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Project Director
Smart Pre-Payment Metering Project for West Zone
Power Distribution Company Ltd. (WZPDCL) Area
WZPDCL, Khulna

**STANDARD TENDER DOCUMENT (STD)
FOR THE PROCUREMENT OF GOODS (International)
FOR**

**Design, Manufacture, Supply, Installation,
Testing & Commissioning of 1,05,000 nos.
Smart Pre-Payment Meter with Related
Services on Turn Key Basis..**

Invitation for Tender No. : 27.22.4785.905.50.040.21/142
Issued on : 27/05/2021
Tender Package No. : 03 (Three)

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REJECTION CLAUSES

(Tender shall have comply with the following criteria, otherwise tender shall be rejected)

1. Tenderer shall have to comply with eligibility criteria (ITT 5), Litigation history (ITT 13), Experience criteria (ITT 14), Financial Criteria (ITT 15);
2. Tenderer shall have to submit sealed & signed tender document [ITT 35.2(c)];
3. Tenderer shall have to comply Terms of Payment Clause [GCC 27], Delivery and completion time as per ITT 21.1(q) of TDS and Delivery & Documents as perGCC 23.1];
4. Tender shall remain valid for the period specified in TDS after the date of Tender submission deadline (ITT 27.2);
5. Tender must be accompanied by a valid Tender Security (ITT 29.2 & ITT 29.3);
6. With Tender Submission Letter, Tender shall have to attach Letter of Authorization confirming the Signatory (ies) of the Tender to commit the Tenderer (ITT 34.3, 34.4 & 34.5);
7. Tenderer shall have to submit Audited Financial reports and Letter of commitment for Line of credit as evidence of Financial Capacity [ITT 15.1 (a)];
8. If Tenderer participate in forming JVCA, then Tenderer shall have to submit copy of the JVCA Agreement/Letter of Intent to form JVCA with draft proposed Agreement;
9. Tenderer shall have to submit all the documents as specified in Qualification criteria [ITT 13.1, 14.1 & 15.1] of TDS ;
10. Tenderer shall have to submit all the documents as specified in clause no. 7.49 of Section-7 Technical Specification.
11. Tenderer shall have to submit Specifications Submission & Compliance Sheet (PG4-4) in respective Manufacturer's Letter Head /Office Pad with sealed & signed by both respective Manufacturer's and Tenderer as per section-05 and ITT 14.1(b) (e) of TDS.

Section-1: Instructions to Tenderers

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Section-1: Instructions to Tenderers

A. General

- 1. Scope of Tender**
- 1.1 The Purchaser named in the Tender Data Sheet (TDS) (hereinafter referred to as the "Purchaser") wishes to issues these Tender Documents for the supply of Goods, and Related Services incidental thereto, as specified in the TDS and as detailed in Section 6: Schedule of Requirements.
- 1.2 The name of the Tender and the number and identification of its constituent lot(s) are stated in the TDS.
- 1.3 The successful Tenderer will be required to complete the delivery of the goods and related services (when applicable) as specified in the GCC Clause **18**.
- 2. Interpretation**
- 2.1 Throughout this Tender Document
- (a) the term "in writing" means communication written by hand or machine duly signed and includes properly authenticated messages by facsimile or electronic mail;
 - (b) if the context so requires, singular means plural and vice versa; and
 - (c) "day" means calendar days unless otherwise specified as working days;
 - (d) "Tender Document ", means the Document provided by a Purchaser to a Tenderer as a basis for preparation of its Tender;
 - (e) "Tender ", depending on the context, means a Tender submitted by a Tenderer for delivery of Goods and Related Services to a Purchaser in response to an Invitation for Tender;
- 3. Source of Funds**
- 3.1 The Purchaser has been allocated public funds from the source as indicated in the TDS and intends to apply a portion of the funds to eligible payments under the contract for which this Tender Document is issued.
- 3.2 For the purpose of this provision, "public funds" means any funds allocated to a Purchaser under Government budget, or loan, grants and credits placed at the disposal of a Purchaser through the Government by the development partners or foreign states or organizations.
- 3.3 Payments by the development partner, if so indicated in the TDS, will be made only at the request of the Government and upon approval by the development partner in accordance with the applicable Loan/Credit/Grant Agreement, and will be subject in all respects to the terms and conditions of that Agreement.

4. Corrupt, Fraudulent, Collusive or Coercive Practices

- 4.1 The Government requires that Procuring Entities, as well as Tenderers shall observe the highest standard of ethics during implementation of procurement proceedings and the execution of Contracts under public funds.
- 4.2 The Government requires that Procuring Entities, as well as Tenderers and Suppliers shall, during the Procurement proceedings and the execution of Contracts under public funds, ensure-
- (a) strict compliance with the provisions of Section 64 of the Public Procurement Act 2006 (Act 24 of 2006);
 - (b) abiding by the code of ethics as mentioned in the Rule 127 of the Public Procurement Rules, 2008;
 - (c) that neither it's any officer nor any staff or any other agents or intermediaries working on its behalf engages in any practice as detailed in ITT Sub Clause 4.3.
- 4.3 For the purposes of ITT Sub-clause 4.2 the terms set forth as follows:
- (a) **corrupt practice** means offering, giving or promising to give, receiving, or soliciting, either directly or indirectly, to any officer or employee of a Purchaser or other public or private authority or individual, a gratuity in any form; employment or any other thing or service of value as an inducement with respect to an act or decision or method followed by a Purchaser in connection with a Procurement proceeding or contract execution;
 - (b) **fraudulent practice** means the misrepresentation or omission of facts in order to influence a decision to be taken in a Procurement proceeding or Contract execution;
 - (c) **collusive practice** means a scheme or arrangement between two (2) or more Persons, with or without the knowledge of the Purchaser, that is designed to arbitrarily reduce the number of Tenders submitted or fix Tender prices at artificial, non competitive levels, thereby denying a Purchaser the benefits of competitive price arising from genuine and open competition; or
 - (d) **coercive practice** means harming or threatening to harm, directly or indirectly, Persons or their property to influence a decision to be taken in a Procurement proceeding or the execution of a Contract, and this will include creating obstructions in the normal submission process used for Tenders.
- 4.4 Should any corrupt, fraudulent, collusive or coercive practice of any kind come to the knowledge of the Purchaser, it will, in the first place, allow the Tenderer to provide an explanation and shall, take actions only when a satisfactory explanation is not received. Such exclusion and the reasons thereof, shall be recorded in the record of the procurement proceedings and promptly communicated to the Tenderer concerned. Any communications between the Tenderer and the Purchaser related to matters of alleged fraud or corruption shall be in

writing.

- 4.5 If corrupt, fraudulent, collusive or coercive practices of any kind determined by the Purchaser against any Tenderer alleged to have carried out such practices, the Purchaser shall -
- (a) exclude the concerned Tenderer from further participation in the particular Procurement proceeding; or
 - (b) reject any recommendation for award that had been proposed for that concerned Tenderer or;
 - (c) Declare, at its discretion, the concerned Tenderer to be ineligible to participate in further Procurement proceedings, either indefinitely or for a specific period of time.
- 4.6 The Tenderer shall be aware of the provisions on corruption, fraudulence, collusion and coercion in Section 64 of the Public Procurement Act, 2006 and Rule 127 of the Public Procurement Rules, 2008 and others as stated in GCC Clause 3.

5. Eligible Tenderers

- 5.1 This Invitation for Tenders is open to eligible Tenderers from all countries, except for any specified in the TDS. A Tenderer will be eligible if it is a citizen, or is constituted, registered and operates in conformity with the provisions of the laws of that country.
- 5.2 A Tenderer may be a physical or juridical individual or body of individuals, or company, association invited to take part in public procurement or seeking to be so invited or submitting a Tender in response to an Invitation for Tenders.
- 5.3 Government-owned enterprises in Bangladesh shall be eligible only if they can establish that they (i) are legally and financially autonomous, (ii) operate under commercial law, and (iii) are not a dependent agency of the Purchaser.
- 5.4 Tenderers shall have the legal capacity to enter into the Contract. A Tenderer that is under a declaration of ineligibility by the Government of Bangladesh in accordance with applicable laws at the date of the deadline for Tender submission or thereafter shall be disqualified.
- 5.5 Tenderers and all parties constituting the Tenderer shall not have a conflict of interest pursuant to Rule 55 of the Public Procurement Rules, 2008.
- 5.6 Tenderers in its own name or its other names or also in the case of its Persons in different names, shall not be under a declaration of ineligibility for corrupt, fraudulent, collusive or coercive practices as stated under ITT Sub Clause 4.3.
- 5.7 Tenderers are not restrained or barred from participating in public Procurement on grounds of execution of defective supply in the past under any Contract.
- 5.8 Tenderers are not under a declaration of ineligibility by an international financing agency such as World Bank, Asian Development Bank or any other international agency.

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- 5.9 Tenderers shall not be insolvent, be in receivership, be bankrupt, be in the process of bankruptcy, be not temporarily barred from undertaking business and it shall not be the subject of legal proceedings for any of the foregoing.
- 5.10 Tenderers shall have fulfilled its obligations to pay taxes and social security contributions under the provisions of laws and regulations of the country of its origin. In the case of foreign Tenderers, a certificate of competent authority in that country of which the Tenderer is citizen shall be provided.
- 5.11 Tenderers shall provide such evidence of their continued eligibility satisfactory to the Purchaser, as the Purchaser will reasonably request.
- 5.12 These requirements for eligibility will extend, as applicable, to Sub-contractor proposed by the Tenderer.

6. Eligible Goods and Related Services

- 6.1 All goods and related services to be supplied under the contract are eligible, unless their origin is from a country specified in the TDS.
- 6.2 For purposes of this Clause, the term “goods” includes commodities, raw material, machinery, equipment, and industrial plants; and “related services” includes services such as insurance, transportation, installation, and commissioning, training, and initial maintenance.
- 6.3 For purposes of this clause, “origin” means the country where the goods have been mined, grown, cultivated, produced, manufactured or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.
- 6.4 The origin of goods and services is distinct from the nationality of the Tenderer. The nationality of the firm that produces, assembles, distributes, or sells the goods shall not determine their origin.

7. Site Visit

- 7.1 For goods contracts requiring installation/ commissioning/ networking or similar services at site, the Tenderer, at the Tenderer’s own responsibility and risk, is encouraged to visit and examine the Site and obtain all information that may be necessary for preparing the Tender and entering into a contract for the supply of goods and related services.
- 7.2 The Tenderer should ensure that the Purchaser is informed of the visit in adequate time to allow it to make appropriate arrangements.
- 7.3 The costs of visiting the Site shall be at the Tenderer’s own expense.

B. Tender Document

- 8. Tender Document: General**
- 8.1 The Sections comprising the Tender Document are listed below and should be read in conjunction with any addendum issued under ITT Clause 11.
- Section 1 Instructions to Tenderers (ITT)
 - Section 2 Tender Data Sheet (TDS)
 - Section 3 General Conditions of Contract (GCC)
 - Section 4 Particular Conditions of Contract (PCC)
 - Section 5 Tender and Contract Forms
 - Section 6 Schedule of Requirements
 - Section 7 Technical Specifications
 - Section 8 Drawings
- 8.2 The Purchaser shall reject any tender if the Tender Document was not purchased directly from the Purchaser, or through its agent as stated in the TDS.
- 8.3 The Tenderer is expected to examine all instructions, forms, terms, and specifications in the Tender Document as well as addendum to Tender Documents.
- 9. Clarification of Tender Documents**
- 9.1 A prospective Tenderer requiring any clarification of the Tender Document shall contact the Purchaser in writing at the Purchaser's address indicated in the TDS before **two-third** of time allowed for preparation and submission of Tender elapses.
- 9.2 A Purchaser is not obliged to answer any clarification received after that date requested under ITT Sub-Clause 9.1.
- 9.3 The Purchaser shall respond in writing within five (5) working days of receipt of any such request for clarification received under ITT Sub-Clause 9.1
- 9.4 The Purchaser shall forward copies of its response to all those who have purchased the Tender Document, including a description of the enquiry but without identifying its source.
- 9.5 Should the Purchaser deem it necessary to amend the Tender Document as a result of a clarification, it shall do so following the procedure under ITT Clause 11.
- 10. Pre-Tender Meeting**
- 10.1 To clarify issues and to answer questions on any matter arising in the Tender Document, the Purchaser may, if stated in the TDS, hold a Pre-Tender Meeting at the place, date and time as specified in the TDS. All Potential Tenderers are encouraged to attend the meeting, if it is held.
- 10.2 Minutes of the pre-Tender meeting, including the text of the questions raised and the responses given, together with any responses prepared after the meeting, will be transmitted within one week (7 days) after holding the meeting to all those who purchased the Tender Document and even those who did not attend the meeting.

11. Addendum to Tender Documents

- 10.3 Any amendment to the Tender Document listed in ITT Sub-Clause 8.1 that may become necessary as a result of the pre-Tender meeting shall be made by the Purchaser exclusively through the issue of an Addendum as stated under ITT Sub-Clause 11 and not through the minutes of the pre-Tender meeting.
- 10.4 Non-attendance at the pre-Tender meeting will not be a cause for disqualification of a Tenderer.
- 11.1 At any time prior to the deadline for submission of Tenders, the Purchaser on its own initiative or in response to a clarification request in writing from a Tenderer, having purchased the Tender Document or as a result of a Pre-Tender meeting, may revise the Tender Document by issuing an addendum pursuant to Rule 95 of the Public Procurement Rules, 2008.
- 11.2 The addendum issued under ITT Sub-Clause 11.1 shall become an integral part of the Tender Document and shall have a date and an issue number and shall be circulated by fax, mail or e-mail, to Tenderers who have purchased the Tender Documents within five (5) working days of issuance of such addendum, to enable Tenderers to take appropriate action.
- 11.3 The Tenderer shall acknowledge receipt of an addendum.
- 11.4 Tenderers who have purchased the Tender Documents but have not received any addendum issued under ITT Sub-clause 11.1 shall inform the Purchaser of the fact by fax, mail or e-mail before **two-third** of the time allowed for the submission of Tenders has elapsed.
- 11.5 Procuring Entities shall also ensure posting of relevant addenda with the reference number and date on their website.
- 11.6 To give a prospective Tenderer reasonable time in which to take an amendment into account in preparing its Tender, the Purchaser may, at its discretion, extend the deadline for the submission of Tenders, pursuant to Rule 95(6) of the Public Procurement Rule, 2008 and under ITT Clause 36.
- 11.7 If an addendum is issued when time remaining is less than one-third of the time allowed for the preparation of Tenders, a Purchaser shall extend the deadline by an appropriate number of days for the submission of Tenders, depending upon the nature of the Procurement requirement and the addendum. The minimum time for such extension shall not be less than seven (7) days.

C. Qualification Criteria

12. General Criteria

- 12.1 The Purchaser requires the Tenderer to be qualified by meeting predefined, precise minimum requirements, which entails setting pass/fail criteria, which if not met by the Tenderer, will result in rejection of its Tender.

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- 12.2 In addition to meeting the eligibility criteria, as stated in ITT Clause 5, the Tenderer must satisfy the other criteria stated in ITT Clauses 13 to 15 inclusive.
- 12.3 To qualify for a multiple number of lots in a package for which tenders are invited in the Invitation for Tenders, The Tenderer shall demonstrate having resources and experience sufficient to meet the aggregate of the qualifying criteria for the individual lot. The requirement of overall experience and specific experience under ITT Sub-Clause 14.1 (a) and 14.1 (b) shall not be separately applicable for individual lot.
- 13. Litigation History**
- 13.1 The maximum number of arbitration awards against the Tenderer over a period shall be as specified in the TDS.
- 14. Experience Criteria**
- 14.1 Tenderers shall have the following minimum level of supply experience to qualify for supplying the Goods and Related Services under the contract:
- (a) A minimum number of years of overall experience in the supply of goods and related services as specified in the TDS; and
 - (b) Specific experience of satisfactory completion of supply of similar goods of minimum value stated in the TDS under maximum number of contracts stated in TDS within the period stated in TDS; and
 - (c) A minimum supply and/or production capacity of Goods as specified in the TDS.
- 15. Financial Criteria**
- 15.1 Tenderers shall have the following minimum level of financial capacity of qualify for the supply of goods under the contract:
- (a) Availability of minimum liquid assets or working capital or credit facilities from a Bank, as specified in the TDS.
- 16. Appointment of Subcontractor**
- 16.1 Tenderer, pursuant to Rule 53 of the PPR2008, is allowed to sub-contract a portion of the Supply.
- 16.2 The Tenderer shall specify in its Tender all portion of the Goods that will be Subcontracted, if any, including the entity(ies) to whom each portion will be subcontracted to, subject to the maximum allowable limit for subcontracting of Goods specified in the TDS.
- 16.3 All subcontracting arrangement must be disclosed at the time of Tendering, and subcontractors must be identified in the Tender submitted by Tenderer.
- 16.4 A Subcontractor may participate in more than one Tender, but only in that capacity.
- 16.5 Subcontractors must comply with the provision of ITT Clause 5. For this purpose contractor shall complete the Subcontractor's information in Form PG4-1 for submission with tender.
- 16.6 If the Purchaser determines that a subcontractor is ineligible, the subcontracting of such portion of the Goods assigned to the ineligible subcontractor shall be disallowed.

D. Tender Preparation

- 17. Only One Tender**
- 17.1 If a Tender for Goods is invited on 'lot-by-lot' basis, each lot shall constitute a Tender. A Tenderer shall submit only one (1) Tender for each lot, A Tenderer who submits or participates in more than one (1) Tender for each lot will cause all the Tenders with that Tenderer's participation to be rejected.
- 18. Cost of Tendering**
- 18.1 Tenderers shall bear all costs associated with the preparation and submission of its Tender, and the Purchaser shall not be responsible or liable for those costs, regardless of the conduct or outcome of the Tendering process.
- 19. Issuance and Sale of Tender Document**
- 19.1 A Purchaser, pursuant to Rule 94 of the Public Procurement Rules, 2008 shall make Tender Documents available immediately to the potential Tenderers, requesting and willing to purchase at the corresponding price if the advertisement has been published in the newspaper pursuant to Rule 90 of the Public Procurement Rules, 2008.
- 19.2 Full contact details with mailing address, telephone and facsimile numbers and electronic mail address, as applicable, of those to whom Tender Documents have been issued shall be recorded with a reference number by the Purchaser or its agent.
- 19.3 There shall not be any pre-conditions whatsoever, for sale of Tender Document and the sale of such Document shall be permitted up to the day prior to the day of deadline for the submission of Tender.
- 20. Language of Tender**
- 20.1 Tenders shall be written in English language. Supporting documents and printed literature furnished by the Tenderer may be in another language provided they are accompanied by an accurate translation of the relevant passages into the English language, in which case, for purposes of interpretation of the Tender, such translation shall govern.
- 20.2 Tenderers shall bear all costs of translation to the governing language and all risks of the accuracy of such translation.

21. Contents of Tender

- 21.1 The Tender prepared by the Tenderer shall comprise the following:
- (a) Tender Submission Letter (Form PG4-1) as furnished in Section 5: Tender and Contract Forms;
 - (b) Tenderer information sheet (Form PG4-2) as furnished in Section 5: Tender and Contract Forms;
 - (c) The completed Price Schedule for Goods and Related Services (Form PG4-3A, 3B, 3C and PG4-3D) as furnished in Section 5: Tender and Contract Forms as stated under ITT Clauses 23 and 24;
 - (d) Tender Security as stated under ITT Clause 29,30 and 31;
 - (e) The completed Specifications Submission and Compliance Sheet (Form PG4-4) as furnished in Section 5: Tender and Contract Forms as stated under ITT clause 25.2;
 - (f) Alternatives, if permitted, as stated under with ITT Clause 22;
 - (g) Written confirmation authorising the signatory of the Tender to commit the Tenderer, as stated under ITT Sub-Clause 34.3;
 - (h) The completed eligibility declarations, to establish its eligibility as stated under ITT Clause 5, in the Tender Submission Sheet (Form PG4-1), as furnished in section 5: Tender and Contract Forms;
 - (i) An affidavit confirming the legal capacity stating that there are no existing orders of any judicial court that prevents either the Tenderer or employees of a Tenderer entering into or signing a Contract with the Purchaser as stated under ITT clause 5;
 - (j) An affidavit confirming that the Tenderer is not insolvent, in receivership or not bankrupt or not in the process of bankruptcy, not temporarily barred from undertaking their business for financial reasons and shall not be the subject of legal proceedings for any of the foregoing as stated under ITT Clause 5;
 - (k) A certificate issued by the competent authority stating that the Tenderer is a Tax payer having valid Tax identification Number (TIN) and VAT registration number or in lieu any other document acceptable to the Purchaser demonstrating that the Tenderer is a genuine Tax payer and has a VAT registration number as a proof of fulfillment of taxation obligations as stated under ITT Clause 5. In the case of foreign Tenderers, a certificate of competent authority in that country of which the Tenderer is citizen shall be provided ;
 - (l) Documentary evidence demonstrating that they are enrolled in the relevant professional or trade organizations registered in Bangladesh or in case of foreign tenderer in their country of origin or a certificate concerning their competency issued by a professional institution in accordance with the law of the country of their origin, as stated under ITT Clause 5;

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- (m) The country of origin declarations, to establish the eligibility of the Goods and Related Services as stated under ITT Clause 6, in the Price Schedule for Goods and Related Services (Form PG4-3B, 3C and PG4-3D) as, applicable, furnished in Section 5: Tender and Contract Forms;
 - (n) Documentary evidence as stated under ITT Clauses 25, that the Goods and Related Services conform to the Tender Documents;
 - (o) Documentary evidence as stated under ITT Clause 26 that the Tenderer's qualifications conform to the Tender Documents;
 - (p) Documents establishing legal and financial autonomy and compliance with commercial law, as stated under ITT Sub-clause 5.3 in case of government owned entity; and
 - (q) Any other document as specified in the TDS.

21.2 The Tenderer shall submit the Tender Submission Letter (Form PG4-1) as furnished in Section 5: Tender and Contract Forms. This form must be completed without any alterations to its format, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested.

21.3 The Tenderer shall submit the completed Price Schedule for Goods and Related Services (Form PG4-3A, 3B, 3C and PG4-3D), according to their origin as appropriate as furnished in section 5: Tender and Contract Forms.

22. Alternatives

22.1 Unless otherwise stated in the TDS, alternatives shall not be considered.

23. Tender Prices, Discounts

23.1 The prices and discounts quoted by the Tenderer in the Tender Submission Letter (Form PG4-1) and in the Price Schedule (Form PG4-3A, 3B, 3C and PG4-3D) shall conform to the requirements specified below.

23.2 All lots or items as listed in Section 6: Schedule of Requirements must be listed and priced separately on the Price Schedule following the Form PG4-3A, 3B, 3C and PG4-3D as applicable.

23.3 Tenders are being invited either for a single lot or for a number of lots on 'lot-by-lot' basis, as specified in the TDS.

23.4 Each lot shall constitute a Tender, If Tenders for Goods are invited on 'lot-by-lot' basis.

23.5 Tenders being invited for a single lot or for a number of lots on 'lot-by-lot' basis, price quoted shall correspond to 100% of the items specified for each lot and to 100% of the quantities specified for each item of that particular lot and shall correspond to 100% of the total offered lot value, unless otherwise stated in the TDS

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- 23.6 A Lot Tender not offering minimum number of items of those being priced based on percentage of the total number of items, and, the corresponding minimum value based on percentage of the total lot value, as specified in the ITT Sub-Clause 23.5 shall also be considered non-responsive.
- 23.7 Subject to ITT Sub-Clause 23.5, a Lot tender not offering a particular item which represents more than fifty percent (50%) of the estimated lot value identified by the Purchaser and specified in the TDS, even if it complies with the requirement of minimum number of items based on percentage of the total number of items as stated under ITT Sub Clause 23.5, shall be considered non-responsive.
- 23.8 The price to be quoted in Tender Submission Letter (Form PG4-1) shall be the total price of the Tender, excluding any discounts offered, only **in case of being awarded more than one lot**, by the Tenderer
- 23.9 The tenderer wishing to offer any discount shall indicate the methodology for their application in the Tender Submission Letter (Form PG4-1) **for being awarded of more than one lot**.
- 23.10 Prices shall be quoted as specified in each Price Schedule (Form PG4-3A, 3B, 3C and PG4-3D) as applicable. The disaggregation of price components is required solely for the purpose of facilitating the comparison of tenders by the Purchaser. This shall not in any way limit the Purchaser's right to contract on any of the terms offered. In quoting prices, the Tenderer shall be free to use transportation through carriers registered in any eligible Countries. Similarly, the Tenderer may obtain insurance services from any eligible country. Prices shall be entered in the following manner:
- 23.11 For Goods, manufactured within Bangladesh, the prices in the Price schedule (Form PG4-3A) shall be entered separately in the following manner:
- (a) The price of the Goods quoted EXW (ex works, ex factory, ex warehouse, ex showroom, or off-the-shelf, as applicable), including all customs duties and import vat and other taxes already paid or payable on the components and raw material used in the manufacture or assembly of the Goods;
 - (b) VAT payable on account of supplier, if the contract is awarded; and
 - (c) The price for inland transportation, insurance, and other local costs for the delivery of the Goods to their destination (Project Site) specified in the TDS.

23.12 For Goods, manufactured outside Bangladesh, to be imported, the prices in the Price schedule (Form PG4-3B) shall be entered separately in the following manner:

- (a) the price of the Goods, quoted CIP (named place of destination, in the Bangladesh) or CIF (named port of destination, in Bangladesh) as specified in the TDS;
- (b) VAT payable on account of supplier, if the contract is awarded; and
- (c) the price for inland transportation, insurance, and other local costs for the delivery of the Goods to their final destination (Project Site) specified in the TDS.
- (d) in addition to the CIP/CIF prices specified in 23.12(a) above, the price of the Goods to be imported may be quoted in other INCOTERM and shall be governed by the rules prescribed in the current edition of INCOTERM published by the International Chamber of Commerce, Paris, if so specified in the TDS;

23.13 For Goods, manufactured outside Bangladesh, already imported, the prices in the Price schedule (Form PG4-3C) shall be entered separately in the following manner:

- (a) the price of the Goods, including the original import value of the Goods; plus any mark-up ; plus any other related local cost, and custom duties, import VAT and other import taxes already paid on the Goods already imported.
- (b) the custom duties, import VAT and other import taxes already paid (need to be supported with documentary evidence) on the Goods already imported.
- (c) the price of the Goods, obtained as the difference between (a) and (b) above;
- (d) VAT payable on account of supplier, if the contract is awarded; and
- (e) The price for inland transportation, insurance, and other local costs for the delivery of the Goods to their final destination (Project Site) specified in the TDS.

[For previously imported Goods, the quoted price shall be distinguishable from the original import value of these Goods declared to customs and shall include any rebate or mark-up of the local agent or representative and all local costs except import duties and taxes, which have been paid. For clarity, the tenderers are asked to quote the price including import duties, and additionally to provide the import duties and the price net of import duties which is the difference of those values.]

23.14 for Related Services, other than inland transportation and other services required to convey the Goods to their final destination, whenever such Related Services are specified in the Schedule of Requirements, the prices in the price schedule (Form PG4-3D) shall be entered in the following manner :

- (a) The price of each item comprising the Related Services (inclusive of any applicable taxes).

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- 24. Tender Currency**
- 24.1 For expenditures that will be incurred in Bangladesh, the Tenderer shall quote the prices in Bangladesh Taka.
- 24.2 Suppliers offering Goods manufactured or assembled in Bangladesh are permitted to submit their Tender in a combination of local and foreign currencies.
- 24.3 For expenditures that will be incurred outside Bangladesh, the Tenderer may quote the prices in USD or GBP or EUR or JPY as specified in TDS.
- 25. Documents Establishing the Conformity of the Goods and Related services**
- 25.1 To establish the conformity of the Goods and Related Services to the Tender Documents, the Tenderer shall furnish as part of its Tender the documentary evidence that the Goods and Related services conform to the technical specifications and standards in Section 7, Technical Specifications.
- 25.2 Documentary evidence of conformity of the Goods and services to the Tender Documents may be in the form of literature, drawings, and data, and shall consist of:
- (a) a detailed description of the essential technical and performance characteristics of the Goods;
 - (b) if so required in TDS, tenderer shall also furnish a list giving full particulars, including available sources and current prices of spare parts, special tools, etc., necessary for the proper and continuing functioning of the Goods during the period specified in the TDS, following commencement of the use of the Goods by the Purchaser ; and
 - (c) an item-by-item commentary on the Purchaser's Technical Specifications demonstrating substantial responsiveness of the Goods and Related services to those specifications, or a statement of deviations and exceptions to the provisions of Section 7. Technical Specifications.
- 26. Documents Establishing Qualifications of the Tenderer**
- 26.1 The documentary evidence of the Tenderer's qualifications to perform the contract if its Tender is accepted shall establish to the Purchaser's satisfaction:
- (a) that the Tenderer meets each of the qualification criterion specified in Sub-Section C, Qualification Criteria of the ITT;
 - (b) that, if required in the TDS, a Tenderer that does not manufacture or produce the Goods it offers to supply shall submit the Manufacturer's Authorization Letter (Form PG4-5) furnished in Section 5: Tender and Contract Forms, to demonstrate that it has been duly authorized by the manufacturer or producer of the Goods to supply the Goods to Bangladesh.; and
 - (c) that, if required in the TDS, in case of a Tenderer not doing business within Bangladesh, the Tenderer is or will be (if awarded the contract) represented by an Agent in the country equipped and able to carry out the Supplier's maintenance.
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- 27. Validity Period of Tender**
- 27.1 Tender validities shall be determined on the basis of the complexity of the Tender and the time needed for its examination, evaluation, approval of the Tender and issuance of the Notification of Award pursuant to Rule 19 and 20 of the Public Procurement Rules, 2008.
- 27.2 Tenders shall remain valid for the period specified in the TDS after the date of Tender submission deadline prescribed by the Purchaser, as stated under ITT Clause 36. A Tender valid for a period shorter than that specified will be rejected by the Purchaser as non- responsive.
- 28. Extension of Tender Validity and Tender Security**
- 28.1 In justified exceptional circumstances, prior to the expiration of the Tender validity period, the Purchaser following Rule 21 of the Public Procurement Rules,2008 may solicit, **not later than ten (10) days** before the expiry date of the Tender validity, compulsorily all the Tenderers' consent to an extension of the period of validity of their Tenders.
- 28.2 The request for extension of Tender validity period shall state the new date of the validity of the Tender.
- 28.3 The request from the Purchaser and the responses from the Tenderers will be made in writing.
- 28.4 Tenderers consenting in writing to the request made by the Purchaser under ITT Sub-Clause 28.1 shall also correspondingly extend the validity of its Tender Security for twenty-eight (28) days beyond the new date for the expiry of Tender validity.
- 28.5 Tenderers consenting in writing to the request under ITT Sub-Clause 28.1 shall not be required or permitted to modify its Tender in any circumstances.
- 28.6 If the Tenderers are not consenting in writing to the request made by the Purchaser under ITT Sub-Clause 28.1, its Tender will not be considered for subsequent evaluation.
- 29. Tender Security**
- 29.1 The Tender Security and its amount shall be determined sufficient to discourage the submission of frivolous and irresponsible tenders pursuant to Rule 22 of the Public Procurement Rule,2008 and shall be expressed as a rounded fixed amount and, shall not be stated as a precise percentage of the estimated total Contract value.
- 29.2 The Tenderer shall furnish as part of its Tender, in favour of the Purchaser or as otherwise directed on account of the Tenderer as specified in TDS.
- 29.3 Amount of the Tender security may be determined on the basis of different percentages for each lot, but the amount in fixed and currency as specified in TDS, if so indicated that the Tenders are invited on lot-by-lot basis under ITT Sub Clause 23.3

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- 30. Form of Tender security**
- 30.1 The Tender Security shall be in the form of an irrevocable bank guarantee issued by an internationally reputable bank and shall require to be endorsed by its any correspondent bank located in Bangladesh, to make it enforceable, in the format (Form PG4-6) furnished in Section 5: Tender and Contract Forms;
- 30.2 be payable promptly upon written demand by the Purchaser in the case of the conditions listed in ITT Clause 33 being invoked; and
- 30.3 Remain valid for at least twenty eight (28) days beyond the expiry date of the Tender Validity in order to make a claim in due course against a Tenderer in the circumstances detailed under ITT Clause 33 and pursuant to Rule 25 of the Public Procurement Rules, 2008.
- 31. Authenticity of Tender Security**
- 31.1 The authenticity of the Tender security submitted by a Tenderer shall be examined and verified by the Purchaser in writing from the Bank issuing the security, prior to finalization of the Evaluation Report pursuant to Rule 24 of the Public Procurement Rule, 2008.
- 31.2 If a Tender Security is found to be not authentic, the Tender which it covers shall not be considered for subsequent evaluation and in such case the Purchaser shall proceed to take punitive measures against that Tenderer as stated under ITT Sub-Clause 4.6, pursuant to Rule 127 of the Public Procurement Rules, 2008 and in accordance with Section 64(5) of the Public Procurement Act, 2006.
- 31.3 Tender not accompanied by a valid Tender Security as stated under Sub-Clause 29, 30 and 31, shall be considered as non-responsive.
- 32. Return of Tender Security**
- 32.1 No Tender security shall be returned by the Tender Opening Committee (TOC) during and after the opening of the Tenders pursuant to Rule 26 of the Public Procurement Rules 2008.
- 32.2 No Tender security shall be returned to the Tenderers before contract signing, except to those who are found non-responsive.
- 32.3 Tender securities of the non-responsive Tenders shall be returned immediately after the Evaluation Report has been approved by the Purchaser.
- 32.4 Tender securities of the responsive Tenderers shall be returned only after the lowest evaluated responsive Tenderer has submitted the performance security and signed the contract , that being even before the expiration of the validity period specified in Clause 27.
- 32.5 Tender Securities of the Tenderers not consenting within the specified date in writing to the request made by the Purchaser under ITT Sub-Clause 28.1 regarding extension of its Tender validity shall be discharged or returned forthwith.
- 33. Forfeiture of Tender Security**
- 33.1 The Tender security pursuant to Rule 25 of the Public Procurement Rules,2008 may be forfeited if a Tenderer:
- (a) withdraws its Tender after opening of Tenders but within the validity of the Tender as stated under ITT Clauses 27, and 28, pursuant to Rule 19 of the Public

Procurement Rules 2008; or

- (b) refuses to accept a Notification of Award as stated under ITT Sub-Clause 62.3, pursuant to Rule 102 of the Public Procurement Rules 2008; or
- (c) fails to furnish performance security as stated under ITT Sub-Clause 63.2, pursuant to Rule 102 of the Public Procurement Rules 2008; or
- (d) refuses to sign the Contract as stated under ITT Sub-Clause 67.2 pursuant to Rule 102 of the Public Procurement Rules 2008; or
- (e) does not accept the correction of the Tender price following the correction of arithmetic errors as stated under ITT Clause 49, pursuant to Rule 98(11) of the Public Procurement Rules 2008

34. Format and Signing of Tender

- 34.1 The Tenderer shall prepare one (1) original of the documents comprising the Tender as described in ITT Clause 21 and clearly mark it "ORIGINAL". In addition, the Tenderer shall prepare the number of copies of the Tender, as specified in the TDS and clearly mark each of them "COPY". In the event of any discrepancy between the original and the copies, the original shall prevail.
- 34.2 Alternatives, if permitted under ITT Clause 22, shall be clearly marked "Alternative".
- 34.3 The original and each copy of the Tender shall be typed or written in indelible ink and shall be signed by a person duly authorised to sign on behalf of the Tenderer. This authorisation shall consist of a written authorisation and shall be attached to the Tender Submission Letter (Form PG4-1).
- 34.4 The name and position held by each person signing the authorisation must be typed or printed below the signature.
- 34.5 All pages of the original and of each copy of the Tender, except for un-amended printed literature, shall be numbered sequentially and signed or initialled by the person signing the Tender.
- 34.6 Any interlineations, erasures, or overwriting shall be valid only if they are signed or initialled by the person(s) signing the Tender.
- 34.7 Person(s) signing the Tender shall describe his or her name, address, position.

