b) Automatically, upon detection of any fault or trouble, or
- c) Manually, by commands

The results of the test shall indicate, as exactly as possible, the physical location of the suspected package/ card. Deviation shall be treated as “Major Deviation” but the absence of such facility shall be treated as “**Critical Deviation**”.

#### 10.4 System Restart

The system shall be provided with the following restart facilities:

- a) Automatic restart in case of faults which relate to interruption of call processing functions
- b) Manual restart, by command, in case recovery is not possible with automatic restart
- c) Manual restart, by operation of some hardware switches, when manual restart by command is not possible
- d) Manual restart, when it is necessary to upgrade system software
- e) Cold restart, in case of complete power shutdown

Deviation shall be treated as “**Major Deviation**”.

#### 10.5 Trunk Circuit Testing

- 10.5.1 The system shall be equipped with automatic and manual test facilities for checking proper functioning and localizing faults on trunk circuits. The facilities shall be accessed by commands.

10.5.2 The system shall be equipped with an Automatic Answering Number to terminate test calls and shall have the following features.

- a) To automatically answer a test request
- b) To send a test tone
- c) To automatically clear the test request after 10 seconds

Absence of such facility shall be treated as “**Major Deviation**”.

10.6 Signal tracing facility

The system shall be equipped with an on-line real call signal tracing facility for CCS7 ISUP White Book Signaling. Such facility should also be available for SIGTRAN and broadband signaling, such as H.248, H.323, SIP (I/T) and MGCP. It is necessary to have online or offline decoders to translate received data into intelligible formats (*in English*) for proper understanding. If this facility is not in built in proposed system, the bidder may include separate equipment for this. Absence of such test facility and any deviation from the features shall be treated as “**Major Deviation.**”

10.7 Alarm Supervision

The system shall be provided with supervision software to continually check the normality of hardware and software. In case of any error, trouble, fault or failure an appropriate "**alarm indication**" shall be generated. The indication shall be notified by printed messages and by visual & audible means. Appropriate procedures shall be applied to cancel audible alarms. All alarm indications may be classified into the following categories and any deviation shall be treated as “**minor**”.

10.7.1 "**CRITICAL**" - indicating a very serious failure or fault which can result in system failure & stoppage of call processing and demanding immediate attention of O & M personnel.

10.7.2 "**MAJOR**" - indicating a serious fault or trouble demanding immediate action and which can lead to critical fault if kept unattended for long time.

10.7.3 "**MINOR**" - indicating fault or trouble not requiring immediate action

10.8 Interfacing of External Alarms

The system shall have provisions to interface at least (but not limited to) the following external alarms to exchange OMM system:

10.8.1 Failure of A.C. mains power supply - as a **Major** alarm

10.8.2 Failure alarms of Rectifier, Inverter, DEG - as **Major & Minor** alarms

10.8.3 Abnormal ambient room temperature - as a **Major** alarm

10.8.4 Failure of Air Conditioner - as a **Major** Alarm

10.8.5 Fire alarm on detection of smoke - as a **Critical** alarm

10.8.6 Failure alarms of Transmission system - as **Major & Minor** alarms.

10.9 Alarm Panels

10.9.1 The bidder shall install alarm panels in the system switch/ console room. Such panel shall be equipped with enough visual and audio devices to indicate all categories of alarms.

- 10.9.2 The visual alarm devices shall preferably be divided into groups to indicate relevant functional modules of the system.
- 10.9.3 Provisions shall be provided to reset the audible alarm buzzer.
- 10.9.4 Provisions shall be made for an additional "**remote alarm panel**" (with enough visual and audio devices) remotely from the switch console room. The distance can be a maximum of 50 meter.
- 10.9.5 The remote alarm panels' audio devices shall be very high-pitched with high dB level; and these devices shall be reset by a switch located in the system's console/ switch room.
- 10.9.6 Audio device for the remote alarm panel shall be triggered by events of "**Critical**" and "**Major**" alarms only.
- 10.9.7 The alarm panel devices, for both internal and remote, shall be powered from the exchange DC power supply.
- 10.9.8 Whenever the audio alarm is reset by the "**reset switch**", the event shall be recorded in the system's log.
- 10.9.9 Provisions shall be provided such that, in the event of occurrence of any "**critical alarm**", a closure of loop is made on a telephone line-pair. BTCL will provide telephone connection but the bidder will provide relevant contacts/ relays for provisions of such loop.
- 10.10 Temporary Suspension of Services

The system shall have the capability to temporarily suspend services of any or many subscriber by specific MML command(s).

a) Number of Suspension Class

At least 10(ten) different "**class of suspension**" will be available and those classes will be defined by difference in attachment, to the subscriber number, of one or more "**parameter flags**" (*like non payment of bills, shifting of numbers, temporary closed, permanently closed etc.*) of that MML command. Deviation shall be treated as "**minor**". But if the available classes are less than 6(six) and 4(four) then the deviation shall be treated as "**major**" and "**critical**" respectively.

b) Calls to Temporary Suspended Number

The system shall have the capability of routing calls dialed to temporary suspended numbers to relevant dedicated announcements. The routing (*i.e., the announcement number*) will depend on the "**suspension class parameter flag**" attached to the relevant subscriber. The calls to announcements will be non-charging. Deviation shall be treated as "**major**".

c) Re-routing of Subscriber on Temporary Suspension

The system shall have the capability to re-route subscriber on temporary suspension to dedicated announcements and this re-routing shall be done automatically on lifting of handset or completion of the subscriber DC loop by any other means. The routing (*i.e., the announcement number*) will depend on the

"*suspension class parameter flag*" attached to the relevant subscriber. The calls to announcements will be non-charging. Deviation shall be treated as "**major**".

d) Printing of List of Subscribers on Temporary Suspension

The system shall allow the capability to print on TTY and Console, the list of subscribers on temporary suspension. The print menu shall allow screening of the list on class of suspension basis; and the outputs shall be short-format (*showing the suspension class and the total subscribers on that class*) and long-format (*showing the suspension class and the list of subscribers on that class*). Deviation shall be treated as "**major**".

10.11 Hold on Announcement for Emergency Numbers

For calls to "**Emergency Numbers**" (Police, Fire, Ambulance etc) the system shall have the capability to connect them:

- i. first to a hold-on announcement
- ii. then to the emergency number
- iii. but if all circuits are busy, then

the calling subscriber to be put on-queue with some audio indication that his call is in queue. The calls to announcements will be non-charging but the calls to "**emergency numbers**" may or may not be charging. Deviation shall be treated as "**minor**".

10.12 Dual Directory Numbering

The system shall have the possibility of temporary dual numbering access for a group or all of the subscribers. These facilities are to be used in case of exchange prefix change or subscriber re-numbering. Deviation shall be treated as "**minor**".

10.13 Charging of Pilot Line for PABX Group

The system shall provide facility for incrementing the meters of only Pilot Line for any PABX Group. In such cases, the other lines on the group may not be provided with meters.

10.14 Call Limit Facility

The system shall have the capability to provide "**Call Limit Facility**" to any, many or all subscribers of the exchange. The facility shall be activated (*including selection of the subscriber number, limiting values etc*), modified, erased and deactivated by MML command(s). The "**Call Limit**" facility shall be invoked in the following procedure. Absence of this facility in the switch shall be treated as "**critical deviation**" but any deviation from the following procedure shall be treated as "**minor**". The facility shall be integrated with the switch platform and shall not be dependant on any external equipment.

- a) Two "**Counter**"s shall be provided for each subscriber for which this service has been extended; the initial value in both these counters shall be zero;
- b) The counters shall have the ability to be incremented up to five digits ranging from 00000 to 99999;
- c) The Operator shall put a value to the first counter, through pre-defined MML parameter(s) or Operation Menu;

- d) The system shall allow interrogation of contents of these counters through MML commands;
- e) Whenever, answer signal is received on an outgoing call by that subscriber, the value on the second counter will be incremented real-time and such increment shall be equal to the increment in relevant charge meter counter of that subscriber;
- f) After the end of any and all calls, the difference between the two meters will be calculated, and if the difference is less than 25% of the value in the first counter, an alarm message will be generated (*and will be printed on alarm log*) and a special flag will be attached to that subscriber;
- g) A subscriber such tagged, upon lifting of his handset for next call, shall be directed first towards an announcement and after completion of one cycle of the announcement shall be re-directed to dial-tone;
- h) If the difference between the values of the first and second counter is less than 1% of the value in the first counter, another alarm message will be generated (*and will be printed on alarm log*) and a different special flag will be attached to that subscriber;
- i) A subscriber such tagged, upon lifting of his handset for next call, shall be directed first towards an announcement but shall not be provided with a dial tone. However, the subscriber will be allowed to receive all incoming calls;
- j) Whenever the difference between the values of the first and second counter becomes zero, the subscriber shall be tagged with another flag and will be put on a "**temporary suspension of service**" class;
- k) A subscriber such tagged, upon lifting of his handset for next call shall be directed towards an announcement, shall not be given dial-tone and shall not receive any incoming calls;
- l) Whenever the difference between the first and second counters becomes less than 5% of the value of first counter, the system shall automatically invoke a real-time charge monitoring of subsequent outgoing calls made by the subscriber. If during any of those calls, the difference between the two counters become zero, the system shall automatically cut the ongoing call, tag the subscriber with a flag and put him on a "**temporary suspension of service**" class;
- m) The Operator shall be allowed to put a subsequent value, through pre-defined MML parameter(s) or Menu, to the first counter. In such case, the new value shall be added to the value already existing in that counter;
- n) Activation, Modification, Erasure, Deactivation and Initialization of those counters shall be protected by multi-layer password control;
- o) The system shall generate alarm message for any unauthorized attempt of any activities in any of such counters;
- p) All authorized activities in any of such counters shall be recorded in activity event logs of the system.

#### 10.15 Subscriber Line Category

The system shall have the possibility to assign various category to any or all the subscriber. The assignment and its modification shall be made through relevant MML commands. Deviation shall be treated as “**major**”.

- a. Individual Line  
Analog Line
- b. Payphone Line
- c. Grouped Lines :
  - i) PBX line with Pilot Number
  - ii) PBX line with Subsequent Number.

#### 10.16 Subscriber Line Class

The system shall have the possibility to assign various class to any or all the subscriber. The assignment and its modification shall be made through relevant MML commands. Deviation shall be treated as “**major**”.

- a. International Subscriber Dialing (ISD) Line
- b. Nation Wide Dialing (NWD) Line
- c. Local Calls only line
- d. Call Limited Subscriber Line.

#### 10.17 Announcement before Dial Tone

The system shall provide facilities for diversion to announcement before dial tone. The provision will work in the following manner. Absence of this facility shall be regarded as "**major deviation**" and deviation from the following process shall be treated as "**minor**".

- a) Provisions shall be available to provide this service to any or many or all subscribers of the exchange;
- b) Provision shall be activated and deactivated by MML command(s);
- c) The subscriber(s) such provisioned, upon lifting of handset shall first be diverted to an announcement and after completion of one cycle of the announcement shall be re-diverted to dial tone;
- d) The facility so provisioned shall either remain activated for a pre set time period (and automatically be deactivated after completion of that period) or shall be deactivated by MML command again.

#### 10.18 High Charge Call Notification

- a) The system shall allow notification of high-charge calls by any subscribers of the exchange;
- b) Such notification message will be generated whenever any call has exceeded some pre-set limits;
- c) The notification(s) will be printed in log file and/ or on TTY printers;
- d) Limits shall be set either on duration of the call or on charge meter increment of the call or both of them;
- e) The system shall be default on global basis for all subscribers of the exchange;
- f) The system shall allow changing of the threshold limits for triggering of the notification;
- g) Such changes shall be made by MML command(s).

Absence of this facility shall be regarded as "**major deviation**" and deviation from the above process shall be treated as "**minor**".

#### 10.19 Call Supervision:

##### 10.19.1 Release Supervision

The normal release of any call shall be controlled by the calling subscriber. But for cases of calls to certain special services and for malicious call trace, where called party release conditions apply, the call release shall be controlled by called party. The charging of calls shall stop after release by either party. Deviation shall be treated as "**major**".

##### 10.19.2 Time Supervision

The following time supervision shall be adopted by the system :

i)	Pre-Dialing Supervision	:	20 seconds nominal
ii)	Partial Dial Timing	:	10 seconds nominal
iii)	Ringling Supervision under "called subscriber no answer" condition	:	60 seconds maximum
iv)	Called subscriber on-hook after answer while calling subscriber is off-hook	:	5 seconds for local calls 15 seconds for ISD calls

The duration of above timings shall also be adjustable by MML commands. The bidder shall specify limits of his system.

##### 10.19.3 Sending of Howler Tone

The procedure for sending howler tone to locked-out subscriber is described below. Absence of this howler tone facility shall be treated as "**major deviation**".

- a) On receipt of the time supervision signal, the concerned subscriber line shall be released and sent into "**Locked Out**" condition.
- b) The system shall send "**Busy Tone**" to the locked out line.
- c) If the locked out subscriber does not replace handset within 60 seconds, the tone shall be automatically changed to "**Howler Tone**" and its level shall be gradually increased up to a fixed level.
- d) If the subscriber receiving the howler tone does not replace handset within 20 seconds, the howler tone shall be automatically stopped.
- e) Whenever the locked out subscriber replaces handset, lockout condition shall be automatically cancelled and the subscriber line shall return to normal.
- f) If the lock-out condition persists for more than 240 seconds, the system shall generate a fault message and the line shall be considered as on a "**permanent loop**" condition.

#### 10.20 Requirements of the Subscriber Service Facilities

10.20.1 The system shall be capable to provide any or all the subscriber the following (but not limited to) service facilities.

These facilities will be :

- a) assigned, modified and withdrawn by MML commands
- b) activated, operated, suspended or deactivated by, either
  - i) MML commands in the exchange, or
  - ii) Subscriber, with the relevant “**facility code**”.

The successful bidder shall collect from BTCL the relevant “**Facility Code**” and detail activation, operation, suspension and deactivation procedures.

#### 10.20.2 Subscriber Service Facilities :

##### 10.20.2.1 Subscriber Switching Facilities

- a) **Temporary Hot Line**  
Automatic routing of subscriber to a dedicated telephone number upon completion of the DC loop. The activation, operation, suspension and deactivation shall have to be controlled by MML command or subscriber. Deviation shall be treated as “**major**”.

- b) **Temporary Hot Line with Timer**

Automatic routing of subscriber to a dedicated telephone number under condition that no digit is dialed within a pre-set time after completion of the DC loop. The activation, operation, suspension and deactivation shall have to be controlled by MML command or subscriber. Deviation shall be treated as “major”.

- c) **Outgoing Call Restriction**

The system shall provide several levels (minimum 10 arbitrary and field defined levels shall be made available) which can be considered as subscriber class of service assignment. These levels will be used to give outgoing call restriction to any subscriber line. The facility shall be system controlled by MML command. This type of restriction shall have priority over code control barring. Deviation shall be treated as “**minor**”. But if the available levels are less than 6 (six) and 4 (four) then the deviation shall be treated as “**major**” and “**critical deviation**” respectively.

- d) **Code Controlled Outgoing Call Barring**

The system shall provide all subscriber of the exchange to control his own level of call restriction by changing his own class of service. The restriction (barring) shall be controlled by codes (passwords) assigned by the subscriber himself. The system Engineer shall have the ability to initialize or cancel the code by MML command but shall not be able to interrogate the code itself. Minimum 7(seven) level of code barring shall be provided. Deviation shall be treated as “**minor**”. But if the available levels are less than 5 (six) and 4 (four) then the deviation shall be treated as “**major**” and “**critical deviation**” respectively.

- e) **Priority Line**

The system shall have the facility to assign, by MML command, to give any subscriber line different priorities on different aspects of call regulation and route filtering. Deviation shall be treated as “**minor**”.

f) Incoming Only Line

The system shall have the facility to convert any or all subscriber line to receive incoming call only by assigning a dedicated special category by MML command. In this case, the subscriber, on lifting of handset, shall be diverted to an announcement. Absence of such service shall be treated as “**major deviation**” and any other deviation shall be treated as “**minor**”.

g) Outgoing Only Line

The system shall have the facility to convert any or all subscriber line to deny him from receiving of any incoming call by assigning a dedicated special category by MML command. In this case, when the subscriber is called, the calling party shall either get busy tone or shall be diverted to an announcement. Absence of such service shall be treated as “**major deviation**” and any other deviation shall be treated as “**minor**”.

h) Called Party Charged Line

The system shall have the facility to convert any or all subscriber line to a called party charged line. Whenever, an incoming call is received by this number, on off-hook by the called subscriber, appropriate signals shall be sent to calling party exchange to suppress meter pulses at the originating exchange. Facilities shall be provided to charge the called subscriber in this case. Absence of such service shall be treated as “**major deviation**”.

i) Incoming Call Restriction

The system shall have the facility to convert any or all subscriber line to prevent him from receiving certain incoming call by assigning a dedicated special category. The type of calls to be barred shall be controlled by MML command. In this case, when the subscriber receives call of that particular category, the calling party shall either get busy tone or shall be diverted to an announcement. Absence of such service shall be treated as “**major deviation**”.

j) Malicious Call Identification

The system shall have the facility to detect the identity of the calling number in case of malicious call to any subscriber. The facility shall be assigned by MML command and shall be activated either automatically by the system or by the subscriber at his own choice. The system shall be available in both “**with holding**” or “**without holding**” facility. Absence of such service shall be treated as “**major deviation**”.

K) Do Not Disturb Service

The system shall have the facility to convert any or all subscriber line to divert all its incoming calls to a “**do not disturb**” message service. The facility shall be assigned by MML command but shall either be activated or deactivated by subscriber, as and when he chooses to do so. Absence of such service shall be treated as “**minor deviation**”.

l) Call Forwarding or Call Transfer

The system shall have the facility to convert any or all subscriber line to provide the following call facilities. The facilities shall be assigned by MML command, but shall be activated and deactivated either by MML command or by the subscriber. Absence of such service shall be treated as “**major**” and any other deviation shall be treated as “**minor**”.

i) Call Forwarding Unconditional (Follow Me)

All incoming calls to that subscriber shall be automatically diverted to the number desired by the called subscriber. The called party shall also be billed for calls to diverted number.

ii) Call Forwarding On Busy

All incoming calls to that subscriber shall be automatically diverted to the number desired by the called subscriber only when the called subscriber is busy. The called party shall also be billed for calls to diverted number.

iii) Call Forwarding On No Reply

All incoming calls to that subscriber shall be automatically diverted to the number desired by the called subscriber if the called party does not answer within a pre-set time-out period (the period to be field programmable). The called party shall also be billed for calls to diverted number.

m) Absentee Service

The system shall provide the facility of subscriber controlled absentee service with call rerouting to any dedicated announcement service. The service shall be assigned by MML command. Absence of such service shall be treated as “**minor deviation**”.

n) Camp on Busy (Call Waiting) Service

The system shall provide the facility of subscriber controlled camp-on-busy service so that when his number is busy, a second incoming caller receives ring-back tone instead of busy tone and the called party receives a camp-on tone. The service shall be assigned by MML command. Absence of such service shall be treated as “**minor deviation**”.

o) Subscriber’s Premises Meter

The system shall provide the facility to send 12 KHz or 16 KHz multi-metering pulses to activate charging in home meters. Absence of such service shall be treated as “**minor deviation**”.

p) Automatic Alarm Call or Wake-Up Call

The system shall provide the facility to allow subscriber registered multiple alarm (wake-up) call facilities. The service shall be assigned and de-assigned by MML commands but shall be activated, used, modified and deactivated by the subscriber. Absence of such service shall be treated as “**major deviation**”.

10.20.2.2 Subscriber Calling facilities

a) Short Code Dialing

The system shall provide the facility to allow subscribers to register “**short codes**” against often used numbers. The service shall be assigned and de-assigned by MML commands but shall be activated, used, modified and deactivated by the subscriber. Absence of such service shall be treated as “**minor deviation**”.

b) Last Number Redial

The system shall offer the possibility to allow subscriber to request automatic redial by the system to a subscriber found busy on first try or on no answer. The service shall be assigned and de-assigned by MML commands but shall be activated and deactivated by the subscriber. Absence of such service shall be treated as “**minor deviation**”.

c) Three-way Conference Call

The system shall allow the possibility to use three-way call facility on either hold on inquiry or conference. The service shall be assigned by MML commands but shall be activated and deactivated by the subscriber. The bidder shall provide at least 2% circuit of present capacity of subscribers for 3-way conference calls. Absence of such service shall be treated as “**minor deviation**”.

d) Immediate Call Charge

The system shall allow the possibility to immediately print in system TYY, on activation by the subscriber, call charges of any call by the subscriber. The service shall be assigned by MML commands but shall be activated by the subscriber when he desires so. Absence of such service shall be treated as “**minor deviation**”.

e) Last Call Charge Inquiry

The system shall allow subscriber to inquire about the charging information of the “**last call**” dialed. Such inquiry, invoked by a dialing a specific code, shall be answered by voice clips. The service shall be assigned and de-assigned by MML commands but shall be activated by the subscriber. Absence of such service shall be treated as “**minor deviation**”.

f) Charge Meters Total Inquiry

The system shall allow subscriber to inquire about the real-time total value of his four mandatory charge meters. Such inquiry, invoked by a dialing a specific code, shall be answered by voice clips. The service shall be assigned and de-assigned by MML commands but shall be activated by the subscriber. Absence of such service shall be treated as “**minor deviation**”.

g) Code Controlled Barring

The system shall allow subscriber (single or PBX) to control/ restrict the class of call barring with codes of his choice. The service shall be assigned and de-assigned by MML command and shall be activated or deactivated by the subscriber. The facility shall have two types of control:

- i) Barring for all calls and unbarring for all calls

The subscriber shall bar with his secret password for all calls of a class of his choice. When, he wants to make a call of the barred class, he shall cancel the bar, make the call and bar again when he chooses to do so.

- ii) Barring for all calls, unbar for one call and auto-bar on finish of call

The subscriber shall bar with his secret password for all calls of a class of his choice. When, he wants to make a call of the barred class, he shall cancel the bar, make the call, replace his handset and line shall be automatically barred again.

The barring class may be for either or any combination of the following facilities:

- i) For ISD call
- ii) For NWD call
- iii) For Local call.

Absence of such service shall be treated as “**major deviation**”.

- h) Calling Line Identification Presentation (CLIP)

- i) The system shall have capability to supply, on demand or by default the calling party’s telephone number (within the same exchange or from any other exchange) to the called party end-user equipment before answering the call. A display device connected to the telephone or built-in LCD display in the telephone set shall be required to view the calling number.

- ii) The CLIP shall be activated/materialized by Frequency-shift Keying (FSK) signaling.

- iii) The service shall be assigned by MML commands and shall remain activated until withdrawn again by MML command.

Absence of such service shall be treated as “**change of substance**”.

- i) Calling Line Identification Restriction (CLIR)

The calling number shall be restricted for display on the called subscriber line by activation of Calling Line Identification Restriction (CLIR) function permanently for all calls or on a temporary, per call basis. The service shall be assigned by MML commands but shall be activated by the subscriber when he desires so. This service shall be deactivated by the supplier at initial phase. It will be activated by the supplier when BTCL will require it in future. Absence of such service shall be treated as “**major deviation**”.

- j) Calling Line Identification Restriction Override (CLIR- O)

The called subscriber shall have the ability to override the CLIR facility given to the calling number. The service shall be assigned by MML commands but shall be activated by the subscriber when he desires so. Absence of such service shall be treated as “major deviation”.

**:: End of Chapter ::**

## Book 2

### Chapter Eleven

#### Requirements of System Observation and Measurement Facilities

##### 11.1 Traffic Load Observation

The system shall have facilities to continually observe traffic load in the network itself and network elements. The results of such observations will be recorded and printed after pre-set period. At least (*but not limited to*) the following counters will be provided. The required counters will be activated and deactivated by commands. Absence of Traffic Load Observation facility shall be treated as “Critical Deviation” and any deviation (each of them) from the following counters shall be considered as “**Minor Deviation**”.

##### 11.1.1 For the Soft Switch

- a) Node-wise number of total Incoming calls presented.
- b) Node-wise number of total Outgoing calls presented.
- c) Node-wise number of total Internal calls presented.

##### 11.1.2 For every circuit group under TGW

- a) Number of Inward calls presented
- b) Number of Outward calls presented
- c) Total call duration (*in minutes*) for incoming calls
- d) Total call duration (*in minutes*) for outgoing calls
- e) Total incoming traffic *in erlang*
- f) Total outgoing traffic *in erlang*
- g) Total Traffic in the circuit group *in erlang*
- h) Number of circuits engaged for incoming calls
- i) Number of circuits engaged for outgoing calls
- j) Number of circuits in use
- k) Number of equipped circuits
- l) Number of unavailable circuits
- m) Percentage of Inward busy circuits
- n) Percentage of Outward busy circuits
- o) Number of incoming seizures refused
- p) Number of outgoing seizures refused
- q) Total number of refused seizures
- r) Total number of successful calls
- s) Percentage of refused incoming calls (*due to no auxiliary equipment*)
- t) Percentage of refused incoming calls (*due to terminating subscriber busy*)
- u) Percentage of refused incoming calls (*due to other reasons*)
- v) Percentage of refused outgoing calls (*due to no circuit*)
- w) Percentage of refused outgoing calls (*due to other reasons*)
- x) Percentage of successful Incoming calls
- y) Percentage of successful Outgoing calls
- z) Number of simultaneous seizure on both-way circuit group
- aa) Total number of calls to signaling terminals (MFCS/ MFCR/ CC7 handler)

##### 11.1.3 For an access code prefix and routing

- a) Number of calls to access code prefix

- b) Number of calls to access routing
- c) Number of calls to first choice routing
- d) Number of calls to second choice routing
- e) Number of calls to third choice routing
- f) Number of completed calls
- g) Number of failed calls due to calling subscriber
- h) Number of failed calls due to called subscriber
- i) Number of calls failed due to originating node/exchange
- j) Number of calls failed due to forward node/exchange
- k) Causes of the failed calls

#### 11.1.4 For a destination

- a) Observation of call distribution
- b) Observation on causes of call failure

#### 11.1.5 Programming for Traffic Observation

The system shall allow field programming of the format for different traffic data observations. The selection & activation, de-selection & deactivation, printout time, circuit groups, counters and other parameters shall be executed by commands. At least (but not limited to) the following basis of programming features shall be allowed:

- a) Half-hourly basis
- b) Hourly basis
- c) Two-hourly basis
- d) Twelve-hourly basis
- e) Daily basis
- f) Weekly basis
- g) Monthly basis
- h) Circuit group basis
- i) All circuit groups basis
- j) Selected counters basis
- k) All counters basis
- l) Any mixture of the above basis

#### 11.1.6 Saving of Traffic Data Output

- a) The system shall allow saving of any or many sets of traffic observation data output to system's primary memory
- b) The system shall allow subsequent shifting of those data to secondary memory devices
- c) Enough buffer shall be provided in the primary memory device to store data output for dumps equivalent to 48 (forty eight) complete dump sets for all available traffic counters
- d) Whenever, any portion of the records in the primary memory is shifted to secondary memory, that portion shall automatically be deleted from the primary memory
- e) The system shall generate a "minor alarm" and "major alarm" whenever the content of the buffer has exceeded 75% and 85% respectively
- f) If records in the primary memory are not shifted to secondary memory and the buffer becomes full, the system shall generate an alarm message and start over-writing on "first-in first-out" basis.

#### 11.2 Real Time Sample Observation of Calls in circuit group under TGW

The system shall allow real-time observation of calls for any or many circuit group. Concurrent observation facility for at least 3(three) circuit groups shall be available. The observation shall include at least (but not limited to) the following events for all the calls made through that circuit group(s). The observation shall be activated (*including provisions for pre-selection of events and related time-periods for observation*) by command and shall be continued until deactivated by command again or the period has ended. Absence of this observation facility shall be treated as "Major Deviation" and any deviation (*each of them*) from the following listed events shall be treated as "**Minor Deviation**".

- a) Start Time of observation
- b) End Time of Observation
- c) Identity of the circuit group
- d) Total number of Call attempts through the circuit group
- e) Signaling used, *for each call*
- f) Calling party number, *for each call*
- g) Digits dialed by the calling party, *for each call*
- h) Routing code used, *for each cal*
- i) Access or translation code used, *for each cal*
- j) Duration of conversation, *for each call*
- k) Total Number of successful calls
- l) Total Duration of all calls, *in minutes*
- m) Total traffic, *in erlang*
- n) In case of uncompleted calls, the cause of failure

#### 11.3 Observation of Calls Transferred to any device

The system shall allow observation of calls transferred to any device, like announcement. The observation shall include at least (but not limited to) the following events. The observation shall be activated (*including provisions for pre-selection of events and related time-periods for observation*) by command and shall be continued until deactivated by command again or the period has ended. Absence of this observation facility shall be treated as “Major Deviation” and any deviation (*each of them*) from the following listed events shall be treated as “**Minor Deviation**”.

- a) Calling party directory number
- b) Calling party circuit (for incoming calls)
- c) Cause of call forwarding
- d) Signaling code used

#### 11.4 Observation of Traffic Load on Signaling Links

- a) Signaling Link number
- b) Signaling Device number
- c) Number of forced retransmission cycles violating threshold value.

#### 11.5 Real Time Observation of Signaling during call setup

The system shall allow real-time observation of traffic in signaling links. The observation shall include at least (but not limited to) the following events. The observation shall be activated (*including provisions for pre-selection of events*) by command and shall be continued for all subsequent calls until deactivated by command again. Absence of this observation facility shall be treated as “Major Deviation” and any deviation (*each of them*) from the following listed events shall be treated as “**Minor Deviation**”.

- a) Signals interchanged during call setup phase
- b) Signals interchanged up to called party answer phase
- c) Signals interchanged during the complete call

#### 11.6 Measurement of Traffic Volume in Erlang

The system shall allow statistical measurement of traffic volume in any, many or all trunk or circuit groups under TGW. The measurement shall include at least (but not limited to) the following type of output. The measurement function shall be activated (*including*

*provisions for pre-selection of types and related time-periods for measurement*) by command and shall be continued until deactivated by command again or the period has ended. Absence of this measurement facility shall be treated as “Major Deviation” and any deviation (*each of them*) from the following listed events shall be treated as “**Minor Deviation**”.

- a) Total originating traffic
- b) Intra-Office traffic
- c) Total terminating traffic
- d) Total outgoing traffic
- e) Total incoming traffic
- f) Outgoing traffic per route
- g) Incoming traffic per route
- h) Outgoing traffic per destination
- i) Outgoing traffic per circuit group

:: End of Chapter ::

## Book 2

### Chapter Twelve

#### Requirements of Operation & Maintenance and Mediation & Billing Sub-System Facilities

12.0 The system shall include a centralized Network Management System (NMS) for proper operation and maintenance of the systems covered by this purchase. At the same time, some of the O&M terminals are to be extended to BTRC premise for monitoring purpose. The NMS shall include all necessary hardware and software to be installed on a complete turn-key basis including design, installation, testing and commissioning. The NMS shall have the following characteristics.

#### 12.1 Network Management System (NMS)

The bidder shall quote network management hardware and software for proper operation and management of i) NGN Equipment, ii) Data Equipment and iii) GPON system. The bidder may quote separate NMS for separate equipment/system or a unified NMS for all equipment/system.

##### 12.1.1 Hardware/System Requirements of NMS

###### 12.1.1.1 Server System

The NMS shall be equipped with SUN or equivalent or better high-quality server system in duplicated configuration. The Operating Software shall be based on the latest version of UNIX or LINUX. The internal network architecture shall be Ethernet LAN. The deviation shall be treated as “**Change of Substance**”.

###### 12.1.1.2 Memory Devices

- a) The NMS system shall have Hard Disk Drives in RAID configuration as the primary memory device. At least 2(two) numbers of External DVD Re-writable Drives/ Magneto Optical (MO) Drives shall be provided to act as the secondary memory device.
- b) The capacity of each of the hard drive in the RAID shall be at least 120(One hundred and twenty) GB and the number of drives in the RAID shall be at least 3(three).

The deviation shall be treated as “**Major Deviation**”.

###### 12.1.1.3 Server and Operator Terminals

- a) Each of the Server Terminal shall be from internationally reputed Brand and complete in all aspects to work as PC and shall be equipped with LCD Monitors (at least 17” wide), Hard Drive (at least 200GB), RAM (at least 2 GB), 2.5 inch Portable USB-Mass Storage device (at least 240 GB), sufficient numbers of USB-2 Ports (at least 2), and Optical USB Mouse. The operating voltage should be 230 V AC ± 10%, 50 Hz.
- b) Each of the Operator Terminal/Console shall be from internationally reputed Brand and equipped with at least Core-2 Duo 2.0 GHz Processor, LCD Monitors (at least 17” wide), Hard Drive (**at least 180GB**), RAM (at least 1GB), Re-Writable DVD

Drive, Sufficient numbers of USB-2 Ports (at least 2), Optical USB Mouse. The operating voltage should be 230 V AC ± 10%, 50 Hz

- c) Portable Service console shall be used for configuration and testing of local ports of different equipments, remote measurement, testing and operation. The console would be Laptop Computer from internationally reputed brand with at least Core-2 Duo 1.8 GHz Processor, WXGA LCD Screen (at least 14”), Hard Drive (at least 120GB), RAM (at least 1GB), Re-Writable DVD Drive, Sufficient numbers of USB-2 Ports (at least 2), sufficient serial Ports, Network Interface Card (10/100/1000) **and carrying case. The battery backup shall be at least 2 hours.** The commercial input voltage should be 230 V AC ± 10%, 50 Hz

The deviation shall be treated as “**Major Deviation**”.

- 12.1.1.4 All the Terminals shall be accompanied with Licensed Windows Operating System of latest version, Licensed Anti Virus Software of latest version, necessary drivers for different ports and peripherals, Product Documentation, application software and other standard companions. The licensing period of any software shall not expire until the end of the lifetime of respective equipment for which it was provided. All the operating systems, Antivirus, drivers, documentation, applications shall be provided in CDs or DVDs so that in case of any kind of failure, the maintenance personnel of BTCL can easily install the software and services and make them functional.

The deviation shall be treated as “**Major Deviation**”.

- 12.1.1.5 The bidder shall supply O&M and service terminals/consoles at each TGW site as per following requirement

- |                                       |                      |
|---------------------------------------|----------------------|
| a) <b>O&amp;M Control Console</b>     | - 4 ( <b>Four</b> )  |
| b) <b>Service Observation Console</b> | - 2 ( <b>Two</b> )   |
| c) Test Console                       | - 1 (One)            |
| d) CDR Management and Accounting      | - 2 (Two)            |
| e) Portable Service Console           | - 3 ( <b>Three</b> ) |
| f) <b>Laser Printer</b>               | - 1 ( <b>one</b> )   |

If the bidder fails to quote any or many items described, it shall be treated as “**non compliance**” and it shall be considered that the bidder offered to supply any number of such items “**free of charge**” to BTCL.

- 12.1.1.6 The bidder shall supply Monitoring terminals at BTRC Premise as per following requirement

- |                                |           |
|--------------------------------|-----------|
| a) O&M Control Console         | - 1 (One) |
| b) Service Observation Console | - 2 (Two) |
| c) CDR collection              | - 2 (Two) |

- 12.1.1.7 **Tables and Chairs for Consoles and Terminals**

The Bidder shall provide Tables and Chairs for Servers, Consoles and Terminals. The tables and chairs should be of high quality steel and the standard of these items shall be of full satisfaction to BTCL. The numbers of Tables and Chairs shall be at least 11(Eleven) each. If the bidder fails to quote, it shall be treated as “**non compliance**” and it shall be considered that the bidder offered to supply any number of such items “**free of charge**” to BTCL.

#### 12.1.1.8 **Wide Screen Display Panel**

The supply shall include a Wide Screen LCD Panel (of minimum size **1.5 m x 0.9 m**) of the connected network and the screen shall be mounted on wall. The screen shall

- a) Show the real-time alarm status of the related nodes by easily distinguishable color scheme.
- b) The screen shall show different measurement and operational data in graphical format provided by the NMS system.
- c) The display screen should be rugged and industrial nature and should be able to work 24/7 in the required environmental condition specified in this document earlier.
- d) The LCD screen should consist of the Visual Display Unit, Display Controller and Management Software. The panel management software shall allow switching the video streams.
- e) The operators whose systems are on the same Ethernet should be able to work on the large screen sitting at their own position with their own WIN PC's / OWS's keyboard and mouse.
- f) The screen shall be of high graphics resolution with flicker free image.

The deviation shall be treated as “**Major Deviation**”.

#### 12.1.1.9 **Laser Printer**

The supply shall include at least **5 (Five)** numbers of Printer having following specifications for each lot connected in the LAN of the NMS.

- |                           |   |  |
|---------------------------|---|--|
| a) Resolution             | : | 600 X 1200 pixels Minimum                            |
| b) Pages per minute       | : | Minimum 32   |
| c) Memory                 | : | 32 MB  |
| d) Paper Tray             | : | Three trays, one of 100-Sheets and two of 500-sheets |
| e) Network Interface Card | : | 10/100 base - TX                                     |
| f) Paper size             | : | A3/A4/ Legal/Letter                                  |
| g) Spare cartridge        | : | 3 (Three)  |
| h) Software Driver        | : | 1 (One) Set  |
| i) Product Documentation  | : | 1 (One) Set  |

The deviation shall be treated as “**Major Deviation**”.

### 12.1.2 **Software Requirements of NMS**

#### 12.1.2.1 **Software Capability**

The software(s) shall be modular in structure and shall be capable of merging new files and programs with existing files at the site without any interruption of service in the following cases. Deviation from such capability shall be considered as “**Change of Substance**”.

- a) Expansion or change of NGN/Data/GPON equipment capacity
- b) Loading of new software patches or changes of program version
- c) Changes and employment of new service features and facilities
- d) Permanent or temporary withdrawal of any existing hardware
- e) Changing of any hardware for maintenance or up-gradation purpose

#### 12.1.2.2 ***Password Protection***

The main features and data of the software shall be protected by multi-level password control. Modification of the Network data and Subscriber configuration data shall also be protected by passwords. The system password will not be erased or corrupted during system re-boot and/ or redundant server switchover or for any other reasons. Deviation shall be considered as “**Change of Substance**”.

#### 12.1.2.3 ***Immunity against propagated faults***

All modules of the Software shall be immune against propagation of faults from any other software or hardware modules and shall be protected against any mutilation of data. The faulty software module shall also not propagate its own fault to any other software or any hardware modules. Deviation shall be considered as “**Change of Substance**”.

12.1.2.4 Records of all executed commands shall be kept in log files and these files shall be stored in system hard disk. Any deviation shall be considered as “**Major Deviation**”.

#### 12.1.2.5 ***System and Alarm Messages***

The software shall be capable of recognizing different system degradation, alarm and fault conditions and generate appropriate spontaneous messages. The relevant output messages must be in English; deviation shall be considered as “**Change of Substance**”.

### 12.1.3 ***Functional Requirements of NMS***

12.1.3.1 The NMS shall have the capability to support the following management functions for all elements:

- a) Fault Management
- b) Configuration Management
- d) Performance Management
- e) Security Management

All the management functionalities shall be implemented in the NMS as a set of interactive application components using client-server architecture and can be vertically and horizontally integrated.