E. Tender Submission

35. Sealing, Marking and Submission of Tender

- 35.1 The Tenderer shall enclose the original in one (1) envelope and all the copies of the Tender, including the alternative , if permitted under ITT Clause 22 in another envelope, duly marking the envelopes as "ORIGINAL" "ALTERNATIVE" (if permitted) and "COPY." These sealed envelopes will then be enclosed and sealed in one (1) single outer envelope.

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- 35.2 Tenders shall be properly marked by Tenderers in order not be confused with other types of correspondence which may also be hand-delivered or posted by mail or courier service. The inner and outer envelopes shall:
- (a) bear the name and address of the Tenderer ;
 - (b) be addressed to the Purchaser as stated under ITT Sub-Clause 36.1;
 - (c) bear the specific identification of this tendering process indicated in ITT Sub-Clause 1.2 and any additional identification marks as specified in the TDS; and
 - (d) bear a statement “DO NOT OPEN BEFORE...” the time and date for Tender opening, as stated under ITT Sub-Clause 42.2
- 35.3 The Tenderer is solely and entirely responsible for pre-disclosure of Tender information if the envelope(s) are not properly sealed and marked.
- 35.4 Tenders shall be delivered by hand or by mail, including courier services to location as designated in the ITT Sub-Clause 36.1.
- 35.5 Tenders shall be submitted on the basis of this Tender Document issued by the Purchaser.
- 35.6 The Purchaser will, on request, provide the Tenderer with a receipt showing the date and time when it's Tender was received.
- 35.7 When so specified in the TDS, tenderers shall have the option of submitting their tenders electronically.
- 35.8 Tenderers submitting tenders electronically shall follow the electronic tender submission procedures specified in the TDS.
- 36. Deadline for Submission of tenders**
- 36.1 Tenders shall be delivered to the Purchaser at the address specified in the TDS and no later than the date and time specified in the TDS.
- 36.2 The Purchaser may, at its discretion on justifiably acceptable grounds duly recorded, extend the deadline for submission of Tender as stated under ITT Sub Clause 36.1, in which case all rights and obligations of the Purchaser and Tenderers previously subject to the deadline will thereafter be subject to the new deadline as extended.
- 37. Late tender**
- 37.1 Any Tender received by the Purchaser after the deadline for submission of Tenders as stated under ITT Sub-Clause 36.1, shall be declared LATE, rejected, returned unopened to the Tenderer.
- 38. Modification, Substitution or Withdrawal of Tenders**
- 38.1 A Tenderer may modify, substitute or withdraw its Tender after it has been submitted by sending a written notice duly signed by the authorised signatory properly sealed, and shall include a copy of the authorisation (the power of attorney), confirmed by an affidavit duly authenticated as stated under ITT Clause 34.3, provided that such written notice including the affidavit is received by the Purchaser prior to the deadline for submission of Tenders as

stated under ITT Sub-Clause 36.1.

- 39. Tender Modification** 39.1 The Tenderer shall not be allowed to retrieve its original Tender, but shall be allowed to submit corresponding modification to its original Tender marked as “MODIFICATION”.
- 40. Tender Substitution** 40.1 The Tenderer shall not be allowed to retrieve its original Tender, but shall be allowed to submit another Tender marked as “SUBSTITUTION”.
- 41. Withdrawal of Tender** 41.1 The Tenderer shall be allowed to withdraw its Tender by a Letter of Withdrawal marked as “WITHDRAWAL”.

F. Tender Opening and Evaluation

- 42. Tender Opening** 42.1 Tenders shall be opened pursuant to Rule 97 following steps in Part D of Schedule IV of The Public Procurement Rule, 2008.
- 42.2 Tenders shall be opened in public immediately after the deadline for submission of Tenders at the place, date and time as specified in the TDS but no later than **ONE HOUR** after expiry of the submission deadline. Tender opening shall not be delayed on the plea of absence of Tenderers or his or her representatives.
- 42.3 Any specific electronic Tender opening procedures required if electronic tendering is permitted under ITT Sub-Clause 35.7, shall be as specified in the TDS.
- 42.4 Persons not associated with the Tender may not be allowed to attend the public opening of Tenders.
- 42.5 The Tenderers’ representatives shall be duly authorised by the Tenderer. Tenderers or their authorised representatives will be allowed to attend and witness the opening of Tenders, and will sign a register evidencing their attendance.
- 42.6 The authenticity of withdrawal or substitution of, or modifications to original Tender, if any made by a Tenderer in specified manner, shall be examined and verified by the Tender Opening Committee based on documents submitted under ITT Sub Clause 38.1.
- 42.7 Tenders will be opened in the following manner:
- (a) Firstly, envelopes marked “Withdrawal” shall be opened and “Withdrawal” notices read aloud and recorded, and the envelope with the corresponding Tender shall not be opened, but returned unopened to the Tenderer by the Purchaser at a later time immediately after preliminary examination by the Tender Evaluation Committee (TEC) as stated under ITT Sub-Clause 45.1. No Tender withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and in such case the Tender shall be read aloud at the Tender opening ;
 - (b) secondly, the remaining Tenders will be sorted out and those marked “substitutes” or “modified” will be linked with

their corresponding “original”(O) Tender;

- (c) Next, envelopes marked “Substitution”(S) shall be opened and read aloud and recorded, and exchanged with the corresponding Tender being substituted, and the substituted Tender shall not be opened, but returned unopened to the Tenderer by the Purchaser at a later time immediately after preliminary examination by the Tender Evaluation Committee (TEC) as stated under ITT Sub-Clause 45.1 . No Tender substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and in such case the Tender shall be read aloud at the Tender opening.
- (d) Next envelopes marked “Modification” (M) shall be opened and read aloud with the corresponding Tender and recorded. No Tender modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and in such case the Tender shall be read aloud at the Tender opening.
- (e) thirdly, if so specified in this Tender Document, the envelopes marked “ Alternative ”(A) shall be opened and read aloud with the corresponding Tender and recorded.

42.8 Ensuring that only the correct (M), (S), (A),(O) envelopes are opened, details of each Tender will be dealt with as follows:

- (a) the Chairperson of the Tender Opening Committee will read aloud each Tender and record in the Tender Opening Sheet (TOS)
 - (i) the name and address of the Tenderer;
 - (ii) state if it is a withdrawn, modified, substituted , or original tender;
 - (iii) the Tender price;
 - (iv) the number of initialled corrections;
 - (v) any discounts;
 - (vi) any alternatives;
 - (vii) the presence or absence of any requisite Tender Security; and
 - (viii) Such other details as the Purchaser, at its discretion, may consider appropriate.
- (b) only discounts and alternative read aloud at the Tender opening will be considered in evaluation;
- (c) all pages of the original version of the Tender, except for un-amended printed literature, will be initialled by members of the Tender Opening Committee.

42.9 Upon completion of Tender opening, all members of the Tender Opening Committee and the Tenderers or Tenderer’s duly authorised representatives attending the Tender opening shall sign by name, address, designation and their national Identification Numbers the Tender Opening Sheet, copies of which shall be issued to the Head of the Purchaser or an officer authorised by him or her and also to the members of the Tender Opening Committee and any authorised Consultants and, to the

Tenderers immediately.

42.10 The omission of a Tenderer's signature on the record shall not invalidate the contents and effect of the record under ITT Sub-Clause 42.8.

42.11 No Tender will be rejected at the Tender opening stage except the LATE Tenders. .

42.12 A copy of the record shall be distributed to all Tenderers who submitted tenders in time, and posted online when electronic tendering is permitted.

43. Evaluation of Tenders

43.1 Purchaser's Tender Evaluation Committee (TEC) shall examine, evaluate and compare Tenders that are responsive to the mandatory requirements of Tender Documents in order to identify the successful Tenderer.

43.2 Tenders shall be examined and evaluated only on the basis of the criteria specified in the Tender Document.

44. Evaluation process

44.1 The TEC may consider a Tender as responsive in the Evaluation, only if it is submitted in compliance with the mandatory requirements set out in the Tender Document. The evaluation process should begin immediately after tender opening following four steps:

- (a) Preliminary Examination;
- (b) Technical Examinations and Responsiveness;
- (c) Financial evaluation and price comparison;
- (d) Post-qualification of the lowest evaluated responsive Tenders.

45. Preliminary Examination

45.1 Compliance, adequacy and authenticity of the documentary evidences for meeting the qualification criterion specified in the corresponding section of the Tender document shall have to be preliminarily examined and verified.

45.2 The TEC shall firstly examine the Tenders to confirm that all documentation requested in ITT Clause 21 has been provided. Examination of the compliance, adequacy and authenticity of the documentary evidence may follow the order below:

- (a) Verification of the completeness of the eligibility declaration in the Tender Submission Letter (Form PG4-1), to determine the eligibility of the tenderer as stated under ITT Sub-Clause 21(h). Any alterations to its format, filling in all blank spaces with the information requested, failing which the tender may lead to rejection of the Tender;
- (b) verification of that the Tenderer is enrolled in the relevant professional or trade organisations as stated under ITT Clause 21(l);
- (c) verification of the eligibility in terms of legal capacity and

fulfilment of taxation obligation by the tenderer in accordance as stated under ITT Sub-Clause 21(i) and 21(k);

- (d) verification of eligibility that the tenderer is not insolvent, in receivership, bankrupt, not in the process of bankruptcy, not temporarily barred as stated under ITT Sub-Clause 21(j);
- (e) verification of eligibility of Tenderer's country of origin as stated under ITT Sub-Clause 21(b);
- (f) verification of the written authorization confirming the signatory of the Tenderer to commit the Tender has been attached with Tender Submission Letter (Form PG4-1) as stated under ITT Sub-Clause 21(g); in order to check the authenticity of Tender and Tenderer itself ;
- (g) verification of the Tender Security as stated under ITT Sub-Clause 21(d); and
- (h) Verification of that the written notice for 'WITHDRAWAL' and 'SUBSTITUTION of or MODIFICATION to, the corresponding Tender is proper and authentic, if the tender is "WITHDRAWN", "SUBSTITUTION" or "MODIFICATION", as stated under ITT Sub-Clause 38.1

45.3 The TEC shall confirm that the above documents and information have been provided in the Tender and the completeness of the documents and compliance of instructions given in corresponding ITT Clauses shall be verified, failing which the tender shall be considered as non-responsive.

46. Technical Examinations & Responsiveness

46.1 Only those Tenders surviving preliminary examination need to be examined in this phase.

46.2 Secondly, the TEC will examine the adequacy and authenticity of the documentary evidence which may follow the order below:

- (a) Verification of the completeness of the country of origin declaration in the Price Schedule for Goods and Related Services (Form PG4-3B, 3C and PG4-3D) as furnished in Section 5: Tender and Contract Forms to determine the eligibility of the Goods and Related Services as stated under ITT Sub Clause 21(m).
- (b) Verification and examination of the documentary evidence and completed Specification Submission Sheet (Form PG4-4) as furnished in Section 5: Tender and Contract Forms to establish the conformity of the Goods and Related Services to the Tender Documents as stated under ITT Sub Clause 21(e) and 21(n).
- (c) Verification and examination of the documentary evidence that the Tenderer's qualifications conform to the Tender Documents and the Tenderer meets each of the qualification criterion specified in Sub-Section C,

Qualification Criteria as stated under ITT Sub Clause 21(o).

- (d) Verification and examination of the documentary evidence that Tenderer has met all the requirements in regards to scope of Supply as stated under Section 6, Schedule of Requirements, without any material deviation or reservation.
- 46.3 TEC may consider a Tender as responsive in the evaluation, only if comply with the mandatory requirements as stated under Clause 46.2.
- 46.4 The TEC's determination of a Tender's responsiveness is to be based on the documentary evidence as requested in Clause 46.2 without recourse to extrinsic evidence.
- 46.5 Information contained in a Tender, that was not requested in the Tender Document shall not be considered in evaluation of the Tender.
- 46.6 If a Tender is not responsive to the mandatory requirements set out in the Tender Document it shall be rejected by the TEC and shall not subsequently be made responsive by the Tenderer by correction of the material deviation, reservation.
- 46.7 A material deviation or reservation is one-
- (a) which affects in any substantial way the scope, quality, or performance of the Goods and Related Services and Tenderer's qualifications mentioned in the Tender Document.
 - (b) which limits in any substantial way, inconsistent with the Tender Documents, the Purchaser's rights or the Tenderer's obligations under the Contract; or
 - (c) Whose rectification would anyway affect unfairly the competitive position of other Tenderers presenting responsive Tenders.
- 46.8 During the evaluation of Tender, the following definitions apply:
- (a) "Deviation" is a departure from the requirements specified in the Tender Document;
 - (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Tender Document;
- 46.9 A TEC may regard a Tender as responsive, even if it contains-
- (a) minor or insignificant deviations, which do not meaningfully alter or depart from the technical specifications, characteristics and commercial terms and conditions or other requirements set out in the Tender Document;
 - (b) errors or oversights, which if corrected, would not alter the key aspects of the Tender.

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- 47. Clarification on Tender**
- 47.1 The TEC may ask Tenderers for clarifications of their Tenders, including breakdowns of unit rates, in order to assist the examination and evaluation of the Tenders, provided that, Tender clarifications which may lead to a change in the substance of the Tender or in any of the key elements of the Tender as stated under ITT Sub-Clause 46.7, shall neither be sought nor permitted by the TEC.
- 47.2 Change in the tender price shall not be sought or permitted, except to confirm correction of arithmetical errors discovered by the Purchaser in the evaluation of the Tender, as stated under ITT Clause 49.
- 47.3 Any request for clarifications by the TEC shall not be directed towards making an apparently non-responsive Tender responsive and reciprocally the response from the concerned Tenderer shall not be articulated towards any addition, alteration or modification to its Tender.
- 47.4 If a Tenderer does not provide clarifications of its Tender by the date and time set in the TEC's written request for clarification, its Tender shall not be considered in the evaluation.
- 47.5 Requests for clarification shall be in writing and shall be signed only by the Chairperson of the TEC.
- 48. Restrictions on the Disclosure of Information Relating to the Procurement Process**
- 48.1 Following the opening of Tenders until issuance of Notification of Award no Tenderer shall, unless requested to provide clarification to its Tender or unless necessary for submission of a complaint, communicate with the concerned Purchaser pursuant to Rule 31 of the Public Procurement Rule, 2008.
- 48.2 Tenderers shall not seek to influence in anyway, the examination and evaluation of the Tenders.
- 48.3 Any effort by a Tenderer to influence a Purchaser in its decision concerning the evaluation of Tenders, Contract awards may result in the rejection of its Tender as well as further action in accordance with Section 64 (5) of the Public Procurement Act 2006.
- 48.4 All clarification requests shall remind Tenderers of the need for confidentiality and that any breach of confidentiality on the part of the Tenderer may result in their Tender being disqualified.
- 48.5 Information relating to the examination, evaluation, comparison, and post qualification of the tender or contract award, shall not be disclosed to tenderers or any other persons not officially concerned with such process.
- 49. Correction of Arithmetical Errors**
- 49.1 The TEC shall correct any arithmetic errors that are discovered during the examination of Tenders, and shall promptly notify the concerned Tenderer(s) of any such correction(s) pursuant to Rule 98(11) of the Public Procurement Rule, 2008.

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- 49.2 Provided that the Tender is responsive, TEC shall correct arithmetical errors on the following basis:
- (a) If there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of the TEC there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted will govern and the unit price will be corrected;
 - (b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.
- 49.3 Any Tenderer that does not accept the correction of the Tender amount following correction of arithmetic errors as determined by the application of ITT Sub-Clause 49.2 shall be considered as non-responsive.
- 50. Conversion to Single Currency**
- 50.1 For evaluation and comparison purpose, TEC shall convert all Tender prices expressed in the amounts in various currencies into an amount in Bangladeshi Taka currency, using the **selling exchange rates** established by the Bangladesh Bank, on the date of **Tender opening**.
- 51. Domestic Preference**
- 51.1 **Domestic preference** shall be followed as per rules of PPR 2008.
- 51.2 If **domestic preference shall be a tender-evaluation factor**, the Purchaser will grant a margin of fifteen percent (15%) domestic preference to Goods manufactured in Bangladesh during the evaluation of its Tender while comparing the same with those of other Tenderers under the classification set out in ITT Sub-Clause 51.3. The evaluation will be carried out in accordance with the provisions set out in ITT Clause 54.
- 51.3 Tenders will be classified in one of two groups, as follows:
- (a) **Group A:** Tender offering goods manufactured in Bangladesh, for which:
 - (i) labour, raw materials, and components from within the Bangladesh account for more than thirty (30) percent of the EXW price; and
 - (ii) the production facility in which they will be manufactured or assembled has been engaged in manufacturing or assembling such goods at least since the date of tender submission.
 - (b) **Group B:** Tenders offering Goods manufactured outside Bangladesh that have been already imported or that will be imported.
- 51.4 To facilitate this classification by the Tenderer, the Tenderer shall complete whichever Form of the Price Schedule furnished in the Tender Document is appropriate.

**52. Financial
Evaluation**

51.5 Completion of an inappropriate Form of the Price Schedule by the Tenderer shall not result in rejection of its tender, but merely in the Purchaser's reclassification of the tenderer into its appropriate tender group.

52.1 Thirdly the TEC, pursuant to Rule 98 of the Public Procurement Rules, 2008 shall evaluate each Tender that has been determined, up to this stage of the evaluation, to be responsive to the mandatory requirements in the Tender Document.

52.2 To evaluate a Tender in this stage, the Purchaser shall consider the following:

- (a) Verification and examination of the Price Schedule for Goods and Related Services (Form PG4-3A, 3B, 3C and PG4-3D) as furnished by the Tenderer and checking the compliance with the instructions provided under ITT Clause 23;
- (b) Evaluation will be done for Items or lot by lot as stated under ITT Clause 23 and the Total Tender Price as quoted in accordance with Clause 23 ;
- (c) Adjustment for correction of arithmetical errors as stated under ITT Sub-Clause 49.2;
- (d) Adjustment for price modification offered as stated under ITT Clause 38;
- (e) Adjustment due to discount as stated under ITT Sub-Clauses 23.8, 23.9 and 52.3;
- (f) Adjustment due to the application of economic factors of evaluation as stated under ITT Sub-Clause 52.5 if any;
- (g) Adjustment due to the assessment of the price of unpriced items as stated under ITT Clause 53 if any;
- (h) Adjustment due to the application of a margin of preference (domestic preference), in accordance with ITT Clause 54 if applicable

52.3 If Tenders are invited for a single lot or for a number of lots as stated under ITT Sub-clauses 23.3, TEC shall evaluate only lots that that have included at least the percentage of items per lot as stated under ITT Sub-Clause 23.5 and 23.6. The TEC shall evaluate and compare the Tenders taking into account:

- (a) Lowest evaluated tender for each lot ;
- (b) The price discount/reduction per lot;
- (c) Least cost combination for the Purchaser, considering discounts and the methodology for its application as stated under ITT Sub-clauses 23.8 and 23.9 offered by the Tenderer in its Tender.

52.4 Only those spare parts and tools which are specified as a item in the List of Goods and Related Services in Section 6, Schedule of Requirement or adjustment as stated under ITT Sub-clause 52.5, shall be taken into account in the Tender evaluation. Supplier-recommended spare parts for a specified operating requirement

as stated under ITT Sub-clause 25.2(b) shall not be considered in Tender evaluation.

52.5 The Purchaser's evaluation of a tender may require the consideration of other factors, in addition to the Tender Price quoted as stated under ITT Clause 23. The effect of the factors selected, if any, shall be expressed in monetary terms to facilitate comparison of tenders. The factors, methodologies and criteria to be used shall be as specified in TDS. The applicable economic factors, for the purposes of evaluation of Tenders shall be:

- (a) Adjustment for Deviations in the Delivery and Completion Schedule
- (b) Cost of major replacement components, mandatory spare parts, and service

52.6 Variations, deviations, and alternatives and other factors which are in excess of the requirements of the Tender Document or otherwise result in unsolicited benefits for the Purchaser will not be taken into account in Tender evaluation.

53. Assessing the Price of Unpriced Items

53.1 If it is so permitted under ITT Clause 23 , any Tenderer offered only eighty percent (80%) or minimum percent of the items of a lot as stated under ITT Sub-Clause 23.5, the TEC shall calculate the total lot value by adding up the average prices offered by other responsive Tenderers for the missing items to the lot value to establish the winning lot Tender. If the Tenderer offered less than the specified, the Tender shall be evaluated as sated under ITT Clause 23.

53.2 If the winning lot is missing some items as stated under ITT Sub Clause 53.1, comprising less than twenty percent (20%), the Purchaser may procure the missing items from the Tenderer offering the least cost for those remaining items.

54. Evaluation of Domestic Preference

54.1 If the Tender document so specifies, the Tenderer will grant a margin preference to goods manufactured in Bangladesh as stated in ITT Caluse 51 for the purpose of Tender comparison, in accordance with the procedure outlined below:

54.2 The Purchaser will first review the tenders to confirm the appropriateness of, and to modify as necessary, the tenderer group classification to which Tenderers assigned their tenders in preparing their Tender Forms and Price Schedules.

54.3 All evaluated tenders in each group will then be compared to determine the lowest evaluated tender of each group. Such lowest evaluated tenders shall be compared with each other and if as a result of this comparison a tenderer from Group A and the Tenders offering Goods manufactured in Bangladesh is the lowest, it shall be selected for the award.

54.4 If, as a result of the preceding comparison, the lowest evaluated tender is from Group B,

- (a) all Group B tenders will then be further compared with the

lowest evaluated tender from Group A, after adding to the evaluated tender price of goods offered in the tender for Group B, for the purpose of further comparison only an amount equal to fifteen (15) percent of the CIF/CIP (named place of destination or named port of destination) tender price.

- (b) The lowest-evaluated tender determined from this last comparison shall be selected for the award.

55. Price Comparison

- 55.1 The TEC shall compare all responsive Tenders to determine the lowest-evaluated Tender, as stated under ITT Clause 54.
- 55.2 In the extremely unlikely event that there is a tie for the lowest evaluated price, the Tenderer with the superior past performance with the Purchaser shall be selected, whereby factors such as delivery period, quality of Goods delivered, complaints history and performance indicators could be taken into consideration.
- 55.3 In the event that there is a tie for the lowest price and none of the Tenderers has the record of past performance with the Purchaser, then the the Tenderer shall be selected, subject to firm confirmation through the Post-qualification process described in ITT Clause 57, after consideration as to whether the quality of Goods that is considered more advantageous by the end-users.
- 55.4 The successful Tenderer as stated under ITT Sub Clauses 55.1, 55.2 and 55.3 shall not be selected through lottery under any circumstances.

56. Negotiation

- 56.1 No negotiations shall be held during the Tender evaluation or award with the lowest or any other Tenderer pursuant to Rule 99 of the Public Procurement Rules, 2008.

57. Post-qualification

- 57.1 After determining the lowest-evaluated responsive tender as sated under ITT Sub-Clause 55.1, the Purchaser's TEC pursuant to Rule 100 of the Public Procurement Rules, 2008, shall carry out the Post-Qualification of the Tenderer, using only the requirements specified in Sub-Section C, Qualification Criteria.
- 57.2 The TEC shall contact the references given by Tenderers about their previous Supply experiences to verify, if necessary, statements made by them in their Tender and to obtain the most up-to-date information concerning the Tenderers.
- 57.3 The TEC may visit the premises of the Tenderer as a part of the post-qualification process, if practical and appropriate, to verify information contained in its Tender.
- 57.4 The TEC shall determine to its satisfaction whether the Tenderer that is selected as having submitted the lowest evaluated responsive Tender is qualified to perform the Contract satisfactorily.
- 57.5 The objective of any visit under ITT Sub-Clause 57.3 shall be limited to a general and visual inspection of the Tenderer's facilities and its plant and equipment, and there shall be no discussion concerning the Tender or its evaluation with the

Tenderer during such visit(s).

- 57.6 In the event that the Tenderer with lowest evaluated cost fails the post-qualification, the TEC shall make a similar determination for the Tenderer offering the next lowest evaluated cost and so on from the remaining responsive Tenders, provided that,
- (a) such action shall only be taken if the evaluated costs of the Tenders under consideration are acceptable to the Purchaser;
 - (b) when the point is reached whereby the evaluated costs of the remaining responsive Tenders are significantly higher than that of the official estimate, or the market price, the Purchaser may take action pursuant to Rule 33 and may proceed for re-Tendering, using a revised Tender Document designed to achieve a more successful result.

58. Rejection of All Tenders

- 58.1 The Purchaser may, in the circumstances as stated under ITT Sub-Clause 58.2 and pursuant to Rule 33 of the Public Procurement Rules 2008, reject all Tenders following recommendations from the Evaluation Committee only after the approval of such recommendations by the Head of the Purchaser.
- 58.2 All Tenders can be rejected, if -
- (a) the price of the lowest evaluated Tender exceeds the official estimate, provided the estimate is realistic; or
 - (b) there is evidence of lack of effective competition; such as non-participation by a number of potential Tenderers; or
 - (c) the Tenderers are unable to propose completion of the delivery within the stipulated time in its offer, though the stipulated time is reasonable and realistic; or
 - (d) all Tenders are non-responsive; or
 - (e) Evidence of professional misconduct, affecting seriously the Procurement process, is established pursuant to Rule 127 of the Public Procurement Rules, 2008.
- 58.3 Notwithstanding anything contained in ITT Sub-Clause 58.2 Tenders may not be rejected if the lowest evaluated price is in conformity with the market price.
- 58.4 A Purchaser may pursuant to Rule 35 of the Public Procurement Rules, 2008, on justifiable grounds, annul the Procurement proceedings prior to the deadline for the submission of Tenders.
- 58.5 All Tenders received by the Purchaser shall be returned unopened to the Tenderers in the event Procurement proceedings are annulled under ITT Sub-Clause 58.4.

59. Informing Reasons for Rejection

- 59.1 Notice of the rejection, pursuant to Rule 35 of the Public Procurement Rules, 2008, will be given promptly within seven (7) days of decision taken by the Purchaser to all Tenderers and, the Purchaser will, upon receipt of a written request, communicate to any Tenderer the reason(s) for its rejection but is not required to

justify those reason(s).

G. Contract Award

- 60. Award Criteria**
- 60.1 The Purchaser shall award the Contract to the Tenderer whose offer is responsive to the Tender Document and that has been determined to be the lowest evaluated Tender, provided further that the Tenderer is determined to be Post-Qualified as stated under ITT Clause 57.
- 60.2 A Tenderer shall not be required, as a condition for award of contract, to undertake obligations not stipulated in the Tender Document, to change its price, or otherwise to modify its Tender.
- 61. Purchaser's Right to Vary Quantities**
- 61.1 The Purchaser reserves the right at the time of Contract Award to increase or decrease the quantity, per item, of Goods and Related Services originally specified in Section 6: Schedule of Requirements, provided this does not exceed the percentages indicated in the TDS, and without any change in the unit prices or other terms and conditions of the Tender and the Tender Document.
- 62. Notification of Award**
- 62.1 Prior to the expiry of the Tender validity period and within seven (7) working days of receipt of the approval of the award by the Approving Authority, the Purchaser pursuant to Rule 102 of the Public procurement Rules, 2008, shall issue the Notification of Award (NOA) to the successful Tenderer
- 62.2 The Notification of Award, attaching the contract as per the sample (Form PG4-7) to be signed, shall state:
- (a) the acceptance of the Tender by the Purchaser;
 - (b) the price at which the contract is awarded;
 - (c) the amount of the Performance Security and its format;
 - (d) the date and time within which the Performance Security shall be submitted; and
 - (e) the date and time within which the contract shall be signed.
- 62.3 The Notification of Award shall be accepted in writing by the successful Tenderer within seven (7) working days from the date of issuance of NOA.
- 62.4 Until a formal contract is signed, the Notification of Award shall constitute a Contract, which shall become binding upon the furnishing of a Performance Security and the signing of the Contract by both parties.
- 62.5 The Notification of Award establishes a Contract between the Purchaser and the successful Tenderer and the existence of a Contract is confirmed through the signature of the Contract Document that includes all agreements between the Purchaser and the successful Tenderer.
- 63. Performance Security**
- 63.1 The Performance Security shall be determined sufficient to protect the performance of the Contract pursuant to Rule 27 of the Public Procurement Rules, 2008.