#### 12.1.3.2 ***The NMS should support the following:***

- a) Graphical Unit Interface (GUI)
- b) Real-time alarm display and collection
- c) Card/circuit level diagnosis
- d) Interface line status monitoring, both subscriber lines and network interface.
- e) Performance monitoring and traffic measurement.
- f) Network/NE configuration management.

- g) Routing table management
- h) SNMP-based network management interface(s) to support third party network management system.
- i) Adaptive to ITU-T Q3/CMIP.
- j) Latest version of the Windows, Solaris OS and HPOV or any management system available.
- k) Implementation of software patches and releases on the NGN nodes remotely.

#### 12.1.3.3 **Basic Features and Capabilities**

The NMS shall provide:

- a) Preferably a single Application Program Interface (API) for all network elements regardless of Brand and Model.
- b) Configuration planner for simplifying the task of future network planning and configuration.
- c) Automatic copy of configurations at device, cards, and ports level to the customer information database system within the NMS.
- d) Network Integrity check at the network, device, card, and port levels.
- e) End to end path management.
- f) Advance alarm management setting for priorities and types.
- g) Multiple network managers support with different access authorities.
- h) Network element status displayed by colors.
- i) Graphical User and user-friendly interface with online help.
- j) Identification of problems through event correlation. It should intelligently correlate events into high level alarms, immediately pinpointing the root cause of network problems.
- k) Web-based user interface.
- l) Scalable architecture

#### 12.1.3.4 **Fault/Alarm Management**

The NMS shall support (but not limited to) the following fault and alarm management capabilities:

- a) Detected errors/unusual network behavior should be isolated and controlled.
- b) Results of errors/unusual network behavior should be displayed in graphical and tabular form.
- c) Alarm facilities should permit the easy identification and correction of faulty element.
- d) Alarms should have a status of active, deferred, or cleared and should be in active state when first received.
- e) The severity of the alarm, full alarm message and time of delivery should be available for display and are logged in the alarm database.
- f) The administrator should be able to set various thresholds for alarm reporting, including filtering by severity, number of occurrences within a given period and interval between occurrences.

#### 12.1.3.5 **Configuration Management**

The Configuration Management should initialize and close down manage objects, collect information on demand about the current condition of the network, obtain

announcements of significant changes in the condition of the network, and change the configuration of the Network and the Network Elements.

The NMS should support (but not limited to) the following configuration management capabilities:

- a) Complete configuration of all network devices, cards, and ports for connection establishment and complete control of the network.
- b) Graphical User Interface for configuring all system devices, cards, and ports.
- c) Web-based Graphical User Interface for remote configuration management for all system devices, cards, and ports.
- d) The NMS should have an automatic backup configuration facility.

#### 12.1.3.6 ***Performance Management***

The NMS should support, but should not be limited to the following performance management capabilities:

- a) Monitor network throughput and real-time Bit Error Rate must be supported.
- b) Set thresholds for various variables, such as error rates or link utilization.
- c) Continuous background diagnostics during system uptime are required for early detection of fault conditions and timely activation of alarms.
- d) Log and save all or defined events for present and future reference.
- e) All man-machine interfaces shall be in a Graphical User Interface.

#### 12.1.3.7 **Security Management**

The NMS should support (but not limited to) the following security management capabilities:

- a) Secure access between network elements and the network manager.
- b) The system should incorporate security measures against unauthorized personnel to access the office data/programs and entering of commands.
- c) Several access levels according to the order of their influence on program performance should be identified with the corresponding password.

Each deviation of the above requirement shall be treated as “**Major Deviation.**”

## 12.2 **Lawful Interception (LI)**

12.2.1 The system must meet LI compliance according to –

- a) TS 101 331 Telecommunications security; Lawful Interception (LI); Requirements of Law Enforcement Agencies;
- b) ES 201 158 Telecommunications Security; Lawful Interception (LI); Requirements for Network Functions;
- c) ES 201 671 Telecommunications Security; Lawful Interception (LI); Handover Interface for the Lawful Interception of Telecommunications Traffic (revised version);
- d) TR 101 943 Telecommunications Security; Lawful Interception (LI); Concepts of Interception in a Generic Network Architecture;
- e) TR 101 944 Telecommunications Security; Lawful Interception (LI); Issues on IP Interception;

12.2.2 The LI facility shall include necessary hardware and software for

- a) Management system for interception
- b) Mediation system
- c) Delivery systems

12.2.3 The Lawful Interception Facility shall be capable of handover of

- a) Administrative Information (HI1)
- b) Intercept related Information (HI2)
- c) Content of Communication (HI3)

12.2.4 E1s shall be used to transfer HI3 payload to the **National Monitoring Centre (NMC)**.

12.2.5 LI Monitoring shall be invisible to subscribers and to the staff(s) operating the network.

12.2.6 Minimum number of activated warrants is 1500.

12.2.7 Minimum number of mediated interception request 150.

12.2.8 Bidder shall explain his/her proposal - with diagram, system capacity, integration plan etc. and provide a compliance statement to relevant ETSI/ ITU-T/ IETF recommendations. Deviation of the above requirement shall be treated as “**Substantially Non-responsive**”

### **12.3 CDR Management**

12.3.1 The supply shall include latest industrial standard hardware and necessary Licensed Software to provide the following services:

- a) Download CDRs to a PC hard disk,
- b) Processing these data into suitable format for billing server input
- c) Saving raw-data into DVD / Portable USB-Mass Storage device

The Bidder must agree that actual mediation and configuration shall be finalized during implementation.

### **12.4 Mediation and Billing Sub-System (BSS)**

12.4.1 The supply shall include latest industrial standard hardware and necessary Licensed Software to provide the following services:

- a) Download CDRs to a PC hard disk,
- b) Processing these data into user-friendly tabular and graphical formats
- d) Saving raw-data into DVD/Portable USB-Mass Storage device and

The Bidder must agree that actual mediation and billing configuration shall be finalized during implementation. The bidder shall customize the software as per BTCL requirement.

**12.4.2 *The bidder shall have to arrange real time online CDR transfer to three nodes: BTCL Billing Center, BTRC and LEA. The bidder shall quote a solution which shall include necessary furniture, hardware and software required at BTCL Switch-side and at the deliver nodes i.e. BTCL Billing Center, BTRC and LEA, The bidder shall submit the proposed interconnection diagram, data flow diagram and mention the connectivity requirements. BTCL shall provide the transmission media.***

12.4.3 The deviation shall be treated as “**Critical Deviation**”.

**12.5 Network Operation & Maintenance Vehicle**

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:: End of Chapter ::

Book 2  
**Chapter Thirteen**

**Requirements of Access Network**

**13.1 GPON OLT (Optical Line Terminal)**

- 13.1.1 The GPON OLT shall be housed in standard 19' rack with front-access facility.
- 13.1.2 The equipment shall run on DC power and the power module shall be duplicated with 1+1 hot-standby mode.
- 13.1.3 All line, control and power cards of the equipment shall be hot-swappable.
- 13.1.4 The offered equipment shall support software upgrade without any interruption to network. Software roll-back to the old version shall also be supported.
- 13.1.5 The switching fabric capacity shall be at least 300 Gbps full duplex.
- 13.1.6 The equipment shall support at least 4 (four) GE and at least 2 (two) 10GE uplink interfaces.
- 13.1.7 *The equipment shall support at least 100 numbers of GPON access ports. Each GPON access port shall support a total bandwidth of 2.488 Gbps downstream and 1.244 Gbps upstream.***
- 13.1.8 Aggregation of different GE uplink capacity shall be possible. The bidder shall specify how many GE uplinks interfaces can be aggregated in a group and how many groups can be formed in one OLT.
- 13.1.9 Applications and services

The equipment shall support, but not limited to, the following services:

- 1. High speed internet access services
- 2. VPN services
- 3. Point-to-Point, Point-to-Multipoint Layer 2 services
- 4. Any-to-any Layer 3 services
- 5. Carrier to Carrier wholesale services
- 6. IP Multicast

13.1.10 GPON Interface Requirements

- 1. The GPON interface should comply with ITU-T G.984.1/2/3/4 standards.
- 2. The system shall support Type B redundancy protection for main fiber based on GPON interface and the switchover time is less than 50ms when the main GPON interface fails.
- 3. The offered equipment must support as high as 1:64 splitter ratios.
- 4. The optical performance must be complying with Class B+ standard with 28dB budget link loss.

13.1.11 Synchronization

- a) The GPON OLT shall have multiple options to accept synchronization signal.
- b) The bidder shall state the number of synchronization sources that may be

- configured on the offered equipment and the default clock setting mode.
- c) The offered equipment must support Ethernet synchronization via uplink interface including GE and 10GE which fulfill compliant to G.8261, G.8262 and G.8264 standard.
- d) The external clock input shall comply with the specifications included in ITU-T G.703 Standard.
- e) The equipment shall lock into internal clock when external clock is unstable. The bidder shall explain how switching from external clock to internal clock works.

### 13.1.12 L2 Functions

- a) The equipment shall support layer 2 functions of the seven-layer ISO model. The bidder shall mention the number of MAC addresses supported by the offered equipment in terms of:
  - i. Number of MAC address table
  - ii. Learning Rate per Second
  - iii. Forwarded MAC addresses
- b) The equipment shall support VLAN functionality. The bidder shall mention the number of VLAN ID supported by the offered equipment in terms of:
  - i. Range of VLAN ID
  - ii. Maximum number of configurable VLAN ID
- c) The offered equipment should support VLAN ID local significance up to per physical and logical port at the ONT basis.
- d) The offered equipment should support the following features:
  - i. Mapping of subscriber VLAN to a common service
  - ii. VLANTranslate/re-write subscribers
  - iii. VLAN ID to another VLAN ID
- e) The equipment shall support VLAN switching to map the subscriber traffic based on the IEEE 802.1p priority tagging to a specific VLAN, IEEE 802.1Q VLAN ID to a specific VLAN, the combination of IEEE 802.1p and 802.1Q tagging to a specific VLAN and IP TOS bit to a specific VLAN.
- f) The offered equipment shall support Ethernet Jumbo Frame. The maximum frame size supported should be stated clearly.
- g) The offered equipment should be able to support the following subscriber's access methods, but not limited to:
  - i. DHCP
  - ii. DHCP option 82/60
  - iii. PPPoE
  - iv. Static IP
- h) The offered equipment should support multiple service delivery of data, voice and video to a single ONT. It should be able to support multiple service profile, a minimum of 100 services profile should be supported by the equipment and its Management System. The bidder should state the maximum number of service profile supported by the offered equipment as well as by its Management System.
- i) The offered equipment should support IP policing at the network and subscriber end. The bidder shall explain the detail policing mechanism supported.
- j) The equipment shall support shaping of services per ONT on the downstream direction and bandwidth control via TCONT in the upstream direction from ONT.
- k) The offered equipment should support various quality of services (QoS) and traffic prioritization for service differentiation. The mechanism of QoS and traffic prioritization in every part (OLT, ONT, etc) of the offered equipment shall be explained in detail. The offered equipment should support the following:
  - i. Trusted connectivity where the QoS setting/traffic prioritization configured by customer can be preserved.
  - ii. Un-trusted connectivity where the QoS setting, traffic prioritization configured

- iii. by customer can be overwritten by the offered equipment.
- iii. The detail Downstream and Upstream QoS and traffic prioritization mechanism supported inclusive of the hardware queue available for each direction. A minimum of 8 hardware queues should be supported at both directions. The OLT should implement some queuing mechanism to manage the hardware queue such as SP, WRR, etc.
- l) The offered equipment should support Dynamic Bandwidth Allocation (DBA) mechanism to allow optimum bandwidth utilization on each PON interface. The offered equipment must support NSR and SR mode in DBA.
- m) The offered equipment should support port based network access control authentication method (IEEE 802.1x). The activation of this function should support local mode basis (up to the physical port level), so the mixed configuration between 802.1x enable and 802.1x disable ports within OLT can be flexibly configured according to the service scheme.
- n) The offered equipment should support DHCP relay. Multiple DHCP relay instance should be supported to accommodate multi services in multi provider environment.
- o) The offered equipment should support ARP proxy function for security and scalability purpose. Multiple ARP proxy instances should be supported to accommodate multi services in multi provider environment.
- p) The offered equipment shall support loop back facility based on IEEE 802.1ag. The Tenderer shall explain the detail OAM features capability provided by the offered equipment.
- q) The offered equipment shall support basic OMCI (ONT Management and Control Interface) feature. The bidder shall explain the detail OMCI features capability provided by the offered equipment.
- r) The offered equipment should support port-mirroring function for trouble shooting, monitoring, and tracing purpose. The Tenderer shall explain the port-mirroring function mechanism in detail.
- s) The offered equipment should support the traffic classification policy based on VLAN, Ethertype, VLAN+Ethertype etc.

#### 13.1.13 L3 Functions

The offered equipment shall support routing functions. Customer data traffic shall be switched/routed towards the IP core network. Th bidder shall mention L3 functions supported by the offered equipment.

#### 13.1.14 Multicast Functions

The offered equipment shall support the following functions:

1. IGMP Proxy and IGMP Snooping functions.
2. IGMP proxy function at network side of the GPON in order to decrease the pressure on the multicast router.
3. IGMP quick leave functionality and support zapping time of less than 1 second.
4. Minimum 2000 multicast channels.
5. The proposed equipment should support Controlled Multicast and support to configure the user-profile by NMS or OSS.
6. The equipment shall support multicast CAC (Connection Access Control) function which can be configured as a profile per ONT. For example, the number of multicast channels that a subscriber can watch and the address range.

#### 13.1.15 Traffic Management Functions

1. Indicate in detail how quality of service is managed for the different types of Voice, Data and Video traffic. Explain how traffic is separated, marked and queued from

- the customer's interfaces to the traffic output through Uplink interface.
2. Specify what protocols can be used to conduct packet marking on GPON, that is IP QoS protocols supported.
  3. Please specify the QoS queuing capability on packet interfaces, including the number of queues for each kind of interface.
  4. Please describe traffic policing functions supported by the proposed equipment.

#### 13.1.16 Security and Reliability Functions

- 1) The bidder shall describe in detail about the provision for security functions provided in the equipment.
- 2) The bidder should specify the IGMP versions and the associated security functions supported by his products.
- 3) The bidder should specify the security functions enabling to protect his products during management operations. The GPON should support Radius authentication for operators.
- 4) The offered equipment should support IGMP pre-join
- 5) Please describe in detail the mechanism in GPON to ensures security between L2 customers
- 6) GPON should support SSH V2 function for user logging in.
- 7) The offered equipment should support Rx power reading measurement on the ONT.
- 8) The offered equipment can shutdown the power of service board automatically when the service board temperature is higher than the limitation and also can start-up when the temperature becomes normal.
- 9) The network interface should support Equipment Fault Protection and works in load-balancing mode. The switchover from a faulty card in Equipment Fault Protection should be less than 50ms.

13.1.17 The bidder shall specify backplane architecture in terms of capacity, technology, number of paths, redundancy, etc.

13.1.18 Deviation of the requirement in each clause from 13.1.1 to 13.1.10 shall be treated as '**Critical Deviation**' and deviation of each clause from 13.1.11 to 13.1.17 shall be treated as "**Major Deviation.**"

#### 13.2 PON Splitter

13.2.1 Splitters will be installed in each optical network between the GPON Optical Line Terminal (GPON OLT) and the Optical Network Terminals (ONTs)/**Multi-Dwelling Units (MDUs)/Single Business Units (SBUs)**. AGWs may also be connected through optical fiber available through PON splitter *as an optional requirement*.

13.2.2 The splitter shall use the latest technology for passive optical network splitters.

13.2.3 Splitters shall contain no electronics and use no power. The varieties of split ratios to be used shall be 1:2, 1:4, 1:8, 1:16, 1:32 and 1:64.

13.2.4 Any deviation shall be treated as "**Major Deviation.**"

#### 13.3 Optical Fiber

13.3.1 The OF cable will be standard single mode type (G.652D) and suitable for underground application. The fiber should be suitable for 155 Mbit/s, 622 Mbit/s, 2.5 Gbit/s, 10 Gbit/s and DWDM Transmission at 1310nm and 1550 nm wave lengths.

### 13.3.2 Optical Fiber Characteristics

1. The Optical fiber shall confirm to the latest relevant ITU-Recommendations and the requirements as specified in this document.
2. The Fiber shall comply with the design data given in ITU- Recommendation G.652D.

13.3.3 Any disagreement of clauses 13.3.1 to 13.3.2 will be treated as “**Critical deviation**” for each of such disagreement.

### 13.3.4 Optical Fiber Structure

Item		Construction
Type		Single Mode
Material	Core	Germanium doped Silica
	Cladding	Silica
	Coating	Dual Layers of UV-cured Acrylate, Color coded
Mode Field Diameter		9.2 ± 0.4 μm for 1310 nm 10.4 ± 0.8 μm for 1550 nm
Cladding Diameter		125 ± 1 μm
Coating Diameter		242 ± 10 μm
Coating – Cladding Concentricity		< 12.0 μm
Concentricity Error		≤ 1.0μm
Non circularity of Cladding		≤ 2 %
Curl radius		≥ 4 m
Fiber Cut-off Wavelength ( $\lambda_c$ )		≥ 1180 ≤ 1330 nm
Cable Cut-off Wavelength ( $\lambda_{cc}$ )		≤ 1260 nm
Zero Dispersion Wavelength		1300 – 1322 nm
Zero Dispersion Slope		≤ 0.095 ps/(nm <sup>2</sup> x km)
Dispersion Coefficient		≤ 3.5 ps/(nm x km) 1310 nm ≤ 18 ps/(nm x km) 1550 nm
Attenuation		< 0.36 dB/Km at 1310nm < 0.22 dB/Km at 1550 nm
Refractive Index Profile		Matched Cladding Step Index

Any disagreement of each item will be treated as “**Major deviation**”.

### 13.3.5 Optical Fiber Cable Structure

For double sheath single armored cable (direct buried application)

Item	Construction
Type	Jelly field, loose tube, Single Armored, Duct type/direct buried, double Sheath with FRP strength member
Strength Member	Fibre Reinforced Plastic (FRP)
Buffer Tubes	Color Coded Loose Buffer Tubes stranded around the strength member. The tubes to be filled with <b>Thixotropic</b> Jelly and necessary plastic fillers to have circular cable core

Item		Construction
Core Wrapping		Non Hygroscopic Tape
Core Filling Material		Petroleum Jelly
Inner Sheath Material	Material	Black Polyethylene
	Thickness	1.50 ± 0.2 mm
Armoring	Material	Corrugated steel tape or tube, copolymer coated on both sides
	Thickness	Minimum 0.10 mm
	Application	Overlapping
Outer Sheath	Material	Black Polyethylene
	Thickness	2.50 ± 0.25 mm
Cable Diameter		≤16 mm for 24 core
Maximum Permissible Tensile Force		> 2000 Newton
Minimum Permissible Bending Radius		Dynamic : 25 x Diameter Static (Unloaded): 12.5 x Diameter
Permissible Compressive Stress		3000 Newton / 100 mm
Number of fibre per Buffer Tube		04/06/12 for all types of OFC but shall not be more than 12.
Number of Buffer Tubes		As per requirement
Cable Length in Drum		Minimum 2 Km with a lower level variation 10% for all types of OFC.
Cable Marking		Length Marking: at intervals of every odd meter Number of Fibers in the Cable, running length, Year of manufacture & Name of Manufacturer

Any disagreement/deviation from the sub-head “Type” under item head shall be treated as “**Change of Substance**”. Any disagreement/deviation from the specifications of the items **Strength member, Inner sheath thickness, Outer sheath thickness and armoring thickness** shall be treated as “**Critical Deviation**”. And any disagreement/deviation from the specifications of the items other than above shall be considered as “**Major Deviation**”.

### 13.3.6 Fiber Identification

Each fiber shall be identified by providing suitable individual colors having good fact color properties. Colorless fibers shall not be accepted.

Any disagreement will be considered as “**Critical Deviation**”.

### 13.3.7 Fiber Stranding

A number of protected optical fiber shall be stranded together in such a way that, if the mechanical and temperature limits are exceeded during transportation, storage, handling, installation and operation the fibers will remain undamaged.

### 13.3.8 Longitudinal Water Penetration.

1. The space around the fibers and fillers shall be completely filled with jelly/grease throughout the cable length.
2. The jelly/grease characteristics will be quoted by the Bidder, which must be compatible with the cable components.

3. The jelly/grease shall not affect the color of the primary coating, easily removed and shall be non-toxic, free from bad smelt and shall not affect the human skin.
4. The jelly/grease shall comply with the standard test procedure/ requirement.
5. Cross wounded core binding yarns will be applied during the stranding of the cable core and Cable core will be wrapped with a non-hygroscopic core wrapping tape helically/longitudinally with minimum 10 % overlap.

Any disagreement of each item will be treated as “**Major deviation**”.

### **13.3.9 Delivery and Cable Identification**

1. Cable identification mark along the length of the cable and distance marking shall be provided in meters.
2. Cables will be delivered in wooden/steel/plastic Drums of appropriate size.
3. Cable Ends will be sealed to prevent the entrance of moisture.
4. Drums will be marked to indicate the rolling direction.
5. Following information to be painted on flange of drum:
  - a. Customer Name
  - b. Type Of Cable
  - c. Length of Cable
  - d. Drum Number
  - e. Year of Manufacture
  - f. Gross & Net Weight
  - g. Manufacturer name & Country
6. Optical Fiber cable should operate normally under the following environmental conditions:-
  - a. Operating temperature - 5°C to 60°C
  - b. Operating relative humidity - 60% to 100%
  - c. Storage temperature - 5°C to 60°C
  - d. Storage relative humidity 60% to 95%

Any disagreement of each item will be treated as “**Major deviation**”.

### **13.4 Universal Joint / Splice Closure Kit**

- 13.4.1 The splice closer shall be waterproof type, which will accommodate the joint part of the cable, should be suitable for installation in manhole or hand hole or be directly buried.
- 13.4.2 Fiber splice tray/holder shall be provided inside the closure to accommodate the splice protector and surplus length of fiber after splicing.
- 13.4.3 The material of the sleeve for the closer shall consist of plastic material containing the glass fiber. The metal material for the closer shall be anti-corrosive & anti-rusting.
- 13.4.4 The closer shall have the following characteristics :-
  - No leakage of air for 24 hours after applying  $0.5 \pm 0.1$  kg/cm gas pressure.
  - No invasion of water after 1 hour with  $1.0 \pm 0.1$  kg/cm water pressure.
  - No malfunction for 1 minute at 1500 V DC between metal core and closer surface.

- 13.4.5 Splice closures should be easy to open with the no special or specific tools and should be reusable without the necessity of cable cutting.
- 13.4.6 The joint closure must be 4 way. It should be possible to make 4 way interconnection to different directions with the closure.
- 13.4.7 Adequate number of Tray / Cassette shall be provided to hold minimum **96/48/24 core** fiber splices in case of normal joints along the cable route and minimum 36 core fiber, 72 core fiber joints in case of ‘T’ joints in side each joint closure respectively.
- 13.4.8 Full technical and constructional details of the closure are to be given along with the Bid.
- 13.4.9 Any Disagreement/deviation from each sub-clause of clause 13.4 will be considered as “**Major Deviation**”.

### 13.5 HDPE Pipe Specification

- 13.5.1 HDPE pipe shall be of following minimum standard and shall have to satisfy following technical specifications.

- Specifications for 40mm permanently lubricated HDPE Telecom ducts.

No	Item	Unit	Value	ASTM Test Standard
1	Heat Reversion	Dimension shall not change by more than 3%		D1238
2	Crash Resistance	Deflection with load not greater than 10%		D2412
3	Tensile strength	Kgf/cm <sup>2</sup>	Min. 180	D638
4	Elongation at break	%	Min. 350	D638
5	Impact Test	Sample shall not crack & split		D2444
6	Coefficient of friction	<0.1		
7	Lubricated Layer	Must have solid lubricant, clearly visible and white in color, uniform layer		
8	Lubricated Layer thickness	Should be minimum 10% of wall thickness		
9	Duct size(nominal)	40 X 3.5		
	Outer Diameter	40 ± 0.5 mm		
	Wall thickness	3.5 ± 0.5 mm		
	Minimum coil length	500 meter		

Any non-compliance of serials 1-6 of above specifications of HDPE duct shall be considered as “**Major Deviation**” and any non-compliance of serial number 7, 8, 9 of above specifications of HDPE duct shall be considered as “**Critical deviation**”

- 13.5.2 Installation and commissioning of optical fiber, HDPE duct, Closure, Optical splitter

will be completed by other contractor to be selected through another tender.

### **13.6 Access Gateway**

13.6.1 The Access Gateway (AGW) shall be based on the new packet switching IP technology and will be able to provide various conventional telephony and data services e.g. Voice over IP (VoIP), Virtual Private Network (VPN), high-speed Internet access, ADSL2+, VDSL2, and TDM G.SHDSL.

13.6.2 The equipment shall be housed in standard 19-inch cabinet with rear-access in case of indoor type and front-access in case of outdoor type.

#### **13.6.3 (Deleted)**

13.6.4 The outdoor type access gateway shall contain related equipment to provide POTS and ADSL services and Power supply, MDF etc. in the cabinet and the equipment shall be capable of withstanding environmental conditions (temperature, humidity, water logging etc.) in Bangladesh.

13.6.5 The power supply module shall be duplicated to support 1+1 redundancy.

13.6.6 The main control board shall support 1+1 redundancy in order to guarantee the system reliability.

13.6.7 Any service card shall be inserted into any service slot in order to provide easy expansion.

13.6.8 All cards of the equipment shall support hot-swappable for convenient maintenance.

13.6.9 The equipment shall support voice telephony service by 'POTS only' cards and voice and internet service simultaneously by 'POTS plus ADSL2+' cards. The ADSL2+ cards shall have in-built splitter.

**13.6.10 *The offered equipment shall provide at least two GE (optical) uplinks working in 1+1 redundancy mode for carrying narrowband and broadband traffic.***

13.6.11 The offered equipment shall support 1 + 1 backup for the uplink interfaces of the control boards in order to guarantee the uplink reliability.

13.6.12 Ongoing services shall not be affected during any software patch loading or upgrading.

13.6.13 The main control board of the access gateway shall support H.248 and SIP protocol.

13.6.14 The offered equipment shall support multiple voice encoding and decoding schemes, including **at least** G.711, **G.726** and G.729A/B.

13.6.15 The offered equipment shall support all PSTN basic services and other commonly available supplementary services.

13.6.16 The offered AGW shall support local audio mixing and local announcement playing facility to reduce the load of Media Resource Server.

13.6.17 The offered equipment shall support transparent transmission FAX and T.38 FAX functions.

- 13.6.18 The offered equipment should support overload control:
- 13.6.19 Support the overload control packet loaded by the H.248.
- 13.6.20 The offered equipment shall support ADSL2+ in compliance with ITU-T G.992.5 (ADSL2+) and T1.413. It shall also support Annex A, Annex L of the ADSL2/2+ standard.
- 13.6.21 The offered AGW shall also support the following ADSL2+ enhanced features:
- INP (Impulse Noise Protection) feature. Configuration and query of the uplink and downlink INP parameters should be supported. The equipment shall be up to 16 INPs.
  - TSSi feature. Configuration and modification of the PSD Value of the ADSL2+ Tone are supported. The value can also be maintained through the NMS. Up to 32 of the 512 TONES can be maintained at the same time.
  - Annex M
  - L2 low power consumption mode
  - Supports Missing Tone to avoid the interference with other radio system.
- 13.6.22 The ADSL2+ mode shall be configurable per subscriber port.
- 13.6.23 The offered equipment shall support VDSL2 mode and the VDSL2 shall be compatible with ADSL2+.
- 13.6.24 New AAA server and BRAS are out of this tender. Existing AAA server and BRAS shall be used. The bidder shall assist BTCL in this regard.
- 13.6.25 The offered indoor type AGW shall be expandable up to (not limited to) 1,200 POTS lines per system.
- 13.6.26 There shall have at least **48** ports 1000 BASE-X (SFP) interface module (***with 75% LX & 25% SX SFP module***) and ODF facility at 105 indoor type AGW locations having capacity as shown in **Annex 3.5C**. ***This LAN Switch shall be used to connect the local AGW node & to provide access for the high Internet bandwidth users and to connect with the LAN Switch at the respective TGW site (uplink). The remaining 83 AGW nodes shall be directly connected to the respective LAN Switches at TGW sites.*** 80% of the LAN switches shall support DC power and 20% shall support AC power. ***The LAN switch shall support the following capacity and configuration features. Any deviation shall be treated as "Critical Deviation".***
- a. The switch shall support minimum of 30,000 MAC addresses.***
  - b. The switch shall support minimum of 200 Gbps switching capacity and 100 million packets per second forwarding performance.***
  - c. The switch shall be supplied with 1+1 hot-standby redundant control and switching module and 1+1 hot-standby redundant DC (-48V)/AC (220V) power supply modules.***
  - d. The switch shall be supplied with minimum of 512 MB RAM and 256 MB Flash memory***
  - e. The processing and interface capabilities of the switch should be able to be upgraded to the final capacity with same chassis offered which is at least double of the present requirement. Present capacities are mentioned in Annex-3.5C.***

*The other features and requirements of LAN switches shall be as stated in Clauses-7.1.1 to 7.1.5*

**13.6.26A Each of the deviation of Clause-13.6.1 to 13.6.25 shall be treated as “Major Deviation.”**

**13.6.27 Power Supply Requirements for AGW**

13.6.27.1 The present capacity of the rectifier will be at least double of the present power consumption requirement at the AGW node. The rectifier shall be modular in design and based on parallel redundant N+1 system. One rectifier module shall be reserved for standby purpose in case of any of the active rectifier modules fails.

13.6.27.2 The rectifier AC input range is from 160~285VAC.

13.6.27.3 The rectifier shall be of the latest technology and must be of the switch mode type. Temperature compensation circuit to adjust float voltage against temperature and low voltage disconnect /reconnect must be provided in the system.

13.6.27.4 The rectifier must have automatic battery discharge testing facility with the following requirements:

- a) Facility can be disabled or enabled,
- b) Time, date and duration of the test can be set through the controller,
- c) Once activated, the output voltage of rectifier shall be reduced to below 43.2VDC (settable) and battery is discharged to the load.
- d) If the voltage drops below a preset voltage (usually 48V and settable) before the test period, an alarm shall be triggered to indicate battery failure.
- e) If there is a previous power failure and to prevent wrong battery test results, a settable period shall be programmed in the controller to prevent any battery test. Period shall be settable up to 1 week.

13.6.27.5 For indoor type, standby battery time is 8 hours for present capacity of AGW with recharging time within 10 hours to 80% capacity after fully discharged and for outdoor type, the standby battery time shall be at least 6 hours. Rectifier capacity shall be based on recharging requirement.

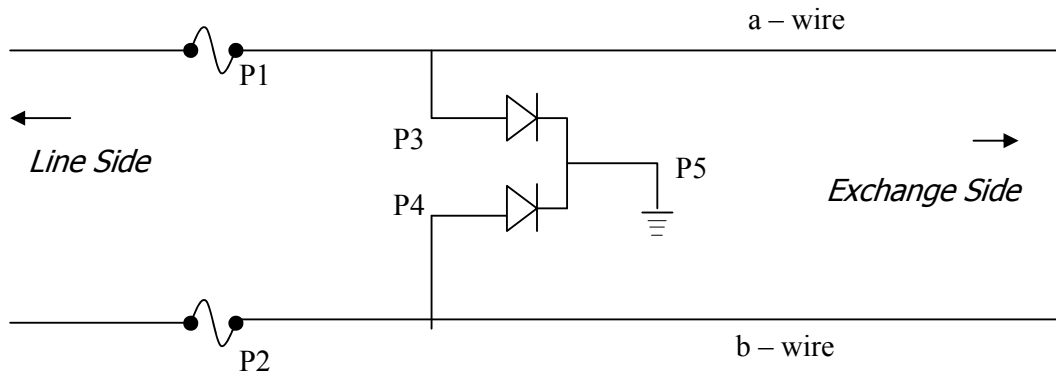
13.6.27.6 The bidder has to submit the detail calculation of battery & Rectifier power requirement to justify the offered capacity.

13.6.27.7 Each of the deviation of the above requirement shall be treated as “**Major Deviation**”.

**13.6.28 Main Distribution Frame (MDF)**

- a. The AGW shall be equipped with MDF for subscriber connection. This may be inbuilt with AGW rack or may be separate. The MDF shall be of modular structure, miniaturized to the extent possible and easily maintainable. The mechanical structure shall be back-to-back for Vertical and Horizontal side. The cable-pair insertion shall preferably be punch-type; the blocks shall allow insertion of jumper-wires of sizes 0.4 mm to 0.6 mm diameter. Any deviation shall be treated as “**minor**”.
- b. Each of the MDF shall have the following minimum criteria and any deviation shall be treated as “**minor**”.
  - Minimum number of total available (horizontal and vertical) pairs = 120% of

- Equipped subscriber capacity.
- Number of OSP pairs in each block = 100 (or 10 x 10).
  - Grounding: Less than 2 ohms.
- c. Each MDF shall be fully equipped with 5-point protection device assemblies. The protection shall be of the following type. Absence of such protection in the MDF shall be treated as "**critical deviation**".



P1 = P2 = Over-current Protection (Ceramic or Glass or others) shall become open-circuit on Over-current.

Breaking voltage : 180V AC  
 Breaking current : 1.25 A  
 Breaking time : 2 ms

P3 = P4 = Over-voltage and Surge Protection (gas discharge or other type) shall become open-circuit on over-voltage or surge.

Nominal Voltage : 180 – 380V AC  
 Nominal Discharge Current : 3 A  
 Nominal Impulse Discharge Current : 100 A  
 Nominal Resistance : > 100 Mohms  
 Current Turn-off Time : < 200  $\mu$ s

P5 = The common point; shall be connected to the frame ground.

- The entire assembly shall preferably be enclosed in a single unit but the individual protectors may also be separate units;
- If the protector assembly is taken out of the slot, the circuit between the line-side and exchange-side for both a-wire and b-wire must become open-circuit;
- The assembly shall preferably be one for each cable-pair but multiple-pair assemblies will also be acceptable;
- The assembly shall provide facility to detect & measure presence of any AC voltage or current;
- The faulty protection-units inside the assembly shall preferably be changeable in the field;
- Facility shall be provided so that if any of the assembly becomes faulty (*either the over-current or over-voltage device*), it will trigger an alarm-loop. The bidder will also provide visual and audio alarm units, with that loop, inside each MDF;
- The supply shall include 125% units of the cable-pairs available of each MDF.

### 13.6.29 Optical Network Terminal (ONT)

The ONT shall have the following functions, features and specifications. Deviation of each clause/sub-clause shall be treated as “**Major Deviation.**”

- a) The type of ONT should include basic residential ONT and advanced residential ONT.
- b) *The basic residential ONT should support two POTS and 4 Fast Ethernet ports.*
- c) *c) The advanced residential ONT should support four POTS and four Fast Ethernet ports.*
- d) The ONT should comply with the Standards set by IETF through different RFCs, IEEE and ITU recommendations on broadband optical access system, GPON system, VLAN, various PPP, IP, DHCP, NAT etc.
- e) Single fiber transmission shall be used for optical transmission (both in the upstream and downstream direction) and bidirectional transmission shall be accomplished by use of a WDM technique.
- f) The ONT shall support configurable downstream FEC.
- g) The ONT shall use NRZ coding and scrambling in both directions.
- h) For upstream, the ONT shall support Class B+ (Optical budget, source type, transmitter range, mean launched power min, mean launched power max, extinction ratio etc.) as defined in ITU-T G.984.2 Amd1.
- i) For downstream, the ONT shall support Class B+ (Optical budget, receiver type, maximum reflectance, BER, minimum sensitivity etc) as defined in ITU-T G.984.2 Amd1.
- j) The ONT should support optical module monitoring.
- k) User Network Interfaces (UNIs):

#### **i) Ethernet**

- 1) The ONT shall support at least four 10/100BASE-T interfaces in conformance with IEEE 802.3u, with RJ45 connectors.
- 2) The Ethernet UNI(s) shall support auto-negotiation of speed and duplex mode by default.
- 3) For each Ethernet UNI, it is possible to configure manually the line rate as 10 or 100 Mbps.
- 4) For each Ethernet UNI, it is possible to configure manually duplex mode as half or full.
- 5) The ONT shall support Auto MDI / MDI-X feature.

#### **ii) POTS**

- 1) The ONT shall support at least two FXS interfaces with analog/VoIP adaptation for POTS, with RJ11 connectors.
  - 2) Each FXS interface shall be in conformance with specific national requirements concerning DC, ringing, AC, DTMF dialing (ITU-T Q.23), tones (alerting patterns and call progress tones) characteristics and on hook/off hook/flash-hook detection.
- l) Data service: The ONT shall support data service both in bridge mode and route mode.
- i) For Bridge mode, the ONT shall
    - 1) Be able to bridge IP over Ethernet.
    - 2) Have at least one learning bridge in conformance with IEEE 802.1D for "bridged" UNIs.

- 3) Work in L2 transparent switching mode. All the packets from the UNI ports will be transparently transmitted to the WAN port.
- 4) Support untagged frames.
- 5) Support 802.1D priority-tagged frames.
- 6) Support 802.1Q VLAN-tagged frames.
- 7) Provide at least 32 user VLAN-8 user VLAN for each UNI port. The range is from 1 to 4094.
- 8) Support VLAN handling as follows.
  - Adding.
  - Removing.
  - Replacing or Remarking.
  - Transparency.
- 9) Support VLAN QinQ based on the Ethernet port.
- 10) Support PPPoE or DHCP sessions forwarding transparently.

ii) For route mode, the ONT shall

- 1) support a built-in PPPoE client and the IP address should be obtained through PPPoE.
- 2) support a built-in DHCP client and the IP address should be obtained through DHCP.
- 3) allow the operator to statically configure its IP address.
- 4) support NAT/NAPT.
- 5) support default route.
- 6) support to obtain the IP address of the DNS server automatically, when serving as a PPPoE client or DHCP client.
- 7) allow the operator to statically configure the IP address of the DNS server.
- 8) support DNS relay.
- 9) support a built-in DHCP server and assignment of IP address, mask and gateway bound with address pool of LAN port to DHCP leases for local device addressing,
- 10) support to query the routing table, ARP table and NAT table.
- 11) support to query the filtering entries of the firewall.

m) Multicast

- 1) The ONT shall support lay 2 multicast (IGMP snooping).
- 2) The multicast streams distribution (coming from one or several multicast VLANs) on the G-PON (from the OLT to the ONT) shall be carried out using the same GEM port dedicated to multicast streams as other ONTs/ONUs of the same IF\_PON port. This GEM port should not be AES encrypted. IGMP signaling shall not be transported on the multicast GEM port used for the multicast streams distribution.
- 3) IGMP v2 /v3 snooping must be supported in the ONT for multicast forwarding.
- 4) For each Ethernet port, 16 multicast programs can be watched simultaneously. The total number of concurrent multicast program should not be less than 16 \* the number of Ethernet ports.
- 5) The ONT shall support fast leave.