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- 63.2 Performance Security shall be furnished by the successful Tenderer in the amount specified in the TDS and **denominated in the currencies** in which the Contract Price is payable pursuant to Rule 102 (8) of the Public Procurement Rules, 2008.
- 63.3 The proceeds of the Performance Security shall be payable to the Purchaser unconditionally upon first written demand as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.
- 64. Form and Time Limit for furnishing of Performance security**
- 64.1 The Performance Security shall be in the form of irrevocable Bank Guarantee in the format (Form PG4-9) as stated under ITT Clause 63, **shall be issued by an internationally reputable bank and it shall have correspondent bank located in Bangladesh, to make it enforceable** pursuant to Rule 27(4) of the Public Procurement Rules, 2008..
- 64.2 Within twenty-eight (28) days from issue of the Notification of Award, the successful Tenderer shall furnish the Performance Security for the due performance of the Contract in the amount specified under ITT Sub Clause 63.2.
- 65. Validity of Performance Security**
- 65.1 The Performance Security shall be required to be valid until a date twenty-eight (28) days beyond the date of completion of the Supplier's performance obligations under the Contract, including any warranty obligations.
- 65.2 If under any circumstances date of completion of the Supplier's performance obligations under the Contract, including any warranty obligations is to be extended, the Performance Security shall correspondingly be extended for the extended period.
- 66. Authenticity of performance Security**
- 66.1 The Purchaser shall verify the authenticity of the Performance Security submitted by the successful Tenderer by sending a written request to the branch of the bank issuing irrevocable Bank Guarantee in specified format.
- 66.2 If the Performance Security submitted under ITT Sub Clause 63.2 is not found to be authentic, the Purchaser shall proceed to take measures against the Tenderer in accordance with Section 64 of the Act and pursuant to Rule 127 of the Public Procurement Rules, 2008.
- 67. Contract Signing**
- 67.1 At the same time as the Purchaser issues the Notification of Award, the Purchaser shall send the draft Contract Agreement and all documents forming the Contract pursuant to Rule 102 of the Public Procurement Rule, 2008, to the successful Tenderer.
- 67.2 Within twenty-eight (28) days of the issuance of Notification of Award, the successful Tenderer and the Purchaser shall sign the contract provided that the Performance Security submitted by the Tenderer is found to be genuine.
- 67.3 If the successful Tenderer fails to provide the required Performance Security, as stated under ITT Clause 63 or to sign the Contract , as stated under ITT Sub-Clause 67.2, Purchaser

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- shall proceed to award the Contract to the next lowest evaluated Tenderer, and so on, by order of ranking pursuant to Rule 102 of the Public Procurement Rules, 2008.
- 68. Publication of Notification of Award of Contract**
- 68.1 Notification of Awards for Contracts of Taka 10(ten) million and above shall be notified by the Purchaser to the Central Procurement Technical Unit within 7(seven) days of issuance of the NOA for publication in their website, and that notice shall be kept posted for not less than a month pursuant to Rule 37 of the Public Procurement Rules, 2008.
- 68.2 Notification of Award for Contracts below Taka 10(ten) million, shall be published by the Purchaser on its Notice Board and where applicable on the website of the Purchaser and that notice shall be kept posted for not less than a month pursuant to Rule 37 of the Public Procurement Rules, 2008..
- 69. Debriefing of Tenderers**
- 69.1 Debriefing of Tenderers by Purchaser shall outline the relative status and weakness only of his or her Tender requesting to be informed of the grounds for not accepting the Tender submitted by him or her pursuant to Rule 37 of the Public Procurement Rule, 2008, without disclosing information about any other Tenderer.
- 69.2 In the case of debriefing confidentiality of the evaluation process shall be maintained.
- 70. Right to Complain**
- 70.1 Any Tenderer has the right to complain if it has suffered or likely to suffer loss or damage due to a failure of a duty imposed on the Purchaser to fulfil its obligations in accordance with Section 29 of the Public Procurement Act 2006 and pursuant to Part 12 of Chapter Three of the Public Procurement Rules, 2008.
- 70.2 Circumstances in which a formal complaint may be lodged in sequence by a potential Tenderer against a Purchaser pursuant to Rule 56 of the Public Procurement Rules, 2008, and the complaints, if any, be also processed pursuant to Rule 57 of the Public Procurement Rules 2008 .
- 70.3 The potential Tenderer shall submit his or her complaint in writing within seven (7) calendar days of becoming aware of the circumstances giving rise to the complaint.
- 70.4 In the first instance, the potential Tenderer shall submit his or her complaint to the Purchaser who issued the Tender Document.
- 70.5 The place and address for the first stage in the submission of complaints to the Administrative Authority is provided in the TDS.
- 70.6 The Tenderer may appeal to a Review Panel only if the Tenderer has exhausted all his or her options of complaints to the administrative authority as stated under ITT Sub-Clause 70.2.

Section-2: Tender Data Sheet

UNSIGNED COPY

Section-2: Tender Data Sheet

Instructions for completing the Tender Data Sheet are provided, as needed, in the notes in italics and under lined mentioned for the relevant ITT clauses.

ITT Clause	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers.
A. General	
ITT 1.1	<p>The Purchaser is: Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Khulna.</p> <p>The Name and identification number of Tender is :</p> <p>Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis.</p> <p>Package No.: 03 (Three)</p>
ITT 1.2	The number, identification and name of lots comprising the Tender is Single lot, the list of goods and related services are identified in Section 6: Schedule of Requirements.
ITT 3.1	The source of public fund is GoB and WZPDCL own fund.
ITT 3.3	The name of the Development Partner is :None
ITT 5.1	Tenderers from the following countries are not eligible: Israel
ITT 6.1	Goods and Related Services from the following counties are not eligible: Israel
B. Tender Document	
ITT 8.2	<p>The following are the offices of the Purchaser or authorised agents for the purpose of providing the Tender Document:</p> <ol style="list-style-type: none"> I. Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Khulna. II. Office of the Divisional Commissioner, Khulna. III. Office of the Director of Purchase, BPDB, WAPDA Building (9th Floor), Motijheel C/A, Dhaka-1000.
ITT 9.1	<p>For clarification of Tender purposes only, the Purchaser's address is:</p> <p>Attention: Engr. Md. Shahidul Alam, Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Khulna</p> <p>Address: Bidyut Bhaban, Boyra Main Road, Khulna-9000</p> <p>Telephone: +88 01700709717, Facsimile number: +88 041 731786</p> <p>Electronic mail address: smartprepayment@gmail.com</p>

ITT Clause	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers.
ITT 10.1	The Pre- Tender meeting shall be held at Address: "Conference Room", 1 st floor, Biddut Bhaban, WZPDCL, Boyra Main Road, Khulna. Time & Date: 09.06.2021at 10:00 AM (BST)
C. Qualification Criteria	
ITT 13.1	The maximum 3 (three) number of arbitrations against the Tenderer over last five (5) years.
ITT 14.1(a)	The Tenderer shall have a minimum of five (5)years of overall experience in the supply of goods and related services, including the following requirement: a) The minimum general experience of the tenderer/manufacturer in the network building, databaseoriented software, hardware & software integrated and interfaced software making of at least 02 nos. in operation or and installation of Smart Prepayment Electric Metering System in Electricity utility since last 5 (five) calendar years. b) The tenderer/ manufacturer shall have local establishment or local representative having proper establishment in Bangladesh for providing instant services as and when required.
ITT 14.1(b)	The Tenderer should fulfilled the following requirements: a) The tenderer/ manufacturer shall have updated ISO certification. b) The manufacturer shall have Satisfactory completion of supply of minimum 50,000 nos. Smart Prepaid Meter with PLC communication and 500 nos. of Data concentrators under a single contract during last 5 (five) calendar years. c) The tenderer/ manufacturer shall have Satisfactory Performance Certificate from the End User (must be a Utility of electricity) with at least 2(Two) contracts of "Design, Manufacture, Supply, Installation, Testing & Commissioning of Smart Pre-Payment meter& Online Smart Pre-Payment Metering System" ofat least 1(one) from outside the manufacturers own country of theSmart Pre-Paid Meter with PLC communicationduring last 5 (five) calendar years. All end user certificates shall be in English in their letter head pad of the end users where detailed e-mail address, Telephone no., Fax no. will be furnished. d) The tenderer shall furnish manufacturer authorization for offered major items like smart pre-payment meter (single phase and three phase), DCU, server/computer, switch/router& Service Cable. e) The tenderer and respective manufacturer shall fill up Specifications Submission & Compliance Sheet (PG4-4) for offered goods with appropriate data. f) The manufacturer shall have supply record of major hardware items like

ITT Clause	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers.
	<p>smart pre-payment meter (single phase and three phase) and DCU for last 5 (five) calendar years.</p> <p>g) Tenderer shall submit DLMS/COSEM CTT3.1 (or updated) certificate of the proposed meters. The Manufacturer's own test report will not be accepted.</p> <p>h) The following samples shall be submitted with the tender to confirm the tender requirement.</p> <p>l) Single phase smart pre-payment meter with both GPRS(3G/4G) and G3-PLC FCC/ Broadband PLC Communication and RF Communication (plug and play) module (Keypad based): 02 (Two) nos.</p> <p>ll) Three phase smart pre-payment meter with both GPRS(3G/4G) and G3-PLC FCC/ Broadband PLC Communication and RF Communication (plug and play) module (Keypad based): 02 (Two) nos.</p> <p>lll) Data Concentrator Unit (DCU): 01 (one) nos.</p> <p>i) Type test report for sample meters (those are submitted with the bid) from internationally reputed independent testing laboratory as per Cl. no. 7.49 of Section-7 Technical Specification.</p> <p>j) Demonstration: Preliminary responsive Tenderers shall have to successfully present & demonstrate the functionality on the sample meters & Existing Smart Pre-payment Metering System (Unified system as well as HES and MDM system) of the tenderer or as per Technical Specification of Tender requirements. The Tenderer's DCU shall have ability to interface and integrate with smart meters from at least 02 (Two) other manufacturers (such manufacturing companies' meter must be already interfaced with the existing Unified system) to ensure interoperability on demonstration. The respective preliminary qualified tenderer will be notified the date of presentation/demonstration at least 07 (Seven) days ahead of the presentation/ demonstration. This presentation/demonstration will be a part of the technical evaluation. Without changing the sample meter, the tenderer may perform the demonstration with necessary firmware upgradation. The tenderers, who will fail to perform this presentation/ demonstration on sample meters & Smart Pre-payment Metering System or whose presentation/demonstration will be unsatisfactory as per technical specification of tender requirements, will be considered Technically Non-responsive and as such their tender will be rejected and shall not be considered for further evaluation.</p> <p>k) Interfacing: The system software has been developed and irrected. The prescribed interfacing protocol has been developed in JAVA which is attached in Part -2 of the tender document. The tenderer's meters will follow that protocol and the tenderer will complete their interfacing on or before demonstration date. No tender will be technically responsive until and unless the interfacing API works and complies with</p>

ITT Clause	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers.
	requirements and also fully satisfy the Engineers authorized by the purchaser. Otherwise the tender shall be rejected and will not be considered for further evaluation.
ITT 14.1(c)	The minimum supply and/or production capacity of Goods is/ are: 2,00,000 (Two Lac) nos. Smart Pre-payment meters/ year.
ITT 15.1(a)	The minimum amount of liquid asset or working capital or credit facility is 720(Seven Hundred and Twenty) million BDT or equivalent.
ITT 16.2	The maximum of percentage 15% of Goods allowed to be subcontracted
D. Preparation of Tender	
ITT 21.1(q)	In addition to the Clause ITT 21.1 the following Documents to be submitted by the tenderer/ manufacturer : i. Documentary evidence in accordance with ITT Clauses 28 establishing the Tenderer qualification to perform the Contract if it's Tender is accepted. [Ref.- ITT cl .no 20.1(g)]. ii. Description of work method and schedule. iii. Delivery and completion time shall be 180 days from the date of qualified commitment of the letter of credit(L/C). iv. List of manufacturers, places of manufacture and testing. v. Details of key personnel. vi. Drawings, documents, catalogues and leaflets. vii. The tenderer shall have to submit the Authorization Letter from data network service provider at their letter head pad as confirmation.
ITT 22.1	Alternatives "shall not be" permitted.
ITT 23.3	Tender is invited for a single lot.
ITT 23.5	Price quoted for each lot shall correspond at least to [insert figure %] of the items specified for each lot and correspond at least to [insert figure %] of the total lot value. N.A.
ITT 23.7	The following particular item represents more than fifty percent (50%) of the estimated lot value is: N.A.
ITT 23.11(c) ITT 23.12 (c) ITT 23.13 (e)	"Final destination (Project Site)": Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.

ITT Clause	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers.
ITT 23.12 (a)	Place of Destination: Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.
ITT 23.12 (d)	In addition to the CIF/CIP price specified in ITT 23.12(a), the price of the Goods manufactured outside Bangladesh shall be quoted: [insert appropriate INCOTERM, other than CIF/CIP] N.A.
ITT 24.3	Name of the foreign currency: USD
ITT 25.2(b)	Spare parts are: Under turnkey contract supply of spare parts upto the warranty period is the responsibility of the supplier. Period of time the Goods are expected to be functioning (for the purpose of spare parts): 3 (three years)
ITT 26.1(b)	Manufacturer's authorization is: Required A Manufacturer's Authorisation Letter is required for [All the items listed in Section 6: Schedule of Requirements.]
ITT 26.1(C)	After sales service is: Required for the period of 3 (Three) years from the date of commissioning or replacement of any goods and serices.
ITT 27.2	The Tender validity period shall be 120 days.
ITT 29.2	The Tender Security shall furnish in favour of Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Khulna.
ITT 29.3	The amount of the Tender Security shall be Tk1,50,00,000.00 (in word: One Crore and Fifty Lakh BDT) or USD 1,76,890.00 (in word: One Lakh Seventy Six Thousand Eight Hundred and Ninety USD).
ITT 34.1	In addition to the original of the Tender, two (02) copies shall be submitted.
E. Submission of Tender	
ITT 35.2(c)	The Tender shall be One stage two envelope. Technical and financial proposal shall be submitted in two separate envelopes with soft copy (ina CD/ pendrive) duly sealed and signed, which shall be in a single envelope duly addressed to the employer. The Technical envelope will be opened first. The Financial Proposal will be kept in safe custody. Financial Proposal of only technically responsive bids will be opened at date and time to be notified later to the respective bidder. The Financial Proposal of the technically non-responsive bidder will be returned unopened to the respective bidder. The tenderer shall enclose the sealed and signed original Technical Proposal and Financial Proposal in different envelope. The envelopes will be marked as Technical Proposal Original and Financial Proposal Original. Similarly copies of technical and financial proposal will be enclosed in two different envelopes and the envelope will be marked 'Copy Technical Proposal' and 'Copy Financial Proposal'. Then original Technical Proposal

ITT Clause	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers.
	<p>envelope and copy of the technical proposals will be put into another envelope and the envelope will be marked as technical proposal. Similarly Original of the Financial Proposal and Copy of the Financial Proposal will put into another envelope will be marked as Financial Proposal. These two envelopes of Technical Proposal and Financial proposal shall then be enclosed one single outer envelope. All the envelopes should be duly sealed and signed by the bidder.</p> <p>Technical proposal shall be submitted as a binding book. Technical proposal in Clip file is not allowed. Soft copy of the Technical proposal and Financial proposal shall be submitted in a CD or Pendrive.</p> <p>The tenderer shall submit Sealed & signed original Tender Document (which was issued by the Employer) by a person duly authorized to sign on behalf of the Tenderer. Copy of issued tender document will not be acceptable.</p>
ITT 35.7	Tenderer “shall not” have the option of submitting their tender electronically.
ITT 35.8	<p>If bidders shall have the option of submitting their bids electronically, the electronic bidding submission procedures shall be:</p> <p style="text-align: center;">N.A.</p>
ITT 36.1	<p>For <u>Tender submission purposes</u> ,the Purchaser’s address is:</p> <p>Attention: Engr. Md. Shahidul Alam, Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Khulna.</p> <p>Address: Office of the Director of Purchase, BPDB WAPDA Building (9th Floor), MotijheelC/A, Dhaka-1000.</p> <p>[Note: important to avoid delays or misplacement of tenders]</p> <p>The deadline for submission of Tenders is 11:30 AM (BST) on 30June, 2021.</p>
F. Opening and Evaluation of Tenders	
ITT 42.2	<p>The Tender opening shall take place at:</p> <p>Address: Office of the Director of Purchase, BPDB WAPDA Building (9th Floor), MotijheelC/A, Dhaka-1000.</p> <p>Time & Date: At 12:00 PM (BST) on 30 June, 2021.</p>
ITT 42.3	<p>If electronic tender submission is permitted as sated under ITT sub-clause 34.8, the specific tender opening procedures shall be:</p> <p style="text-align: center;">N.A.</p>
ITT 51.1	Domestic preference “shall not” be a tender evaluation factor.
ITT 52.5	The applicable economic factors, for the purposes of evaluation of Tenders shall be: N.A.

ITT Clause	Amendments of, and Supplements to, Clauses in the Instruction to Tenderers.
	<p>(a) <u>Adjustment for Deviations in the Delivery and Completion Schedule</u></p> <p>“The Goods covered by this Tendering process are required to be delivered in accordance with, and completed within, the Delivery and Completion Schedule specified in Section 6, Schedule of Requirements. No credit will be given for earlier completion. Tender offering late contract performance schedules within acceptable period will be accepted but the tenders shall be Adjusted in the evaluation by adding to the Tender Price at the rate of [specify percentage] of the Tender Price for each day of delay. Tender offering delivery schedules beyond [specify time Limit] of the date specified in Section 6, Schedule of Requirement, shall be rejected.”</p> <p>(b) <u>Cost of major replacement components, mandatory spare parts, and service</u></p> <p>The Procuring will draw up a list of high-usage and high-value items of components and spare parts [specify (spare parts, tools, major assemblies, estimated quantities)] of usage in the initial period [specify period] of operation. The total cost of these items and quantities will be computed from spare parts unit prices submitted by the Tenderer and added to the tender price, for evaluation purposes only.</p>
G. Award of Contract	
ITT 61.1	<p>The maximum percentage by which quantities per item may be increased is 15%.</p> <p>The maximum percentage by which quantities per item may be decreased is 15%.</p>
ITT 63.2	<p>The amount of Performance Security shall be 10 percent of the Contract Price.</p>
ITT 70.5	<p>The name and address of the office where complaints to the Purchaser are to be submitted is:</p> <p>First Stage :</p> <p>Attention: Engr. Md. Shahidul Alam, Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Khulna</p> <p>Address: Bidyut Bhaban, Boyra Main Road, Khulna-9000.</p> <p>Second Stage :</p> <p>Attention: Managing Director, WZPDCL, Khulna</p> <p>Address: Bidyut Bhaban, Boyra Main Road, Khulna-9000.</p>

Section-3: General Conditions of Contract

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Section-3: General Conditions of Contract

1. Definitions

1.1 The following words and expressions shall have the meaning hereby assigned to them. Boldface type is used to identify the defined term:

- (a) **Completion Schedule** means the fulfilment of the Related Services by the Supplier in accordance with the terms and conditions set forth in the Contract;
- (b) **Contract Agreement** means the Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein;
- (c) **Contract Documents** means the documents listed in the Contract Agreement, including any amendments thereto;
- (d) **Contract Price** means the price stated in the Notification of Award and thereafter as adjusted in accordance with the provisions of the Contract;;
- (e) **Day** means calendar days unless otherwise specified as working days;
- (f) **Delivery** means the transfer of ownership of the Goods from the Supplier to the Purchaser in accordance with the terms and conditions set forth in the Contract;
- (g) **GCC** mean the General Conditions of Contract;
- (h) **Goods** means raw materials, products and equipment and objects in solid, liquid or gaseous form, electricity, and related Services if the value of such Services does not exceed that of the Goods themselves ;
- (i) **Government** means the Government of the People's Republic of Bangladesh;
- (j) **Procuring Entity/Purchaser** means a Entity having administrative and financial powers to undertake Procurement of Goods, Works or Services using public funds, as specified in the PCC;
- (k) **Related Services** means Services linked to the supply of Goods contracts.;
- (l) **PCC** means the Particular Conditions of Contract;
- (m) **Subcontractor** means any natural person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier;
- (n) **Supplier** means a Person under contract with a Purchaser for the supply of Goods and related Services under the Act;
- (o) **Site** means the point(s) of delivery named in the PCC
- (p) **Writing** means communication written by hand or machine duly signed and includes properly authenticated messages by facsimile or electronic mail.
- (q) **Verified Report** means the report submitted by the Purchaser to the Head of the Purchaser setting forth its

findings as to the existence of grounds or causes for termination and explicitly stating its recommendation for the issuance of a Notice to Terminate.

- 2. Contract Documents**
- 2.1 Subject to the order of precedence set forth in the GCC Sub-Clause 5.1, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The Contract Agreement shall be read as a whole.
- 3. Corrupt, Fraudulent, Collusive or Coercive Practices**
- 3.1 The Government requires that Purchaser, as well as Suppliers, shall observe the highest standard of ethics during the implementation of procurement proceedings and the execution of contracts under public funds.
- 3.2 The Government requires that Procuring Entities, as well as Suppliers shall, during the execution of Contracts under public funds, ensure-
- (a) strict compliance with the provisions of Section 64 of the Public Procurement Act 2006 (Act 24 of 2006);
 - (b) abiding by the code of ethics as mentioned in the Rule 127 of the Public Procurement Rules, 2008;
 - (c) that neither it nor any other member of its staff or any other agents or intermediaries working on its behalf engages in any practice as detailed in GCC Sub -Clause 3.3
- 3.3 For the purpose of GCC Sub-clause 3.2 the terms –
- (a) **corrupt practice** means offering, giving or promising to give, receiving, or soliciting, either directly or indirectly, to any officer or employee of a Purchaser or other public or private authority or individual, a gratuity in any form; employment or any other thing or service of value as an inducement with respect to an act or decision or method followed by a Purchaser in connection with a Procurement proceeding or contract execution;
 - (b) **fraudulent practice** means the misrepresentation or omission of facts in order to influence a decision to be taken in a Procurement proceeding or Contract execution;
 - (c) **collusive practice** means a scheme or arrangement between two (2) or more Persons, with or without the knowledge of the Purchaser, that is designed to arbitrarily reduce the number of Tenders submitted or fix Tender prices at artificial, noncompetitive levels, thereby denying a Purchaser the benefits of competitive price arising from genuine and open competition; or
 - (d) **coercive practice** means harming or threatening to harm, directly or indirectly, Persons or their property to influence a decision to be taken in a Procurement proceeding or the execution of a Contract, and this will include creating obstructions in the normal submission process used for Tenders.

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- 3.4 Should any corrupt, fraudulent, collusive or coercive practice of any kind come to the knowledge of the Purchaser, it will, in the first place, allow the Supplier to provide an explanation and shall, take actions only when a satisfactory explanation is not received. Such exclusion and the reasons thereof, shall be recorded in the record of the procurement proceedings and promptly communicated to the Supplier concerned. Any communications between the Supplier and the Purchaser related to matters of alleged fraud or corruption shall be in writing.
- 3.5 If corrupt, fraudulent, collusive or coercive practices of any kind determined by the Purchaser against the Supplier alleged to have carried out such practices, the Purchaser shall proceed under GCC Clause 42.4
- 3.6 The Supplier shall permit the Purchaser to inspect the Supplier's accounts and records and other documents relating to the submission of the Tender and Contract performance.

4. Interpretation

- 4.1 In interpreting the GCC, singular also means plural, male also means female or neuter, and the other way around. Headings in the GCC shall not be deemed part thereof or be taken into consideration in the interpretation or construction thereof or of the Contract. Words have their normal meaning under the English language unless specifically defined.

4.2 Entire Agreement

- (a) The Contract constitutes the entire agreement between the Purchaser and the Supplier and supersedes all communications, negotiations and agreements (whether written or oral) of parties with respect thereto made prior to the date of Contract Agreement; except those stated under GCC Sub Clause 5.1(i) .

4.3 Amendment

- (a) No amendment or other variation of the Contract shall be valid unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorised representative of each party thereto.

4.4 Non-waiver

- (a) Subject to GCC Sub-Clause 4.4(b), no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, neither shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.
- (b) Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, dated, and signed by an authorised representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

4.5 Severability

- (a) If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

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- 5. Documents Forming the Contract in order of precedence**
- 5.1 The following documents forming the Contract shall be in the following order of precedence, namely :
- (a) the signed Contract Agreement;
 - (b) the Notification of Award;
 - (c) The Tender and the appendices to the Tender;
 - (d) Particular Conditions of Contract;
 - (e) General Conditions of Contract;
 - (f) Technical Specifications;
 - (g) Drawings;
 - (h) Priced Schedule and schedule of requirements and ;
 - (i) Other Documents including correspondences listed in the PCC forming part of the Contract.
- 6. Eligibility**
- 6.1 The Supplier and its Subcontractors shall have the nationality of an eligible country. A Supplier or Subcontractor shall be deemed to have the nationality of a country if it is a citizen or constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of that country.
- 6.2 All Goods and Related Services to be supplied under the Contract shall have their origin in Eligible Countries.
- 6.3 For the purpose of the GCC Clause 6.2, origin means the country where the goods have been grown, mined, cultivated, produced, manufactured, or processed; or through manufacture, processing, or assembly, another commercially recognized article results that differs substantially in its basic characteristics from its components.
- 7. Governing Language**
- 7.1 The Contract shall be written in English language. Correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser shall be written in English .Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in English language, in which case, for purposes of interpretation of the Contract, this translation shall govern.
- 7.2 The Supplier shall bear all costs of translation to the governing language and all risks of the accuracy of such translation.
- 8. Governing Law**
- 8.1 The Contract shall be governed by and interpreted in accordance with the laws of the People's Republic of Bangladesh.
- 9. No fees/ Gratuities**
- 9.1 No fees, gratuities, rebates, gifts, commissions or other payments, other than those shown in the Tender or the contract, shall be given or received in connection with the procurement process or in the contract execution.
- 10. Use of Contract Documents & Information**
- 10.1 The Supplier shall not, except for purposes of performing the obligations in this Contract, without the Purchaser's prior written consent, disclose this Contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the Purchaser. Any such disclosure shall be made in confidence and shall extend only as far as may be necessary for purposes of such performance.
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- 10.2 Any document, other than this Contract itself, enumerated in GCC Clause 10.1 shall remain the property of the Purchaser and shall be returned (all copies) to the Purchaser on completion of the Supplier's performance under this Contract if so required by the Purchaser.
- 11. Communications & Notices**
- 11.1 Communications between Parties (notice, request or consent required or permitted to be given or made by one party to the other) pursuant to the Contract shall be in writing to the addresses specified in the PCC.
- 11.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.
- 11.3 A Party may change its address for notice hereunder by giving the other Party notice of such change to the address.
- 12. Trademark, Patent and Intellectual Property Rights**
- 12.1 The Purchaser should not be liable for any infringement of intellectual property rights arising from use of the goods procured. In case there are third-party claims of such infringement of patent, trademark, or industrial design rights, the supplier must indemnify and hold the Purchaser free and harmless against such claims and shall not be in contravention of **The Trademark Act, 2009 and The Patents and Designs Act, 1911.**
- 13. Copyright**
- 13.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.
- 14. Assignment**
- 14.1 The Supplier shall not assign his rights or obligations under the Contract, in whole or in part, except with the Purchaser's prior written consent.
- 15. Sub contracting**
- 15.1 Any subcontracting arrangements made during contract implementation and not disclosed at the time of the Tendering shall not be allowed.
- 15.2 Subcontracting of any portion of the Goods shall not relieve the Tenderer from any liability or obligations that may arise from its performance.
- 15.3 Supplier shall retain full responsibility for the contract and can not pass any contractual obligations to the subcontractor and under no circumstances assignment of the contract to the subcontractor be allowed.
- 15.4 Subcontractors shall comply with the provisions of GCC Clause 3 and 6.
- 16. Supplier's Responsibilities**
- 16.1 The Supplier shall supply all the Goods and Related Services specified in the Scope of Supply as stated under GCC Clause 18 and the Delivery and Completion schedule, as stated under GCC Clauses 23 and 24 in conformity with the provisions of the Contract Agreement.
- 17. Purchaser's Responsibilities**
- 17.1 Whenever the performance of the obligations in this Contract requires that the Supplier obtain permits, approvals and other license from local public authorities, the Purchaser may, if so

needed by the Supplier, make its best effort to assist the Supplier in complying with such requirements in a timely and expeditious manner. However, the supplier shall bear the costs of such permits and/or licenses. On the other hand, the Purchaser shall pay all costs involved in the performance of its responsibilities, in accordance with the contract.

17.2 The Purchaser shall pay the Supplier, in consideration of the provision of Goods and Related Services, the Contract Price under the provisions of the Contract at the times and manner prescribed in the Contract Agreement.

18. Scope of Supply

18.1 Subject to the PCC, the Goods and Related Services to be supplied shall be as specified in Section 6: Schedule of Requirements.

18.2 Unless otherwise stipulated in the Contract, the Scope of Supply shall include all such items not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Delivery and Completion of the Goods and Related Services as if such items were expressly mentioned in the Contract.

19. Amendment to Order

19.1 The Purchaser may make an amendment to Order for necessary adjustment within the general scope of the contract in any one or more of the following aspects in order to fully meet the requirement of the Contract:

- (a) Drawing, design or specifications of the goods, provided that:
 - i. The goods to be furnished are to be specifically manufactured for the government in accordance therewith;
 - ii. The change is an improvement of the goods and advantageous to the Government;
 - iii. It is done at no extra cost; and
 - iv. It is not prejudicial to the losing Tenderers in the sense that such change/s could not have been foreseen during the conduct of the tendering and would have significantly affected the other tenderer's tender;
- (b) The place of delivery;
- (c) The place of performance of the services;
- (d) Additional items needed and necessary for the protection of the goods procured, which were not included in the original contract.

19.2 Such amendment may or may not result to an increase or a decrease of the contract price, and/or an extension or reduction of the delivery period. However, the amendment should not have the result of changing the subject matter of the contract or the specifications of the goods or services, in any material aspect and to such an extent that, if introduced during the Tendering stage, may have had a significant effect on other Tenderer's tender, because this situation would actually require another tendering activity.

20. Instances When Amendment to Order May be Issued

- 20.1 The Purchaser may issue amendments order at any time during contract implementation, through a notice as stated under GCC Clause 11, provided that such adjustment is required to fully meet the requirements of the contract. Any of the following circumstances may serve as basis for such amendment/s:
- (a) Emergency cases, fortuitous events or unforeseen contingencies arising during contract implementation, and such contingencies have an impact on the procurement at hand, such as:
 - i. Changes in the conditions affecting the contract, e.g., a change in the place of delivery;
 - ii. Time is of the essence in the implementation of the contract, and any changes require immediate implementation; and
 - iii. Additional requirements have been identified as necessary for the protection of the goods procured, such as changes in the packaging of the goods, or additional items have become necessary to ensure that the goods are sufficiently protected from the elements;
 - (b) When the contract does not reflect the real intention of the parties due to mistake or accident, and the amendment is necessary to reflect the party's intention; and
 - (c) Other analogous circumstances that could affect the conditions of the procurement at hand

21. Adjustments in Contract Price and/or Delivery Schedule in Amendment to Order

- 21.1 If an amendment to order increases or decreases the cost of ,or the time required for executing any part of the delivery under the original contract, an equitable adjustment in contract price and/or delivery schedule should be mutually agreed upon between parties concerned, and the contract should be modified as stated under GCC Clause 46
- 21.2 If the amendment to order consists of additional items, the price adjustment shall be based on the unit price in the original contract for items of goods similar to those in the original contract. If the contract does not contain any rate applicable to the additional items, then suitable prices shall be mutually agreed upon between the parties, based on prevailing market prices.
- 21.3 It is required, however, that any increase in contract price must not exceed ten percent (10%) of the original contract price.

22. Packing and Documents

- 22.1 The Supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the Contract and in accordance with existing industry standards. The packing shall be sufficient to withstand, without limitation, rough handling and exposure to extreme temperatures, salt and precipitation, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.
- 22.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract as stated under GCC Clause 22.1, including additional requirements, if any, specified in the PCC, and in any subsequent instructions ordered by the Purchaser.

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- 22.3 The outer packaging must contain a "Packing List" which must reflect the actual contents of the package.
- 23. Delivery and Documents**
- 23.1 Subject to GCC Sub-Clause 19, the Delivery of the Goods and completion of the Related Services shall be in accordance with the Delivery and Completion Schedule specified in the Section 6: Schedule of Requirements.
- 23.2 The details of shipping and other documents to be furnished by the Supplier shall be specified in the PCC, and shall be received by the Purchaser at least one week before arrival of the Goods and, if not received the Supplier shall be responsible for consequent expenses.
- 24. Acceptance**
- 24.1 Acceptance by the Purchaser shall be completed not later than fourteen (14) days from receipt of the goods at final destination in the form of an **Acceptance Certificate**, unless any defects in the supply, any damage during transportation or any failure to meet the required performance criteria of the supply are identified and reported to the Supplier as stated under GCC Clause 31 and GCC Clause 32. In such cases the Acceptance Certificate will be issued only for those parts of the contract supplies which are accepted. The Acceptance Certificate for the remaining supplies will only be issued after the Supplier has remedied the defects and/or any non-conformity under GCC Clause 31 and GCC Clause 32.
- 24.2 The appropriate Technical Inspection and Acceptance Committee of the Purchaser must commence the inspection and acceptance process within two (2) days from delivery of the goods, and shall complete the same as soon as practicable.
- 25. Contract Price**
- 25.1 The Contract Price shall be specified in the PCC.
- 25.2 During evaluation, tender has excluded and not taken into account:
- (a) In the case of Goods manufactured in Bangladesh, VAT payable on account of Supplier, which will be payable on the goods if a contract is awarded to the Tenderer;
- (b) in the case of Goods manufactured outside the Bangladesh, already imported or to be imported, customs duties, import VAT and other import taxes levied on the imported Good, VAT, which will be payable on the Goods if the contract is awarded to the Tenderer.
- 25.3 The Contract price will include all the costs paid or payable as stated under GCC Clause 25.2.
- 25.4 Prices charged by the Supplier for the Goods delivered and the Related Services performed under the Contract shall not vary from the price as stated under GCC Sub-Clause 25.1, with the exception of any change in price resulting from a Change Order issued under GCC Clause 19.
- 26. Transportation**
- 26.1 The Supplier is required under the Contract to transport the Goods to a specified place of destination as specified in Section 6: Schedule of Requirements, defined as the Site, transport to such place of destination, including insurance, other incidental costs, and temporary storage, if any. These costs shall be included in the Contract Price.
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27. Terms of Payment

26.2 If not in accordance GCC Clause 26.1, responsibility for transportation of the Goods shall be as specified in the **INCOTERM** indicated in the Price Schedule or any other trade terms specify the responsibilities of the Purchaser and Supplier as specified in PCC.

27.1 The Contract Price, including any Advance Payments, if applicable, shall be paid in the manner as specified in the PCC.

27.2 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the Goods delivered and Related Services performed, and accompanied by the documents as stated under GCC Clause 23 and 24 and upon fulfilment of any other obligations stipulated in the Contract.

27.3 Payments shall be made promptly by the Purchaser, but in no case later than the days indicated in the PCC after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.

27.4 The currencies in which payments shall be made to the Supplier under this Contract shall be those in which the tender price is expressed.

27.5 In the event that the Purchaser fails to pay the Supplier any payment by its respective due date or within the period set forth in the PCC, the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate shown in the PCC, for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.

28. Insurance

28.1 The Goods supplied under this Contract shall be fully insured by the Supplier in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage, and delivery. The Goods remain at the risk and title of the Supplier until their final acceptance by the Purchaser.

28.2 If not in accordance GCC Clause 28.1, the insurance coverage shall be as specified in the **INCOTERM** indicated in the Price Schedule or any other insurance provisions as specified in PCC.

29. Taxes and Duties

29.1 For Goods Manufactured within Bangladesh, the Supplier shall be entirely responsible for all taxes, duties, VAT, license fees, and other such levies imposed or incurred until delivery of the contracted goods to the Purchaser.

29.2 For Goods manufactured outside Bangladesh, the Supplier shall be entirely responsible for all taxes, duties and other such levies imposed outside Bangladesh.

29.3 If any tax exemptions, reductions, allowances or privileges may be available to the Supplier in Bangladesh, the Purchaser shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

30. Performance Security

30.1 The proceeds of the Performance Security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

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- 30.2 The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than Thirty (30) days following the date of Completion of the Supplier's performance obligations under the Contract and the issuance of certification to that effect by the Purchaser, including any warranty obligations as stated under GCC Clause 33, provided that there are no claims filed against the supplier.
- 31. Specifications and Standards**
- 31.1 The Goods and Related Services supplied under this Contract shall conform to the technical specifications and standards mentioned in Section 7, Technical Specification and in Section 8, Drawings, if any.
- 31.2 If there is no applicable standard, the goods must conform to the authoritative standards appropriate to the good's country of origin. Such standards must be the latest issued by the concerned institution.
- 31.3 Subject to the GCC Clause 19, the Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification or other document, or any modification thereof provided or designed by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Purchaser.
- 31.4 Wherever references are made in the Contract to codes and standards in accordance with which it shall be executed, the edition or the revised version of such codes and standards shall be those specified in the Technical Specification. During Contract execution, any changes in any such codes and standards shall be applied only after approval by the Purchaser and shall be treated under GCC Clause 19.
- 32. Inspections and Tests**
- 32.1 The Purchaser shall have the right to test the Goods to confirm their conformity to the Contract specifications. The PCC and Technical specifications shall specify what tests the Purchaser requires and where they are to be conducted. The supplier shall at its own expense and at no cost to the Purchaser, carry out all such tests of the Goods and related services as are specified in the Contract.
- 32.2 The Supplier shall provide the Purchaser with a report of the results of any such test.
- 32.3 The Purchaser may engage external agents for the purpose of conducting inspection or pre-shipment inspection of Goods, provided that the Purchaser shall bear all of its costs and expenses.
- 32.4 The Purchaser or its designated representative as specified shall be entitled to attend the tests and/or inspections under GCC Clause 32.1, provided that the Purchaser shall bear all of its own costs and expenses incurred in connection with such attendance.
- 32.5 Whenever the Supplier is ready to carry out any such test and inspection, it shall give a reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or its designated representative to attend the test and/or inspection.

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- 32.6 The Purchaser may require the Supplier to carry out any test and/or inspection not required by the Contract, but deemed necessary to verify that the characteristics and performance of the Goods comply with the technical specifications, codes and standards under the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such test and/or inspection shall be added to the Contract Price. Further, if such test and/or inspection impede the progress of manufacturing and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Delivery Dates and Completion Dates and the other obligations so affected.
- 32.7 The Purchaser may reject any Goods or any part thereof that fail to pass any test and/or inspection or do not conform to the specifications. The Supplier shall either rectify or replace such rejected Goods or parts thereof or make alterations necessary to meet the specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice under GCC Sub-Clause 32.5.
- 32.8 The Supplier agrees that neither the execution of a test and/or inspection of the Goods or any part thereof, nor the attendance by the Purchaser or its representative, nor the issue of any report as stated under GCC Sub-Clause 32.2, shall relieve the Supplier from any warranties or other obligations under the Contract.

33. Warranty

- 33.1 The Supplier warrants that all the Goods supplied under the Contract are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, except when the design and/or material required by the Purchaser provides otherwise under GCC Clause 19.
- 33.2 The Supplier further warrants that the all Goods supplied under this Contract shall have no defect, arising from design, materials, or workmanship or from any act or omission of the Supplier that may develop under normal use of the supplied Goods in the conditions prevailing in Bangladesh.
- 33.3 In order to assure that manufacturing defects shall be corrected by the Supplier, manufacturer, or distributor, as the case may be, a warranty shall be required from the Supplier for a minimum period of three (3) months in the case of supplies, and one (1) year in the case of equipment, or other such period as may be specified in the PCC, after the Goods, or any portion thereof as the case may be, have been delivered to and accepted in the form of an **Acceptance Certificate** as indicated in the GCC Clause 24.1 at the final destination indicated in the PCC
- 33.4 The warranty periods may vary among the various items and lots. The warranty for Goods delivered ahead will lapse earlier than the succeeding deliveries.
- 33.5 The Purchaser shall promptly notify the Supplier in writing of any claims arising under this warranty.
- 33.6 Upon receipt of such notice, the Supplier shall, within the period specified in the PCC, expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.

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- 33.7 If the Supplier, having been notified, fails to remedy the defect(s) within the period as stated under GCC Sub Clause 33.6, the Purchaser may proceed to call upon the Performance security without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract and under the applicable law.
- 33.8 Performance Security under GCC Clause no 30 shall only be released after the lapse of the warranty period, provided that the goods supplied are free from patent and latent defects and all the conditions imposed under the contract have been fully met.
- (a) A patent defect, which is one that is apparent to the buyer on normal observation. It is an apparent or obvious defect.
- i. For example, a ball pen that does not write is patently defective.
- (b) A latent defect, which is one that is not apparent to the buyer by reasonable observation. A latent defect is "hidden" or one that is not immediately determinable.
- i. For example, a ball pen that writes .75 kilometers instead of the expected 1.5 kilometers, has a latent defect.

**34. Delays in
Delivery and
Extensions of
Time**

- 34.1 The Supplier must deliver the Goods or perform the services procured within the period prescribed by the Purchaser, as specified in the Contract.
- 34.2 If at any time during performance of the Contract, the Supplier or its subcontractors should encounter conditions impeding timely delivery of the Goods or completion of Related Services as stated under GCC Clause 23, the Supplier shall promptly notify the Purchaser in writing. It must state therein the cause/s and duration of the expected delay. The Purchaser shall decide whether and by how much to extend the time. In all cases, the request for extension should be submitted before the lapse of the original delivery date.
- 34.3 Within twenty-one (21) days of receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may grant time extensions, if based on justifiable grounds, without liquidated damages.
- 34.4 The Procuring may extend up to twenty percent (20%) of the original contract time, above 20% of the original contract time approval of Head of Purchaser (HOPE) shall be required, in which case the extension shall be ratified by the Parties by amendment of the Contract as stated under GCC Clause 46.
- 34.5 Except in the case of Force Majeure, as provided under GCC Clause 38, a delay by the Supplier in the performance of its Delivery and Completion obligations shall render the Supplier liable to the imposition of liquidated damages as stated under GCC Clause 35, unless an extension of time is agreed upon, under GCC Sub-Clause 34.3.

**35. Liquidated
Damages**

- 35.1 Subject to GCC Clause 34 and 38, if the , if the Supplier fails to deliver any or all of the Goods by the Date(s) of delivery and/or perform the Related Services within the period specified in the

Contract as stated under GCC Clause 23, the Purchaser shall, without prejudice to all its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the PCC of the Contract price of the delayed Goods or unperformed / Related Services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in those PCC. Once the maximum is reached, the Purchaser may terminate the Contract as stated under GCC Clause 42.

- 36. Limitation of Liability**
- 36.1 Except in cases of criminal negligence or wilful misconduct, and in the case of infringement of patent and intellectual property rights, if applicable, the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, the aggregate liability of the Supplier to the Purchaser shall not exceed the total Contract Price, provided that this limitation shall not apply, to the cost of repairing or replacing defective equipment or, to any obligation of the Supplier to pay liquidated damages to the Purchaser.
- 37. Change in Laws and Regulations**
- 37.1 Unless otherwise specified in the Contract, if after the Contract, any law, regulation, ordinance, order or bylaw having the force of law is enacted, promulgated, abrogated, or changed in Bangladesh (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the Delivery Date and/or the Contract Price, then such Delivery Date and/or Contract Price shall be correspondingly increased or decreased, to the extent that the Supplier has thereby been affected in the performance of any of its obligations under the Contract.
- 38. Definition of Force Majeure**
- 38.1 In this Clause, "Force Majeure" means an exceptional event or circumstance:
- (a) which is beyond a Party's control;
 - (b) which such Party could not reasonably have provided against before entering into the Contract;
 - (c) which, having arisen, such Party could not reasonably have avoided or overcome; and
 - (d) which is not substantially attributable to the other Party.
- 38.2 Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:
- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies;
 - (ii) rebellion, terrorism, sabotage by persons other than the Contractor's Personnel, revolution, insurrection, military or usurped power, or civil war;
 - (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel;
 - (iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and

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- (v) natural catastrophes such as cyclone, hurricane, typhoon, tsunami, storm surge, floods, earthquake, landslides, fires, epidemics, quarantine restrictions, or volcanic activity;
 - (vi) freight embargoes;
 - (vii) acts of the Government in its sovereign capacity.
- 39. Notice of Force Majeure**
- 39.1 If a Party is or will be prevented from performing its substantial obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.
- 39.2 The Party shall, having given notice, be excused performance of its obligations for so long as such Force Majeure prevents it from performing them.
- 39.3 Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.
- 40. Duty to Minimise Delay**
- 40.1 Each Party shall at all times use all reasonable endeavours to minimise any delay in the performance of the Contract as a result of Force Majeure.
- 40.2 A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.
- 41. Consequences of Force Majeure**
- 41.1 The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages, or termination for default if and to the extent that its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- 41.2 The Purchaser may suspend the delivery or contract implementation, wholly or partly, by written order for a certain period of time, as it deems necessary due to force majeure as defined in the contract.
- 41.3 Delivery made either upon the lifting or the expiration of the suspension order. However, if the Purchaser terminates the contract as stated under GCC clause 42, resumption of delivery cannot be done.
- 41.4 Head of Purchaser determines the existence of a force majeure that will be basis of the issuance of suspension of order.
- 41.5 Adjustments in the delivery or contract schedule and/or contract price, including any need to modify contract under GCC Clause 46.
- 42. Termination for Default**
- 42.1 The Purchaser shall terminate this Contract for default when any of the following conditions attends its implementation:
- (a) Outside of force majeure, the Supplier fails to deliver or perform any or all of the GOODS within the period(s) specified in the contract, or within any extension thereof

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- granted by the Purchaser pursuant to a request made by the Supplier prior to the delay;
- (b) As a result of force majeure, the Supplier is unable to deliver or perform any or all of the GOODS, amounting to at least ten percent (10%) of the contract price, for a period of not less than sixty (60) calendar days after receipt of the notice from the Purchaser stating that the circumstance of force majeure is deemed to have ceased; or
 - (c) The Supplier fails to perform any other obligation under the Contract;
 - (d) If the Supplier, in the judgment of the Purchaser has engaged in corrupt, fraudulent, collusive or coercive practices, as stated under GCC Clause 3, in competing for or in executing the Contract;
 - (e) When deductible amount due to liquidated damage reaches its maximum as stated under GCC Clause 35.
- 42.2 Termination of a contract for default is without prejudice to other remedies available to the Purchaser for breach of contract, such as payment of liquidated and other damages, if there are grounds for the latter.
- 42.3 In the event the Purchaser terminates the Contract in whole or in part, as stated under GCC Clause 42.1, the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Related Services similar to those undelivered or not performed, and the Supplier shall be liable to the Purchaser for any additional costs for such similar Goods or Related Services. However, the Supplier shall continue performance of the Contract to the extent not terminated.
- 42.4 In the event as stated under GCC Clause 42.1(d), the Purchaser shall,
- (a) terminate the Supplier's employment under the Contract and cancel the contract, after giving 14 days notice to the Supplier and the provisions of Clause 42 shall apply as if such expulsion had been made under Sub-Clause 42.1
 - (b) declare, at its discretion, the concerned Person to be ineligible to participate in further Procurement proceedings, either indefinitely or for a specific period of time.
- 43. Termination for insolvency** 43.1 The Purchaser shall terminate this Contract if the Supplier is declared bankrupt or insolvent as determined with finality by a court of competent jurisdiction. In this event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Purchaser and/or the Supplier.
- 44. Termination for Convenience** 44.1 The Purchaser, by written notice sent to the supplier, may terminate this Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that the termination is for the Purchaser's convenience, the extent to which performance of the supplier under the contract is terminated, and the date upon which such termination becomes effective.
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44.2 Any of the following circumstances may constitute sufficient grounds to terminate a contract for conveniences :

- (a) If Physical and economic conditions have significantly changed so as to render the contract no longer economically, financially or technically feasible, as determined by the Head of Purchaser;
- (b) The Head of Purchaser has determined the existences of conditions that make contract implementation impractical and/or unnecessary, such as, but not limited to , fortuitous event/s, change in laws and government policies;
- (c) Funding for the contract has been withheld or reduced;
- (d) Any circumstances analogous to the foregoing.

44.3 The GOODS that have been delivered and/or performed or are ready for delivery or performance within thirty (30) calendar days after the Supplier's receipt of Notice to Terminate shall be accepted by the Purchaser at the contract terms and prices. For GOODS not yet performed and/or ready for delivery, the Purchaser may elect:

- (a) to have any portion delivered and/or performed and paid at the contract terms and prices; and/or
- (b) to cancel the remainder and pay to the Supplier an agreed amount for partially completed and/or performed goods and for materials and parts previously procured by the Supplier.

45. Procedures for Termination of Contracts

45.1 The following provisions shall govern the procedures for termination of this Contract as stated under GCC Clauses 42,43 and 44:

- (a) Upon receipt of a written report of acts or causes which may constitute ground(s) for termination as aforementioned, or upon its own initiative, the Purchaser shall, within a period of seven (7) calendar days, verify the existence of such ground(s) and cause the execution of a Verified Report, with all relevant evidence attached;
- (b) Upon recommendation by the Purchaser, the Head of the Purchaser shall terminate this Contract only by a written notice to the Supplier conveying the termination of this Contract. The notice shall state:
 - i. that this Contract is being terminated for any of the ground(s) afore-mentioned, and a statement of the acts that constitute the ground(s) constituting the same;
 - ii. the extent of termination, whether in whole or in part;
 - iii. an instruction to the Supplier to show cause as to why this Contract should not be terminated; and
 - iv. special instructions of the Purchaser, if any.
- (c) The Notice to Terminate shall be accompanied by a copy of the Verified Report;

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- (d) Within a period of seven (7) calendar days from receipt of the Notice of Termination, the Supplier shall submit to the Head of the Purchaser a verified position paper stating why this Contract should not be terminated. If the Supplier fails to show cause after the lapse of the seven (7) day period, either by inaction or by default, the Head of the Purchaser shall issue an order terminating this Contract;
 - (e) The Purchaser may, at any time before receipt of the Supplier's verified position paper, withdraw the Notice to Terminate if it is determined that certain items or works subject of the notice had been completed, delivered, or performed before the Supplier's receipt of the notice;
 - (f) Within a non-extendible period of ten (10) calendar days from receipt of the verified position paper, the Head of the Purchaser shall decide whether or not to terminate this Contract. It shall serve a written notice to the Supplier of its decision and, unless otherwise provided, this Contract is deemed terminated from receipt of the Supplier of the notice of decision. The termination shall only be based on the ground(s) stated in the Notice to Terminate; and
 - (g) The Head of the Purchaser may create a Contract Termination Review Committee (CTRC) to assist him in the discharge of this function. All decisions recommended by the CTRC shall be subject to the approval of the Head of the Purchaser.

**46. Contract
Amendment**

- 46.1 Subject to applicable laws, no variation in or modification of the terms of this Contract shall be made except by written amendment signed by the parties.
- 46.2 The Purchaser, in accordance with their Delegation of Financial Powers, as required, may amend the Contract to reflect the changes introduced to the Original terms and Conditions of the Contract.

**47. Settlement of
Disputes**

47.1 **Amicable Settlement:**

- (a) The Purchaser and the Supplier shall use their best efforts to settle amicably all disputes arising out of or in connection with this Contract or its interpretation.

47.2 **Adjudication**

- (a) If the Supplier /Purchaser believe that amicable settlement of dispute is not possible between the two parties, the dispute shall be refereed to the Adjudicator within fourteen (14) days of first written correspondence on the matter of disagreement;
- (b) The Adjudicator named in the PCC is jointly appointed by the parties. In case of disagreement between the parties,

the Appointing Authority designated in the PCC shall appoint the Adjudicator within fourteen (14) days of receipt of a request from either party;

- (c) The Adjudicator shall give its decision in writing to both parties within twenty-eight (28) days of a dispute being referred to it;
- (d) The supplier shall make all payments (fees and reimbursable expenses) to the Adjudicator, and the Purchaser shall reimburse half of these fees through the regular progress payments;
- (e) Should the Adjudicator resign or die, or should the Purchaser and the Supplier agree that the Adjudicator is not functioning in accordance with the provisions of the Contract; a new Adjudicator will be jointly appointed by the Purchaser and the Supplier. In case of disagreement between the Purchaser and the Supplier the Adjudicator shall be designated by the Appointing Authority designated in the PCC at the request of either party, within fourteen (14) days of receipt of a request from either party.

47.3 **Arbitration**

- (a) If the Parties are unable to reach a settlement under GCC Clause 47.1(a) within twenty-eight (28) days of the first written correspondence on the matter of disagreement, then either Party may give notice to the other party of its intention to commence arbitration in accordance with GCC Sub-Clause 47.3(b);
- (b) The arbitration shall be conducted in accordance with the rules of procedure specified in the PCC.

Section-4: Particular Conditions of Contract

UNSIGNED COPY

Section-4: Particular Conditions of Contract

Instructions for completing the Particular Conditions of Contract are provided, as needed, in the notes in italics mentioned for the relevant GCC clauses.

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
GCC 1.1(j)	The Purchaser is Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL Bidyut Bhaban, Boyra Main Road, Khulna-9000.
GCC 1.1(o)	The site(s)/ point(s) of delivery are: S&D-1, Faridpur, WZPDCL. S&D-2, Faridpur, WZPDCL. Rajbari ESU, WZPDCL. S&D-Madaripur, WZPDCL. Gopalgonj ESU, WZPDCL. Shariatpur ESU, WZPDCL.
GCC 5.1(i)	In addition to the GCC 5.1 the following documents will also be part of the Contract: <ul style="list-style-type: none"> • Bank Guarantee for Performance Security (PG4-9) and Tender Security (PG4-6) • All written correspondances • Applicable local Law & Acts • API annexed in part-2 • All documents related to existing software, servers and networks • The Schedule of Key Personnel • Site Investigation Reports
GCC 11.1	For notices , the Purchaser's contact details shall be: Attention: Engr. Md. Shahidul Alam, Project Director, Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL Address: Bidyut Bhaban, Boyra Main Road, Khulna-9000 Mobile: +88 01700709717 Facsimile number: +88 041 731786 Electronic mail address: smartprepayment@gmail.com

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract									
	<p>For notices, the Supplier's contact details shall be:</p> <p>Attention:</p> <p>Address:</p> <p>Telephone:</p> <p>Facsimile number:</p> <p>Electronic mail address:</p>									
<p>GCC 17.1</p>	<p>The Engineer/ Project Director (PD) or authorised representative of purchasers shall obtain specific approval of the purchaser before taking any of the following actions:</p> <p>(a) Subcontracting of any part of the Works</p> <p>(b) Determining an extension of time</p> <p>(c) Drawings, Catalogues, Manuals etc.: The Contractor shall submit to the Purchaser for approval, within one month after the date of Commencement, such drawings, catalogues, manuals, samples, patterns and models as may be called for therein or as the Purchaser may reasonably require.</p> <p>(d) Before manufacturing of the equipment is to commence, dimensional drawings and diagrams showing all details of the equipment and materials to be used shall be submitted to the Engineer/PD for approval and to the Purchaser simultaneously. These drawings shall be submitted as soon as possible after the date of signing of the Contract and in any case in sufficient time allowance (not later than one month after the date of signing of the contract) to permit modifications to be made if such are deemed necessary and instructed by the Engineer without delaying the supply of the goods. The drawing shall be modified as necessary if instructed by the Engineer/PD and resubmitted for approval.</p> <p>(e) Besides the drawings of individual equipment and system components, the Tenderer shall provide drawings and information regarding general arrangement and layout of goods. After approval of drawings by the Engineer/PD, the Contractor shall submit the approved Drawings to the Purchaser and to the Engineer/PD. It is to be understood, however, that approval of the Drawings will not exonerate the Contractor from any responsibility in connection with the work. Number of copies of drawings to be submitted to the Purchaser and to the Engineer/PD shall be as follows:</p> <table border="0"> <thead> <tr> <th></th> <th style="text-align: center;"><u>Purchaser</u></th> <th style="text-align: center;"><u>Engineer</u></th> </tr> </thead> <tbody> <tr> <td>Drawings for approval</td> <td style="text-align: center;">2 copies</td> <td style="text-align: center;">2 copies</td> </tr> <tr> <td>Approved drawings</td> <td style="text-align: center;">2 copies</td> <td style="text-align: center;">2 copies</td> </tr> </tbody> </table> <p>The Tenderer at his expense if required by the Purchaser shall supply further copies of particular Drawings.</p> <p>One (1) the copy of the Drawing duly approved and signed by the Purchaser or the Engineer/PD will be returned to the Tenderer within 30 days of receipt of the drawings for approval. The Purchaser or the Engineer/PD shall have the right at all reasonable time to inspect at the</p>		<u>Purchaser</u>	<u>Engineer</u>	Drawings for approval	2 copies	2 copies	Approved drawings	2 copies	2 copies
	<u>Purchaser</u>	<u>Engineer</u>								
Drawings for approval	2 copies	2 copies								
Approved drawings	2 copies	2 copies								

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>factory of the Contractor all drawings of any portion of the works.</p> <p>(f) All Drawings associated with the Contract are to have the title of the drawings; the Tenderer's name, the date and the scale are to be shown.</p>
GCC 18.1	<p>The scope of Supply shall be defined in Section-6: Schedule of Requirements.</p> <p>The scope of supply shall also include the goods and related services mentioned in the price schedules (From PG4-3A, 3B, 3C & 3D). If any supply required from outside the Section-6: Schedule of Requirements for the successful completion of the turn key contract, the tenderer will be responsible to delivery that goods and related services.</p>
GCC 22	<p>a) All materials used in packing are to comply with the relevant Bangladesh regulations. Adequate protection and precautions are to be taken to exclude termites or other vermin, noxious insects, larva or fungus from the packing materials or plant. All contents are to be clearly marked for easy identification against the packing list.</p> <p>b) All galvanized ferrous materials shall, in any case, not be touched with water and shall not be handled with any chemical products during transportation to prevent the corrosive effect to the galvanized surface.</p> <p>c) The Contractor shall pack and crate all goods for export to a tropical, humid climate and for ocean transport and in accordance with internationally accepted export practice and such a manner as to protect it from damage and deterioration in transit by truck, rail and sea. The contractor shall be held responsible for and make good any and all damages costs involved due to improper and inadequate packing. Each box or other unit of shipment shall be eligible and properly marked in addition to the usual contractor's marking code. Detailed instructions for marking shown are given in tender document and such marking shall be written either on the box itself or on a metallic tag for drums, steel section etc. strongly attached to the Equipment</p>
GCC 22.2	<ol style="list-style-type: none"> 1. The Supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights, shall take into consideration, where appropriate, the remoteness of final destination of the supply and the absence of heavy handling facilities at all points in transit. 2. The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract and in any subsequent instructions ordered by the Purchaser. 3. The supplier shall provide such crate for shipment of goods as to protect the

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>equipment and materials.</p> <p>The outer packing may be clearly marked on at least four slides as follows:</p> <p>Name and address of Purchaser</p> <p>Name of the Supplier</p> <p>Contract Description</p> <p>Final Destination/Delivery Point</p> <p>Gross weight</p> <p>Package number of total number of packages</p> <p>Brief description of the content</p> <p>Any special lifting instructions</p> <p>Any special handling instructions</p> <p>[Note:The above requirements should be reviewed by a Purchaser on a case-by-case basis, with amendments being made as necessary.]</p>
<p>GCC 23.1</p>	<p>Delivery and Documents:</p> <p>1. Delivery of the goods shall be made by the Supplier in accordance with the terms and the goods shall remain at the risk of the Supplier until delivery has been completed. Delivery shall be considered to have been completed when the last consignment to be delivered are accepted and taken over by the Purchaser at the final destination (Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area project store, WZPDCL, Khulna). All transportation, insurance and other costs incurred in delivering the goods to Port of landing up to the final destination shall be entered in the Tenderer's price schedule.</p> <p>Incomplete Delivery:</p> <p>i) The Tenderer shall be responsible for any shortages in supply when the contents of the cases do not comply with the manifests, for which claim documents will be prepared in the English language by the Purchaser and submitted to the Tenderer for the necessary action.</p> <p>ii) In making a Tender, the Tenderer shall offer and recommend spare parts for 3 (three) years operation and maintenance in the spare parts schedule of the Tender Documents. After list of optional accessories and special tools recommended by the Tender shall also be included. The cost of these recommended optional accessories and special tools will not be taken into consideration for tender evaluation.</p> <p>iii) These spare parts and/ or accessories and special tools shall be submitted by detailed functional description and itemized prices shall be provided. Purchaser will decide which of these recommended spares optional accessories and special tools are required.</p>

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>iv) The Purchaser may order all in any of the spare so recommended. Those ordered are to be delivered to the nominated Site in accordance with the Schedules not later than the dated of receipt of the last Shipment of the associated item of plant. The price of spares shall be submitted to the same price conditions as the associated item of plant. Price Conditions as the associated item of plant.</p> <p>v) All spares are to be interchangeable with the original parts. They are to be treated and packed for long-term storage under the climatic conditions at site. Each spare is to be clearly and permanently labeled on the outside of its container with its description and purpose. When several spares are packed in one case, a general description of the contents is to be given on the outside of the case. All cases, containers, or other package are liable to be opened for inspection and checking at site.</p> <p>vi) Supplier shall carry sufficient inventories to assure ex-stock supply of consumable spares. Other spare parts & component shall be supplied as promptly as possible but in any case within six months of placement of order and establishment of Letter of Credit.</p> <p>vii) <u>Compliance with specification:</u> Notwithstanding any descriptive literature, drawings or illustrations which may have been submitted with the Tender, all details other than those shown on the Schedule will be deemed to be in accordance with the Specification and the Standard specifications and codes referred to in the Specification. Apart from those shown in the Schedule any departures from the specification are to be made with prior written approval of the Engineer. The documentary evidence of the equipment's conformity to the Tender Document may be in the form of literature, drawings and date, and shall furnish. A detailed description of the equipment essential technical and performance characteristics like specification, drawings; A list, giving full particulars, including available sources and current prices, of all spare parts, special tools, etc., necessary for the proper and continuing of the equipment for a period of 10(ten) years; A clause-by-clause commentary on the specifications demonstrating the equipment's statement of deviations and exceptions to the provisions of the Specifications and Details containing the name of the manufacture of type of trade name, reference of all equipment and materials, which shall be firm. The words "equivalent" "similar" etc. for specifying equipment and materials shall not be considered acceptable.</p> <p>viii) <u>Storage of the materials:</u> After the goods under this contract arrive in Bangladesh, the contractor will store meters, the Vending Station and other equipment & materials to the store designated by the employer. The storing facilities are the responsibility of the contractor. Any damage to the equipment facility will be the responsibility of the contractor.</p>

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract						
	<p>ix) <u>Rejection</u>: In the event any of the Equipment supplied by the Contractor is found defective prior to the issue of delivery Certificate or otherwise not in conformity with the requirements of the Contract, the Purchaser or the Engineer shall have the right to either reject the Equipment or request the Tenderer in writing to rectify/ replace the Equipment. The Contractor shall with utmost diligence and at his own expense replace the defective equipment or rectify the defect as the case may be. If the Contractor fails to comply within 30 (Thirty) days after having been informed, the Purchaser has the option to replace or rectify such defective equipment and charge the Tenderer the extra cost plus 15% (fifteen percent) of the total cost.</p> <p>(a) In the event the Contractor is not able to rectify or replace the rejected equipment within reasonable time, the Purchaser reserves the right to recover any money due as a result of rejection and to terminate the Contract for default as provided in the contract.</p> <p>(b) Acquire the said Goods at a reduced price considered equitable under the circumstances.</p>						
GCC 23.2	<p>Shipping Documents</p> <p>a) The Purchaser and the Engineer/PD shall receive the shipping documents described in clause GCC 23.2(1) of Particular Conditions of Contract at the latest one-week before arrival of cargos at the airport of Dhaka or any sea port of entry in Bangladesh.</p> <p>The required numbers of shipping documents shall be supplied to the follows officers of the purchaser:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>1. Project Director Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 phone: 88 041 731257 2(Two) sets</p> </td> <td style="width: 50%; vertical-align: top;"> <p>2. Executive Director (Engineering) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p>3. Executive Director (Finance) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p> </td> <td style="vertical-align: top;"> <p>4. Deputy General Manager (Finance) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p>5. Deputy Manager (Accounts) Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p> </td> <td></td> </tr> </table>	<p>1. Project Director Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 phone: 88 041 731257 2(Two) sets</p>	<p>2. Executive Director (Engineering) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>	<p>3. Executive Director (Finance) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>	<p>4. Deputy General Manager (Finance) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>	<p>5. Deputy Manager (Accounts) Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>	
<p>1. Project Director Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 phone: 88 041 731257 2(Two) sets</p>	<p>2. Executive Director (Engineering) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>						
<p>3. Executive Director (Finance) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>	<p>4. Deputy General Manager (Finance) WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>						
<p>5. Deputy Manager (Accounts) Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area, WZPDCL, Bidyut Bhaban, Boyra Main Road, Khulna-9000 2(Two) sets</p>							

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>No goods should be shipped or delivered without prior instruction (shipping advice) from the Purchaser.</p> <p>b) No goods should be shipped, without prior instruction from the Engineer/Purchaser. In cases, where the goods have been passed inspection but the Contractor from the Engineer/Purchaser has not received the instruction of delivery within one month of the date of inspection, the contractor may proceed with the shipment. In case of ex-factory basis delivery for domestic goods, the purchaser shall arrange to lift the goods from the specified place of the factory/warehouse within 30 (thirty) days after the date of inspection/ acceptance certificate issued by the Purchaser.</p> <p>c) All air cargoes destined for the site shall be landed at Hazrat Shajalal International Airport of Dhaka as specified in Tender Document.</p> <p>d) Any items liable to be damaged in transit shall be effectively protected and securely fixed in their cases. All lists of over 1(one) ton shall be marked to show where slings should be placed.</p> <p>e) The Contractor shall give complete shipping information concerning the weight, size, content of each package including any other information the Purchaser or the Engineer may require.</p> <p>f) Tenderer shall indicate the Bid delivery schedule in the Schedule of Requirements.</p> <p>1) For Imported goods:</p> <p>Upon shipment, the Supplier shall notify the Purchaser and the Insurance Company by Cable or fax or telex: the full details of the shipment including Contract number, description of Goods, quantity, the bill of landing number and date, port of loading, date of shipment, port of discharge, etc. The Supplier shall mail the following documents to the Purchaser, with a copy to the Insurance Company:</p> <p>i) 04 nos. copies of the Supplier's invoice showing goods description, quantity, unit price, total amount.</p> <p>ii) 1(one) original and 8(eight) copies of the negotiable, clean, on-board bill of lading marked freight prepaid and eight (8) copies of non-negotiable bill of lading,</p> <p>iii) 8 (Eight) copies of packing list identifying contents of each package;</p> <p>iv) Insurance certificate;</p> <p>v) Freight Memo,</p> <p>vi) Manufacturer's/supplier's guaranty certificate;</p> <p>vii) Inspection certificate, issued by the nominated inspection Engineer and the Supplier's factory inspection report; and</p> <p>viii) Certificate of origin.</p>

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	<p>ix) Shipping advice issued by the Purchaser.</p> <p>x) The Purchaser shall receive the above documents at least one week before arrival of Goods at the port and, if not received, the Supplier will be responsible for any consequent expenses.</p> <p>xi) The negotiable sets of documents shall be originals signed by the Tenderer. The Commercial Invoice is to show material value plus freight and insurance.</p> <p>xii) Documentary evidence of accepted and taken over of the goods by the Purchaser at the final destination (i.e. Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area project store, WZPDCL, Khulna) in accordance to clause GCC 22.2 of Particular Conditions of Contract.</p> <p>(2) For Goods from within the Purchaser's country as per INCOTERM EXW:</p> <p>Upon delivery of the Goods to the transporter, the Supplier shall notify the Purchaser and send the following documents to the Purchaser:</p> <p>(a) 04 nos. copies of the Supplier's invoice showing the description of the Goods, quantity, unit price, and total amount;</p> <p>(b) delivery note, railway receipt, or truck receipt;</p> <p>(c) Manufacturer's or Supplier's warranty certificate;</p> <p>(d) inspection certificate issued by the nominated inspection agency, and the Supplier's factory inspection report; and</p> <p>(e) Certificate of origin.</p> <p>The Purchaser shall receive the above documents before the arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.</p>
GCC 25.1	<p>The contract Price is:-----[in word-----]</p> <p>a) Unless specified otherwise in Purchaser's Requirements, Tenderer shall quote for the entire facilities on a "single responsibility" basis as described in TDS such that the Tender price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the tendering documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the facilities. This includes all requirements under the Contractor's responsibilities for testing, pre-commissioning and commissioning of the facilities and, where so required by the bidding documents, the acquisition of all permits, approvals and licenses, etc., operation, maintenance, inspection and training services and such other items and services as may be specified in the tendering documents, all in accordance with the requirements of the Conditions of Contract. The tenderer shall complete the appropriate Price Schedules included herein, stating the unit prices, total</p>

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	<p>price per item, the total amount and the expected countries of origin of the Plant to be supplied under the Contract. Prices quoted in the Price Schedules will be entered in the following manner.</p> <ul style="list-style-type: none"> i) The price of goods quoted FOB port of shipment, marine insurance and freight shall also be priced separately; and ii) The price of goods quoted CIF port of entry in the employer's country; and iii) The price of inland transportation, insurance and other local costs incidental to delivery of the goods from the port of entry to their final destination. In quoting the price, the Tenderer shall be free to use oceangoing vessels registered in any eligible source countries. Similarly, the Tenderer shall obtain insurance from Sadharan Bima Corporation of Bangladesh. iv) The price of works and installation work, inclusive of all site testing and services. v) Cost of mandatory spare parts. <p>The terms EXW, CIF, and FOB shall be governed by the rules prescribed in the current edition of INCOTERMS, published by the International chamber of commerce, Paris.</p> <p>Marine and local insurance will be paid at cost but estimated values shall be included in the price schedules. The marine and local insurance and Freight prices quoted in the Schedules shall be the maximum price. Freight charges will be paid, at cost, up to the values quoted.</p> <p>All prices for installation, testing, commissioning and local transportation & haulage in Bangladesh shall be quoted in Bangladesh Taka and payments shall be made in Bangladesh Taka.</p> <p>(b) Currency of Tender:</p> <p>Prices quoted shall be declared in the Schedules contained in the Tender Document. Prices shall be quoted in the following currencies:</p> <ul style="list-style-type: none"> i) The prices shall be quoted in the currency of United States Dollars and Bangladesh Taka. ii) A tenderer expecting to incur a portion of its expenditures in the performance of the Contract in more than one currency and wishing to be paid accordingly shall so indicate in its Tender. iii) If some of the contract expenditures related to Works, Installation and Other Services pursuant to clause 20.2, such expenditures shall be quoted in Bangladesh Taka.