- 6) The ONT shall support to transmit the multicast stream packets encapsulated both in PPPoE and IPoE format.
- n) VoIP and FoIP service
- 1) The ONT shall support session initiation protocol (SIP) for VoIP.
  - 2) The ONT shall optionally support H.248 for VoIP.
  - 3) The ONT shall support to detect fax signals in order to switch to ITU-T G.711 CODEC or use ITU-T T.38.
  - 4) The ONT shall support local loop echo cancellation in conformance with ITU-T G.165 and G.168.
- o) Encoding
- 1) The ONT shall support at least one or all of these audio CODEC algorithms as following.
    - ITU-T G.711 A/μ law.
    - ITU-T G.729.
  - 2) The ONT shall allow the operator to configure the audio CODEC preference order.
  - 3) The ONT shall allow the audio CODEC adjusted dynamically according to some factors such as network congestion status.
  - 4) The ONT shall allow the operator to configure the packetization period for each audio CODEC.
  - 5) The ONT shall manage asymmetrical communications as well from the CODEC point of view as from the number of frames per packet.
  - 6) The ONT shall support adaptive jitter buffer and static jitter buffer.
  - 7) The ONT shall support configurable audio gain for transmit and receive.
  - 8) The ONT shall be able to connect one or several terminals and to register one or several phone numbers.
  - 9) The ONT shall support one E.164 phone numbers per specific connected phone.
  - 10) The ONT shall support RTP/RTCP in conformance with IETF RFC3550.
  - 11) The ONT shall be in conformance with IETF RFC2833 for DTMF Digits, Telephony Tones and Telephony Signals.
  - 12) ***The ONT shall be controlled by the standby Soft Switch without service interruption in case the active Soft Switch becomes faulty.***
  - 13) The ONT shall support local digit mapping.
- p) Supported services:
- 1) The ONT shall support at least these Soft Switch-based voice services as following.
    - Caller ID (CLIP/CLIR).
    - Call Waiting ID (CLIP/CLIR).
    - Three Way Calling / Three Way Conferencing.
    - Call Forwarding / Call Transfer.
    - Repeat Dialing.
    - Call Hold.
    - Avoiding disturbing
  - 2) The ONT shall support G.711 modem transparent transmission
  - 3) The ONT shall support fax services (FoIP).
    - G.711 fax

- T.38 fax

q) **Quality of service**

The ONT shall provide the required QoS for each flow (in coordination with the QoS mechanisms at the OLT). There should be a scheduling/congestion avoidance function for each T-COUNT or Ethernet UNI.

**i) Upstream QoS**

- 1) The ONT shall be able to map the upstream traffic flow to the GEM port based on one or a combination of all these parameters at least as following.
  - VLAN-ID.
  - 802.1p priority
  - VLAN-ID and 802.1p priority.
  - IPTOS/DSCP
  - Ethernet Port
- 2) The ONT shall support four priority queues for each T-COUNT, and the scheduling mechanism can be SP or WRR.
- 3) The ONT shall support the CAR setting based on the GEM port, and mapping the GEM port to the priority queue of the T-COUNT based on 802.1p priority.
- 4) The ONT shall allow the operator to configure mapping the GEM port to the priority queue of the T-COUNT as an option.
- 5) For each priority queue, the tail-drop mechanism should be supported to avoid the congestion.

**ii) Downstream QoS**

- 1) The ONT shall support four priority queues for each Ethernet port, and the scheduling mechanism can be SP.
- 2) The ONT shall support mapping the downstream traffic flow to the priority queue of the Ethernet port based on 802.1p priority.
- 3) For each priority queue, the tail-drop mechanism should be supported to avoid the congestion.

**q) Security**

- 1) The ONT shall support TYPE B protection defined in G.984.x and the switchover time is less than *Is*.
- 2) The ONT shall support the Rogue ONT detection and to close the faulty optical port when receiving the command from the OLT.
- 3) The ONT shall support the AES encryption of downstream packets based on the GEM port.
- 4) The ONT shall support firewall to deny access requests from WAN side connections to LAN side devices.
- 5) The ONT shall support anti-DOS protection.

**r) Management Functions**

- 1) The ONT shall support alarms and performance monitoring defined in ITU Recommendation G.984.3.
- 2) The ONT shall comply with the applicable sections of ITU-T Recommendation G.984.4 and referenced documents. All applicable managed entities in Table 1/G.984.4 required to support the features and services outlined in this document should be supported.
- 3) The ONT shall be manageable locally and remotely, including software upgrading, configuration.

- 4) The ONT shall support dual software regions. When the active software fails, the ONT should support to switch into the backup software region to boost up.
- 5) All the configurations shall support Plug and Play. No extra work should be done manually.
- 6) The ONT shall support the real-time optical module monitoring from the EMS remotely.
- 7) The ONT shall support the real-time traffic rate statistics of PON port and UNI ports from the EMS remotely.

**s) Engineering specifications**

- 1) LED status indication should be supported for power, PON link status and UNI status.
- 2) The indoor ONT should support to be installed on the desk or be mounted on the wall.
- 3) The ONT shall be locally powered @ 90-240VAC (Auto-range) with 50/60Hz frequency.
- 4) The ONT can be equipped with maintenance-free backup battery that will operate the system in case of AC failure as an option.
- 5) The battery monitor function shall be supported
- 6) The ONT shall support the optical cover to avoid harm to people's eyes and prevent the dust from the optical fiber. The optical cover should be given in detail.

**13.6.30 GPON Multi-Dwelling Unit (MDU)**

**13.6.30.1** *GPON MDU, a medium capacity GPON ONT, will be used to provide data, voice, and video services to a commercial or Apartment building. Its upstream connectivity will be with the GPON OLTE through optical Fiber. The MDU shall provide two types of access ports- i) POTS and ii) Fast Ethernet. The bidder shall quote three types of MDUs - (i) 24 POTS+24 FE, (ii) 16 POTS+16 FE and (iii) 8 POTS + 8 FE. The quantities of different types of MDUs are mentioned in Annex-3.4B.*

**13.6.30.2** *For the connectivity of the POTS line to the subscriber premises, the bidder shall quote miniature MDF and all related materials for each of the MDU. The bidder shall have to install 5 MDUs (24POTS+24FE) and 5 MDUs (16POTS+16FE) at selected sites to be decided later on. The bidder shall also quote (per site basis) the related installation materials and services to complete the installation of 10 MDUs in the relevant Forms. The installation and jumpering of the remaining MDUs will be done by BTCL when required. The bidder shall quote the following items with each MDU.*

- i) *Vertical block for terminating the POTS subscribers cable pairs.*
- ii) *Five-point protector: 125% of the initial capacity of each MDU*
- iii) *VF Jumper cable: Length of jumper cable shall be 5 meter per MDU. Wire size shall be 0.4mm or higher.*
- iv) *VF Jumper Wire: The wire size shall be 0.6mm or higher. The bidder shall quote 5 meter wire/POTS subscriber.*
- v) *Necessary Cable Frame for GPON fiber cable and FE LAN cable.*

vi) *Installation box/pedestal to house the equipment, MDF, and Cable frame etc. which shall support WALL /Pole mounting mode for different situation.*

**13.6.30.3** *MDU will be installed in external-room environment and shall be capable to work in Bangladesh environment. The equipment shall run on AC power. AC power source will be provided by BTCL. The backup power arrangement will also be done by BTCL.*

**13.6.30.4** *MDU shall meet the ITU-T K-45 recommendation for line protection against lightning damage.*

**13.6.30.5** *The other technical specifications of MDU shall be similar to that of ONT as described in this chapter.*

:: End of Chapter ::

## Book 2 Chapter Fourteen

### Requirements of Ancillary Facilities

#### 14.1 Digital Distribution Frame (DDF)

The Bidder shall provide necessary termination facility (*Digital Distribution Frame*) for 75 ohms co-axial cable pairs. Each of the DDF shall have the following criteria and any deviation shall be treated as “Major Deviation”.

- a) Frame shall be housed in ETSI 19 inch standard racks or suitable size based on the required DDF Ports;
- b) The base-connectors (male/ female) on the frame-plate to be fixed by threaded nuts or by other mechanical means;
- c) Nominal Impedance of termination = 75 ohms on co-axial pair;
- d) Male / Female Connector for Cable-ends: one each for each cable;
- e) Type of connection on cable-end: Soldering including hard mechanical protection;
- f) Type of Cable connectivity: JIS 3C-2V or equivalent;
- g) The incoming cables from both switching and transmission side shall be connected on the back-side of the cable-end connectors by normal soldering, each of the connector shall be inserted on the back-side of the relevant base-connector and an U-links on front shall connect the switch-end to transmission-end;
- h) The U-link is to be provided with a monitoring point;
- i) Each DDF shall be fully-equipped with base & cable-end male/ female connectors and U-links for all of the available termination points;
- j) Grounding: Less than 2 ohms;
- k) The DDF shall preferably be located inside the equipment room. But it can also be shifted to any other convenient room on mutual agreement. The maximum distance between the TGW position and the DDF shall be considered as 140 meter.
- l) The supply, per site, shall include at least 145% of DDF termination facility required for that particular site.
- m) The co-axial cable which shall be used for DDF termination purpose shall not be very thin or thick and hence such kind of co-axial cables shall not be quoted. Co-axial cable having diameter between 2.C – 2.5C & with modularity 8/16/21 is recommended. The Co-axial cable shall be shielded with Mumetal. Deviation shall be treated as ‘**Critical Deviation**’.

#### 14.2 Co-axial Jumper Wire and Connectors

- i) The Bidder shall supply and install necessary indoor type co-axial cables & jumpers and related cable-tray, mechanical supports and connectors at both ends for: Inter-connection between his DDF and transmission DDFs of BTCL in the same premise.
- ii) The nominal impedance of the cable shall be 75 ohms, the cable characteristics must comply with relevant ITU-T recommendation and the cable type shall be of JIS 3C-2V or equivalent.
- iii) The co-axial cable which shall be used for DDF jumpering purpose shall not be very thin or thick and hence such kind of co-axial jumper cables shall not be quoted. Co-axial cable having diameter between 2.C – 2.5C & with modularity 1/8/16/21 is recommended. The Co-axial cable shall be shielded with Mumetal. Deviation shall be treated as ‘**Critical Deviation**’.

### 14.3 Optical Distribution Frame (ODF)

The Bidder shall provide necessary termination facility (*Optical Distribution Frame*) for terminating optical fibers **and connecting optical ports of the equipment at TGW and AGW sites**. Each of the ODF shall have the following criteria and any deviation shall be treated as “**Major Deviation**”.

- i) General features
  - a) Adopting the popular 19” rack or suitable size based on the required ODF Ports
  - b) Should have splicing and distribution module
  - c) Stable equipments for fixing, stripping and grounding of the optical fibers
  - d) Suitable for ribbon and non-ribbon optical fibers
  - e) Suitable for installation of FC, SC and ST adaptors
  - f) Optical fibers, fiber optic pigtails and jumpers are separate, without disturbing each other
  - g) Fiber optic cable management
- ii) Each of the ODF shall be properly grounded as per standard specification.
- iii) The supply, per site, shall include ODF termination facility at least double of the present equipped **Optical** ports.
- iv) The bidder shall terminate the equipped **Optical** to its installed ODF.

### 14.4 Pigtail

14.4.1 The Bidder shall quote following Pigtail with FC/PC connector at one end and no connector at other end. Requirement is shown in Annex 3.5.

- 1) 3 meter: as per schedule of requirements.
- 2) 5 meter: as per schedule of requirements.
- 3) 10 meter: as per schedule of requirements.
- 4) 30 meter: as per schedule of requirements.

14.4.2 The Bidder shall quote following pigtail with SC/PC connector at one end and no connector at other end. Requirement is shown in Annex 3.5.

- 1) 3 meter: as per schedule of requirements.
- 2) 5 meter: as per schedule of requirements.
- 3) 10 meter: as per schedule of requirements.
- 4) 30 meter: as per schedule of requirements.

### 14.5 Spare Patch Cord

14.5.1 The Bidder shall quote following Patch Cord with FC/PC connectors at both ends. Requirement is shown in Annex 3.5.

- 1) 3 meter: as per schedule of requirements.
- 2) 5 meter: as per schedule of requirements.
- 3) 10 meter: as per schedule of requirements.
- 4) 30 meter: as per schedule of requirements.
- 5) 50 meter: as per schedule of requirements.

14.5.2 The Bidder shall quote following Patch Cord with SC/PC connector at one end and FC/PC connector at another end. Requirement is shown in Annex 3.5.

- 1) 3 meter: as per schedule of requirements.
- 2) 10 meter: as per schedule of requirements.

**14.6** *The bidder shall quote the following tools and tester for operation and delivery of the service for each AGW site.*

- |   |                 |
|---|-----------------|
| <i>a) Head Gear Tone Tester</i>           | <i>- 3 sets</i> |
| <i>b) Step Type Aluminum Ladder (1 m)</i> | <i>- 1</i>      |
| <i>c) Step Type Aluminum Ladder (2 m)</i> | <i>- 1</i>      |
| <i>d) Punching Tools</i>                  | <i>- 5 sets</i> |
| <i>e) Jumper Scrapper</i>                 | <i>- 3 nos.</i> |

:: End of Chapter ::

Book 2  
**Chapter Fifteen**

**Requirements of Power System**

15.0 The Offer shall include necessary rectifiers and inverters. The details of such power plant facilities are listed below.

**15.1 Inverter**

The offer shall include necessary DC to AC inverter modules to provide AC power source to run at least the following hardware. The back-up batteries shall be used as the source power. The Bidder in his offer shall give a detail breakdown of AC power requirement (in VA) of the hardware listed below. The calculation for capacity requirement of the inverter shall be as follows:

15.1.1 Minimum Hardware to be powered by Inverter

i) At SB Nagar & Gulshan site:

- a) 12(Twelve) nos of Control Console
- b) 1(one) no of Console Printer
- c) 3(three) nos of Emergency Light.
- d) Network Management System and associated equipment (Printer, LCD Display etc.)

ii) At other five sites :

- a) 8(Eight) nos of Control Console
- b) 1(one) no of Console Printer
- c) 2(two) nos of Emergency Light.

15.1.2 Calculation for Inverter Requirement

Total AC Volt Ampere (VA) requirement for above hardware at busy-hour load=  $I_e$   
Reserve = 10 %

Total Required Capacity =  $1.10 \times I_e = I_r$  VA

Reserved Capacity for other systems = 100 VA

Total Required capacity =  $I_r + 100 = I_t$  VA

Capacity of each Inverter Module in VA =  $m_c$

Number of required modules =  $I_t / m_c = N$  (rounded up to the next integer value)

Number of required module =  $N + 1$ .

The Bidder shall give the above details of inverter dimensioning of each of the exchanges. Failure to give detail breakdown shall be treated as “**non-compliance**”.

The Inverters shall be electronic switch-mode type with automatic redundancy control functions. The control panel shall provide visual and audible alarm facilities and required alarm loops to the exchange OMM.

Each non-compliance shall be treated as “**major deviation**”.

15.1.3 Surge Arrestors for Seven sites

The bidder shall supply 2 (two) sets of Surge Arrestors and they will be connected on the input of the main AC commercial supply and the input of the system rectifier. The bidder shall make necessary survey to find out the exact requirements. The nominal characteristics of the surge arrestors are as follows:

Type: Compact and Sealed, 3-phase, 1 for each phase.  
Nominal working voltage: 230V AC (phase to neutral)  
Nominal current: 0.2A  
Breaking voltage: 1.3kV  
Breaking current: 1.5kA.

15.1.4 Each non-compliance shall be treated as “**major deviation**”.

## 15.2 Battery

a) The offer shall include necessary battery sets to be installed **at seven TGW (SS and NMS also)** sites to provide back-up DC power source to run the system during AC mains failure. The Bidder in his offer shall use the detail breakdown of its DC power requirement, as given by him in the bid offer. The required back-up time for Soft switch and Trunk Gateway sites shall be 8 Hrs. The number of sets shall be 2(two) for each site. The site-wise calculation for minimum capacity requirement of the battery shall be as follows:

- 1) Total DC Amps requirement of the system at busy-hour load =  $I_1$
- 2) Total DC Amps requirement for Inverters =  $I_2$
- 3) Total Exchange load =  $I_1 + I_2 = I_e$  in Amp
- 4) Total reserve DC Amps requirement (*for SS sites only*) = 800
- 5) Total reserve DC Amps requirement (*for TGW sites only*) = 500
- 6) Total DC Load (*for SS sites*) =  $I_e + 800 = I_{tm}$  in Amp
- 7) Total DC Load (*for TGW sites*) =  $I_e + 500 = I_{tr}$  in Amp
- 8) Allowable maximum discharge = 60 %
- 9) Total Required Back-up Capacity (*for TGW sites*) =  $8 \times I_{tr} = I_{br}$  in AH
- 10) Total required battery capacity (*for TGW site*) =  $I_{br} / 0.6 = I_{cr}$  in AH
- 11) Capacity of each Set of Battery (*for TGW site*) =  $m_{cr} = I_{cr} / 2$  in AH
- 12) Total required Back-up Capacity (*for SS site*) =  $8 \times I_{tm} = I_{bm}$  in AH
- 13) Total required battery capacity (*for SS site*) =  $I_{bm} / 0.6 = I_{cm}$  in AH
- 14) Capacity of each Set of Battery (*for SS site*) =  $m_{cm} = I_{cm} / 2$  in AH.

b) The Bidder shall give the above details of battery dimensioning for each Soft switch and each Trunk Gateway sites separately. Failure to give detail breakdown shall be treated as non-compliance and in such case BTCL shall draw its own conclusion.

c) The Batteries shall be sealed, dry-charged and maintenance-free. The abnormal fall in terminal voltage shall generate visual and audible alarm facilities and required alarm loops to the exchange OMM shall be connected. The minimum life-cycle of the batteries must be 1500 times full-discharge or at least 5(five) years, whichever is longer.

d) In order to protect the exchange equipment as well as the battery in case of dropping of the DC voltage below a certain level, the rectifier connection to the battery sets must be provided with a device for disconnecting the battery sets as soon as such levels arrive.

- e) Provisions must be available to detect the battery-voltage and other parameters from the exchange.
- f) All of the exposed parts of the terminals in each cell of the battery-sets will be provided with adequate oxidation-proof covers.
- g) Provisions shall be provided in the battery-room for an inter-locked exhaust-fan which will turn-on whenever any of the battery sets goes into boost-charge mode.
- h) Provisions shall be made for adequate acid-proof tiles in the places of battery mounting.
- i) The charging-current at 10hrs charging rate for the battery sets, as supplied shall be carried-over to calculation for rectifier requirement.
- j) The bidder shall have to supply 2.2V *per cell* battery.

Each non-compliance shall be treated as “**major deviation**”.