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>(c) Price Variations:</p> <p>The prices quoted for the contract shall be fixed and valid until completion of the Contract performance and no price variation shall be allowed whether in the cost of Labour, materials or any other factors affecting prices of Works. A tender submitted with an adjustable price quotation will be treated as non-responsive and will be rejected.</p>
GCC 26.2	<p>The transportation of all goods is the responsibility of the supplier. The supplier or bidder will be solely responsible for partial or fully damage of goods.</p>
GCC 27.1	<p>Terms of Payment:</p> <p>The method and conditions of payment to be made to the Supplier under this Contract shall be as follows:</p> <p>(a) Payment for Goods supplied from abroad:</p> <p>Payment of foreign currency portion shall be made in USD in the following manner:</p> <p>1. The currency or Currencies in which payment is to be made to the Supplier under this Contract shall be specified in the subject to the following general principle: Payment will be made in the currency or currencies in which the Contract price has been stated in the Supplier's Bid, as well as in other currencies in which the Supplier had indicated in its Bid that it intends to incur expenditures in the performance of the Contract and wishes to be paid. LC Charges within Bangladesh shall be paid by the Purchaser and those outside Bangladesh paid by the supplier. The payment for goods supplied from aboard to be made as follows:</p> <p>(i) 10% of the CIP/CIF amount except service (Operation, maintenance and training) of contract amount of the supply of the material and equipment shall be paid as an advance payment against submission of irrevocable and unconditional Bank Guarantee by the contractor of equal amount issued from a reputed schedule bank of Bangladesh and after signing of the contract. The invoice for the advance payment shall be verified by consignee office, certified by the Engineer and approved by competent authority of WZPDCL. The Contractor shall furnish the said Bank Guarantee within 28 (twenty-eight) days of the notification of contract award, in an amount equal to the advance payment. The advance payment security will be released after completion of post landing inspection of all items.</p> <p>(ii) 60% (Sixty per cent) of the Contract Price for supply of material and equipment with accessories shipped shall be paid through LC on submission of shipping documents specified in clause GCC 23 of the bid document. Project Director/Engineer will certify the invoice and the payment advice will be issued by the purchaser's representative (Accounts Department).</p> <p>(iii) 10% (ten per cent) of the Contract Price of goods received shall be paid through letter of credit upon submission of claim supported by the acceptance certificate</p>

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	<p>issued by the Purchaser specified in GCC Clause 24. Acceptance certificate will include damage report along with the invoice to be certified by engineer and passed for payment by the purchaser's representative Project Director/Engineer will certify the invoice and the payment advice will be issued by the purchaser's representative (Accounts Department).</p> <p>(iv) 10 % (Ten per cent) of the Contract Price for supply of material and equipment with accessories shall be paid through LC after installation and commissioning of the prepaid metering System, on submission of documents i.e. Provisional Acceptance Certificate (PAC) and successful commission of system along with the Invoice. Project Director/Engineer will certify the invoice and the payment advice will be issued by the purchaser's representative (Accounts Department).</p> <p>(v) 10% (ten per cent) of the Contract Price shall be paid through letter of credit after installation and successful commissioning of Prepaid Metering System on submission of Final Acceptance Certificate (FAC) and invoiced duly certified by engineer and passed for payment by the purchaser. Project Director/Engineer will certify the invoice and the payment advice will be issued by the purchaser's representative (Accounts Department).</p> <p>2. Payment of local currency portion shall be made in Bangladesh Taka within thirty (30) days of presentation of claim supported by a certificate from the Purchaser declaring that the Goods have been delivered and that all other contracted Related Services have been performed.</p> <p>3. Provisional Acceptance Certificate (PAC): The purchaser shall issue a Provisional Acceptance Certificate after successful installation, testing, commissioning and handing over of System.</p> <p>The issuance of a Provisional Acceptance Certificate in no way relieves the Tenderer of his responsibility for the satisfactory operation of the System as per warranty clause.</p> <p>4. Final Acceptance Certificate (FAC): Application for the Final Acceptance Certificate may be made to the Purchaser at the end of the Period of Guarantee for the Works or any portion thereof, provided that the Tenderer has fulfilled his obligations under the Contract.</p> <p>Provided that if, by reason of the fact that it has become necessary for the Tenderer to replace or renew any portion of the work, the obligations of the Contract shall continue after the period first therein mentioned, the right of the Contractor to apply for a Final.</p> <p>Acceptance Certificate in respect of the Works or portion thereof other than the portions of the Work replaced or renewed shall not be affected by that fact, and after the Tenderer has ceased to be under any obligation under the Contract in respect of the portions supplied he may apply for a Final Acceptance Certificate in respect thereof.</p> <p>The Purchaser shall issue to the Contractor a Final Acceptance Certificate within</p>

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>30 (Thirty) days after receiving an application therefore, which the Tenderer was entitled to make.</p> <p>A Final Acceptance Certificate shall, save in the case of fraud or dishonesty relating to or affecting any matter dealt within the Certificate, be conclusive evidence as to the sufficiency of the works and of the value thereof unless any proceedings arising out of the Contract whether or otherwise shall have been commenced by either party before the Final Certificate has been issued or within three months thereafter.</p> <p>i) The Purchaser shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Tenderer or the works unless the Tenderer shall have made a claim in writing in respect thereof before the giving of the Final Acceptance Certificate under this Clause.</p> <p>5. Delivery Certificate:</p> <p>Upon receipt of the Goods as defined in the Schedule of Requirements, at the designated destination, and after inspections, the Purchaser will issue a Delivery Certificate in which he shall certify the date on which, the Goods has been so delivered. This certificate shall be issued within 60 (sixty) days of the receipt of the last delivery of the Equipment constituting a lot at the destination as per Contract. Should the Equipment be found defective due to faulty design or workmanship or damage due to defective packing or otherwise not in conformity with the requirements of the Contract, the Delivery Certificate shall be withheld until such time as the defects have been corrected.</p> <p>The Equipment shall be deemed to have been accepted by the Purchaser after the expiry of 60 (sixty) days from the date of receipt of the last delivery of the Equipment constituting a lot at the destination unless the Purchaser has notified to the Tenderer of the defects found in the Equipment received by them.</p> <p>The issuance of a Delivery Certificate shall in no way relieve the Tenderer of his responsibility for the satisfactory operation of the Equipment in terms of the Specification and as per Warranty.</p> <p>(b) Payment for Goods and Services supplied from within the Bangladesh:</p> <p>Local Currency Payment for supply of goods, Installation, Erection, Testing, Commissioning and Inland Transportation and related service shall be made in the following manner through employer's existing payment procedures.</p> <p>(i) 80%(Eighty percent) of the contract price for supply of goods, installation, testing and commissioning shall be paid on submission of invoice on monthly progress duly certified by engineer and passed for payment by employers representative. This milestone will be completed not less than 4(four) installments of payments. All payment advice will be issued by the purchaser's representative.</p> <p>(ii) 10%(Ten percent) of the contract price for supply of goods, installation, testing</p>

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	<p>and commissioning after hand over shall be paid after installation, testing and commissioning of pre-payment metering system on submission of documents ie provisional reports of completion and successful commissioning of pre-payment metering system along with the invoiced duly certified by engineer. All payment advice will be issued by the purchaser's representative.</p> <p>(iii) Final 10% (Ten percent) of the Contract Price for supply of goods, installation, testing and commissioning Pre-payment Metering System package received shall be paid within 45 (Forty Five) days after submission of claim supported by an invoice to be certified by engineer and passed for payment by the purchaser's representative supported by the final acceptance certificate (FAC), R&I and post landing inspection and acceptance of testing & commissioning report. The letter of credit opener shall issue the payment advice. All payment advice issued by the purchaser's representative.</p> <p>(c) Payment for supply of Software & Network:</p> <p>Payment for supply of software and newtwork shall be made in BDT and in the following manner through purchaser's existing payment procedures.</p> <p>(i) 30% (thirty percent) of the contract price of only for the software and Network portion shall be paid based on installation of all softwares(developed/to be developed) and networks certified by the engineer.All payment advice will be issued by the purchaser's representative.</p> <p>(ii) 30% (thirty percent) of the contract price of only for the software and Network portion of installation, testing and commissioning of software and Networkafter hand over shall be paid after installation, testing and commissioning of system on submission of documents ie provisional reports of completion and successful commissioning of Pre-Paid metering system along with the invoice. All payment advice will be issued by the purchaser's representative.</p> <p>(iii) 30% (thirty percent) of the contract price of only for the software and network portion shall be paid based on monitoring on the over all field operation for 6 months and will certify the performance by the engineer after the date of commissioning of the Pre-paid metering System. All payment advice will be issued by the purchaser's representative.</p> <p>(iv) Final 10% (Ten percent) of the Contract Price of only for the software and Network portion of installation, testing and commissioning System package received shall be paid within 45 (Forty Five) days after hand over, on submission of claim supported by an invoice to be certified and passed for payment by the purchaser's representative supported by the final acceptance certificate (FAC), R&I and post landing inspection and acceptance of testing & commissioning report. The letter of credit opener shall issue the payment advice. All payment advice will be issued by the purchaser's representative.</p> <p>Banking Charges:</p> <p>a) Letter of Credit opening and other charges including amendment charges within Bangladesh shall be borne by WZPDCL and those outside Bangladesh shall be</p>

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>borne by the supplier.</p> <p>b) The supplier shall have to bear all such charges both inside and outside Bangladesh in case of time extension of L/C if done at the request of the supplier.</p>
GCC 27.3	<p>Payments shall be made in no case later than the 45 days after submission of an invoice or request for payment by the Supplier, and after the Purchaser has accepted it.</p>
GCC 28.2	<p>The minimum insurance cover shall be 110% (Hundred Ten). The insurance policy would be furnished from Bangladesh Sadharan Bima Corporation.</p> <p>(a) The maximum deductible for insurance of the Works and of Plant and Materials and Marine and Inland Transportation and All risk erection is Tk ----- [amount] [the Contractor shall provide this amount at the time of Contract signing].</p> <p>(b) The minimum cover for insurance of the Works and of Plant and Materials in respect of the Contractor's faulty design is Tk.20 (Twenty) million.</p> <p>(c) The maximum deductible for insurance of Equipment is Tk -----[amount]. [the Contractor shall provide this amount at the time of Contract signing].</p> <p>(d) The minimum cover for loss or damage to Equipment is Tk. 20 (Twenty) million.</p> <p>(e) The maximum deductible for insurance of other property is Tk----- [amount]. [the Contractor shall provide this amount at the time of Contract signing].</p> <p>(f) The minimum cover for insurance of other property is Tk.5 (Five) million.</p> <p>(g) The minimum cover for personal injury or death insurance:</p> <p>(i) for the Contractor's employees is as per the law and common practice in Bangladesh.</p> <p>(ii) and for third parties is as per the law and common practice in Bangladesh.</p>
GCC 29.2	<p>a) Bangladesh Income Tax and VAT for Income Earned in Bangladesh</p> <p>i) The Supplier/Contractor shall be entirely liable to pay Income Tax at prevailing rule of the Government of Bangladesh for payments of foreign currency (i.e. CIF/CIP price & service cost in foreign currency) & local currency portion under the contract. Income Tax shall be deducted at source during payment of bills/invoice for onward deposition of the same into Government Treasury.</p> <p>ii) The Supplier/Contractor shall not be responsible for payment of applicable Value Added Tax (VAT) on the imported materials and equipments of the Contract price. WZPDCL will pay the same VAT during clearing stage at the port. But the applicable VAT on service portion (both local and foreign currency) and Materials & Equipments cost without CIF/CIP price of the contract value shall be paid by the contractor which will deducted at source from the contractor's invoice/bill during payment.</p>

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>b) Foreign country Taxes and Permits</p> <p>The Supplier shall pay all sales, income and other taxes and duties, tariffs and imports that can be lawfully assessed against the supplier by the Government or any lawful authority of any country other than the people's Republic of Bangladesh which has jurisdiction over the Supplier in connection with this contract and shall pay for all licenses permits and inspection required for the supply including the cost or securing all export licenses and permits for materials, equipment, supplies and personnel exported from that country to Bangladesh.</p> <p>c) Import related duties, taxes, VAT, levies</p> <p>WZPDCL will be responsible for the payment of import related duties, taxes, VAT, levies and all sort of charges etc. to be liable by the port as well as other Govt. agencies inside Bangladesh for the goods to be imported in accordance with the specification. But WZPDCL shall not pay the same on any replacement/ additional items.</p>
GCC 32.1	<p>The inspections and tests shall be as follows:</p> <p>Orientation Training and Factory Performance Tests & Acceptance:</p> <p>i. The Purchaser shall be entitled to inspect at all reasonable items during manufacturing to witness the factory performance acceptance test on the Contractor's premises of the materials and workmanship of all equipment to be supplied under the Contract, and if part of the said Equipment is being manufactured on other's premises, the Contractor shall obtain for the Purchaser permission to inspect, examine and test as if the said Equipment were being manufactured on the Contractor's premises.</p> <p>An Engineering Team (nominated by the Purchaser) will participate on the quality acceptance test (QAT) for the offered equipment at the manufacturer's plant and confirm their quality as per specification. The Purchaser's nominated "Engineering Team" consists of at least 04 (Four) Engineers in each team shall have the witness of the QAT of the goods on the manufacturer's premises.</p> <p>Such inspection examination or testing if made shall not release the Contract from any obligation under the Contract. The Contractor shall give to the Purchaser 30 (thirty) days notice in writing of the date and on the place at which any equipment will be ready to witness the factory performance acceptance test on the Contractor's premises of the materials and workmanship of all equipment to be supplied under the Contract.</p> <p>Tests shall be performed in accordance with the relevant SANS/IEC standards and as per contract shall be complied with offered technical particulars and guarantees. All expenses for such tests shall be borne by the bidder</p> <p>ii. Before testing and inspection five copies of the test schedule showing the standards applied, number of samples, guaranteed values, test methods and other relevant information shall be submitted for approval by the Engineer/Purchaser.</p>

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>The manufacturer/ Supplier shall furnish the following to the 'Engineering Team':</p> <ol style="list-style-type: none"> a) Approved specification, Guaranteed technical particulars and Drawings of the goods. b) The test schedule showing the standards applied, test methods and other relevant information. c) Type test report of the offered goods. d) Factory test report of all the goods as per relevant standard. <p>iii. Where the Contract provides for tests on the premises of the Tenderer, the Supplier/ Manufacturer shall provide all reasonable facilities and assistance viz. labour, materials, electricity, fuel, stores, apparatus, instruments etc. as may be required and as may be reasonably demanded to carry out such tests efficiently at no charge to the purchaser.</p> <p>All the cost regarding QAT witness by the Purchaser's 'Engineering Team' i.e. the cost of Air Ticket from Dhaka to the place of training & return, internal transportation, Phone, Fax, E-mail, Health insurance, Hotel accommodation, Food etc. and pocket money per day per (as per GOB/Compnay rules)for the period excluding journey time shall be borne by the Supplier and the cost shall be included with the equipment quoted price.</p> <p>iv. The Tenderer/ manufacturer/ supplier shall invite consignee to nominate representatives for witnessing such factory performance acceptance test of the goods/equipment and inspection of factory production line.</p> <p>v. Where no specific tests are specified then the equipment shall be tested in accordance with the appropriate standards or alternative standard accepted by the Purchaser. Where no appropriate standard is available, tests shall be carried out in accordance with the Manufacturer's standard practice, which shall meet with the approval of the Engineer/Purchaser.</p> <p>Test shall be performed in accordance with the relevant standards supplemented by the specification requirements and as per contract. Where no specific tests are specified then the equipment shall be tested in accordance with the appropriate standards or alternative standard accepted by the Purchaser.</p> <p>Purchaser's 'Engineering Team' shall select samples from the goods to be supplied on random basis for testing. The selected samples shall be tested according to the relevant standards at the manufacturer premises in presence of Purchaser's 'Engineering Team'. In case of absence of requisite testing facilities in the manufacturer premises, the samples shall be tested in the testing laboratory accepted by the Purchaser/ Purchaser 'Engineering Team'.</p> <p>vi. As and when any Equipment shall have passed the tests referred to in this Clause the Engineer or the Purchaser's representative shall furnish to the Contractor a witness / Quality Certificate.</p> <p>The supplier shall provide test reports to the purchaser duly countersigned by the witnessing team within 10 (ten) days after completion of QAT. The purchaser will issue written instruction to the supplier to deliver the goods to the purchaser's designated</p>

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>stores against satisfactory test report.</p> <p>vii. If as a result of such witness the factory performance acceptance test of the equipment, (other than "Tests on Completion") the Engineer or the Purchaser's representatives shall decide that such equipment is defective or not in accordance with the contract, he shall notify the contractor accordingly stating in writing his objection and reason therefore. The Contractor shall, with all speed, make good the defect or ensure that the equipment complies with the Contract. Thereafter, if required by the Engineer, the tests shall be repeated under the same terms and conditions at the Contractor expense and all reasonable expenses to which the Purchaser may be put by the repetition of the tests shall be deducted from the Contract Price.</p> <p>No equipment shall be packed, prepared for shipment or dismantled for the purpose of packing unless it has been tested and approved or tests have been waived and written instruction have been received from the Purchaser.</p> <p>If any dissimilarity is observed during post delivery inspection on receive goods in respect to pre-inspected goods, the purchaser has to right, not to receive the goods in the purchaser's store.</p> <p>viii. The Contractor shall provide 12 (twelve) copies of reports for Proeject Director & 10 (Ten) copies to the Purchaser of all witness the factory performance acceptance test within 30 (thirty) days after completion Factory Performance Tests and Acceptance.</p> <p>ix. No goods shall be packed, prepared for shipment or ready for the purpose of packing unless it has been inspected and approved (or inspection has been waived) and written instructions for shipment.</p> <p>During Technical Orientation & Quality Test Witness, the inspection team will select 03(Three) meters and 02 (Two) Data concentrator units random basis for testing the selected meters in an independent testing lab for the following tests: i) Dry heat test; ii) Damp heat cycle test; iii) Electromagnetic compatibility (EMC) tests as per relevant IEC standards. The tenderer will arrange these tests in an independent Testing Laboratory during Quality Test Witness.</p> <p>Post Landing Inspection: The inspection and tests may be conducted on the premises of the Supplier or its Sub-Contractor at point of delivery and/or at the goods' final destination Where conducted on the premises of the Supplier or its Sub-Contractor all reasonable facilities and assistance including access to drawings and production data shall be furnished to the inspectors at no charge to the Purchaser.</p> <ol style="list-style-type: none"> 1. Should any inspected or tested goods fail to conform to the Specifications, the Purchaser may reject them and the Supplier shall either replace the rejected goods or make all alterations necessary to meet the specification, requirements free of cost to the Purchaser. 2. The Purchaser's right to inspect, test and where necessary, reject the goods after the goods arrival in the Purchaser's country shall in no way be limited or waived by reason of the goods having previously been inspected, tested and passed by the Purchaser or its representative prior to the goods shipment from

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	<p>the country of Origin.</p> <p>3. Nothing in any Clause shall in any way release the Supplier from any warranty or other obligations under this Contract.</p>
GCC 33.3	<p>The Period of Validity of the warranty shall be 3 years from the date of completion of works including testing & commissioning and handing over to the employer and the place of final destination shall be project site(s). The following condition shall also be applicable for Warranty and Guarantee of Goods:</p> <ol style="list-style-type: none"> 1. Guarantee of Goods and Guaranty period as used in this document will mean warranty and period of guarantee respectively. Warranty/ Guarantee period is 3 years from the date of completion of works including testing & commissioning and handing over to the employer. 2. Goods or portion thereof, if replaced under this clause, will come under fresh warranty/ Guarantee for a further period of 3 (three) years from the date of replacement. 3. The Supplier warrants that the goods supplied under the Contract are new, unused, of the most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the Contract. 4. The Supplier further warrants that all goods supplied under this Contract shall have no defect arising from design, materials or workmanship (except in so far as the design or material is required by the Purchaser's Specifications) or from any act or omission of the Supplier, that may develop under normal use of the Supplied Goods in the conditions obtaining in the country of final destination.
GCC 33.6	<p>The Supplier shall correct any defects covered by the Warranty 30 (thirty) days of being notified by the Purchaser of the occurrence of such defects.</p>
GCC 35.1	<p>The applicable rate for liquidated damages for delay shall be : 0.5 percent of the Contract Price of the delayed Goods or unperformed Related services for each week of delay until actual delivery or performance</p> <p>The maximum amount of liquidated damages shall be: Ten (10%) percent of the Contract Price.</p>
GCC 47.2(b)	<p>The name of the Adjudicator: Managing Director, WZPDCL, Khulna.</p>
GCC 47.3(b)	<p>The rules of procedure for arbitration proceedings shall be as follows:</p> <ol style="list-style-type: none"> a) If the parties are unable to reach a settlement as per GCC Clause 47.1(a) within twenty eight (28) days of the first writteh correspondence on the matter of disagreement, then either party may give notice to the other party of its intention to commernce arbitration in accordance with GCC Sub-clause 47.3(b). b) The arbitration shall be conducted in accordance with the Arbitration Act (Act No. 1 of 2001) of Bangladesh as at present in force and in the place shown in

GCC Clause	Amendments of, and Supplements to, Clauses in the General Conditions of Contract
	the PCC.

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Section-5: Tender and Contract Forms

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Section-5: Tender and Contract Forms

Form	Title
Tender Forms	
PG4 – 1	Tender Submission Letter
PG4 – 2	Tenderer Information Sheet
PG4 – 3A,3B & 3C	Price Schedule for Goods
PG4 – 3D	Price Schedule for Related Services
PG4 – 4	Specifications Submission and Compliance Sheet
PG4 – 5	Manufacturer's Authorisation Letter
PG4 – 6	Bank Guarantee for Tender Security
Contract Forms	
PG4 – 7	Notification of Award
PG4 – 8	Contract Agreement
PG4 – 9	Bank Guarantee for Performance Security
PG4 – 10	Bank Guarantee for Advance Payment

Forms PG4-1 to PG4-6 comprises part of the Tender and should be completed as stated in ITT Clause 21.

Forms PG4-7 to PG4-10 comprises part of the Contract as stated in GCC Clause 5.

Tender Submission Letter (Form PG4 – 1)

[This letter shall be completed and signed by the Authorised Signatory preferably on the Letter-Head pad of the Tenderer].

To: [Contact Person] [Name of Purchaser] [Address of Purchaser]	Date:
Invitation for Tender No:	[indicate IFT No]
Tender Package No:	[indicate Package No]
Lot No:	[indicate number of Lots]

We, the undersigned, offer to supply in conformity with the Tender Document the following Goods and related Services:

--

In accordance with ITT Clauses 22 and 23, the following prices and discounts apply to our Tender:

The Tender Price is: (ITT Sub-Clause 23.1)	Taka [state amount in figures] and Taka[state amount in words]
Mandatory Spare parts Price (If economic Factor is applicable) (ITT Sub-Clause 52.2 (f) & 52.5 (b))	Taka [state amount in figures] and Taka[state amount in words]
The unconditional discount for being awarded more than one lot in this package is: (ITT Sub-Clause 23.8)	Taka [state amount in figures] and Taka[state amount in words]
The methodology for Application of the discount is: (ITT Sub-Clause 23.9)	[state the methodology]
The advance payment is: (GCC Sub-Clause 27.1)	[state the amount based on percentage of the Tender Price]

and we shall accordingly submit an Advance Payment Guarantee in the format shown in Form PG4 - 10.

In signing this letter, and in submitting our Tender, we also confirm that:

- a) our Tender shall be valid for the period stated in the Tender Data Sheet (ITT Sub-Clause 27.2) and it shall remain binding upon us and may be accepted at any time before the expiration of that period;

- b) a Tender Security is attached in the form of a bank guarantee] in the amount stated in the Tender Data Sheet (ITT Clause 29) and valid for a period of 28 days beyond the Tender validity date;
- c) if our Tender is accepted, we commit to furnishing a Performance Security in the amount stated in the Tender Data Sheet (ITT Sub-Clause 63.2) in the form stated in Tender Data Sheet (ITT Sub-Clause 64.1) and valid for a period of 28 days beyond the date of completion of our performance obligations;
- d) we have examined and have no reservations to the Tender Document, issued by you on [insert date];
- including Addendum to Tender Documents No(s) [state numbers] ,issued in accordance with the Instructions to Tenderers (ITT Clause 11). [insert the number and issuing date of each addendum; or delete this sentence if no Addendum have been issued];
- e) we, including as applicable, subcontractor for any part of the contract resulting from this Tender process, have nationalities from eligible countries, in accordance with ITT Sub-Clause 5.1;
- f) we are submitting this Tender as a sole Tenderer
- g) we are not a Government owned entity as defined in ITT Sub-Clause 5.3
or
we are a Government owned entity, and we meet the requirements of ITT Sub-Clause 5.3];
(delete one of the above as appropriate)
- h) we, declare that we are not associated, nor have been associated in the past, directly or indirectly, with a consultant or any other entity that has prepared the design, specifications and other documents, in accordance with ITT Sub-Clause 5.5;
- i) we, including as applicable subcontractor have not been declared ineligible by the Government of Bangladesh on charges of engaging in corrupt, fraudulent, collusive or coercive practices, in accordance with ITT Sub-Clause 5.6;
- j) furthermore, we are aware of ITT Sub Clause 4.3 concerning such practices and pledge not to indulge in such practices in competing for or in executing the Contract;
- k) we intend to subcontract an activity or part of the Supply, in accordance with ITT Sub-Clause 16.1 to the following Subcontractor(s);

Nature of the Supply or related service	Name and address of Subcontractor

- l) we, confirm that we do not have a record of poor performance, such as abandoning the Supply, not properly completing contracts, inordinate delays, or financial failure as stated in ITT Sub-Clause 5.8, and that we do not have, or have had, any litigation against us, other than that stated in the Tenderer Information Sheet(Form PG4-2);

-
- m) we are not participating as Tenderers in more than one Tender in this Tendering process. We understand that your written Notification of Award shall become a binding Contract between us, until a formal Contract is prepared and executed;
- n) we understand that you reserve the right to accept or reject any Tender, to cancel the Tender proceedings, or to reject all Tenders, without incurring any liability to Tenderers, in accordance with ITT Clause 58.1.

Signature:

[insert signature of authorised representative of the Tenderer]

Name:

[insert full name of signatory with National ID]
--

In the capacity of:

[insert designation of signatory]

Duly authorised to sign the Tender for and on behalf of the Tenderer

[If there is more than one (1) signatory add other boxes and sign accordingly].

Attachment-1: Written confirmation authorising the above signatory(ies) to commit the Tenderer, in accordance with ITT Sub-Clause 34.3;

Tenderer Information Sheet (Form PG4-2)

[The Tenderer shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted]

Invitation for Tender No: [Indicate IFT No] Date [Insert date of Tender Submission]
Tender Package No: [Indicate Package No]

A. Individual Tenderers

1. Eligibility Information of the Tenderer [ITT Clauses 5 & 21]	
1.1	Tenderer's Legal Name:
1.2	Tenderer's legal address in Country of Registration
1.4	Tenderer's Year of Registration
1.5	Tenderer's Authorised Representative Information
	Name
	National ID number
	Address
	Telephone / Fax Numbers
	e-mail address
1.6	Attached are copies of original documents of : [check box(es) of the attached original documents]
	<input type="checkbox"/> Articles of Incorporation or Registration of firm named in 1.1, in accordance with ITT sub-Clause 5.1 and 5.2]
	<input type="checkbox"/> In case of government owned entity, documents establishing legal and financial autonomy and compliance with commercial law, in accordance with ITT Sub-Clause 5.3
	<input type="checkbox"/> An affidavit confirming the legal capacity stating that there are no existing orders of any judicial court that prevents either the tenderer or employees of a tenderer entering into or signing a Contract with the Purchaser in accordance with ITT clause 5
	<input type="checkbox"/> An affidavit confirming that the tenderer is not insolvent, in receivership or not bankrupt or not in the process of bankruptcy, not temporarily barred from undertaking their business for financial reasons and shall not be the subject of legal proceedings for any of the foregoing in accordance with ITT Clause 5.
	<input type="checkbox"/> A certificate issued by the competent authority of Bangladesh stating that the Tenderer is a Tax payer having valid Tax identification Number (TIN) and VAT registration number or in lieu any other document acceptable to the Purchaser demonstrating that the Tenderer is a genuine Tax payer and has a VAT registration number as a proof of fulfillment of taxation obligations in accordance with ITT Clause 5 .
	<input type="checkbox"/> Documentary evidence demonstrating that they are enrolled in the relevant professional or trade organizations registered in Bangladesh in accordance with ITT Clause 5.

2. Litigation History: [Number of arbitration awards against the tenderer over the period in accordance the ITT Clause 13.1] if no [state "None"]

3. Qualification Information of the Tenderer:

3.1	Number of years of overall experience of the Tenderer in the supply of goods and related services as stated under ITT Sub-Clause 14.1(a):	
3.2	Number of completed supply contracts in the supply of similar goods and related services of required value within the period mentioned in TDS as stated under ITT Sub-Clause 14.1(b): <ul style="list-style-type: none"> ▪ Number of Contracts: ▪ Value of the Contracts: ▪ Period of the Contract: 	
3.3	The supply and/or production capacity of Goods, if applicable, as stated under ITT Sub-Clause 14.(c)	
3.4	Available liquid assets or working capital or credit facility in accordance with ITT Clause 15.1(a)	

B. Individual Members of a Joint Venture (If applicable)

4.1	Each Member of a JVCA shall provide all the information requested in the form above, Sections 1-3.
4.2	Attach a power of attorney for each of the authorising signatories of the Tender on behalf of the JVCA.
4.3	Attach the Agreement among all Members of the JVCA (and which is legally binding on all Members), which shows that: <ul style="list-style-type: none"> (a) all Members shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms; (b) one of the Members will be nominated as being in charge, authorised to incur liabilities, and receive instructions for and on behalf of any and all Members of the joint venture; and (c) the execution of the entire Contract, including payment, shall be done exclusively with the Member in charge

Note: The above represents the minimum requirements. These may be added to buy the Purchaser on a case-by-case basis, as necessary.