### 15.3 Rectifier

- a) The offer shall include necessary rectifier modules *at seven TGW (SS and NMS also)* to provide DC power source to run the system and to charge the back-up batteries. The Bidder in his offer shall give a detail breakdown of its DC power requirement and the charging current for the back-up batteries at 10 hrs charging rate. The site-wise calculation for capacity requirement of the rectifier set shall be as follows:
  - 1) Total DC Amps requirement of the system at busy-hour load =  $I_1$
  - 2) Total DC Amps requirement of the Inverters =  $I_2$
  - 3) Total Charging Amps for the quoted batteries at 10 hrs charging rate =  $I_3$
  - 4) Total Exchange load =  $I_1 + I_2 + I_3 = I_e$
  - 5) Reserve = 25 %
  - 6) Required Capacity =  $1.25 \times I_e = I_r$
  - 7) *(for SS sites only)* Reserved Capacity for other systems = 800 amps
  - 8) *(for SS sites only)* Total Required capacity =  $I_r + 800 = I_{tr}$  Amp
  - 9) *(for TGW sites only)* Reserved Capacity for other systems = 500 amps
  - 10) *(for TGW sites only)* Total Required capacity =  $I_r + 500 = I_{tr}$  Amp
  - 11) Capacity of each Rectifier Module =  $m_c$
  - 12) Number of required modules =  $I_{tr} / m_c = N_r$  *(rounded up to the next integer value)*
  - 13) Number of modules to be supplied =  $N_r + 1$
  - 14) Capacity of the Rectifier Racks =  $N_r + 4$ .
- b) The Bidder shall give the above details of rectifier dimensioning for each SS site and each TGW site separately. Failure to give detail breakdown shall be treated as non-compliance and in such case BTCL shall draw its own conclusion.
- c) The Rectifiers shall be electronic switch-mode type with automatic redundancy control and charging control functions. The control panel shall provide visual and audible alarm facilities and required alarm loops to the exchange OMM.
- d) Each of the rectifier shall be provided with circuit-breakers *(both in AC & DC side)* of adequate capacity and shall allow full isolation from the source and the load.
- e) The Rectifier Rack *(or Frame)* shall be provided with circuit-breakers *(both in AC & DC side)* of adequate capacity and shall allow full isolation from the source and the

load. If the all of the rectifiers are taken-out of service, provisions shall be there for automatic diversion of the load to battery.

- f) The rectifier rack shall contain one or more DC distribution panel consisting of circuit-breakers of 5A, 10A, 20A, 30A and 50A capacity. The number of such breakers shall be such that it will be at least 100% redundant from the quantity destined to be used for the present capacity of the switch in site.

Each non-compliance shall be treated as “**major deviation**”.

#### **15.4 Smoke and fire alarms equipment**

- 15.4.1 The Bidder shall provide the following smoke & fire detecting equipment in the every equipment room (*TGW, SS, NMS, Power, AGW*) for supplied equipment under this purchase. The alarm shall be audible and visible and is to be extended to the entrance of the room as well as in the main entrance of the equipment building. The alarm bells are to be triggered by the system emergency alarms and are to be operated by station no-break power source. The bell is to be placed in a place where it will be heard easily from the building security duty point. Any deviation shall be treated as “**major deviation**”.

- a. **Smoke detector**

Bidder shall provide brief description of the offered system.

- b. **Fire Fighter**

Bidder shall provide brief description of the offered facility

:: End of Chapter ::

Book 2  
**Chapter Sixteen**

**Criteria for Evaluation of Technical Bids**

- 16.1 Notwithstanding whatever is stated in other clauses of the tender documents, the criteria for evaluation of substantial responsiveness of the received *Technical* bids of this tender shall be according to clauses described in this chapter of the tender document. If any bidder refuses to agree to any clauses of this chapter, his bid shall automatically be considered as “**substantially non responsive**”. *In this chapter Bid(s) shall mean “Technical Bid(s)”*.
- 16.2 However, relevant clause(s) stated elsewhere in this document shall also be applicable if such clause(s) do(es) not contradict any or many clause(s) of this chapter.
- 16.3 The TEC will first evaluate/examine the contents of all “Mandatory Documents” of each Bid.**
- 16.4 Bidder who will not give any or many of the required documents as mentioned in “Mandatory Documents”, the TEC shall consider that bid to be “not eligible” and reject the concerned bid.**
- 16.5 TEC shall *further* evaluate only the bids of the Bidders whose bids will be found “**Eligible**”.
- 16.6 During evaluation, TEC shall consider bidders’ compliances to various clauses and sub-clauses of this tender; but shall have the authority to conclude its own decision about such compliances.
- 16.7 If the bidder does not give any statement to its compliance to any of the tender clauses or sub-clauses, its’ compliance to that clause/ sub-clause (as applicable) shall be treated as “**non compliance**” to that particular clause/ sub-clause.
- 16.8 If the bidder puts any condition to his compliance to any of the tender clauses and/ or sub-clauses, its’ compliance shall be treated as “**non compliance**” to that particular clause and/ or sub-clause.
- 16.9 If the bidder does not give any statement to its compliance to any of the tender clauses or sub-clauses or drops any clause or sub-clause in the “**Schedule of Compliance**”, its’ compliance to that clause/ sub-clause (*as applicable*) shall be treated as “**not complied**” to that particular clause/ sub-clause.
- 16.10 TEC shall also consider the contents of various attached documents. If any content of the attached documents contradicts the compliance statement of the bidder to any of the clauses and/ or sub-clauses, the bid shall be treated as “**non compliance**” to that particular clause and/ or sub-clause. In all of such cases, BTCL’s decision shall be final.
- 16.11 If, in answer to any query by TEC, the bidder provides any or many clarifications to its bid, TEC shall consider those clarifications. However, if such clarifications contradict the relevant statements given in his original offer, the clarification(s) shall be disregarded.
- 16.12 During evaluation process, if the Bidder proposes to change the equipment model, to supply shortfall quantities, and to supply the proper size/capacity/configuration item

without additional cost, to overcome the deviation in the submitted bid that proposal shall not exempt the bid from the penalty points to be earned for the deviations as per relevant clauses.

- 16.13 The following deviations of any offer will be treated as “**minor deviation**” of the bid:
- 16.13.1 Any deviation which has already been termed as “**minor deviation**” in this tender document.
- 16.13.2 The non-compliant of any clause/sub clause of this tender document having no weight as minor deviation or major deviation or change of substance or critical deviation shall be considered as minor deviation.
- 16.13.3 Every item of “minor deviation” shall earn a score of **1(one)** “**penalty point**”.
- 16.14 The following deviations of any offer will be treated as “**major deviation**” of the bid:
- 16.14.1 Any deviation which has already been termed as “**major deviation**” in this tender document.
- 16.14.2 If the bid BoQ has any shortage of quantity in any of the required hardware and/or software (for each of such short quoted item) unless otherwise specified in the tender.
- 16.14.3 Any item of “**major deviation**” shall earn a score of **5(five)** “**penalty points**”.
- 16.15 The following deviations of any offer will be treated as “**Critical Deviation**” of the bid :
- 16.15.1 Any deviation which has already been termed as “critical deviation” in this tender document.
- 16.15.2 If the Bidder has changed either the language or format of any of the different forms attached with this document.
- 16.15.3 Any item of “**Critical Deviation**” shall earn a score of **40 (forty)** “penalty points”.
- 16.16 The following deviations of any offer will be treated as “**change of substance**” of the bid:
- 16.16.1 Any deviation which has already been termed as “**change of substance**” in this tender document.
- 16.16.2 If the bidder refuses to provide answers to any requested clarification(s).
- 16.16.3 If any Certificate or any other document attached as part of the bid is found to be false or unauthentic.
- 16.16.4 If, for any Bidder, the bid does not contain all the prescribed forms, duly filled up but without price.
- 16.16.5 A bid containing any item of “**change of substance**” shall be treated as “**substantially non responsive**”.
- 16.17 The penalty points earned by each bid will be added to get total penalty points. If the bid of any bidder earns more than 79 (Seventy Nine) penalty points in Total, the bid shall be treated as “**substantially non responsive**”.

- 16.18 BTCL’s decision to treat any bid as “**substantially non responsive**” shall be final.
- 16.19 A bid, not treated by BTCL as “**substantially non responsive**”, shall automatically be considered as “**responsive**”. The financial envelope of the responsive bids shall be opened and process for evaluating financially shall begin.
- 16.20 The bid(s) treated as “**substantially non responsive**” shall not be considered for further evaluation.
- 16.21 The “Financial Offer” of the “Substantially Non-Responsive” bid will be returned unopened to the bidder.**
- 16.22 The “Financial Offer” of the Substantial Responsive bids shall be opened on a pre-notified date and time in the presence of the bidders or their representatives who wish to attend.**
- 16.23 Quality and Cost Based Evaluation (QCBE) method will be followed for the selection of the successful bidder. The Technical point of the “Substantially Responsive” bid will be evaluated as below for combining with financial evaluation.**
- 16.24 Criteria for calculation of Technical Evaluation Score of Evaluation:

Evaluation Criteria		Score	Description & Point			
A. Similar Project Experiences	Project experiences of NGN network in domestic and overseas countries	10	I. Number of project experience of NGN based commercial network delivering Class V services in <b>overseas countries</b> within the latest 5 years			
			≥ 9	6-8	3-5	1-2
			4	3	2	1
			II. Number of Project experiences of NGN based commercial network delivering Class V services in domestic countries within the latest 5 years			
			≥ 6	3-5	1-2	
			3	2	1	
			IV. Number of commercial systems running satisfactorily for more than 2 years			
			≥ 8	6-7	4-5	
Sub Total		10				
B. Number of turn-key works bidder has completed or is working to complete in BTCL/BTTB within last 12(twelve) years	Number of Turn-key works	3	Number of Project/Works/Contract Rewarded			
			≥ 5	3-4	<3	
			3	2	1	
	PAC issuance	3	% of number of project completed (last PAC issued)			
			100%	60%-99%	25%-59%	
			3	2	1	

	FAC issuance	2	% of FAC issued			
			76%-100%	50%-75%	<50%	
			2	1	0	
Sub Total		8				
C. Supply record of major equipment based on Customer's Satisfactory Working Record	Manufacturer's supply record based on the quantity of equipment installed in the telecom networks in the bidder's and/or overseas countries					
	Soft Switch	3	>12	9-12	4-8	0-3
			3	2	1	0
	Media Gateway	2	>30	11-30	0-10	
			2	1	0	
	Access Gateway	2	>150	51-150	0-50	
			2	1	0	
Sub Total		7				
<i>Total</i>		25				
Conformity of the Offered Equipment	75	Penalty points earned shall be converted into Score according to the following formula				
		Score=75*(100-Penalty Points of the responsive bid)/100				
Total	75					
Grand Total (Technical Score)	100					

16.25 The Technical Score of each responsive bid will then be converted into a Technical Factor according to the following formula, which will be applied on the quoted price for selecting successful bidder.

$$\text{Technical Factor (T}_f\text{)} = 1 + \{0.5 * (\text{T}_{\text{high}} - \text{T}_n) / 100\}$$

$\text{T}_{\text{high}}$  = The highest Technical Score

$\text{T}_n$  = Technical Score earned by the bidder (where n=bidder name)

:: End of Chapter ::

Book 2  
**Chapter Seventeen**

**Criteria for Evaluation of Financial Bids and Selection of Successful Bidder**

- 17.1 *The TEC shall evaluate the “Financial Offers” of only those bidders whose technical offer will be found “Substantially Responsive”. The criteria of becoming “Substantially Responsive” of the technical bid have been defined in the previous chapter.*
- 17.2 Notwithstanding whatever is stated in other clauses of the tender documents, the criteria for Evaluation of the Financial Offer of the Technically Responsive bids and Selection of Successful Bidder of this tender shall be according to clauses described in this chapter of the tender document. If any bidder refuses to agree to any clauses of this chapter, his bid shall automatically be considered as “**substantially non responsive**”.
- 17.3 The Tender Evaluation Committee shall consider all of the forms of BOQ submitted with the “Financial Offer”. If there is any discrepancy between the contents of a form submitted with the “Technical Offer” and the contents of the corresponding form submitted with the “Financial Offer”, the offer shall be treated be as “**Financially Non-responsive**”.
- 17.4 If any condition is set forth by the bidder in the financial offer, the bid shall be treated as “**Financially Non-responsive**”.
- 17.5 If, for any Bidder, the “Financial Offer” does not contain all the prescribed Forms, duly filled up, the bid shall be considered as “**Financially Non-responsive**”.
- 17.6 If the Bidder wishes to give any discount, it shall be given after the “Total Price” of the bid either as a lump sum or as a percentage. If any irregular discount is offered, the bid shall be treated as “**Financially Non-responsive**”. Any discount shown in the financial offer, shall proportionately apply on unit prices of all items of goods and services, i.e. unit prices of all items shall be proportionately discounted for every purpose including evaluation of Bids, signing of contract and placement of future order.
- 17.7 The total price quoted by the bidder in his bid i.e., “**The Quoted Total Price**” shall not be the criteria for selection of the “**Successful Bidder**”.
- 17.8 All of the “**Financially Responsive**” bids will be further evaluated to find the actual bid price. The process of calculation of the “**Actual Bid Price**” shall be in accordance with the clauses described in this chapter.
- 17.9 TEC shall evaluate the contents of all of the Prescribed Forms submitted with the bid.
- 17.10 During such evaluation, the unit prices and discount (if any) quoted by the bidder shall be considered as final. Change of prices during evaluation stages shall not be allowed.
- 17.11 There shall be full conformity between the summary or total prices and their related breakups of unit prices. If any discrepancy is found, the relevant unit price shall be considered as a reference price for evaluation purpose.
- 17.12 The bidder shall quote for all items which is necessary for completion of all scopes of works described in this tender. No subsequent addition of any new item(s) in the BoQ

will be allowed with new price during BoQ finalization.

- 17.13 TEC shall correct purely arithmetic errors (both in quantity and calculated total price excluding unit price) that are identified during the evaluation of tenders. TEC shall give prompt notice of any such correction to the respective bidder. If bidder does not accept such correction as arithmetic error, it will be considered as change of substance.
- 17.14 The Bidder shall not quote different unit price for same equipment/card/spare/accessory in different forms. If Bidder quote different unit price for same equipment/card/spare/accessory in different forms, the lowest unit price of respective equipment/card/spare/accessory shall be considered for evaluation considering arithmetic correction. It shall be understood that such lowest price shall remain same for the contract and for any subsequent expansion up to the final capacity of the system.
- 17.15 *If any responsive bidder quotes the price of a particular product/material in BDT and the quoted amount is more than 10 (ten) million, then for evaluation purpose, the prevailing CD-VAT and other related applicable cost for that particular product/material shall be added to the price quoted by other responsive bidder in FOB USD.***
- 17.16 There shall not be any inconsistency between unit price and corresponding total price of any item in the BoQ Forms. That means the Bidder is not allowed to quote unit or total price for any goods and services as “free” or “zero” or “FOC” (**Free of Charge**) to scale-down the quoted price. Deviation for each item shall be treated as “**Critical Deviation.**”
- 17.17 The Bidder shall be responsible for turn-key implementation of the project and during execution of the contract if any shortfall of quantity of any item is detected; it shall be considered that the Contractor will supply required quantities of respective item without any additional charges to BTCL under this purchase and BTCL will not provide any CD VAT or any other duties for such type of goods.
- 17.18 For each of the “**responsive**” bids, the TEC shall examine the total quoted price of each of the responsive bids and determine actual total bid price after necessary correction (if any) as stated in this chapter. This price will be termed as “**Actual Bid Price (P<sub>Bid</sub>)**”.
- 17.19 After determining the actual Bid Price “**P<sub>Bid</sub>**” of each of the responsive Bids, the TEC will find out the evaluated total bid price, **P<sub>Ev</sub>** [up to two digits after decimal point] for each of the responsive bids by using the formula as stated below.

$$P_{Ev} = \text{Technical Factor (T}_f\text{)} * P_{Bid}$$

- 17.20 For determination of the successful Bidder, the TEC will list and arrange the responsive Bids with their respective evaluated total Bid prices **P<sub>Ev</sub>** in ascending order (i.e, lowest evaluated price at the top of the list and the highest evaluated price at the bottom of the list). The TEC will also include the total bid prices “**P<sub>Bid</sub>**” in the same list accordingly.
- 17.21 The Bidder of the responsive Bids with the lowest evaluated bid price (**P<sub>Ev</sub>**) will be the “**Successful Bidder**” for this bidding process. If the Bidder of 1<sup>st</sup> lowest evaluated Bid price (**P<sub>Ev</sub>**) fails to be awarded of the contract then the Bidder of the next higher evaluated Bid price (**P<sub>Ev</sub>**) will be the “**Successful Bidder**” and so on. Contract will be signed with the successful bidder on the basis of the Total Bid price “**P<sub>Bid</sub>**”, not on the basis of the Evaluated total Bid price **P<sub>Ev</sub>**.
- 17.22 BTCL reserves the right to accept any Bid, to annul the Bidding process, or to reject any or all Bids, at any time prior to contract award, without thereby incurring any liability to

the affected Bidders, or any obligation to inform Bidders of the grounds for BTCL's actions.

- 17.23 After the opening of Bids, information relating to the examination, clarification, and evaluation of Bids and recommendations for award shall not be disclosed to Bidders or other persons not officially concerned with the evaluation process until after the award of the Contract is announced.

:: End of Chapter ::

## Annex-1

### Format for Maintenance Support during Guarantee Period

The Contractor, at his own cost to be quoted during the bid, shall provide the following maintenance supports during the whole Warranty/ Guarantee Period of the Contract:

1. The supports shall start from the date of cutover into commercial service of the first equipment/ system purchased under this contract.
2. The period of the service shall continue for **3 (three) calendar years** from “**the date of effect**” of the last Provisional Acceptance Certificate (PAC) of the contract.
3. For providing this service, the contractor shall start an office in Dhaka, within 10 (ten) days of putting the first equipment in to commercial service.
4. The office must be equipped with necessary logistics support.
5. The service shall cover full trouble-shooting and corrective maintenance support for all equipment and sites covered by this purchase.
6. The manpower shall be dedicated for this service only and shall not be part of any other implementation, installation and commissioning team of the Contractor, but shall be a completely separate team of people dedicated for this purpose only.
7. All personnel of that team must have proper training and must have prior experience in Trouble-shooting, Operation and Maintenance of the relevant systems.
8. The typical type and experience, minimum number and the locations of the required personnel shall be as follows :
  - a. 1 (one) foreign Expert, having at least 3 (three) years experience in providing O&M support to customers, to be stationed in Dhaka and to act as the Chief of the Maintenance support team.
  - b. 2 (two) foreign/ local personnel, 1 each for Hardware and Software, having at least 2 (two) years experience in relevant equipment, to be stationed in Dhaka.
  - c. All the personnel of the team must speak fluent English and/ or Bangla.
9. The Contractor shall submit the detail bio-data of all the personnel of the team to BTCL at least 15 (fifteen) days before intended start of the services and obtain necessary approval of personnel. The Contractor shall submit the contact details of the approved personnel including mobile and fixed telephone numbers, email addresses and escalation hierarchy in terms of number of hours.
10. The contractor shall be responsible for all types of expenditure to be borne for these manpower, including office, overhead, all modes of transportation etc.
11. The services to be provided (but not limited to) shall be :
  - a. Equipping and maintaining an updated inventory of spares and accessories in Dhaka at a premise mutually agreed upon with BTCL. The inventory, at all time, shall include at least 1 (one) unit of replace spares/ cards/ modules.
  - b. Replacement of faulty cards/ modules/ equipment/ system within the specified time period.
  - c. Regular and required replenishment & updating of the spare & accessories inventory.