Price Schedule for Goods (Form PG4-3A)
[Group A Tenders: Goods Manufactured/ Offered in Bangladesh]

Invitation for Tender No:	27.22.4785.905.50.040.21/142	Date:	27/05/2021
Tender Package No:	3	Package Description:	Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis.
Tender Lot No:		Lot Description:	[enter description as specified in Section 6]

1	2	3	4	5	6	7	8	9	10
Line Item No .	Description of Item	Unit of Measurement	Quantity	Unit price EXW [Taka.]	EXW price per Line Item (Col. 4 × 5) [Taka.]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	Cost of local labour, raw materials and components from with origin in Bangladesh [Taka.]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 6+7) Taka
		[Insert name of the Unit]	[Insert number of Unit to be supplied]	[Insert EXW unit price, also indicate Currency]	[Insert total EXW price per line item]	[Insert corresponding price per line item]	[Insert cost of local labour, raw material and components as a% of the Col 5]	[Insert Supplier's VAT if Contract is awarded]	[Insert total price per line item]
1.0	Meter& Accessories								
1.1	Supply of Keypad base Single phase Smart pre paid meters with G3-PLC (FCC)/ Broadband PLC communication module and 10500 Nos. External GPRS communication module (Plug and Play)	Nos.	102000						
1.2	Supply of Keypad base Three phase Oline Smart Pre Paid Meters with G3-PLC (FCC)/ Broadband PLC communication module and 500 nos. External GPRS Module (Plug and Play)	Nos.	3000						
1.3	Supply of DC (Data Concentrator) with Enclosure Box, CT and SIM Cards	Nos.	1200						
1.4	Hand Held Unit	Nos.	12						

1	2	3	4	5	6	7	8	9	10
Line Item No .	Description of Item	Unit of Measurement	Quantity	Unit price EXW [Taka.]	EXW price per Line Item (Col. 4 × 5) [Taka.]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	Cost of local labour, raw materials and components from with origin in Bangladesh [Taka.]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 6+7) Taka
1.5	Optical communication cable (for downloading data from meter to PC).	Nos.	60						
1.6	Supply of relative IT hardware (Storage/Fiber cable) and Software (Optional as and when required)	L.S.	L.S.						
1.7	Installation, testing & commissioning cost of Keypad base Single phase Smart pre paid meters	Nos.	102000						
1.8	Installation, testing & commissioning cost of Keypad base Three phase Oline Smart pre paid meters	Nos.	3000						
1.9	Installation, testing & commissioning cost of DC (Data Concentrator), DC Enclosure Box and CT with required materials such as cables/ clamps/ screw/ nut-bolts/ connector etc. when/wehere required to install DC.	Nos.	1200						
1.10	Dismantle cost of existing post paid meters with carrying and handover.	Nos.	105000						
	Sub-total (A)								
2.0	Utility Vending Station (UVS)								
2.1	Workstation with Required Software (both System and application)	Nos.	12						
2.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)	Nos.	25						
2.3	SIM Card with Required Software (both System and application)	Nos.	25						

1	2	3	4	5	6	7	8	9	10
Line Item No .	Description of Item	Unit of Measurement	Quantity	Unit price EXW [Taka.]	EXW price per Line Item (Col. 4 × 5) [Taka.]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	Cost of local labour, raw materials and components from with origin in Bangladesh [Taka.]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 6+7) Taka
2.4	Slip Printer with Required Software (both System and application)	Nos.	25						
2.5	Router and Switch with Required Software (both System and application)	Nos.	12						
2.6	UPS 5KVA 2 hr. backup with Required Software (both System and application)	Nos.	6						
2.7	Split Type square AC 2 ton	Nos.	6						
	Sub-total (B)								
3.0	Utility Customization Center								
3.1	Workstation with Required Software (both System and application)	Nos.	6						
3.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)	Nos.	6						
3.3	SIM Card with Required Software (both System and application)	Nos.	6						
3.4	Slip Printer with Required Software (both System and application)	Nos.	6						
3.5	Laptop with Required Software (both System and application)	Nos.	15						
3.6	Laser Printer with Required Software (both System and application)	Nos.	6						
3.7	Split Type square AC 2 ton	Nos.	6						
	Sub-Total (C)								

1	2	3	4	5	6	7	8	9	10
Line Item No .	Description of Item	Unit of Measurement	Quantity	Unit price EXW [Taka.]	EXW price per Line Item (Col. 4 × 5) [Taka.]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	Cost of local labour, raw materials and components from with origin in Bangladesh [Taka.]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 6+7) Taka
4.0	Network								
4.1	Network 3: The Master Information Center(MIC)Network to the Utility Vending Station (UVS)/UCC Networks. This is a physical connection via fibre optical line. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)	Nos.	6						
4.2	Network 5(a): The Master Information Center (MIC) to the DC/DCU and DC/DCU to the related Meters. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)	lot	1						
4.3	Network 6: The Master Information Center(MIC) to the Online 3-phase / 1-phase meter. This is a Wireless connection. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)	lot	1						
	Sub-Total (D)								
5.0	Others								
5.1	03 (Three) years Operational support for system	lot	1						
5.2	Manpower Training (Local)	Man-Month	6.5						

1	2	3	4	5	6	7	8	9	10
Line Item No .	Description of Item	Unit of Measurement	Quantity	Unit price EXW [Taka.]	EXW price per Line Item (Col. 4 × 5) [Taka.]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	Cost of local labour, raw materials and components from with origin in Bangladesh [Taka.]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 6+7) Taka
5.3	Manpower Training (Foreign)	Man-Month	3.5						
	Sub-total(E)								
Note : Price offered in Bangladesh Taka							Total Price for Lot		
Point of Delivery as per Schedule of Requirement: Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.					Period of Delivery and Completion as per Schedule of Requirement: Delivery and completion time shall be 180 days from the date of qualified commitment of the letter of credit (L/C).				

Name:	[insert full name of signatory]	Signature with Date and Seal
In the capacity of:	[insert designation of signatory]	[Sign]
Duly authorised to sign the Tender for and on behalf of the Tenderer		

Price Schedule for Goods (Form PG4-3B)
[Group B Tenders: Goods Manufactured outside Bangladesh, to be imported]

Invitation for Tender No:	27.22.4785.905.50.040.21/142	Date:	27/05/2021
Tender Package No:	3	Package Description:	Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis.
Tender Lot No:		Lot Description:	[enter description as specified in Section 6]

1	2	3	4	5	6	7	8	9	10	
Line Item No.	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price CIP[ininsert place of destination] Or CIF[ininsert port of destination] [FC]	CIF/CIP price per Line Item (Col. 5 × 6) [FC]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 7+ Col. 8)	
									FC	Taka
		[insert country of origin of the Good]	[Insert name of the Unit]	[Insert number of Unit to be supplied]	[Insert unit price in CIF or CIP, also indicate currency]	[Insert total price per line item]	[Insert corresponding price per line item]	[Insert Supplier's VAT if Contract is awarded] (If applicable as per VAT Act)	[Insert total price per line item]	
1.0	Meter& Accessories									
1.1	Supply of Keypad base Single phase Smart pre paid meters with G3-PLC (FCC)/ Broadband PLC communication module and 10500 Nos. External GPRS communication module (Plug and Play)		Nos.	102000						
1.2	Supply of Keypad base Three phase Oline Smart Pre Paid Meters with G3-PLC (FCC)/ Broadband PLC communication module and 500 nos. External GPRS Module (Plug and Play)		Nos.	3000						
1.3	Supply of DC (Data Concentrator) with Enclosure Box, CT and SIM Cards		Nos.	1200						
1.4	Hand Held Unit		Nos.	12						

1	2	3	4	5	6	7	8	9	10	
Line Item No.	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price CIP[inset place of destination] Or CIF[inset port of destination] [FC]	CIF/CIP price per Line Item (Col. 5 × 6) [FC]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 7+ Col. 8)	
									FC	Taka
1.5	Optical communication cable (for downloading data from meter to PC).		Nos.	60						
1.6	Supply of relative IT hardware (Storage/Fiber cable) and Software (Optional as and when required)		L.S.	L.S.						
1.7	Installation, testing & commissioning cost of Keypad base Single phase Smart pre paid meters		Nos.	102000						
1.8	Installation, testing & commissioning cost of Keypad base Three phase Oline Smart pre paid meters		Nos.	3000						
1.9	Installation, testing & commissioning cost of DC (Data Concentrator), DC Enclosure Box and CT with required materials such as cables/ clamps/ screw/ nut-bolts/ connector etc. when/wehere required to install DC.		Nos.	1200						
1.10	Dismantle cost of existing post paid meters with carrying and handover.		Nos.	105000						
	Sub-total (A)									
2.0	Utility Vending Station (UVS)									
2.1	Workstation with Required Software (both System and application)		Nos.	12						
2.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)		Nos.	25						
2.3	SIM Card with Required Software (both System and application)		Nos.	25						
2.4	Slip Printer with Required Software (both System and application)		Nos.	25						

1	2	3	4	5	6	7	8	9	10	
Line Item No.	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price CIP[inset place of destination] Or CIF[inset port of destination] [FC]	CIF/CIP price per Line Item (Col. 5 × 6) [FC]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 7+ Col. 8)	
									FC	Taka
2.5	Router and Switch with Required Software (both System and application)		Nos.	12						
2.6	UPS 5KVA 2 hr. backup with Required Software (both System and application)		Nos.	6						
2.7	Split Type square AC 2 ton		Nos.	6						
	Sub-total (B)									
3.0	Utility Customization Center									
3.1	Workstation with Required Software (both System and application)		Nos.	6						
3.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)		Nos.	6						
3.3	SIM Card with Required Software (both System and application)		Nos.	6						
3.4	Slip Printer with Required Software (both System and application)		Nos.	6						
3.5	Laptop with Required Software (both System and application)		Nos.	15						
3.6	Laser Printer with Required Software (both System and application)		Nos.	6						
3.7	Split Type square AC 2 ton		Nos.	6						
	Sub-Total (C)									

1	2	3	4	5	6	7	8	9	10	
Line Item No.	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price CIP[inset place of destination] Or CIF[inset port of destination] [FC]	CIF/CIP price per Line Item (Col. 5 × 6) [FC]	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col. 7+ Col. 8)	
									FC	Taka
4.0	Network									
4.1	Network 3: The Master Information Center(MIC)Network to the Utility Vending Station (UVS)/UCC Networks. This is a physical connection via fibre optical line. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		Nos.	6						
4.2	Network 5(a): The Master Information Center (MIC) to the DC/DCU and DC/DCU to the related Meters. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		lot	1						
4.3	Network 6: The Master Information Center(MIC) to the Online 3-phase / 1-phase meter. This is a Wireless connection. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		lot	1						
	Sub-Total (D)									
5.0	Others									
5.1	03 (Three) years Operational support for system		lot	1						
5.2	Manpower Training (Local)		Man-Month	6.5						
5.3	Manpower Training (Foreign)		Man-Month	3.5						
	Sub-total(E)									
Note : Price offered in foreign currency (FC) & Bangladesh Taka							Total Price for Lot			
Point of Delivery as per Schedule of Requirement: Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.						Period of Delivery and Completion as per Schedule of Requirement: Delivery and completion time shall be 180 days from the date of qualified commitment of the letter of credit (L/C).				

Name:	[insert full name of signatory]	Signature with Date and Seal
In the capacity of:	[insert designation of signatory]	[Sign]
Duly authorised to sign the Tender for and on behalf of the Tenderer		

[Note: The Purchaser may also use other INCOTERMs, if deemed necessary, In such case Form PG4-3B, will require to be customized by the Purchaser]

UNSIGNED COPY

Price Schedule for Goods (Form PG4-3C)

[Group B Tenders: Goods Manufactured outside Bangladesh, already imported]

Invitation for Tender No:	27.22.4785.905.50.040.21/142	Date:	27/05/2021
Tender Package No:	3	Package Description:	Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis.
Tender Lot No:		Lot Description:	[enter description as specified in Section 6]

1	2	3	3	4	5	6	7	8	9	10	11
Line Item No.	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price Including Custom Duties, import VAT & other import taxes already paid [Taka]	Custom Duties, import VAT & other import taxes already paid per unit [Taka]	Unit Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 5 – Col.6)	Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 4X Col. 7)	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col.8+ Col.9) [Taka]
		[insert country of origin of the Good]	[Insert name of the Unit]	[Insert number of Unit to be supplied]	[Insert unit price including CD & all import taxes]	[Insert CD, VAT & import taxes paid per unit] to be supported by documents	[insert unit price net of CD, VAT and import taxes]	[insert price per line item net of CD, VAT and import taxes]	[Insert corresponding price per line item]	[Insert Supplier's VAT if Contract is awarded]	[Insert total price per line item]
1.0	Meter& Accessories										
1.1	Supply of Keypad base Single phase Smart pre paid meters with G3-PLC (FCC)/ Broadband PLC communication module and 10500 Nos. External GPRS communication module (Plug and Play)		Nos.	102000							
1.2	Supply of Keypad base Three phase Oline Smart Pre Paid Meters with G3-PLC (FCC)/ Broadband PLC communication module and 500 nos. External GPRS Module (Plug and Play)		Nos.	3000							
1.3	Supply of DC (Data Concentrator) with Enclosure Box, CT and SIM Cards		Nos.	1200							
1.4	Hand Held Unit		Nos.	12							

1	2	3	3	4	5	6	7	8	9	10	11
Line Item No .	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price Including Custom Duties, import VAT & other import taxes already paid [Taka]	Custom Duties, import VAT & other import taxes already paid per unit [Taka]	Unit Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 5 – Col.6)	Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 4X Col. 7)	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col.8+ Col.9) [Taka]
1.5	Optical communication cable (for downloading data from meter to PC).		Nos.	60							
1.6	Supply of relative IT hardware (Storage/Fiber cable) and Software (Optional as and when required)		L.S.	L.S.							
1.7	Installation, testing & commissioning cost of Keypad base Single phase Smart pre paid meters		Nos.	102000							
1.8	Installation, testing & commissioning cost of Keypad base Three phase Oline Smart pre paid meters		Nos.	3000							
1.9	Installation, testing & commissioning cost of DC (Data Concentrator), DC Enclosure Box and CT with required materials such as cables/ clamps/ screw/ nut-bolts/ connector etc. when/wehere required to install DC.		Nos.	1200							
1.10	Dismantle cost of existing post paid meters with carrying and handover.		Nos.	105000							
	Sub-total (A)										
2.0	Utility Vending Station (UVS)										
2.1	Workstation with Required Software (both System and application)		Nos.	12							
2.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)		Nos.	25							

1	2	3	3	4	5	6	7	8	9	10	11
Line Item No .	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price Including Custom Duties, import VAT & other import taxes already paid [Taka]	Custom Duties, import VAT & other import taxes already paid per unit [Taka]	Unit Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 5 – Col.6)	Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 4X Col. 7)	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col.8+ Col.9) [Taka]
2.3	SIM Card with Required Software (both System and application)		Nos.	25							
2.4	Slip Printer with Required Software (both System and application)		Nos.	25							
2.5	Router and Switch with Required Software (both System and application)		Nos.	12							
2.6	UPS 5KVA 2 hr. backup with Required Software (both System and application)		Nos.	6							
2.7	Split Type square AC 2 ton		Nos.	6							
	Sub-total (B)										
3.0	Utility Customization Center										
3.1	Workstation with Required Software (both System and application)		Nos.	6							
3.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)		Nos.	6							
3.3	SIM Card with Required Software (both System and application)		Nos.	6							
3.4	Slip Printer with Required Software (both System and application)		Nos.	6							
3.5	Laptop with Required Software (both System and application)		Nos.	15							
3.6	Laser Printer with Required Software (both System and application)		Nos.	6							
3.7	Split Type square AC 2 ton		Nos.	6							
	Sub-Total (C)										

1	2	3	3	4	5	6	7	8	9	10	11
Line Item No .	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price Including Custom Duties, import VAT & other import taxes already paid [Taka]	Custom Duties, import VAT & other import taxes already paid per unit [Taka]	Unit Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 5 – Col.6)	Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 4X Col. 7)	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col.8+ Col.9) [Taka]
4.0	Network										
4.1	Network 3: The Master Information Center(MIC)Network to the Utility Vending Station (UVS)/UCC Networks. This is a physical connection via fibre optical line. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		Nos.	6							
4.2	Network 5(a): The Master Information Center (MIC) to the DC/DCU and DC/DCU to the related Meters. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		lot	1							
4.3	Network 6: The Master Information Center(MIC) to the Online 3-phase / 1-phase meter. This is a Wireless connection. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		lot	1							
	Sub-Total (D)										
5.0	Others										
5.1	03 (Three) years Operational support for system		lot	1							
5.2	Manpower Training (Local)		Man-Month	6.5							
5.3	Manpower Training (Foreign)		Man-Month	3.5							
	Sub-total(E)										

1	2	3	3	4	5	6	7	8	9	10	11
Line Item No .	Description of Item	Country of Origin	Unit of Measurement	Quantity	Unit price Including Custom Duties, import VAT & other import taxes already paid [Taka]	Custom Duties, import VAT & other import taxes already paid per unit [Taka]	Unit Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 5 – Col.6)	Price per line item net of Custom Duties, import VAT & other import taxes already paid [Taka] (Col. 4X Col. 7)	Inland transportation, Insurance and other local costs for the delivery of the Goods to their final destination [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item (Col.8+ Col.9) [Taka]
Note : Price offered in Bangladesh Taka							Total Price for Lot				
Point of Delivery as per Schedule of Requirement: Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.						Period of Delivery and Completion as per Schedule of Requirement: Delivery and completion time shall be 180 days from the date of qualified commitment of the letter of credit (L/C).					

Name:	[insert full name of signatory]	Signature with Date and Seal
In the capacity of:	[insert designation of signatory]	[Sign]
Duly authorised to sign the Tender for and on behalf of the Tenderer		

Price and Completion Schedule - Related Services (Form PG4-3D)

Invitation for Tender No:	27.22.4785.905.50.040.21/142	Date:	27/05/2021
Tender Package No:	3	Package Description:	Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis.
Tender Lot No:		Lot Description:	[enter description as specified in Section 6]

1	2	3	4	5	6	7	8	9	
Service No.	Description of Services (excludes inland transportation and other services required in Bangladesh to convey the goods to their final destination)	Country of Origin	Unit of Measurement	Quantity	Unit price of service [FC] or [Taka]	Price per line item of service (Col. 5 X Col. 6) [FC] or [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item of service (Col. 7)	
								FC	Taka
		[insert country of origin of the Service]	[Insert name of the Unit]	[Insert number of Unit to be supplied]	[Insert unit price]	[Insert price per line item of service]	[Insert Supplier's VAT if Contract is awarded]	[Insert total price per line item of service]	
1.0	Meter& Accessories								
1.1	Supply of Keypad base Single phase Smart pre paid meters with G3-PLC (FCC)/ Broadband PLC communication module and 10500 Nos. External GPRS communication module (Plug and Play)		Nos.	102000					
1.2	Supply of Keypad base Three phase Oline Smart Pre Paid Meters with G3-PLC (FCC)/ Broadband PLC communication module and 500 nos. External GPRS Module (Plug and Play)		Nos.	3000					
1.3	Supply of DC (Data Concentrator) with Enclosure Box, CT and SIM Cards		Nos.	1200					
1.4	Hand Held Unit		Nos.	12					
1.5	Optical communication cable (for downloading data from meter to PC).		Nos.	60					
1.6	Supply of relative IT hardware (Storage/Fiber cable) and Software (Optional as and when required)		L.S.	L.S.					
1.7	Installation, testing & commissioning cost of Keypad base Single phase Smart pre paid meters		Nos.	102000					

1	2	3	4	5	6	7	8	9	
Service No.	Description of Services (excludes inland transportation and other services required in Bangladesh to convey the goods to their final destination)	Country of Origin	Unit of Measurement	Quantity	Unit price of service [FC] or [Taka]	Price per line item of service (Col. 5 X Col. 6) [FC] or [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item of service (Col. 7)	
								FC	Taka
1.8	Installation, testing & commissioning cost of Keypad base Three phase Oline Smart pre paid meters		Nos.	3000					
1.9	Installation, testing & commissioning cost of DC (Data Concentrator), DC Enclosure Box and CT with required materials such as cables/ clamps/ screw/ nut-bolts/ connector etc. when/where required to install DC.		Nos.	1200					
1.10	Dismantle cost of existing post paid meters with carrying and handover.		Nos.	105000					
	Sub-total (A)								
2.0	Utility Vending Station (UVS)								
2.1	Workstation with Required Software (both System and application)		Nos.	12					
2.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)		Nos.	25					
2.3	SIM Card with Required Software (both System and application)		Nos.	25					
2.4	Slip Printer with Required Software (both System and application)		Nos.	25					
2.5	Router and Switch with Required Software (both System and application)		Nos.	12					
2.6	UPS 5KVA 2 hr. backup with Required Software (both System and application)		Nos.	6					
2.7	Split Type square AC 2 ton		Nos.	6					
	Sub-total (B)								
3.0	Utility Customization Center								
3.1	Workstation with Required Software (both System and application)		Nos.	6					

1	2	3	4	5	6	7	8	9	
Service No.	Description of Services (excludes inland transportation and other services required in Bangladesh to convey the goods to their final destination)	Country of Origin	Unit of Measurement	Quantity	Unit price of service [FC] or [Taka]	Price per line item of service (Col. 5 X Col. 6) [FC] or [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item of service (Col. 7)	
								FC	Taka
3.2	GRPS/EDGE/EVDO Modem with Required Software (both System and application)		Nos.	6					
3.3	SIM Card with Required Software (both System and application)		Nos.	6					
3.4	Slip Printer with Required Software (both System and application)		Nos.	6					
3.5	Laptop with Required Software (both System and application)		Nos.	15					
3.6	Laser Printer with Required Software (both System and application)		Nos.	6					
3.7	Split Type square AC 2 ton		Nos.	6					
	Sub-Total (C)								
4.0	Network								
4.1	Network 3: The Master Information Center(MIC)Network to the Utility Vending Station (UVS)/UCC Networks. This is a physical connection via fibre optical line. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		Nos.	6					
4.2	Network 5(a): The Master Information Center (MIC) to the DC/DCU and DC/DCU to the related Meters. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		lot	1					
4.3	Network 6: The Master Information Center(MIC) to the Online 3-phase / 1-phase meter. This is a Wireless connection. (Installation & Monthly Communication charge shall be paid by the contractor until the project handover)		lot	1					
	Sub-Total (D)								

1	2	3	4	5	6	7	8	9	
Service No.	Description of Services (excludes inland transportation and other services required in Bangladesh to convey the goods to their final destination)	Country of Origin	Unit of Measurement	Quantity	Unit price of service [FC] or [Taka]	Price per line item of service (Col. 5 X Col. 6) [FC] or [Taka]	VAT Payable on account of Supplier if the Contract is awarded [Taka]	Total Price per line item of service (Col. 7)	
								FC	Taka
5.0	Others								
5.1	03 (Three) years Operational support for system		lot	1					
5.2	Manpower Training (Local)		Man-Month	6.5					
5.3	Manpower Training (Foreign)		Man-Month	3.5					
	Sub-total(E)								
Note Price offered in foreign currency (FC) & Bangladesh Taka						Total Price for Lot			
Point of Delivery as per Schedule of Requirement: Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.					Period of Delivery and Completion as per Schedule of Requirement: Delivery and completion time shall be 180 days from the date of qualified commitment of the letter of credit (L/C).				

Total (From PG4-3A+3B+3C+3D) =

Name:	[insert full name of signatory]	Signature with Date and Seal
In the capacity of:	[insert designation of signatory]	[Sign]
Duly authorised to sign the Tender for and on behalf of the Tenderer		

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021
 Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3
 Package No:

1. Specifications of 230 VOLT 5(60)ASingle Phase Online SMART PREPAYMENT ELECTRIC ENERGY METER

(To be filled up and signed by the Tenderer & Manufacturer, otherwise the offer will not be acceptable)

Sl. No.	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
1.	Reference Standard	-	IEC	
2.	Country of Origin		To be mentioned	
3.	Manufacturer's Name & address		To be mentioned	
4.	Place of Manufacturer		To be mentioned	
5.	Starting Year of Manufacture & Testing		To be mentioned	
6.	Model of Meter	-	To be mentioned	
7.	Generation of the offered Meter		To be mentioned	
8.	Type	-	Indoor	
9.	Installation		Indoor installation	
10.	Connection	-	1- phase, 2-wire (unidirectional)	
11.	Rated voltage	Volt	230	
12.	Maximum voltage	Volt	280	
13.	Basic Current	Amp	<=5	
14.	Maximum Current	Amp	>=60	
15.	Frequency	Hz	50	
16.	Number of Terminal	No.	4	
17.	Diameter of Terminal; Bore	mm	6mm to accommodate 10 mm ² cable	
18.	No. of Element (minimum)	No.	2 (One in Phase & other in Neutral)	
19.	Voltage circuit loss at rated voltage	VA & W	5VA, 2 Watt	
20.	Current circuit loss at rated current	VA	2.5	
21.	Variation of Power factor		0.5 lag to 0.8 lead	
22.	Variation of voltage		+30% to -30%	
23.	Performance Curve		To be submitted	
24.	Impulse withstand voltage	KV	6	
25.	Starting current (minimum)	mA	0.4% of basic current	
26.	KWh register type	-	LCD Display	
27.	Meter constant	Impulse/ kWhr	To be mentioned	
28.	Accuracy class	Class	1.0	
29.	Type of Battery		Lithium Battery	

Sl. No.	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
30.	Built in clock		Real Time Clock (RTC) as per IEC 62054-21 or updated version	
31.	Battery Reserve & Life		10(Ten) Years	
32.	No. of Digits for Credit Storage		5+1	
33.	Credit Transfer System		To be mentioned	
34.	Tariff Structure		Utility's tariff structure	
35.	KWhr dispensing register		Solid state LCD Display	
36.	Front Page Indications		- Credit Status, - Accept/Reject - Low credit warning - Consumption Rate - Tamper Indication	
37.	Disconnection Facility		- On credit expiry, - Decommissioning state - Exceeded Power threshold - When tampered	
38.	Provision for emergency Friendly Credit		To be Mentioned	
40.	Time interval of re-calibration (minimum)	Year	10	
41.	Service life (minimum)	Year	10	
42.	Weight of meter	Kg	To be mentioned	
43.	Overall dimensions (height, width, depth)	mm	To be mentioned	
44.	Load Control		To be mentioned	
45.	Warranty	Years	3 Years	
46.	List of Recommended Spares		To be mentioned	
47.	Any other facility if any		To be mentioned	
48.	Meter body sealing condition		Hermetically Sealed/ Ultrasonic welded to avoid unauthorized opening of meter cover	
49.	Latching relay		As per specification mentioned in Section-7.27.3	
50.	Communication compatibility		Both RS485, GPRS(3G/4G)/ NB-IoT and G3-PLC FCC/ Broadband PLCand RF (plug and play)	
51.	Communication Protocol		DLMS/COSEM	
52.	Vending		Vending facility through online, Mobile SMS, Mobile Apps, POS, ATM/Bank booth etc.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021

Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3 Package No:

2. Specifications of 400 VOLT 10(100) A Three Phase Online SMART PREPAYMENT ELECTRIC ENERGY METER

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

Sl. No.	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
1.	Reference Standard	-	IEC	
2.	Country of Origin		To be mentioned	
3.	Manufacturer's Name & address		To be mentioned	
4.	Place of Manufacturer		To be mentioned	
5.	Year of Manufacture & Testing		To be mentioned	
6.	Model of Meter	-	To be mentioned	
7.	Generation of the offered Meter		To be mentioned	
8.	Type	-	Indoor	
9.	Installation		Meters are to be installed at easy approachable places in the consumer's premise.	
10.	Connection	-	3- phase, 4-wire (unidirectional)	
11.	Rated voltage	Volt	400	
12.	Maximum voltage	Volt	500	
13.	Basic Current	Amp	<=10	
14.	Maximum Current	Amp	>=100	
15.	Frequency		50HZ	
16.	Number of Terminal	No.	8	
17.	Diameter of Terminal; Bore	mm	8.5mm to accommodate 25 mm ² cable	
18.	No. of Element	No.	3	
19.	Voltage circuit loss at rated voltage	VA & W	<=5 W and 10 VA	
20.	Current circuit loss at rated current	VA	2.5	
21.	Variation of Power factor		0.5 lag to 0.8 lead	
22.	Variation of voltage		+30% to -30%	
23.	Performance Curve		To be submitted	
24.	Impulse withstand voltage	KV	6	
25.	Starting current (minimum)	mA	0.4% of basic current	
26.	KWh register type	-	LCD Display	
27.	Meter constant	Impulse/ kWhr	To be mentioned	
28.	Accuracy class	Class	1.0	
29.	Type of Battery		Lithium Battery, if necessary	

Sl. No.	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
30.	Built in clock		Real Time Clock (RTC) as per IEC 62054-21 or updated version	
31.	Battery Reserve & Life		10(Ten)Years	
32.	No. of Digits for Credit Storage		5+1	
33.	Credit Transfer System		To be mentioned	
34.	Tariff Structure		Utility's tariff structure	
35.	KWhr dispensing register		Solid state LCD Display	
36.	Front Page Indications		- Credit Status - Accept/Reject - Low credit warning - Consumption Rate - Tamper Indication	
37.	Disconnection Facility		- On credit expiry - Decommissioning state - Exceeded Power threshold - When Tampered	
38.	Provision for emergency Friendly Credit		To be Mentioned	
39.	Provision for Fixed charge/ Minimum charge		To be Mentioned	
40.	Time interval of re-calibration (minimum)	Year	10	
41.	Service life (minimum)	Year	10	
42.	Weight of meter	Kg	To be mentioned	
43.	Overall dimensions (height, width, depth)	mm	To be mentioned	
44.	Warranty	Years	3 Years	
45.	List of Recommended Spares		To be mentioned	
46.	Any other facility if any		To be mentioned	
47.	Meter body sealing condition		Hermetically Sealed/ Ultrasonic welded to avoid unauthorized opening of meter cover	
48.	Latching relay		As per specification mentioned in Section-7.44.3	
49.	Communication compatibility (plug and play)		BothRS485,GPRS(3G/4G)/ NB-IoT and G3-PLC FCC/ Broadband PLC and RF	
50.	Communication Protocol		DLMS/COSEM	
51.	Vending		Vending facility through online, Mobile SMS, Mobile Apps, POS, ATM/Bank booth etc.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142

Date: 27/05/2021

Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis.

Tender 3
Package No:

3. Specifications of Optical Communication Cable

(To be filled up and signed by the Manufacturer & Tenderer)

SI No.	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
1.	Brand		Any International reputed brand operating in the recognized continental markets for decades.	
2.	Model		To be mentioned by the supplier/tenderer.	
3.	Country of Origin		To be mentioned by the supplier/tenderer.	
4.	Mode		Multimode and single mode as required	
5.	Length		5M	
6.	Compatibility		Compatible with selected storage system and HBAs	
7.	Warranty Period	Calendar Year	Full 03(Three) years replacement and instant service warranty. Replacement time maximum 07(Seven) days.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021

Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3 Package No:

4. Specifications of Router (8-port switch integrated) for UVS & UCC

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

SI No	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
1	Brand		Any International Reputed Brand: To be mentioned by Tenderer	
2	Model		To be mentioned by Tenderer	
3	Country of origin		USA /EU/Japan	
4	Country of Assemble		To be mentioned by Tenderer	
5	Interfaces		WAN : 1 x Ethernet 10Base-T/100Base-TX/1000Base-T - RJ-45 WAN : 1 x Ethernet 10Base-T/100Base-TX - RJ-45 LAN : 8 x Ethernet 10Base-T/100Base-TX - RJ-45 Management : 1 x Console - RJ-45, Management : 1 x Auxiliary - RJ-45, Peripheral : Min. 1 x Hi-Speed USB - 4 pin USB,	
6	Capacity		IPSec VPN tunnels : 50	
7	Remote Management Protocol		HTTPS, Telnet, SNMP 3, HTTP, SSH	
	Encryption Algorithm		256-bit AES, 192-bit AES, PKI, PEAP, 128-bit AES, TKIP, DES, Triple DES, SSL, LEAP	
	Features		DHCP server, DNS proxy, Traffic shaping, Bidirectional Forwarding Detection (BFD), IPv6 support, Content filtering, VLAN support, URL filtering, Intrusion Prevention System (IPS), High Availability, Stateful Failover, Dynamic Multipoint VPN (DMVPN), Weighted Fair Queuing (WFQ), Class-Based Weighted Fair Queuing (CBWFQ), Link Fragmentation and Interleaving (LFI), DiffServ support, IGMP snooping, Stateful Packet Inspection (SPI), NAT support, WAN failover, VPN support, Virtual Route Forwarding-Lite (VRF-Lite), Access Control List (ACL) support, Spanning Tree Protocol (STP) support, Quality of Service (QoS), Load balancing, Auto-uplink (auto MDI/MDI-X), MAC address filtering	
	RAM		512 MB (installed) / 768 MB (max)	
8	Flash Memory		256 MB (installed) / 256 MB (max)	
9	Connectivity Technology		Wired	
10	Network / Transport Protocol		L2TPv3, DHCPDNS, IPSec, FTP, L2TP, DDNS	
11	Routing Protocol		EIGRP, BGP, RIP-1, RIP-2, VRRP, NHRP,	

SI No	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
			GRE, HSRP, PIM-SM, OSPF	
12	Power Supply / Device		Power adapter External	
13	Voltage Required		AC 120/230 V	
14	Power provided		60 Watt	
15	Data Link Protocol		Fast Ethernet, Ethernet	
16	Enclosure Type		Desktop	
17	Warranty		Full 03 (Three) years replacement and instant service warranty from the date of commissioning.	
18	Brand		Any International Reputed Brand: To be mentioned by Tenderer	
	Model		To be mentioned by Tenderer	
19	Country of origin		USA /EU/Japan	
20	Country of Assemble	Calendar Year	To be mentioned by Tenderer	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142

Date: 27/05/2021

Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis.