- d. Periodic and Regular checks on the performance of the systems to ensure that they are running in good condition and are not susceptible to any major fault.
  - e. Transfer of technology to BTCL's personnel to enable them to become self-sufficient in fault finding and fault removal.
  - f. Short on-the-job training to BTCL's personnel as and where and when necessary.
  - g. Trouble-shoot and debug any faults occurring in the equipment/ system within the time-period specified in the contract.
  - h. Identify the faulty elements in installation of the system and take actions for rectification.
  - i. Assist BTCL's personnel in subsequent re-installation, re-location of different network elements and other minor works, whenever and wherever desired by BTCL.
  - j. Accompany and assist BTCL's personnel in network performance tests.
  - k. Assist BTCL's personnel in identifying the Key Performance Indicators of the system and take corrective actions for network optimization.
  - l. Help and advice BTCL personnel to properly maintain O&M & CDR data bases and Management of CDRs.
  - m. Regularly inform BTCL of all types of Software and Hardware upgrades of the equipment/ system and suggest actions to be taken by BTCL.
12. The format of the support services to be given by the contractor shall be as follows :
- a. Chief of the Maintenance support team shall regularly visit the relevant system sites and carry out regular health-checks of the systems.
  - b. On occurrence and/ or detection of any fault to any or many system/ equipment supplied to BTCL's network, under the contract the representative(s) of the first party shall inform the representative(s) of the second party, over telephone, of such fault.
  - c. All such reports will be logged by both parties, mentioning the time of such reports.
  - d. The personnel of the second party, on being informed by the first party, will attend to any fault of any or many equipment at any or many sites. Normally, the second party will send its technical personnel to site within 02 (two) hours after reporting of the fault. If the fault is reported after 20:00 Hrs or on weekly holidays, the response time can be extended up to 04 (four) hours. On abnormal cases and for occurrences in long holidays, the maximum allowable response time period shall be 12 (twelve) hours from the time of report of fault by the first party.
13. The procedures for removal of faults shall be as follows :
- a. If the fault is of minor nature and has not caused any stoppage of service by the relevant equipment, the second party will rectify the fault within 12 (twelve) hours from the time of reporting of the fault.
  - b. If the fault has caused stoppage of service by the relevant equipment, the second party shall change the faulty unit from its reserve stock and take away the faulty unit for subsequent repair. Such replacement will be done within 4 (four) hours from the reporting of the fault.
  - c. For any delay beyond 12 hours, the first party shall preserve the right to impose financial penalty on the second party. Such penalty shall be as per discretion of the first party.
  - d. If such delays become regular phenomenon, the first party shall have the right to terminate the contract and impose financial penalty on the second party as per discretion of the first party.
14. The second party shall bear all costs related to such services, including costs for spares & accessories, personnel, transportation, equipment and logistics. However, BTCL may offer spaces to house the relevant inventory & personnel.
15. The second party shall provide its personnel with mobile telephone facilities.

## Annex-2

### Format for Annual Maintenance Support after Guarantee Period

The Contractor, at his own cost to be quoted during the bid, shall provide the following maintenance supports after expiry of the Warranty/ Guarantee Period of the Contract:

- 1) The details of the support services shall be agreed upon between the contractor and BTCL before expiry of the Warranty/ Performance Guarantee period of the contract.
- 2) The minimum period of the services shall be for 1 (one) year and shall be renewable on per year basis for next 5 (five) years. The unit prices and other terms and conditions of the services shall be fixed on mutual agreement between the contractor and BTCL but the maximum price per year will not exceed the quoted yearly service charge.
- 3) The support services shall start from the next day of the date of expiry of the performance guarantee period of the contract.
- 4) For providing this service, the contractor shall dedicate a liaison personnel and an office in Dhaka, at least 15 (fifteen) days before expiry of the Warranty Period of the contract.
- 5) The liaison office and personnel must have mobile telephone number(s). The liaison personnel must have at least 3 (three) years experience in O&M of similar systems and fluent in English and/ or Bangla.
- 6) The service shall cover full on-demand trouble-shooting, debugging and other corrective maintenance support for all equipment and sites covered by this purchase.
- 7) The service shall include 24 hrs per day x 7 days per week x 52 weeks per year **“Phone-in support desk”** service to be located in Dhaka.
- 8) The service shall also include **“On Demand”** and **“As and when necessary”** on-site personnel support (local and/ or expatriate, as the requirement may be) to provide trouble-shooting, debugging and other corrective maintenance services.
- 9) All personnel of the phone-in support desk must have proper training and must have prior experience in Trouble-shooting, De-bugging, Operation and Maintenance of the relevant systems.
- 10) The language of contact shall be either English and/ or Bangla.
- 11) The services to be provided shall also include (but not limited to) :
  - a. Equipping and maintaining an inventory of emergency spares and accessories in Dhaka at a premise mutually agreed upon with BTCL. The inventory, at all time, shall include at least 1 (one) unit of replace spares/ cards/ modules.
  - b. Replacement of faulty cards/ modules/ equipment/ system within the specified time period.
  - c. Regular and required replenishment & updating of the spare & accessories inventory.
  - d. Transfer of technology to BTCL’s personnel to enable them to become self-sufficient in fault finding and fault removal.
  - e. Short on-the-job training to BTCL’s personnel as and where and when necessary.
  - f. Trouble-shoot and debug any faults occurring in the equipment/ system within the time-period specified in the contract.

- g. Assist BTCL's personnel in subsequent re-installation, re-location of different network elements and other minor works, whenever and wherever desired by BTCL.
  - h. Regularly inform BTCL of all types of Software and Hardware upgrades of the equipment/ system and suggest actions to be taken by BTCL.
  - i. Assist BTCL's personnel in planning expansion activities.
  - j. Guarantee the flow and availability of all spare parts and units without major design changes for at least 5 (five) years from the issuance of Final Acceptance Certificate (FAC).
  - k. Guarantee the flow and availability of all equipment, materials and services required for any subsequent expansion of the offered equipment for at least 5 (five) years from the issuance of Final Acceptance Certificate (FAC).
  - l. Guarantee that, if there is any major design change or stoppage of production (of spares and/ or equipment needed for expansion), the contractor will bear all the costs related to provision of alternate solutions.
- 12) The format of the support services to be delivered to BTCL (first party) by the contractor (second party) shall be as follows :
- i) On occurrence of any fault to any or many system/ equipment supplied to BTCL's network under the contract, the representative(s) of the first party shall inform the liaison office/ personnel of the second party, over telephone, of such fault.
  - ii) All such reports will be logged by both parties, mentioning the time of such reports.
  - iii) The personnel of the contractor, on being informed by BTCL, will log the problem/ fault with the "Phone-in Support Desk" service and inform the concerned personnel of BTCL of the relevant registration details. However, the support desk shall be advised to also log fault report(s) informed directly by the concerned personnel of BTCL.
  - iv) If the relevant fault can not be removed by assistance from the phone-in desk, the first party will inform the liaison personnel over telephone of such non-removal of fault. In such cases, the second party shall arrange to attend to the fault by sending its technical personnel to site within 02 (two) hours after reporting of the non-removal of the fault. If the fault is reported after 20:00 Hrs or during holidays, the response time can be extended up to 04 (four) hours. In abnormal cases and for occurrences in long holidays, the maximum allowable response time period shall be 12 (twelve) hours from the time of report of fault by the first party.
  - v) If the fault can not be removed by the assistance of contractor's local office, the contractor shall arrange necessary expert personnel within the time period specified in the contract.
  - vi) If the fault removal involves changing of spares/ cards/ modules, such changes will be made from the local inventory within 4 (four) hours of detection of such requirement.
  - vii) The fault removal deadline shall be as follows :
    - a) If the fault is of minor nature and has not caused any stoppage of service by the relevant equipment, the second party will rectify the fault within 12 (twelve) hours from the time of reporting of the fault.
    - b) If the fault has caused stoppage of service by the relevant equipment, the second party shall arrange to change the faulty unit from its reserve stock and take away the faulty unit for subsequent repair. Such replacement will be done within 4 (four) hours from the reporting of the fault.
    - c) If the removal of fault involves assistance of expert personnel, such

- personnel shall be made available *within 7 (seven) days of detection of such requirement.*
- d) If the removal of fault involves import of any additional spares/ cards/ modules, the contractor shall fulfill all requirements at its own costs and make the relevant item(s) available in site within 15 (fifteen) days of detection of such requirement.
  - viii) For cases where removal of fault involves phone-in and/ or local efforts only, for any delay in beyond 12 hours, the first party shall preserve the right to impose financial penalty on the second party. Such penalty shall be as per discretion of the first party.
  - ix) For cases where removal of fault involves expert personnel, for any delay in beyond 15 days, the first party shall preserve the right to impose financial penalty on the contractor. Such penalty shall be as per discretion of BTCL.
  - x) If such delays become regular phenomenon, the first party shall have the right to terminate the contract and impose financial penalty on the contractor as per discretion of BTCL.
- 14) The contractor shall bear all costs related to such services, including costs for spares & accessories, personnel, transportation, equipment and logistics.

### Annex-3.1

#### Capacity Requirements of the Soft switch

	Items	Unit	Required	Bidder's Offer
<b>A.</b>	<b>Soft Switch</b>			
1	Minimum Busy Hour Call Attempt (BHCA)	Million unit	4.0	
2	<b><i>Minimum Trunk Handling Capacity</i></b>	<b><i>Number</i></b>	<b><i>50,000</i></b>	
3	Minimum Gateway Handling Capacity	Number	30	
4	<b><i>Minimum Number of FE / GE Port</i></b>	<b><i>Number</i></b>	<b><i>2+2</i></b>	

Note: The bidder shall quote the price escalation formula for increasing BHCA capacity with increment of 1 million BHCA (other criteria remaining the same) so that BTCL can finalize the BHCA capacity during preparation of BoQ. The non-quotation shall be treated as “**Critical Deviation**”.

## Annex-3.2

### Capacity Requirements of the Trunk Gateway (TGW)

#### Trunk Gateways Present Equipped Capabilities

Sl.	Items	Unit	Required	Bidder's Offer
<b>A</b>	<b>Trunk Capabilities</b>			
<b>Shere Bangla Nagar Site</b>				
1	Number of equipped E1	Number	174	
2	STM-1 Trunk (optical Interface)	Number	4	
3	Minimum Number of Gigabit port	Number	4	
4	Minimum number of CCS7 Sig. Terminal	Number	34	

<b>Gulshan Site</b>				
<b>A</b>	<b>Trunk Capabilities</b>			
<b>1</b>	<b>Number of equipped E1</b>	<b>Number</b>	<b>210</b>	
2	STM-1 Trunk (optical Interface)	Number	1	
3	Minimum Number of Gigabit port	Number	4	
<b>4</b>	<b>Minimum number of CCS7 Sig. Terminal</b>	<b>Number</b>	<b>46</b>	

<b>Ramna Site</b>				
<b>A</b>	<b>Trunk Capabilities</b>			
1	Number of equipped E1	Number	226	
2	STM-1 Trunk (optical Interface)	Number	1	
3	Minimum Number of Gigabit port	Number	4	
4	Minimum number of CCS7 Sig. Terminal	Number	38	

<b>Mogbazar Site</b>				
<b>A</b>	<b>Trunk Capabilities</b>			
1	Number of equipped E1	Number	90	
2	STM-1 Trunk (optical Interface)	Number	2	
3	Minimum Number of Gigabit port	Number	4GE+2FE	
4	Minimum number of CCS7 Sig. Terminal	Number	20	

<b>Mirpur Site</b>				
<b>A</b>	<b>Trunk Capabilities</b>			
1	Number of equipped E1	Number	32	
2	STM-1 Trunk (optical Interface)	Number		
3	Minimum Number of Gigabit port	Number	4	
4	Minimum number of CCS7 Sig. Terminal	Number	6	

<b>Nilkhet Site</b>				
<b>A</b>	<b>Trunk Capabilities</b>			
1	Number of equipped E1	Number	40	
2	STM-1 Trunk (optical Interface)	Number		
3	Minimum Number of Gigabit port	Number	4	
4	Minimum number of CCS7 Sig. Terminal	Number	6	

Uttara Site				
A	Trunk Capabilities			
1	Number of equipped E1	Number	30	
2	STM-1 Trunk (optical Interface)	Number		
3	Minimum Number of Gigabit port	Number	4	
4	Minimum number of CCS7 Sig. Terminal	Number	6	

The Bidder has to mention the present & final Processing capabilities for required configuration of the offered Equipment for all above mentioned sites

### Annex 3.3

#### Capacity Requirements of the Access Gateway (AGW)

SN	Description of items	Unit	Quantity	Downlink ports Configuration/AGW	
				POTS	ADSL2+
1	AGW type-1	Set	45	1200	240
2	AGW type-2	Set	60	1000	200
3	AGW type-3	Set	50	900	180
4	AGW type-4	Set	15	500	100
5	AGW type-5 ( <i>Outdoor</i> )	Set	18	250	50

### Annex 3.4A

#### CAPACITY REQUIREMENTS OF THE GPON OLTE AND SPLITTER

Name of Sites	GPON OLTE Uplink Requirement				Downlink GPON port requirement	Site-wise splitter requirement						# of FTTB
	10G port	GE port	STM1 port	E1 port	GPON port	1:2	1:4	1:8	1:16	1:32	1:64	
<i>Gulshan</i>	2	2+2	1	24	8		4	16	4			192
<i>Sher-e-Bangla Nagar</i>	4	2+2		16	8					8		256
<i>Mirpur</i>	2	2+2		16	8						8	512
<i>Nilkhet</i>	2	2+2		16	8	8				16		512
<i>Moghbazar</i>		2+2		16	8						8	512
<i>Ramna</i>	4	2+2	1	16	8					8		256
<i>Uttara</i>	2	2+2		16	8						8	512
<b>Total</b>	<b>16</b>		<b>2</b>	<b>120</b>	<b>56</b>	<b>8</b>	<b>4</b>	<b>16</b>	<b>4</b>	<b>32</b>	<b>24</b>	<b>2752</b>

### Annex 3.4B

#### CAPACITY REQUIREMENTS OF MDU/ONT/SBU WITH DIFFERENT DOWNLINK PORTS

Site Name	MDU			ONT (with ATB)		SBU	Total POTS	TOTAL FE
	24POTS +24FE	16POTS +16FE	8POTS +8FE	2POTS +4FE	4POTS +4FE	8POTS+ 4FE+ 8E1		
<i>Gulshan</i>	60	55	15	4	6	3	2486	2482
<i>Sher-e-Bangla Nagar</i>	80	70	20	5	8	2	3261	3263
<i>Mirpur</i>	160	140	40	10	15	2	6498	6510
<i>Nilkhet</i>	160	140	40	10	15	2	6498	6510
<i>Moghbazar</i>	160	140	40	10	15	2	6498	6510
<i>Ramna</i>	80	70	20	5	8	2	3261	3263
<i>Uttara</i>	160	140	40	10	15	2	6498	6510
<b>Total</b>	<b>860</b>	<b>755</b>	<b>216</b>	<b>55</b>	<b>83</b>	<b>15</b>	<b>34,999</b>	<b>35,049</b>

### Annex 3.4C

#### CAPACITY REQUIREMENTS OF THE OPTICAL FIBER, HDPE DUCT, JOINT CLOSURE, TERMINATION BOX, PIGTAIL AND PATCH CORD

SN	Description of items	Unit	Quantity
1	24 core optical fiber cable	KM	250
2	48 core optical fiber cable	KM	140
3	96 core optical fiber cable	KM	60
4	HDPE duct	KM	397
5	Joint Closure normal	number	145
6	Joint Closure T type	number	50
7	Termination Box/ODF	number	207
8	Pigtail 3 meter length	number	4476
	Pigtail 5 meter length	number	3000
	Pigtail 10 meter length	number	1000
	Pigtail 30 meter length	number	500
8	Patch cord 3 meter length	number	720
	Patch cord 5 meter length	number	600
	Patch cord 10 meter length	number	400
	Patch cord 30 meter length	number	100
	Patch cord 50 meter length	number	50

### Annex 3.5A

#### CAPACITY REQUIREMENTS OF EACH LAN SWITCH (TYPE-1) AT SB NAGAR AND RAMNA TGW SITES

SN	Description of items	Unit	Quantity	Configuration
1	Chassis	Set	1	
2	Control and Switch Module	Piece	2	1+1 redundant mode
3	DC power supply	Piece	2	1+1 redundant mode
4	<i>GE optical interface (with 80% LX &amp; 20% SX SFP module)</i>	<i>Port</i>	<i>120</i>	<i>60+60 redundant mode in two different module</i>
5	<i>10/100/1000TX Interface</i>	<i>Port</i>	<i>24</i>	<i>12+12 redundant mode in two different module</i>
	<i>10G Optical with SX module</i>	<i>port</i>	<i>4</i>	<i>2+2 redundant mode in two different module</i>
6	System Software	Set	1	

### Annex 3.5B

#### CAPACITY REQUIREMENTS OF THE LAN SWITCH (TYPE-2) AT EACH OTHER TGW SITES

Serial	Description of items	Unit	Quantity	Configuration
1	Chassis	Set	1	
2	Control and Switch Module	Piece	2	1+1 redundant mode
3	DC power supply	Piece	2	1+1 redundant mode
4	<i>GE optical interface (with 75% LX &amp; 25% SX SFP module)</i>	<i>Port</i>	<i>96</i>	<i>48+48 redundant mode in two different module</i>
5	<i>10/100/1000TX Interface</i>	<i>Port</i>	<i>24</i>	<i>12+12 redundant mode in two different module</i>
6	<i>10G optical Interface</i>	<i>Port</i>	<i>2</i>	<i>1+1 redundant mode in two different module</i>
7	System Software	Set	1	

### Annex 3.5C

#### CAPACITY REQUIREMENTS OF THE LAN SWITCH (TYPE-3) AT EACH AGW SITE (TOTAL 105 SITES)

Serial	Description of items	Unit	Quantity	Configuration
<i>1</i>	<i>Chassis</i>	<i>Set</i>	<i>1</i>	
<i>2</i>	<i>Control and Switch Module</i>	<i>Piece</i>	<i>2</i>	<i>1+1 redundant mode</i>
<i>3</i>	<i>Power supply</i>	<i>Piece</i>	<i>2</i>	<i>1+1 redundant mode</i>
<i>4</i>	<i>GE optical interface (with 75% LX &amp; 25% SX SFP module)</i>	<i>Port</i>	<i>48</i>	
<i>5</i>	<i>System Software</i>	<i>Set</i>	<i>1</i>	

## Annex 3.6

### CAPACITY REQUIREMENTS OF EACH FIREWALL

Sl.	Items	Unit		
			Required	Bidder's Offer
<b>A</b>	<b>Firewall Present Capacity</b>			
<b>A.1</b>	<b>Processing Capabilities</b>			
1	<i>Memory</i>	GB	2	
2	<i>Minimum</i> Cleartext throughput	Gbps	2	
3	<i>Minimum</i> Concurrent connections/Sessions	Nos	500,000	
4	Minimum system performance with 128 / 256 -bit IPSec encryption	Mbps	400	
5	Minimum/ Maximum Tunnels	Nos	2000/12000	
6	<i>Minimum</i> Redundant FE port	Nos	2	
7	<i>Minimum</i> Redundant GE port	Nos	3	

Form A  
SUMMARY PRICE OF THE BID

SL	Name of Item (s)	Total Price		
		USD	+	BDT
<b>A</b>	<b>Total Price for Equipment</b>			
A.1	Total Price for all Soft Switch (from Form B.1)			
A.2	Total Price for Trunk Gateway (from Form B.2)			
A.3	Total Price for Access Gateway (from Form B.3)			
A.4	Total price for GPON OLT Equipments (from Form B.4)			
<b>A.5A</b>	<b>Total Price for all LAN Switch (from Form B.5A)</b>			
<b>A.5B</b>	<b>Total Price for Firewall (from Form B.5B)</b>			
A.6	Total Price for BTRC Monitoring Facilities and LI Connectivity Facilities (from Form B.6)			
A.7	Total Price for Network Management System (from Form B.7)			
A.8	Total Price for Other Equipment (from Form B.8)			
A.9	Total Price for DC Power for SS and TGW's (from Form B.10A)			
A.10	Total Price for DC Power for AGW (from Form B.10B)			
A.11	Total Price for Auxiliary Installation Equipment (from Form B.11)			
	<b>Total Price for Equipment (FoB/ FCA)</b>			
<b>B</b>	<b>Total Freight (from Form B.1 to B.10)</b>			
	<b>Total Price for Equipment (C&amp;F)</b>			
<b>C</b>	<b>Total Insurance (from Form B.1 to B.10)</b>			
X	Total Price for Equipment (CIF) = A+B+C			
D	Total Price for Services			
D.1	Total Price for all Soft Switch (from Form B.1)			
D.2	Total Price for Trunk Gateway (from Form B.2)			
D.3	Total Price for Access Gateway (from Form B.3)			
D.4	Total price for GPON OLT Equipments (from Form B.4)			
<b>D.5A</b>	<b>Total Price for all LAN Switch (from Form B.5A)</b>			
<b>D.5B</b>	<b>Total Price for Firewall (from Form B.5B)</b>			
D.6	Total Price for BTRC Monitoring Facilities and LI Connectivity Facilities (from Form B.6)			
D.7	Total Price for Network Management System (from Form B.7)			
D.8	Total Price for Other Services (from Form B.9)			
D.9	Total Price for DC Power for SS and TGW (from Form B.10A)			
D.10	Total Price for DC Power for AGW (from Form B.10B)			
D.11	Total Price for Auxiliary Installation Equipment (from Form B.11)			
Y	Total Price for Services			
	<b>Total Price for The Bid (X + Y)</b>			