Tender 3
Package No:

5. Specifications of Work Station

(To be filled up and signed by the Manufacturer & Tenderer)

SI No.	Name of Item	Unit	Required Specification	Full Technical Specification & Standard (to be mentioned)
1	Brand		Any International reputed brand operating in the recognized continental markets for decades.	
2	Model		To be mentioned by the supplier/tenderer.	
3	Country Of Origin		North America / EU / Japan	
4	Country of Manufacture		To be mentioned by the supplier/tenderer.	
4	Processor	GHz	Intel core i7-10 th generation or higher	
5	Clock Speed	GHz	3.2 GHz (min) or maximum compatible with latest generation, 6 MB Cache Memory(min)	
6	Chipset		Intel H81 Express Chipset or higher	
7	Bus Speed	Mhz	Min. 1600 MHz	
8	RAM	GB	8 GB or Higher DDR4, Expandable to 16 GB	
9	HDD	GB	2000 GB (1024 RPM)	
10	Mouse		Same Brand USB Scroll Optical (V-Track) Mouse	
11	Keyboard		Same brand USB Multimedia Keyboard	
12	Graphics		Integrated Intel HD 4200 or Higher	
13	Monitor	inch	Same brand LED 18.5" Monitor	
14	DVD ROM Drive		DVD RW Drive	
15	Hard disk controller	gbps	Serial ATA 3.0 Gbps or Latest	
16	Audio		Integrated sound card	
17	I/O Ports		8 USB 3.0 (2 front, 6 rear, 1 internal), Serial, Parallel, RJ-45 Etc. + Display port 1.2, Mic.in & Headphone out (front)	
18	NIC	mbps	Integrated 10/100/1000 Network Card	
19	Slots		At least 3. 2 PCI, 1 PCIe x1	
20	OS Support		Windows 7/8/10, Linux, etc.	
21	OS		License windows with recovery kit	
22	Software		Licensed Anti-Virus Software	
23	Brochure and CDs		All brochure, instructions, manual and driver CDs to be supplied with the product	
24	Connection Cables		All necessary power and data connection cables to be supplied along with the product, power cables (3 pin flat)	
25	Warranty Period	Calendar Year	Full 03(Three) years replacement and instant service warranty. Replacement time maximum 07(Seven) days.	

[The Tenderer should complete all the columns as required]

Signature:

Signature

Name & Designation of tenderer

Name and Designation of Manufacturer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021
Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3
Package No:

6. Specifications of Laptop

(To be filled up and signed by the Manufacturer & Tenderer)

SI No.	Name of Item	Unit	Required Specification	Full Technical Specification & Standard (to be mentioned)
1	Brand		Any International reputed brand operating in the recognized continental markets for decades.	
2	Model		To be Mentioned by the supplier/tenderer.	
3	Country of Origin		North America / EU/ Japan	
4	Country of Manufacturer		To be Mentioned by the supplier/tenderer.	
5	Processor	GHz	Intel Core i7 Processor-10th generation or higher, Min. 2.80 GHz or Higher or maximum compatible with latest generation; 4 MB L3 cache or higher	
6	RAM	GB	(1x8 GB) 1 DIMM DDR4	
7	Hard Disk Drive	GB, rpm	Min. 512GB SATA SSD with 2000GB External Portable HDD	
9	Combo Drive		DVD RW Drive	
10	Graphics		Integrated GMA HD6630M or higher	
11	Monitor	inch	HD, True Life Display	
12	Port & Connector		Min 2 USB 3.0 port, 1 X RJ 45 port for LAN, 1 X RJ, External Micro phone, Head Phone + Media Card Reader, Audio Jacks	
13	Keyboard		Integrated standard Keyboard	
14	Pointing Device		Both Touch Pad and one additional USB mouse	
15	Webcam		Min. 1 Mega Pixel	
16	Speaker		Integrated Internal Speaker	
17	Wireless Technology		Wireless LAN and Bluetooth	
18	Battery		6 cell lithium ion battery	
19	Battery Backup		4 hours or higher with A/C Adapter	
20	Weight & Colour	kg	Max 2.2 kg, Black	
21	Operating System		Windows 10 with Original License and recover CD.	
22	Carrying Case		Original Standard Carrying Case, Same brand.	
23	Software		License Anti-Virus Software (Kaspersky/Norton/Semantic)	
24	Bangla software		Licensed Software with CD (Preferably Lekhoni)	
25	Certification		FCC class B, ISO 9001: 2000	
26	Warranty Period	Calendar Year	Full 03(Three) years replacement and instant service warranty. Replacement time maximum 07(Seven) days.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021
Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3
Package No:

7. Specifications of Network Laser Duplex Printer

(To be filled up and signed by the Manufacturer & Tenderer)

SI No.	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
1	Brand		Any International reputed brand operating in the recognized continental markets for decades.	
2	Model		To be mentioned by the supplier/tenderer.	
3	Country of Origin		North America / EU / Japan	
4	Country of Manufacturer		To be mentioned by the supplier/tenderer.	
5	Toner type		Toner and associated drum unit in single case, No starter toner.	
6	Fuser Unit		Instant on fuser technology with ceramic heating elements.	
7	Resolution	dpi	1200 × 1200 dpi (Minimum)	
8	Processor	MHz	Min. 800 MHz	
9	Printing Speed	ppm	62-Page-per Minute (Letter), 35 PPM (A4) (min.)	
10	First Page Print Out	second	As fast as 8 seconds	
11	Memory	MB	256 MB (Minimum) Expandable to 1 GB	
12	Memory Slots		2 DIMM Slots Minimum	
13	Interface		Jet direct Fast Ethernet embedded print server, two open EIO slots, High Speed USB 2.0 Port & Parallel Port (min.)	
14	Languages		PCL 6, PCL 5e, POST Script 3 emulation	
15	Duty Cycle	page	2, 75,000 Pages per Month	
16	Trays		100 sheet multi-purpose input tray, 2 x 500 sheet input tray 50-sheet face up output tray, 250-sheet face down output tray	
17	Media Sizes		Letter, Legal, A4, A5, B5 and custom sizes	
18	Media Types		Paper (Plain, Preprinted, Letterhead, Bond, Color, Recycled, Rough), Transparencies, Labels	
19	Power Requirements		220-240 V / 50Hz +	
20	Client Operating System Supported		Windows XP/7/8/Linux etc., server	
21	Network Operating System Supported		Via HP Jetdirect print server: Me, NT 4.0, 2000, XP, XP 64-bit, Server 2003, Red Hat Linux 6 and later.	
22	Network Protocols Supported		Via HP Jet direct print server: TCP/IP, HTTP	
23	Warranty Period	Calendar Year	Full 03(Three) years replacement and instant service warranty. Replacement time maximum 07 (Seven) days.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021

Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3
Package No:

8. Specifications of Air-conditioner (AC)

(To be filled up and signed by the Manufacturer & Tenderer)

SI No.	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
1	Brand		Any International reputed brand operating in the recognized continental markets for decades like General, Hitachi, LG, Sharp etc.	
2	Model		To be mentioned by the supplier/tenderer.	
3	Country of Origin		To be mentioned by the supplier	
4	Country of Manufacturer		To be mentioned by the supplier/tenderer.	
5	Type		Split	
6	Capacity	Tonnage	2	
7	Compressor Type		To be mentioned by the supplier/tenderer.	
8	Cooling Capacity	Watts	To be mentioned by the supplier/tenderer.	
9	Noise Level Indoor (High/medium/Low)	Db	To be mentioned by the supplier/tenderer.	
10	Moisture Removal	(Ltrs/Hr)	To be mentioned by the supplier/tenderer.	
11	Star Rating		3/4/5	
12	Energy Efficiency Rating (EER)	W/W	>= 3.10	
13	Power Input	Watts	To be mentioned by the supplier/tenderer.	
14	Running Current	Amps	To be mentioned by the supplier/tenderer.	
15	Voltage/ Frequency	Volt/ Hz	230V/ 50/60 Hz±0.5%	
16	Timer		Yes/ No (Shall be mentioned)	
17	Sleep		Yes/ No (Shall be mentioned)	
18	Indicator		Yes/ No (Shall be mentioned)	
19	Auto Restart:		Yes/ No (Shall be mentioned)	
20	Remote Control Type		To be mentioned by the supplier/tenderer.	
21	Air Direction (Up/Down):		Yes/ No (Shall be mentioned)	
22	Anti-Bacteria Filter		Yes/ No (Shall be mentioned)	
23	Dimensions (Indoor unit/ Outdoor unit)	mm	To be mentioned by the supplier/tenderer.	
24	Weight (Indoor unit/ Outdoor unit)	Kg	To be mentioned by the supplier/tenderer.	
25	Warranty Period	Calendar Year	Full 03(Three) years replacement and instant service warranty. Replacement time maximum 03 (Three) days.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021
 Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3
 Package No:

11. Specifications of Slip Printer

(To be filled up and signed by the Manufacturer & Tenderer)

SINo	Name of Item	Unit	Required specifications	Full Technical Specification & Standard (to be mentioned)
01	Brand		Any International reputed brand operating in the recognized continental markets for decades.	
02	Model		To be mentioned by supplier/tenderer.	
03	Country of Origin		To be mentioned by supplier/tenderer.	
04	Country of Manufacturer		To be mentioned by supplier/tenderer.	
05	Print Method		Thermal line printing	
06	Print Speed	mm/sec	Max. 200 mm/sec	
07	Data Buffer	KB	4KB.	
08	Inked Ribbon		To be mentioned by supplier/tenderer.	
09	Interface		USB Interface, BI-directional parallel.	
10	Power Supply (Adapter)	Volt	AC 120 ~240V DC 24V, 1.5A.	
11	Auto Cutter		Yes.	
12	Paper		Roll Paper.	
13	Driver/Manual	nos.	All Manual, Driver CD/DVD, Power Cable (3 Pin Flat), USB Cable have to be provided.	
14	Warranty Period	Calendar Year	Full 03(three) years replacement and instant service warranty. Replacement time maximum 07(Seven) days.	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Specifications Submission and Compliance Sheet (Form PG4-4)

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021
Package Description: Design, Manufacture, Supply, Installation, Testing & Commissioning of 1,05,000 nos. Smart Pre-Payment Meter with related services on Turn-key Basis. Tender 3
Package No:

12. Specifications for Hand Held Units

(To be filled up and signed by the Manufacturer & Tenderer, otherwise the offer will not be acceptable)

Item No	Name of Item	Required specifications	Full Technical Specification & Standard (to be mentioned)
01.	Manufacturer Name	To be mentioned	
02.	Manufacturer Address	To be mentioned	
03.	Operating System	Android (Updated version)	
04.	Model no.	To be mentioned	
05.	Country of Origin	To be mentioned	
06.	Type	To be mentioned	
07.	Transaction capacity	To be mentioned	
08.	Rechargeable Battery	To be mentioned	
	Communications Interface	To be mentioned	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of tenderer

Duly authorised to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

SI No	Name of Item	Required specifications	Full Technical Specification & Standard (to be mentioned)
15	Industrial Environment	Provide IP51 or better protection level Work at the temperature of -40°C to +60°C	
16	Remote upgrade	Support upgrade software package stored locally, and dispatch the package to all connected meters by multicast. Support OTA (Over the Air) technology	
17	RAM	256 MB	
18	Feeding phase monitor	The concentrator should be able to identify the feeding phase of each meter (for single-phase meters) via PLC communication. The concentrator should be able to detect changing of feeding phase of meter (for single-phase meters) via PLC communication.	
19	Last gasp	When power off, the concentrator will send the alarm to Master Station.	
20	Transformer Monitoring and Protection	Overload detection and alarm. Low power factor detection and alarm.	
21	Other features	-Plug and play communication module -Easy and friendly UI -Automatically detect meter -Remote and local firmware upgrade -On demand read/write -Remote configuration -Scheduled Reading -Concentrator Firmware upgrade -Meter firmware upgrade -Alarm -Meter Data Management -Network Clock Management -Web service Management	

[The Tenderer should complete all the columns as required]

Signature:

Name & Designation of Tenderer

Duly authorized to sign the Tender for and on behalf of the Tenderer

Signature

Name and Designation of Manufacturer

Manufacturer's Authorisation Letter (Form PG4 - 5)

[The Tenderer shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Tenderer shall include it in its tender, if so indicated in the **TDS as stated under ITT Sub-Clause 26.1(b)**]

Invitation for Tender No:	Date:
Tender Package No:	
Tender Lot No:	
To: Name and address of Purchaser]	

WHEREAS

We [insert complete name of Manufacturer],

who are official manufacturers of [insert type of goods manufactured], having factories at [insert full address of Manufacturer's factories], do hereby

authorize [insert complete name of Tenderer] to supply the following Goods, manufactured by us [insert name and or brief description of the Goods].

We hereby extend our full guarantee and warranty as stated under GCC Clause 33 of the General Conditions of Contract, with respect to the Goods offered by the above Tenderer.

Signed: [insert signature(s) of authorized representative(s) of the Manufacturer]

Name: [insert complete name(s) of authorized representative(s) of the Manufacturer]

Address: [insert full address including Fax and e-mail]

Title: [insert title]

Date: [insert date of signing]

Bank Guarantee for Tender Security (Form PG4 – 6)

[This is the format for the Tender Security to be issued by a scheduled bank of Bangladesh as stated under ITT Clauses 29 and 30]

Invitation for Tender No:

Date:

Tender Package No:

Tender Lot No:

To:

[Name and address of Purchaser]

TENDER GUARANTEE No:

We have been informed that [insert name of Tenderer] (hereinafter called “the Tenderer”) intends to submit to you its Tender dated [insert date of Tender] (hereinafter called “the Tender”) for the supply of [description of goods and related services] under the above Invitation for Tenders (hereinafter called “the IFT”).

Furthermore, we understand that, according to your conditions, Tenders must be supported by a Bank Guarantee for Tender Security.

At the request of the Tenderer, we [insert name of bank] hereby irrevocably undertake to pay you, without cavil or argument, any sum or sums not exceeding in total an amount of Tk [insert amount in figures and in words] upon receipt by us of your first written demand accompanied by a written statement that the Tenderer is in breach of its obligation(s) under the Tender conditions, because the Tenderer:

- a. has withdrawn its Tender after opening of Tenders but within the validity of the Tender Security ; or
- b. refused to accept the Notification of Award (NOA) within the period as stated under Instructions to Tenderers (ITT) ; or
- c. failed to furnish Performance Security within the period as stipulated in the NOA; or
- d. refused to sign the Contract Agreement by the time specified in the NOA; or
- e. did not accept the correction of the Tender price following the correction of the arithmetic errors in accordance with the ITT; or

This guarantee will expire:

- (a) if the Tenderer is the successful Tenderer, upon our receipt of a copies of the contract signed by the Tenderer and the Performance Security issued to you in accordance with the ITT; or
- (b) if the Tenderer is not the successful Tenderer, twenty eight (28) days after the expiration of the Tenderer’s Tender validity period, being [date of expiration of the Tender validity plus twenty eight(28) days]

Consequently, we must receive at the above-mentioned office any demand for payment under this guarantee on or before that date.

Signature

Seal

Notification of Award (Form PG4 - 7)

Contract No:

Date:

To:

[Name of Contractor]

This is to notify you that your Tender dated [insert date] for the supply of Goods and related Services for [name of contract] for the Contract Price of Tk [state amount in figures and in words] as corrected and modified in accordance with the Instructions to Tenderers, has been approved by [name of Purchaser].

You are thus requested to take following actions:

- i. accept in writing the Notification of Award within seven (7) working days of its issuance pursuant to ITT Sub-Clause 62.3
- ii. furnish a Performance Security in the specified format and in the amount of Tk [state amount in figures and words] ,within Twenty-eight (28) days from issue of this Notification of Award but not later than (specify date), in accordance with ITT Clause 64.2
- iii. sign the Contract within twenty eight (28) days of issuance of this Notification of Award but not later than (specify date), in accordance with ITT Clause 67.2

You may proceed with the execution of the supply of Goods and related Services only upon completion of the above tasks. You may also please note that this Notification of Award shall constitute the formation of this Contract, which shall become binding upon you.

We attach the draft Contract and all other documents for your perusal and signature.

Signed

Duly authorised to sign for and on behalf of
[name of Purchaser]

Date:

Contract Agreement (Form PG4 - 8)

THIS AGREEMENT made the [day] day of [month][year] between [name and address of Purchaser] (hereinafter called "the Purchaser") of the one part and [name and address of Supplier] (hereinafter called "the Supplier") of the other part:

WHEREAS the Purchaser invited Tenders for certain goods and related services, viz, [brief description of goods and related services] and has accepted a Tender by the Supplier for the supply of those goods and related services in the sum of Taka [Contract Price in figures and in words] (hereinafter called "the Contract Price").

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the General Conditions of Contract hereafter referred to.
2. The following documents forming the Contract shall be in the following order of precedence, namely :
 - (a) the signed Form of Contract Agreement;
 - (b) the Notification of Award
 - (c) The Tender and the appendices to the Tender
 - (d) Particular Conditions of Contract;
 - (e) General Conditions of Contract;
 - (f) Technical Specifications;
 - (g) Drawings;
 - (h) Price Schedules and Schedule of Requirements and;
 - (i) Other document including correspondences listed in the PCC forming part of the Contract
3. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the goods and related services and to remedy any defects therein in conformity in all respects with the provisions of the Contract.
4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the goods and related services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Bangladesh on the day, month and year first written above.

For the Purchaser:

For the Supplier:

Signature

Print Name

Title

In the presence of Name

Address

Bank Guarantee for Performance Security (Form PG4 – 9)

[This is the format for the Performance Security to be issued by an internationally reputable bank and it shall have correspondent bank located in Bangladesh, to make it enforceable in accordance with ITT Sub-Clause 64.1 pursuant to Rule 27(4) of the Public Procurement Rules, 2008.]

Contract No:

Date:

To:

[Name and address of Purchaser]

PERFORMANCE GUARANTEE No: [insert Performance Guarantee number]

We have been informed that [name of supplier] (hereinafter called “the Supplier”) has undertaken, pursuant to Contract No [reference number of Contract] dated [date of Contract] (hereinafter called “the Contract”) for the supply of [description of goods and related services] under the Contract.

Furthermore, we understand that, according to your conditions, Contracts must be supported by a performance guarantee.

At the request of the Supplier, we [name of bank] hereby irrevocably undertake to pay you, without cavil or argument, any sum or sums not exceeding in total an amount of Tk [insert amount in figures and in words] upon receipt by us of your first written demand accompanied by a written statement that the Supplier is in breach of its obligation(s) under the Contract conditions, without you needing to prove or show grounds or reasons for your demand of the sum specified therein.

This guarantee is valid until [date of validity of guarantee], consequently, we must receive at the above-mentioned office any demand for payment under this guarantee on or before that date.

[Signatures of authorized representatives of the bank]

Signature

Seal

Bank Guarantee for Advance Payment (Form PG4 – 10)

N.A.

[this is the format for the Advance Payment Security to be issued by an internationally reputable bank and it shall have correspondent bank located in Bangladesh, to make it enforceable in accordance with GCC Clause 27.1]

Contract No:

Date:

To:

[Name and address of Purchaser]

ADVANCE PAYMENT GUARANTEE No:

We have been informed that [name of supplier] (hereinafter called “the Supplier”) has undertaken, pursuant to Contract No [reference number of Contract] dated [date of Contract] (hereinafter called “the Contract”) for the supply of [description of goods and related services] under the Contract.

Furthermore, we understand that, according to your Particular Conditions of Contract Clause 26.1, Advance Payment(s) on Contracts must be supported by a bank guarantee.

At the request of the Supplier, we [name of bank] hereby irrevocably undertake to pay you, without cavil or argument, any sum or sums not exceeding in total an amount of Tk [insert amount in figures and in words] upon receipt by us of your first written demand accompanied by a written statement that the Supplier is in breach of its obligation(s) under the Contract conditions, without you needing to prove or show grounds or reasons for your demand of the sum specified therein.

We further agree that no change, addition or other modification of the terms of the Contract to be performed, or of any of the Contract documents which may be made between the Purchaser and the Supplier, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee is valid until [date of validity of guarantee], consequently, we must receive at the above-mentioned office any demand for payment under this guarantee on or before that date.

[Signatures of authorized representatives of the bank]

Signature

Seal

Section-6: Schedule of Requirements

UNSIGNED COPY

Section-6: Schedule of Requirements

Invitation for Tender No 27.22.4785.905.50.040.21/142 Date: 27/05/2021

Tender Package No: 03 (Three)

Notes on Schedule of Requirements

Objectives

The objectives of the Schedule of Requirements are

- (a) To provide sufficient information on the quantities of Works to be performed to enable Tenders to be prepared efficiently and accurately; and
- (b) When a Contract has been entered into, to provide a priced (Schedule of Requirement) for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the (Schedule of Requirement) in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and content of the (Schedule of Requirement) should be as simple and brief as possible.

Day work Schedule

A Day work Schedule should be included only if the probability of unforeseen work, outside the items included in the (Schedule of Requirement), is high. To facilitate checking by the Employer of the realism of rates quoted by the Tenderers, the Daywork Schedule should normally comprise the following:

- (a) a list of the various classes of labour, materials, and construction plant for which basic Daywork rates or prices are to be inserted by the Tenderer, together with a statement of the conditions under which the Contractor will be paid for work executed on a Daywork basis.
- (b) nominal quantities for each item of Daywork, to be priced by each Tenderer at Daywork rates as Tender. The rate to be entered by the Tenderer against each basic Daywork item should include the Contractor's profit, overheads, supervision, and other charges.

Provisional Sums

A general provision for physical contingencies (quantity overruns) may be made by including a provisional sum in the Summary Schedule of Requirement. Similarly, a contingency allowance for possible price increases should be provided as a provisional sum in the Summary Schedule of Requirement. The inclusion of such provisional sums often facilitates budgetary approval by avoiding the need to request periodic supplementary approvals as the future need arise. Where such provisional sums or contingency allowances are used, the PCC should state the manner in which they will be used, and under whose authority (usually the Engineer's).

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other Contractors should be indicated in the relevant part of the Schedule of Requirements as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Employer to select such specialized Contractors.

To provide an element of competition among the Tenderers in respect of any facilities, amenities, facilities, attendance, etc., to be provided by the successful Tenderer as prime Contractor for the use and convenience of the specialist Contractors, each related provisional sum should be followed by an item in the Schedule of Requirement inviting the Tenderer to quote a sum for such amenities, facilities, attendance, etc.

Correction of Errors

If in preparing its Tender, the Tenderer has made errors in the unit price or the total price, and wishes to correct such errors prior to submission of its Tender, it may do so, but shall ensure that each correction is suitable initialled by the authorised person of the Tenderer and that a statement shall be made as to the total number of corrections made, at the end of the priced Schedule of Requirement.

The overall works of prepayment e-metering system divided into following 4 major areas:

-
- A. Software development for the system and maintenance service.
 - B. Hardware Procurement, Installation and Commissioning
 - C. Establishment of country wide secure and dedicated data-network service.
 - D. Procurement, Installation and Commissioning of Prepayment Meter.

A. Software development and maintenance service:

The software play major role for the system operation and management. The success of the project fully depends on dynamic and adaptable software. Software has been developed and installed which have ability to operate any kind of prepayment meter. The software included (i) MIC management (ii) Vending management (iii) Tariff Management (iv) Load management (v) POS management (vi) Customization service management (vii) Log & Alert management (viii) Backup (ix) Accounting information system management (x) SMS management (xi) CDC Management and (xii) Meter Management. Data security is one of the major concerns of the system so that the tender shall ensure high level security to develop the software. The system is able to handles more than one core meters in the whole country including the employer's distribution areas. The employer has the source code and proper documentation of software system. The offered meters (with SDK, API & DLL) shall be interfaced with already developed software by .tenderer/manufacturer during/before evaluation stage

B. Hardware Procurement, Installation and Commissioning

The tenderer shall provide related hardware regarding to establish Vending Station and Customization Center. The warranty period of hardware will be 3 years. Supplied hardware shall have local support service from manufacture. The tenderer shall install and commission all hardware at utility mentioned sites.

C. Establishment/arrangement of country wide secure and dedicated data-network service

There is an established country wide secure, dedicate and redundant data-network service for the prepayment e-metering system. In the network every utility has separate identity. Data link cover (i) MIC to Data-network service provider (ii) MIC to Vending Station (ii) Data-network service provider to POS (iv) MIC to CDC (v) MIC to Meters.

D. Procurement, Installation and Commissioning of Smart Prepayment Meter.

The tenderer shall be responsible for delivery, storage, installation and maintenance of the equipment for the duration of operationa support service. The following equipment shall be part of the contract but not limited to:

Single Phase Smart Prepayment Meters

Tenderers are required to submit bids for 102,000 nos. Smart keypad meters.

Three Phase Online Smart Prepayment Meters

Tenderers are required to submit bids for 3000 nos. Smart keypad meters.

A. List of Goods and Delivery Schedule

When completing Form PG4-3A, 3B & 3C the Tenderer shall quote prices and contract delivery dates for each lot separately, as specified in the List of Goods and Delivery Schedule.

Sl. No.	Description of Items	Unit of Measurement	Quantity	Point of Delivery [Final (Project Site) Destination as specified in TDS]	Delivery Date Required (in weeks)	
					Earliest Delivery Date	Latest Delivery Date
1	Design, Manufacture, Supply, Installation, Testing & Commissioning of Smart Pre- paid metering Networks	Lot	1			
2	Design, Manufacture, Supply, Installation, Testing & Commissioning of Utility Vending Station (UVS)	Nos.	6x2			
3	Design, Manufacture, Supply, Installation, Testing & Commissioning of Utility Customization Center(UCC)	Nos.	6			
4	Design, Manufacture, Supply, Installation, Testing & Commissioning of single phase & three phase Smartpre-paid energy meters with communication modules	Nos.	1,05,000			
5	Design, Manufacture, Supply, Installation, Testing & Commissioning of DCU (Data Concentrator Unit) with Enclosure Box, CT and SIM Cards	Nos.	1200			
6	Design, Manufacture, Supply, Installation, Testing & Commissioning of Hand Held Unit	Nos.	12			
7	Replacement of existing meters	Nos.	1,05,000			
8	Interfacing of offered meters with the existing smart pre-payment Metering system softwares of the purchaser	Nos.	1,05,000			
9	Three (3) years Operational support for system	Lot	1			
10	Manpower Training (Local & Foreign)	Man-Mionth	10			
11	Infrastructure Development for 12 Nos. UVS and 06 Nos. UCC (Optional as when/ Where required)	Lot	1			
12	Supply of relative IT hardware (Storage/Fiber cable etc) and Software (Optional when and where required)	L.S	L.S			
13	Optical communication cable (for downloading data from meter to PC).	Nos.	60			

Network

The MIC, the CDC and the DRS will be assigned with real IP address.

Sl. No.	Description of Items	Description of the Network	Unit of Measurement	Quantity
01	<p>Network 3:</p> <ul style="list-style-type: none"> • The MIC to the UVS/UCC. • This is a physical connection via fibre optical line 	<ul style="list-style-type: none"> • Dedicate leased fibre line (like DDN) • @minimum 2mbps • A secured & separate APN • Alive network for 24x7 round the clock • A fixed static IP scheme • Bi-directional (Full Duplex) • @minimum 1Gbps twisted pair (RJ45) • Different Locations (in WZPDCL area). • Chosen Data Service Network Provider so the every other operated on air mobile operators will be available for necessary communication amongst them and that has to be ensured. • A secured & separate APN. • A fixed static IP scheme. • Bi-directional (Full Duplex). 	Nos.	6
02	<p>Network 6:</p> <ul style="list-style-type: none"> • The MIC to Online 1-phase and 3phase meters. • This is a Wireless connection. 	<ul style="list-style-type: none"> • GPRS/EDGE/EVDO or other. • Different Locations (in WZPDCL area). • Chosen Data Service Network Provider so the every other operated on air mobile operators will be available for necessary communication amongst them and that has to be ensured. • A secured & separate APN. • A fixed static IP scheme. • Bi-directional (Full Duplex). 	lot	1
03	<p>Network 5(a):</p> <ul style="list-style-type: none"> • The Master Information Center (MIC) to the DC/DCU and DC/DCU to the related Meters. 	<ul style="list-style-type: none"> • To be mentioned 	lot	1

Point of Delivery (Location and address)	Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.
Delivery Date: (a) Earliest Delivery Date (b) Latest Delivery Date	

**Utility Vending Station (UVS)
Hardware**

Sl. No.	Description of Items	Unit of Measurement	Quantity
1	Workstation	Nos.	12
2	GRPS/EDGE/EVDO Modem	Nos.	25
3	SIM Card	Nos.	25
4	Slip Printer	Nos.	25
5	Router and Switch with Required Software (both System and application)	Nos.	12
6	UPS 5KVA 2 hr. backup	Nos.	6
7	AC's with related material and services (including installation)	Nos.	6
8	Civil Works: existing infra-structure development for the UVS (As and when required)	Lot	1

Point of Delivery (address of location)	Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area Project store, WZPDCL, Khulna.
Delivery Date: (a) Earliest Delivery Date (b) Latest Delivery Date	

**Utility Customization Center (UCC)
Hardware**

Sl. No.	Description of Items	Unit of Measurement	Quantity
1	Workstation	Nos.	6
2	GRPS/EDGE/EVDO Modem	Nos.	6
3	SIM Card	Nos.	6
4	Slip Printer	Nos.	6
5	Laptop	Nos.	15
6	Laser Printer	Nos.	6
7	AC's with related material and services (including installation)	Nos.	6
7	Civil Works: existing infra-structure development for the UCC (As and when required)	Lot	1

Point of Delivery (address of location)	Smart Pre-Payment Metering Project for West Zone Power Distribution Company Ltd. (WZPDCL) Area , Project store, WZPDCL, Khulna.
Delivery Date: (a) Earliest Delivery Date (b) Latest Delivery Date	

Manpower Training (Local)

Sl. No.	Description of Manpower/ Qualification criteria	Quantity	Training Location	Description of training contents/ materials
1	Software Engineer, Network & Hardware Engineer, Electrical Engineer	4.5 Man-Month	To be mentioned by Tenderer	<p>Linux operating System, API, DLL, PL/SQL/JAVA, VPN, Indepth operations and source code analysis of Unified System, HES and MDM system with related areas as required.</p> <p>Every piece of Software supported Hardware that is involved in the system and on interfacing with conventional network and Meters focusing at major on PLC, DCU/ECG, GPRS, VPN with related AMI server and related areas as required.</p> <p>On the electrical parts of the system as well as the customization of the meter and related areas as required</p>
2	Operator and End user	2.0 Man-Month	To be mentioned by Tenderer	POST operate the vending station, Meter Customization and the related areas as required

Manpower Training (Foreign)

Sl. No.	Description of Manpower/ Qualification criteria	Quantity	Training Location	Description of training contents/ materials
1	Software Engineer, Network & Hardware Engineer, Electrical Engineer	3.5 Man-Month	To be mentioned by Tenderer	<p>Linux operating System, API Details, DLL, PL/SQL/JAVA, VPN, Indepth operations and source code analysis of HES and MDM system with related areas as required.</p> <p>Every piece of Software supported Hardware that is involved in the system and on interfacing with conventional network and Meters focusing at major on PLC, DCU/ECG, GPRS, VPN with related AMI server and related areas as required.</p> <p>On the electrical parts of the system as well as the customization of the meter and related areas as required</p>

Address of location	
<u>Date:</u>	
(a) Earliest Delivery Date	
(b) Latest Delivery Date	

The tenderer will provide required local training as well as Foreign training in the manufacturers/suppliers country(s) or in the above mentioned locations. So that the trainees can operate and maintain the system smoothly after handover of the turn key project. The training programs will cover Software Engineer, Network & Hardware Engineer, Electrical Engineer and operators. At least 50 (Fifty) numbers of officers and staff will be trained before completion of contract.

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Section-7: Technical Specifications

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Section-7: General Specification

The Principle

For a stable and efficient electricity distribution system and an effective and trust worthy revenue collection system a country wide Smart Pre-Paid Metering System is evident. As the technology advancement reaches at its peak for peace to help the utility companies to manage a well-organized electricity distribution system, the utility companies no need to rely on conventional metering system. An adaptation of Smart Pre-Paid Metering System can change the needs and the requirements of better solution for the utility companies that make the whole distribution system more dynamic and digitally enhanced. By introducing the features and advantages of the Smart Pre-Paid Metering System that will not only provide freedom of the consumers but also generate a pace in collection strategy of the utility companies in comfort eliminating all kinds of confusion and havoc of corruption.