In Words: US Dollar ..... and BD Taka .....  
..... only

## Form B.1

### SUMMARY PRICE FOR SOFT SWITCH (SS)

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for Soft Switch Hardware						
A.2	Total Price for Soft Switch Software						
A.3	Total Price for Auxiliary Equipment						
A.4	Total Price for Other Material						
	Total Price for Equipment (FoB/ FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
<b>X Total Price for Equipment (CIF)</b>							
<b>D Total Price for Services</b>							
D.1	Total Price for Soft Switch Services						
D.2	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	<i>Total Price for SS (X + Y)</i>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.2

### SUMMARY PRICE FOR TRUNK GATEWAY (TGW)

SITE NAME : .....  
*(The Bidder shall fill up one form for each site)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for TGW Hardware						
A.2	Total Price for TGW Software						
A.3	Total Price for Auxiliary Equipment						
A.4	Total Price for Other Material						
	Total Price for Equipment (FoB/ FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
X	Total Price for Equipment (CIF)						
<b>D Total Price for Services</b>							
D.1	Total Price for TGW Services						
D.2	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	Total Price for the TGW (X + Y)						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

### Form B.3

SUMMARY PRICE FOR ACCESS GATEWAY (AGW)

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**TYPE: .....**  
*(The Bidder shall fill up one form for each type)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for AGW Hardware						
A.2	Total Price for AGW Software						
A.3	Total price for MDF/Termination Box						
A.4	Total Price for Auxiliary Equipment						
A.5	Total Price for Other Material						
	Total Price for Equipment (FoB/ FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
<b>X Total Price for Equipment (CIF)</b>							
<b>D Total Price for Services</b>							
D.1	Total Price for AGW Services						
D.2	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	Total Price for the AGW (X + Y)						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.4

### SUMMARY PRICE FOR GPON OLTE AND SPLITTER

SITE NAME : .....  
*(The Bidder shall fill up one form for each TGW site)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for GPON OLTE Hardware						
A.2	Total Price for GPON OLTE Software						
A.3	Total Price for Splitter						
A.4	Total Price for MDU						
A.5	Total Price for SBU						
A.6	Total Price for ONT						
A.7	Total Price for Auxiliary Equipment						
A.8	Total Price for Other Material						
	Total Price for Equipment (FoB/ FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
X	Total Price for Equipment (CIF)						
<b>D Total Price for Services</b>							
D.1	Total Price for GPON OLTE Services						
D.2	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	Total Price for the GPON OLTE (X + Y)						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.5A

### SUMMARY PRICE FOR LAN SWITCH

**TYPE: .....**  
*(The Bidder shall fill up one form for each type)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for LAN Switch Hardware						
A.2	Total Price for LAN Switch Software						
A.3	Total Price for Auxiliary Equipment						
A.4	Total Price for Other Material						
	Total Price for Equipment (FoB/ FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
<b>X Total Price for Equipment (CIF)</b>							
<b>D Total Price for Services</b>							
D.1	Total Price for LAN Switch Services						
	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	Total Price for Switch (X + Y)						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.5B

### SUMMARY PRICE FOR FIREWALL

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for Firewall Hardware						
A.2	Total Price for Firewall Software						
A.3	Total Price for Auxiliary Equipment						
A.4	Total Price for Other Material						
	Total Price for Equipment (FoB/ FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
X	Total Price for Equipment (CIF)						
<b>D Total Price for Services</b>							
D.1	Total Price for Firewall Services						
	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	Total Price for Firewall (X + Y)						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.6

### SUMMARY PRICE FOR LI EQUIPMENT

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for BTRC Monitoring Facilities Hardware						
A.2	Total Price for BTRC Monitoring Facilities Software						
A.3	Total Price for LI Connectivity Hardware						
A.4	Total Price for LI Connectivity Software						
A.5	Total Price for Auxiliary Equipment						
A.6	Total Price for Other Material						
	Total Price for Equipment (FoB/FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
X	Total Price for Equipment (CIF)						
<b>D Total Price for Services</b>							
D.1	Total Price for BTRC Monitoring Facilities Services						
D.2	Total Price for LI Connectivity Services						
D.3	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	<i>Total Price for BTRC Monitoring and LI Connectivity (X + Y)</i>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.7

### SUMMARY PRICE FOR NETWORK MANAGEMENT SYSTEM

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for Network Management Hardware						
A.2	Total Price for Network Management Software						
A.3	Total Price for CDR Management Hardware						
A.4	Total Price for CDR Management Software						
	Total Price for Equipment (FoB/ FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
X	Total Price for Equipment (CIF)						
<b>D Total Price for Services</b>							
D.1	Total Price for Network Management System Services						
D.2	Total Price for CDR Management Services						
D.3	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	<i>Total Price for the Network Management System (X + Y)</i>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.8

### SUMMARY PRICE FOR OTHER EQUIPMENT

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Summary price for HDPE duct						
A.2	Summary price for Optical Fiber Cable						
A.3	Summary price for Joint Closure normal						
A.4	Summary price for Joint Closure T type						
A.5	Summary price for Pigtail						
A.6	Summary price for patch Cord						
A.7	Summary price for Termination Box/ODF						
A.8	Summary price for Coaxial Cable						
A.9	Summary price for Coaxial Cable Connectors						
A.10	Summary price for DDF						
A.11	Price for Buffer Stock Maintenance Spares						
A.12	Summary price for spares and Consumables						
A.13	Summary Price for Set of required specific tools and testers for all equipment						
A.14	Summary price for any other Equipment (if needed but not mentioned)						
	<b>Total Price for Equipment FOB/FCA)</b>						
<b>B Total Freight</b>							
	<b>Total Price for Equipment (C&amp;F)</b>						
<b>C Total Insurance</b>							
	<b>Total Price for Other Equipment (A + B + C)</b>						
<b>X</b>	<b>Total Price for Other Equipment (CIF)</b>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.9

### SUMMARY PRICE FOR OTHER SERVICES

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Other Services</b>							
A.1	Total Price for Maintenance assistance up to Guarantee Period						
A.2	Total Price for Post Guarantee Maintenance assistance Program						
A.3	Total Price for Customers Proof of Concept						
A.4	Total Price for Provisional Acceptance Test						
A.5	Total Price for Final Acceptance Test						
A.6	Total Price for Foreign Training						
A.7	Total Price for Local Training						
	Total Price for Other Services (FOB/FCA)						
<b>B Total Price for Other Services related to Turn-Key completion of the Project</b>							
B.1	Total Price for Survey, Network Planning and Design Services						
B.2	Total Price for Project Implementation Services						
B.3	Total Price for Inter-working Services						
B.4	Total Price for Inter-connection Services						
	Sub - Total for B						
	<i>Total price for Other Services (A + B)</i>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.10.A

### SUMMARY PRICE FOR DC POWER FOR SS AND TGW

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for Rectifier Equipment						
A.2	Total Price for Backup Battery Equipment						
A.3	Total Price for DC/ AC Inverter						
	Total Price for Equipment (FOB/FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
X	Total Price for Equipment (CIF)						
<b>D Total Price for Services</b>							
D.1	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	<i>Total Price for DC Power Equipment (X + Y)</i>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.10B

### SUMMARY PRICE FOR DC POWER FOR AGW SITES

TYPE NAME: .....

*(The Bidder shall fill up one form for each AGW type)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Total Price for Rectifier Equipment						
A.2	Total Price for Backup Battery Equipment						
A.3	Total Price for DC/ AC Inverter						
	Total Price for Equipment (FOB/FCA)						
<b>B Total Freight</b>							
	Total Price for Equipment (C&F)						
<b>C Total Insurance</b>							
X	Total Price for Equipment (CIF)						
<b>D Total Price for Services</b>							
D.1	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	<i>Total Price for DC Powe Equipment (X + Y)</i>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form B.11

### SUMMARY PRICE FOR AUXILIARY INSTALLATION EQUIPMENT

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Total Price for Equipment</b>							
A.1	Summary price for False Ceiling						
A.2	Summary price for Raised Floor						
A.3	Summary price for Aluminum Glass Partition						
A.4	Summary price for Lighting Facilities for Equipment Room						
A.5	Summary Price for Emergency Lights in Equipment Room						
A.6	Summary Price for Earthing Facility for all Equipment						
A.7	Summary Price for Lightening and Surge Protection Facility						
A.8	Summary Price for Fire Detection and Fire Fighting Facility						
A.9	Summary Price for Building Modification						
A.10	Summary Price for Station AC Power Wiring						
A.11	Summary Price for Unforeseen Works (if any)						
	<b>Total Price for Equipment FOB/FCA)</b>						
<b>B Total Freight</b>							
	<b>Total Price for Equipment (C&amp;F)</b>						
<b>C Total Insurance</b>							
<b>X Total Price for Equipment (CIF)</b>							
<b>D Total Price for Services</b>							
D.1	Total Price for Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	<i>Total Price for Auxiliary Installation Equipment (X + Y)</i>						

In Words: US Dollar ..... and BD Taka .....  
 ..... only

## Form C.1

### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF SS

SITE NAME: .....

*(The Bidder shall fill up one form for each site)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A</b> <i>Equipment (The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	Soft Switch Hardware						
A.2	Soft Switch Software						
A.3	Auxiliary Equipment						
A.4	Other Material						
	<b>Sub Total for A</b>						
<b>B</b> <i>Services (The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	Soft Switch Services						
B.2	Installation, testing and commissioning Services						
	<b>Sub Total For B</b>						
	<b>Price for SS and SG (A+B)</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.2

### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF TRUNK GATEWAY (TGW)

SITE NAME: .....

*(The Bidder shall fill up one form for each site)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	TGW Hardware						
A.2	TGW Software						
A.3	Auxiliary Equipment						
A.4	Other Material						
	<b>Sub Total for A</b>						
<b>B Total Price for Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	TGW Services						
B.2	Installation, testing and commissioning Services						
<b>Y</b>	<b>Total Price for Services</b>						
	Price for the TGW (A +B)						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

### Form C.3

#### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF ACCESS GATEWAY (AGW)

TYPE NAME: .....  
*(The Bidder shall fill up one form for each type)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	AGW Hardware						
A.2	AGW Software						
A.3	Auxiliary Equipment						
A.4	MDF /termination box						
A.5	Other Material						
	<b>Sub Total for A</b>						
<b>B Total Price for Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	AGW Services						
B.2	Installation, testing and commissioning Services						
<b>Y</b>	<b>Total Price for Services</b>						
	Price for the AGW (A +B)						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.4

### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF GPON OLTE

SITE NAME: .....

*(The Bidder shall fill up one form for each site)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	GPON OLTE Hardware						
A.2	GPON OLTE Software						
A.3	Splitter ratio 1.2						
A.4	Splitter ratio 1.4						
A.5	Splitter ratio 1.8						
A.6	Splitter ratio 1.16						
A.7	Splitter ratio 1.32						
A.8	Splitter ratio 1.64						
A.9	MDU (with software pre-installed)						
A.10	SBU (with software pre-installed)						
A.11	ONT (with software pre-installed)						
A.12	<b>UPS*</b>	<b>set</b>	<b>10</b>				
A.13	Other Material/Equipment						
	<b>Sub Total for A</b>						
<b>B Total Price for Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	GPON OLTE Services						
B.2	Installation, testing and commissioning Services						
<b>Y Total Price for Services</b>							
	Price for the GPON OLTE (A +B)						

**\*4 UPS for 24POTS+24FE, 4 UPS for 16POTS+16FE and 2 UPS for 8POTS+8FE. The capacity of UPS shall be such that it can support 2 hours backup power to the concerned MDU type at full load.**

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.5A

### Detail List and Price for all individual items/Parts of LAN Switch

TYPE NAME: .....  
*(The Bidder shall fill up one form for each type)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	LAN Switch Hardware						
A.2	LAN Switch Software						
A.3	Auxiliary Equipment						
A.4	Other Material						
	<b>Sub Total For A</b>						
<b>B Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	LAN Switch Services						
B.2	Installation, testing and commissioning Services						
	Price for LAN Switch (A +B)						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.5B

### Detail List and Price for all individual items/Parts of Firewall

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	Firewall Hardware						
A.2	Firewall Software						
A.3	Auxiliary Equipment						
A.4	Other Material						
	<b>Sub Total For A</b>						
<b>B Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	Firewall Services						
B.2	Installation, testing and commissioning Services						
	Price for Firewall (A +B)						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.6

### Detail List and Price for all individual items/Parts of LI equipment

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	BTRC Monitoring Facilities Hardware						
A.2	BTRC Monitoring Facilities Software						
A.3	LI Connectivity Hardware						
A.4	LI Connectivity Software						
A.5	Auxiliary Equipment						
A.6	Other Material						
	<b>Sub Total for A</b>						
<b>B Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	BTRC Monitoring Facilities Services						
B.2	LI Connectivity Services						
B.3	Installation, testing and commissioning Services						
	<b>Sub Total for B</b>						
	Price for BTRC Monitoring and LI Connectivity (A +B)						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.7

### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF NETWORK MANAGEMENT SYSTEM

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	Network Management Hardware						
A.2	Network Management Software						
A.3	CDR Management Hardware						
A.4	CDR Management Software						
	<b>Sub Total for A</b>						
<b>B Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	Network Management System Services						
B.2	CDR Management System Services						
B.3	Installation, testing and commissioning Services						
	<b>Sub Total for A</b>						
	<b>Price for the Network Management System (A +B)</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.8

### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF OTHER EQUIPMENT

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	24 core optical fiber cable	KM	250				
A.2	48 core optical fiber cable	KM	140				
A.3	96 core optical fiber cable	KM	60				
A.4	HDPE duct	KM	397				
A.5	Joint Closure normal	number	145				
A.6	Joint Closure T type	number	50				
A.7	Pigtail 3 meter length	Number	4476				
	Pigtail 5 meter length	Number	3000				
	Pigtail 10 meter length	Number	1000				
	Pigtail 30 meter length	Number	500				
	Patch Cord 3 meter length	Number	720				
A.8	Patch Cord 5 meter length	Number	600				
	Patch Cord 10 meter length	Number	400				
	Patch Cord 30 meter length	Number	100				
	Patch Cord 50 meter length	number	50				
A.9	Termination box/ODF						
A.10	Coaxial Cable						
A.11	Coaxial Cable Connectors						
A.12	DDF						
A.12	Buffer Stock Maintenance Spares						
A.13	Spares and Consumables						
A.14	Set of required specific tools and testers for all equipment						
A.15	Any other Equipment (if needed but not mentioned)						
	<b>Sub Total for A</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.9

### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF OTHER SERVICES

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Other Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	Maintenance Support during Guarantee Period						
A.2	Post Guarantee Maintenance Support Program						
A.3	Customers Proof of Concept						
A.4	Provisional Acceptance Test						
A.5	Final Acceptance Test						
A.6	Factory Training						
A.7	Local Training						
	<b>Sub Total for A</b>						
<b>B Other Services related to Turn-Key completion of the Project</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	Survey, Network Planning and Design Services						
B.2	Project Implementation Services						
B.3	Inter-working Services						
B.4	Inter-connection Services						
	<b>Sub Total for B</b>						
	<b>Price for Other Services (A + B)</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.10A

### DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF DC POWER FOR SS AND TGW SITES

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	Rectifier						
A.2	Backup Battery						
A.3	DC/ AC Inverter						
	<b>Sub Total for A</b>						
<b>B Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	Installation, testing and commissioning Services						
	<b>Price for DC Powert (A + B)</b>						

**In Words:** US Dollar ..... and BD Taka .....  
..... only

## Form C.10B

**DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF DC POWER FOR AGW SITE**

**TYPE NAME: .....**

*(The Bidder shall fill up one form for each AGW type)*

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
A.1	Rectifier						
A.2	Backup Battery						
A.3	DC/ AC Inverter						
	<b>Sub Total for A</b>						
<b>B Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>							
B.1	Installation, testing and commissioning Services						
	<b>Price for DC Power (A + B)</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form C.11

DETAIL LIST AND PRICE FOR ALL INDIVIDUAL ITEMS/PARTS OF AUXILIARY INSTALLATION  
EQUIPMENT

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
<b>A</b>	<b>Equipment</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>						
A.1	False Ceiling						
A.2	Raised Floor						
A.3	Aluminum Glass Partition						
A.4	Lighting Facilities for Equipment Room						
A.5	Emergency Lights in Equipment Room						
A.6	Earthing Facility for all Equipment						
A.7	Lighting and Surge Protection Facility						
A.8	Fire Detection and Fire Fighting Facility						
A.9	Building Modification						
A.10	Station AC Power Wiring						
A.11	Unforeseen Works (if any)						
	<b>Sub Total for A</b>						
<b>B</b>	<b>Services</b> <i>(The bidder shall fill up the list as per his/her system configuration and to fulfill the requirement of BTCL)</i>						
B.1	Total Price for Installation, testing and commissioning Services						
	<b>Price for Auxiliary Installation Equipment (A + B)</b>						

**In Words:** US Dollar ..... and BD Taka .....  
..... only

### Form D.1

#### DETAIL LIST AND PRICE FOR MAINTENANCE SPARES FOR 2 (TWO) YEARS

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
	<i>(The bidder shall fill up the list as per relevant clause of Tender Document and to fulfill the requirement of BTCL)</i>						
	<b>Total For Maintenance Spares</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only



### Form D.3

DETAIL LIST AND PRICE FOR CONSUMABLE ITEM FOR 2(TWO) YEARS

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
	<i>(The bidder shall fill up the list as per relevant clause of Tender document and to fulfill the requirement of BTCL)</i>						
	<b>Total For Consumable Items</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only



### Form E.1

PRICE QUOTATION FOR OPTIONAL ITEM (IF ANY)

SL	Name of Item (s)	Unit	Qty	FOB Price in USD		Price in BDT	
				Unit Price	Total Price	Unit Price	Total Price
	<i>(The bidder shall fill up the list as per relevant clause of Tender document and to fulfill the requirement of BTCL)</i>						
	<b>Total</b>						

**In Words:** US Dollar ..... and BD Taka .....  
 ..... only

## Form E.2

### QUOTATION FOR FUTURE ORDER

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(a) Future Order Formula for Equipment: *(Bidder shall specify)*

(b) Future Order Formula for Service: *(Bidder shall specify)*

## Form F

### SUMMARY OF THE BID

*(Bidder may expand the list for mentioning sub-components of any system)*

Sl	Name of Item	Model Number and Name	Manufacturer's Name	Manufacturer's Address	Country of Origin
<b>A</b>	<b>Mandatory Items</b>				
A.1	Soft Switch (s)				
A.2	Trunk Gateway				
A.3	Access Gateway				
A.4	MDU				
A.5	ONT				
A.6	LAN Switch				
A.7	Firewall				
A.8	Network Management System				
A.9	Rectifier				
A.10	Battery				
A.11	Inverter				
A.12	Optical Fiber				
A.13	HDPE duct				
<b>B</b>	<b>Optional Items (If Any)</b>				