Digital Metering System brings a quantum leap in energy calculation in accuracy. But eventually most of the energy meters are analog devices. Conventionally mostly installed the analog meters are not only a less-in-accuracy but also it creates and follows to maintain a human hauled operational system that is a bit costly and rather slow. On the contrary the digital metering systems are quick and free from all the demerits of the running aged old electricity distribution system.

Let's have a quick through of National Unified Smart Pre-Paid Metering System. In prepaid model, an electricity consumer has to buy credit (Unit/Currency) from the utility company and to enjoy the limited bought electricity credit into the meter before he can use the electricity. This amount is slowly credited as the consumer uses electricity. One can refill one's necessary credit at any nearest Point of Sale for electricity. As it is clear that the consumer is solely responsible for the pre-buying energy credit and accommodating the purchased energy for optimal use, the utility company requires no resources and personal for billing purposes and that surely will help to improve customer care services. In a sense it is a direct and practical procedure to help the consumers to be optimal in one's uses to reduce down the system loss and averaging the incremental collection of the revenue. By the National Unified Smart Pre-Paid Meter System. The Load Demand will be aligned as the consumer can meet the facility of monitoring one's installed credit initials.

But this model also introduces a chance of fraud if there is a complete lack of meter usage supervision. This is easily corrected by introducing data exchange mechanism within the energy meters that are able to report usage statistics, load profile, power failures, tamper data and other relevant information. Building this data exchange mechanism within a keycode meter will require additional hardware like power line communication or mobile communication chips. But as more and more manufactures enter the market it will become difficult to maintain the success of the model if they do not follow a single standard. It will be difficult for the utilities to run a successful business if they cannot replace an existing meter from a particular manufactures with another meter from another manufactures. So it is undoubtedly a present time demand to have standardized single uniform platform of distribution system for a nation.

This is only possible when all manufactures follow a single guideline and standards. These standards include meter data and history, data exchange format and software specification for all related software. This document proposes such a system which not only includes practical lessons learned from the field but also introduces new features and components that are necessary for utility companies to manage new generation of prepaid meters with tariff management. A complete breakdown of the overall system is specified first with diagram, then it is described in detail, network architecture is explained next and the hardware and software specification defined. A complete and exhaustive specification like this can only ensure the success of all future meter requirements of Bangladesh but can also act as a model for other countries to follow.

There are already existing single phase meters deployed and used in the field. Some of the mode of media of these works with a smartcard and others with keypad. The proposed solution builds on the existing model by providing standardized data exchange mechanism. The data exchange media will be the smartcard or keycode tokens. This will carry both tariff and recharge amount data from utility to meter and carry usage data from meter to utility (i.e. bidirectional data transfer). And for the keypad process a standard key mechanism also been introduced and adopted. A standardized data format for the smartcard has been adopted. Since many manufactures use different encoding and security within their meter, the data exchange mechanism also has provision for manufacturer encoded data that can be only decoded by the meter. The manufacturer will provide API to create this encoded data from raw data to the utility.

In Bangladesh, the electricity is being runing on traiff beneficiary approach. So the revenue collection must have been counted and calculated at the meter side for a real time calculation and have to generate a real customer data pattern that will definately enhance the data exchange to reveal the energy generation as well as the load management.

All the Smart Pre-Paid meter that shall be procured shall be followed the discribed system software architecture (attached in part-2 of this STD).

The overall network system of the Smart Pre-Paid metering system:

7.1 The Technical Specification on the Network and the Software of the Smart Pre-Paid Metering System has mainly two parts.

- **The Master Information Center (MIC):** All the servers, the routers, the switches, the billing software located centrally in the utility premises are defined together as The **Master Information Center**.
- **The Data Network Service Provider (Mobile Network Companies):** The Data Network Service Provider companies are responsible for providing both SIM/ RIM card data circuit for data network service having a stable bandwidth capacity. Short Message Service (PUSH-PULL SMS) also is available and defined for the short text messaging system activated in the mobile network companies.

7.2 The System

The system as shown in the diagram are containing several continuous areas each performing different particular roles.

7.2.1 Master Information Center (MIC):

The core area of the system is the Master Information Center (MIC). This is where all the running communication processes and the running business processes are installed and located residing in the utility company premises. **There is only one Master Information Center (MIC) at WZPDCL premises in Khulna.**

The Master Information Center (MIC) is comprise of

- **The Database Servers (RDBMS):** The Multiple database servers provide reliable data storage and delivery.
- **The Routers and the Firewalls:** The Routers are connected through the system master station to The Data Network Service Provider round the clock. All the network connections have gone through the firewall for maximum security reasons.
- **The Application Server:** This is a request processing side. There should be at least two application servers at this end as to make the system a little flexible. These servers lonely will be responsible for processes of all the requests from the Point of Sales (POS) terminals and vending stations.

The functions of these servers are:

- ✓ To provide a real time and relentless connectivity in between the database and POS/Utility Vending Station,
 - ✓ To provide secure authentication service to POS/ Utility Vending Station,
 - ✓ To process unit charge/bill pay request from POS/ Utility Vending Station,
 - ✓ To ensure required encrypt data quickly,
 - ✓ To transfer results and status of the data to POS/Utility Vending Station for hardcopy receipt to a consumer,
- **The Short Message Server (PUSH-PULL SMS):** This server will process PUSH-PULL SMS requests arriving from the various consumers through The Data Network Service Provider.
 - **The Accounting and Billing Server:** This server will keep and produce the various billing and transaction reports for all the vendors, mobile operators and consumers.

7.2.2 The Data Network Service Provider (Mobile Operators): The Data Network Service Provider actually it refers to the mobile operators will provide the following services:

- Provide data network service through GPRS/EDGE/EVDO/HSPA network,
- Provide PUSH-PULL SMS service to utility companies and their consumers through mobile phones.

Every Data Network Service Provider will be connected to each utility only one Master Information Centre through a dedicate fiber or leased fiber line.

7.2.3 Point of Sales (POS):

The POS is where the utility consumers will come most of the time to recharge their credits. The Consumers will deliver their meter information and pay the vendor his preferred and demanded amount. Each POS will be equipped with a laptop or desktop, smartcard reader/writer, a slip printer, a network modem and the POS software. The vendor will enter these consumer details into the POS software and issue a request to process the transaction. The POS software will use the data network service to connect to the application server at Master Information Center and initiate a fund transfer request. Before getting the fund transfer he should have a fund collection from the respective vending station of the respective utilities. The process will first check whether there are enough funds available in the vendor's account for this transaction. If 'No' then a message is sent back to the POS informing regarding the insufficiency fund status. If there is enough fund, then the application server initiates a transfer fund request from the vendor account. If the transfer is successful, then the server checks the database to find the type of meter installed at the consumer premises. If it is a keypad meter then the server will generate the 'n' digit keypad number necessary to recharge the meter. If it is a smartcard based meter then an encrypted data is generated that contains instruction to update the smartcard. This number or the encrypted message along with a success recharge message is sent back to the POS software along with the kept data of the smart card of the respective meters(as it is a two way communication system). The POS software then depending on the meter either prints the keypad code or writes into the consumer meter smart card through the smart card reader. In both cases, the software will print a receipt containing the amount paid instantly. The POS software will keep the till next vended amount in accordance with it's purchased amount as well as the system master station will also follow the log of transaction for future use.

In case of the three phase meters, the SMS server will send back the success message to the POS software and the software will print the acknowledgement receipt for the consumer.

7.2.4 Utility Vending Stations 24x7:

This performs the same function as POS but this will be managed by the utility companies itself round the clock. It is the wing from the utility companies to the POS vendors and the consumers also. It will be established for multi purposes as well. The consumer will get necessary services regarding the meters during stipulated office hours and the complains will be attended from here. So a customization center must integrate here to give the consumer a prompt, better and reliable service to shorten down the power cut. The POS vendors will come here to collect the required energy during the official time table. The vending stations will deposit the collected amount to the Bank. Again for the consumers the late hour collected amount will be kept and deposited to the bank after certain time maintaining the friendly hours.

Since it will be managed by the utility company. A 'n' digit code can be generated or smart card written directly taking cash from the consumer. The vending stations along with the customization center will be connected to The Master Information Center though a secured dedicated leased line or where possibly through the mobile data network where leased line is not available or not feasible.

7.2.5 Utility Consumers: Consumers can check their assigned load status and other information by sending PUSH-PULL SMS by a predefined format using their mobile phones. Each utility company will have its own short-code (example: BPAY or 2729) which will be valid for all mobile operators. When a PUSH-PULL SMS is sent, the data network service provider will send it directly to the Master Information Center's PUSH-PULL SMS server through the connected network. The PUSH-PULL SMS server will process the PUSH-PULL SMS request, generate the appropriate response and send the response back to the requesting mobile phone containing the requested information. This will work as PUSH-PULL SMS service.

7.2.6 *On-Line Prepayment meters*: Both the Single Phase and Three phase meters will have on-line vending facility. Each meter will be fitted built-in GSM (GPRS 3G/4G) modem though which the information can directly be communicated to and from the meter as well as the meters should communicate with server through G3-PLC (FCC)/ BROADBAND PLC/RFusing DC/DCU.

7.2.7 Customization Center: Mostly located at utility premises, this center will integrate with the system master station to create new consumer, assign/change meter of consumer and perform all administrative tasks to maintain consumer data integrity in the Master Information Center. This customization center also will be integrated at each vending stations of the respective utilities.

7.2.8 Data Service Network: The backbone of the proposed Smart Pre-Paid eMetering System will be established on already erected and developed network by a recognized data service network provider. The only one system master station of each utility company will be connected with their network through a firewall. The data service network provider actually the mobile operators will be connected through this data service network. Similarly the vending stations of the utility organizations may also be connected through the same data service network as required.

7.2.9 The Central Data Center (CDC): Here the all the utilities of the country operational data will be sent at a Prime Time. The CDC will keep all the Data for not only to preserve but to make an impact on the management of the Smart Pre-Paid Meter System. The establishment of the the CDC will be almost like The Master Information Center in a larger scale. The entire MIC will be connected to the CDC through the chosen established Data Network Service round the clock. The data preservation at CDC must be kept by an authenticated and reliable person. A Prime Time will be fixed and only CDC can fetch all the day long data of each utility. MIC cannot have any access to CDC. CDC will provide customer data at internet one day behind. So, each of any customer can see their previous data through internet.

7.3 The Network Specification of the Smart Pre-Paid Metering System

The Pre-Paid Metering System will require the following basic network connections to work seamlessly that will online 24x7. These networks are defined below:

- **Network 1:** The Master Information Center to the Data Service Network Provider (the Mobile Operator Network).
- **Network 2:** The Data Service Network Provider (The Mobile Operator) to the POS Network.
- **Network 3:** The Master Information Center to the Utility Vending Station Network.
- **Network 4:** The Master Information Center to the Central Data Center.
- **Network 5:** The Master Information Center to the meters

7.3.1 Network 1: The Master Information Center to the Data Service Network Provider (the Mobile Operator Network)

This Data Service Network Provider will connect The Master Information Center to all the mobile networks available. The connection in between of those two will most likely be either dedicated fiber or leased fiber line. Each link speed should be minimum of 2Mbps. A single link (in case of leased line) will terminate at the system master station and the other end will be one for the Data Service Network Provider. The termination points will be 1Gbps twisted pair (RJ45). This network will carry:

- All the data traffic from the POSs at each a single span of real time.
- All PUSH-PULL SMS message traffic from users at each a single span of real time.
- All the utility vending station data traffic where applicable at each a single span of real time.
- All the Monetary Transactions from The Master Information Center to the Data Service Network Provider (the mobile network) accounting and billing server.

SSL/PKI can be applied to make the all sorts of communications ensured. The network should be made redundant if taken through a vendor (multipath, multilink or wireless).

7.3.2 Network 2: The Data Service Network Provider (The Mobile Operator) to the POS Network.

The POSs, that is eventually located at different areas, will be connected round the clock to The Master Information Center by using Data Service Network (mobile network). These can be GPRS, EDGE, EVDO or any other proven and convenient wireless network technology. An arrangement must be made by the utility companies with the chosen Data Service Network Provider so that every other operated on air mobile operators will be available for necessary communication amongst them and that has to be ensured that the network will be a separate VLAN and data from this network will not mix with other data networks of the mobile operators. Also a fixed static IP scheme should be agreed upon. All data communication must be bi-directional(Full Duplex). It should be noted that although this will use existing GPRS/EGDE/EVDO networks, this will be a separate data service network and will not have any kind of foreign access like the internet. All data will be switched and logged managed by the chosen Data Service Network (from the mobile operator network directly) to The Master Information Center through firewall protected routers.

7.3.3 Network 3: The Master Information Center to the Utility Vending Station Network

This will connect The Master Information Center to the Utility Vending stations. This should also be a dedicated or leased fiber line. This network can also be based on leased DDN line from BTCL where appropriate. A 2Mbps link per Utility Vending Station is recommended. This link must be established secured by VPN. There should be redundancy in the network. Whenever possible and feasible a leased fiber or DDN line should be used to connect the vending stations to The Master Information Center. Rather on an alternate the chosen Data Service Network (the mobile network) will be used.

Rather the described 03 networks above the connection in between the MIC and the CDC and The CDC to the DRC will be maintained through the chosen established Data Network Service round the clock.

7.3.4 Network-4: The Master Information Center to the Central Data Center (the Mobile Operator Network)

This Data Service Network Provider will connect The Master Information Center to all the mobile networks available. The connection in between of those two will most likely be either dedicated fiber or leased fiber line. Each link speed should be minimum of 2Mbps. A single link (in case of leased line) will terminate at the system master station and the other end will be one for the Data Service Network Provider. The termination points will be 1Gbps twisted pair (RJ45). This network will carry: All the data traffic from the MICs at each a single span of real time.

SSL/PKI can be applied to make the all sorts of communications ensured. The network should be made redundant if taken through a vendor (multipath, multilink or wireless).

7.4 System Integration, Installation, Operation and Maintenance

The Tenderer will be responsible for design, manufacture, supply, installation, testing & commissioning smart pre-paid meters & metering system with related service on turn key basis, which will include to the operation of the system and interfacing of offered meters with purchasers existing software. Already developed software API is enclosed in part-2 of the STD. The whole system will be integrated so that all parts run smoothly. These responsibilities include but are not limited to:

- Work with utility to test and finalize all input and output.
- Deploy software at each required locations.
- Ensure interoperability of each software module.
- Install a secure software installation method.
- Arrange for SMS message short codes from mobile operators.
- Work with the data service network provider (mobile operators) and with the purchasers' to setup the required network communication for both wireless and physical connections.
- Work with the data service network provider (mobile operators) representation to setup SMS message server and communication.
- Work with utility, pos vendors and all concerned to test software for bugs and if required fix bugs or incorporate improvements and suggestions.
- Work to provide vending service to the smart prepaid metering consumer of the respective utilities through Mobile SMS, mobile Apps, POS, ATM/Bank booth, web service etc.
- Work with meter manufactures to make sure all software and hardware meters communicate properly.
- Work with utility to make sure that all software follows the defined standards, agree on change with all partners if required.
- Interfacing: The system software has been developed and irrected. The prescribed interfacing protocol has been developed in JAVA which is attached in Part -2 of the tender document. The tenderer's meters will follow that protocol and will complete their interfacing API on or before demonstration date. No tender will be technically responsive until and unless the interfacings API works and comply with requirements and also fully satisfy the Engineers authorized by the Employer. Othwise the tender shall be rejected and will not be considered for further evaluation.

- The offered meter will be manufactured in such a way so that its API can follow the already developed system software's API. The rights & the cCopy rights of the system software and the pattern of the system will be the sole owner of the people's republic of Bangladesh.
etc. and more as required.

The software parts are described below:

- The online single phase and 3phase meter must be connected directly with the MIC server using the built in GPRS/EDGE/EDVO/HSPA modem.
- The communication data format is XML.
- The XML data exchange format is defined in the XML schema files.
- The communication channel of the 3phase online meter must be encrypted by 256bit SHA and seeded by a true random number generator.
- Each online pre paid meter will have contained a unique key installed
- Each online 3phase meter will have contained a unique key installed.
- Utility must be able to program the following data into the meter before they are used:
 - Meter ID
 - Data Communication Port (default 2100, custom port)
 - Server IP Address
 - Server Port
 - Encryption Key
- The meter will get a fixed IP address from the installed SIM card.
- The meter will always listen to the "Data Communication Port" for incoming data and will always send data to "Server IP Address: Server Port".
- For incoming request, the reply data will go through the same connection similar to HTTPS.
- Incoming request from server to IP address and port 2100 of meter.
- Server posts encoded XML data.
- Server sends two carriage return to denote that it has send the entire request.
- The meter decodes the data, process the request and generates appropriate response and send it back to server.
- Bidirectional data transfer will use the same connection like HTTPS.
etc. and more as required.

7.5 Vending Software:

This software should have proper installer to install and this software should have a hardware constrained with a unique hardware electronic ID like MAC address or chasis ID or Processor ID or vendor service tag no. ID or etc.

- Sales Module
 - ✓ This module will sale credit or energy as per consumer requirement
 - ✓ To Define type of Pre Payment meter.
 - ✓ To Collect consumer and meter related information from related MIC database like tariff and Slab, holiday, friendly hour, Emergency credit, connection load, and Alert level etc. and related information through established network.

- ✓ To Send defined information through Smart card or generating token or through SMS/GPRS for remote Meter.
- ✓ To Collect Meter historical data that will be collected from the meter and operational data from Smart card and update those to MIC database.

etc. and more as required.

- Data Exchange module

- ✓ This module will collect updated information from MIC and send & insert it to relevant databases.
- ✓ To Collect information from temporary local database and send all those processed data to MIC through P2P connection by established LAN or Dial Up or through Data network Service.
- ✓ All exchangeable data need to prepare using encryption methodology.

etc. and more as required.

- Report Module:

There will be a several types of reports to be generated. It has to be met the on demand process of the each utility division.here some of it's type are noted below:

- ✓ Daily Sales report,
- ✓ Individual consumer purchase report,
- ✓ Operator related report,
- ✓ Generate log for Data Exchange module,

etc. and more as required.

7.6 POS Application

This application work **will be operative for 24x7 round the clock online system.**

Sales Module

7.6.1 For Smart card base Meter

- ✓ To Collect consumer and meter historical Information from Smart card and get Credit demand by key input.
- ✓ Send those information's to the MIC through short Message service (SMS) or by GPRS/EDGE Service through established data network service.
- ✓ To Collect necessary information From the MIC as per request and update smart card by those information's.
- ✓ To Print module for slip print.
- ✓ To Send acknowledgment to the MIC after completion of Operation.
- ✓ To Generate log file for all operations.

etc. and more as required.

7.6.2 For Keypad base meter

- ✓ To Insert consumers' identification number and credit demand to POS interface and POS will send those to the MIC through short Message service (SMS) or by GPRS/EDGE Service through established data network service.
- ✓ To Collect Token Number for the above request from the MIC and print it to thermal paper.

-
- ✓ To Send acknowledgment to the MIC after completion of Operation.
 - ✓ To Generate log file for all operation.

etc. and more as required.

7.6.3 For Online single phase and three phase Meter

- ✓ To Insert consumer identification number and credit demand to POS interface and the POS will send those through short Message service (SMS) or by GPRS/EDGE Service through established data network service.
- ✓ To Collect acknowledgement from the MIC after sending information to Meter by the MIC itself through short Message service.
- ✓ then at POS an acknowledgement will be received and print a slip for consumer.
- ✓ To Send acknowledgment to the MIC after completion of Operation.
- ✓ To Generate log file for all operation.

etc. and more as required.

7.7 The MIC Software

MIC Application

This application will be **the core** of the total Smart Pre-Paid metering system. Any type data modification will be allowed **and accomplished** only by this application. It will have different management Module for processing different type tasks.

7.7.1 Consumer Information Management

- **Information modification**
 - By this module **only** authorized user can modify any kind of data related to consumer.
 - Consumer personal information.
 - Consumer tariff Class.
 - Connection load.
 - Issued meter related information.

etc. and more as required.

- **Report module**
 - Consumer personal information
 - Sales report
 - Consumption report
 - Historical report

etc. and more as required.

- **Tariff Management**
 - Management module
 - Insertion of new tariff

-
- Modification of existing tariff
 - Tariff Slab insertion and modification
 - Activation Date issue

etc. and more as required.

- **Report module**

- Individual tariff details
- All active tariff details
- Tariff history log

etc. and more as required.

7.7.2 Customized Information Management

This Module will use for include/exclude/Modification of common feature for individual or common Consumer.

- Holiday Information
- Friendly Hour
- Weekend
- Emergency Credit Limit
- Credit Alert Information

etc. and more as required.

7.8 Utility Vending Station Management

- **Management module**

- Issue new vending Station
- Update vending Station information.
- Deposit Information Update
- Vending Authentication information
- Vending sales Limit

etc. and more as required.

- **Report Module**

- Individual Vending related information
- Vending sales pattern
- Vending Station Deposit Status.

etc. and more as required.

7.9 POS Management

- **Management module**

- Issue new POS
- Update POS information.
- Deposit Information Update

- POS Authentication information
- Issued GSM/GPRS SIM related information.
- Commission related information
- POS sales Limit

etc. and more as required.

- **Report Module**

- a. Individual POS related information
- b. POS sales pattern
- c. POS Deposit Status.
- d. POS Sale Commission and related report

etc. and more as required.

7.10 Load Control:

This feature is a unique and essential part of the system to regulate the Load Management. This will be included into the meter and obviously the software. The Load control module will work on both for the offline & online meters. This module will reside in the application software. In the meter the request will follow the trigger of load control. so there will be a micro-controller programmed load control feature.

7.11 DATA Exchange Management Service

This is a self running and automatic service that has the vital role for the total system. It will be the way by which all vending Station and POS can communicate and exchange information with the MIC.

- To Prepare update or modified data from MIC database Server.
- To Collect and insert new Data from every Vending Station and POS to MIC Database Server.
- To Synchronize all updated data from database Server, Vending Station and POS.
- To Generate log for every task for synchronization.

etc. and more as required.

7.11.1 Content management Application

- **Short Message Service(SMS) module**

- **POS management**

- ✓ To Collect request SMS/GPRS from POS.
- ✓ To Process and generate information from MIC database as per request.
- ✓ To Send replied SMS/GPRS for the particular request to the particular request.
- ✓ To Send Common information to POS.

etc. and more as required.

- **Consumer management**

- ✓ To Send Meter operational information to online 3 phase Meter as per requirement for instant urgent basis.
- ✓ To Collect Meter related information from remote meter through SMS.

etc. and more as required.

Token Management

- To Collect requested information from database.
- To Generate Token for individual request.
- To Generate token for common information.

etc. and more as required.

Meter Management

Meter Customization

- To Issue new meter for individual consumer.
- To Update meter related information to database.
- To Collect meter related information from database and send those to Meter.
- To Generate report for related task like day wise meter customization.

etc. and more as required.

Meter/Smart Card Change Application

- To Change new issued meter or card related information to database
- To Send meter related information to new issued Meter.
- To Send changing information with common information to Smartcard as it can be accessible by the particular Meter.

etc. and more as required.

Meter Status Access module

- This module will used for accessing meter Current information Collected from Meter through Common Meter Status Card or RF/IR communicator or through RS485 Serial interface.

etc. and more as required.

7.11.2 Instant Service Management

It is a portable application by which utility can mentor and monitor meters installed at Field. This application must have been hardware constrained.

- To Interface to collect information from meter through Meter through Common Meter Status Card or RF/IR communication or through RS485 Serial interface.
- To Update information to Meter as per MIC requirement.
- To Interface to Collect information from MIC database as per requirement to update information to meter and stored it to temporary database at the portable device for the time being.
- To Interface to Update MIC database with collected information from occurred situation.

etc. and more as required.

7.11.3 Authorization Management

- As everyone cannot get permission to access every management module, this module will use for giving permission to individual for accessing specific management module.
- It will also manage permission for user of vending Station and POS by providing user name and password.

etc. and more as required.

7.11.4 Backup Module

This module is to take backup of the MIC related database.

etc. and more as required.

7.12 Report Management Console

Sales reports

- Account wise sales reports.
- Daily sales reports.
- Monthly sales reports.
- Tariff wise sales reports.
- POS wise sales reports.

etc. and more as required.

Consumption reports

- Account wises.
- Tariff wises.
- Feeder wises.
- Month wises.

etc. and more as required.

VAT reports

- Date wises
- Month wises
- Year wises

etc. and more as required.

Customer reports

- Account wise
- Meter no wise
- Phase wise
- Tariff wise
- All customer

etc. and more as required.

- **Exception reports**

- Sanction load violation report on No of [n]% violated
- Low/No consumption report

etc. and more as required.

7.13 Account log info report

- Account wise
- All
- Others
- Holiday report
- Tariff report
- Vending station/POS report
- Credit given report
- Vending station information report
- Sales pattern

-
- Deposit status
 - Vending statistics report

etc. and more as required.

It is notable that the software that will be involved and installed in the CDC, MIC, UVS, UCC & POS will be followed on the basis of a decided conversion of the Data Exchange Format that will be responsible for The meter that must be able to read and to write data to the smartcard in specific decided format if it is a smartcard based meter or decode information from decided encoded keys typed through the keypad if it is a keypad based meter.

At the POS or the Utility Vending Station the Token will be generated for the Keypad base meters so the software should have follow the keypad numbering scheme as described below. Here it is should be mentioned that the scheme is perception only it could be changed or modified with respect to the manufacturer that varies.

7.14 Keypad Numbering Scheme

While the manufacturer is free to use any number scheme they see fit, the number scheme must be secure and use minimum number of digits and must always contain the following fields in encrypted form:

Meter ID

Recharged amount

Sanctioned Load

Sequence Number

The meter must check the validity of these fields before recharging the credit. The sequence number is an auto generated number starting from 1 for each recharge or keypad numbers. A keypad number will only be accepted if the previous number has been keyed in. For example if a consumer goes to POS to recharge 300Tk and gets keycode xxxyyzzz (which contains sequence number n). The next month he goes again to recharge 250Tk and gets keycode pppqqrrr (which contains sequence number n+1). Keycode pppqqrrr will only be accepted if xxxyyzzz has been keyed in previously i.e. meter will only accept a keycode containing sequence number 'n' if at some point keycode containing sequence number 'n-1' has been keyed in. This is to ensure that keycodes are not discarded by a consumer intentionally.

Periodically it may be necessary to generate a keycode that contains more data. The keycode scheme must be able to accommodate the following data if and when required:

Meter ID

Recharged amount

Sanctioned Load

Sequence Number

Load Change

- Sanctioned Load
- Start Time
- Load Control

Rate

- Start Unit
- Peak Rate
- Offpeak Rate

- Activation Date
- Holiday
- Month
 - Day

It is assumed that the keypad number with only the meter id, amount, load and sequence number will be a lot shorter than the key code containing all the rate information.

At the POS or the Utility Vending Station the data transfer will be occurred for the smartcard base meters so the software should follow the Smart Card Data Format scheme as described below. Here it should be mentioned that the scheme is a perception only it could be changed or modified with respect to the manufacturer that varies.

7.15 Smart Card Data Format

SLE4428 or 100% compatible 1K Byte EEPROM Memory Card must be used in the card based meter. The memory card will have encrypted and no encrypted memory parts. The encrypted bytes must be generated by the meter SDK/API as supplied by the manufacturer. The manufacturer is free to use any encoding scheme to secure the data but must contain all the data as mentioned in the following table:

<u>Data</u>	<u>Bytes</u>	<u>Memory Address (Bytes)</u>
Non Encrypted Data		
Binary Pattern (1010110011110000)	2	1-2
Version	1	3
Meter ID	10	4-13
Consumer ID	10	14-23
Utility ID	2	24-25
Sanctioned Load (kW)	6	26-31
Meter Type	1	32
Sanctioned Load Exceeded	1	33
Last Recharge Amount	2	34-35
Last Recharged Date (DMY)	3	36-38
Last Transaction ID	10	39-48
Unused/Future Provision	55	49-100
Encrypted Data as Generated by the Meter Manufacturer SDK/API		

<p>The following Data must exist within the encrypted Data:</p> <p><u>Data To Meter:</u> Meter ID, Consumer ID, Utility ID, Sanctioned Load, Recharge Amount, Weekend, Emergency Account, Friendly Hour (start/end), Peak Hour (start/end), Buzzer Volume, Rates, Rate starts at unit, Rate at Peak, Rate at Off peak, Activation Date, Holidays, Month, Day, Load Change, Load Control, Start Time (hour/minute), Sanctioned Load, Etc. and more as required.</p> <p><u>Data From Meter:</u> Tamper Status, RTC Status, LR Status, Usage Data for the last 6 months individually, Month, Year, KWh, Taka Recharged, Taka Used, Average Power, Reactive Power, Maximum Power, Volt Ampere, KWh in Peak, KWh in Off peak, KVarh in Peak, KVarh in Off peak, Total charge in Peak, Total charge in Off peak, Number of power failures, Number of time sanctioned load exceeded, Load Control, Tamper, Number of times tampered, Date/ Time of Tamper, Etc. and more as required.</p>	923	101-1024
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7.16 Encrypted Data Generation SDK/API

It is notable that the software that will be involved and installed in the CDC, MIC, UVS, UCC & POS will be followed on Encrypted Data Generation SDK/API of the related respective meter supplied by the meter manufacturer responsible for. The meter that must be able to read and to write data to the smartcard in specific decided format if it is a smartcard based meter or decode information from decided encoded keys typed through the keypad if it is a keypad based meter through the involved Encrypted Data Generation SDK/API.

At the POS or the Utility Vending Station the data transfer will be occurred for the smartcard base meters or the Token will be generated for the Keypad base meters so the software should have follow and use

Encrypted Data Generation SDK/ API as described in Part B of the Tender Document. Here it is should be mentioned that the Encrypted Data Generation SDK/API is a perception only it could be changed or modified with respect to the manufacturer that varies.

The meter manufacturer must provide SDK/ API to generate encrypted that suitable for the meter to process and understand the API interface that has been developed in JAVA and operating system is on Linux.

The manufacturer must provide:

- Library compiled in GCC Linux that can be integrated in Java Program.
- Sample project and source code illustrating usage of provided java program
- Documentation of each function, input and output.

Work with utility to make sure that all software follows the defined standards, agree on change with all partners if required. Standards are summarized below:

7.17 POS-SMS Communication Format

The POS will communicate directly with the MIC using a separate & private Data Service Network (mobile network or other secure network where applicable). The data exchange will occur through an encrypted XML data exchange. The communication channel will use a 512bit or 1024bit SSL which the vendor must acquire. A private key will reside on the server and a public

key will be available. The XML request and response formats are defined in the attached XML scheme files. Furthermore, the following additional information are required:

Server Address:

Port: 443, standard SSL port

URL: https://server_address/pos_process/

1. Accounting Server-SMS Communication Format
2. Meter Manufacturer API/SDK Format

The Tenderer must collect, integrate and test proper functionality of these SDK from the meter manufacturers:

- Library compiled in GCC Linux that can be integrated in any Linux C program.
- Windows DLL or C library with all required header files.
- .NET managed DLL.
- Sample project illustrating usage provided library/ DLL.
- Documentation.
- Installer.

Function Lists: The following functions and parameters must be implemented:

Function meter_encode:

Related Parameters

Parameter	Data Type
Recharge_amount	Integer
Sanctioned_load	Float
Sequence Number	Integer
Rate	Array
Holiday	Array
Loss	Array
Load Change	Array
Meter_id	String
Expected_output	Unsigned char (1=keyode, 2=binary data)
Meter_id	String
Sanctioned Load,Weekend,Emergency Account,Friendly (start/end),Peak (start/end),Buzzer Volume,Rate, Holiday, Loss, Load Change includes:Rates,Rate starts at unit,Rate at Peak,Rate at Offpeak,Activation Date,Holidays,Month,Day,Load Change,Load Control, Start Time (hour/minute),Sanctioned Load, Etc.	Array

and more as required.	
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Related Response	
Parameter	Data Type
Status	Boolean
Amount	Float
Encoded_Data	Byte array
Keycode	String
Meter_id	String
Etc. and more as required.	

Function meter_decode:	
Parameter	Data Type
Meter_id	String
Encoded_Data	Byte array
Etc. and more as required.	
Related Response	
Parameter	Data Type
Status	Boolean
Tamper Status, RTC Status, LR Status, Usage Data for the last 6 months individually, Month, Year, KWh, Taka Recharged, Taka Used, Average Power, Reactive Power, Maximum Power, Volt Ampere, KWh in Peak, KWh in Off peak, KVarh in Peak, KVarh in Off peak, Total charge in Peak, Total charge in Off peak, Number of power failures, Number of time sanctioned load exceeded, Load control, Tamper, Number of times tampered Date/ Time of Tamper	Array
Etc. and more as required.	

7.18 Meter Number Scheme

The meter number scheme will be the unique and be followed by a conversion of all the utilities. The number scheme will not be the scheme described but the description will be the basic of the conversion of the meter number scheme which will be supplied after signing of the contract

A minimum 11 digit meter number is envisioned. The first two digits will be utility ID. The second digit will correspond to meter_type. 1=Smart Card based, 2=Keypad type, 3=online. The next 8 digits will be a sequence number used to identify each meter and will consist of numbers (0-9).

7.19 3φ Meter-SMS Data Exchange and Authentication Scheme

The XML data exchange format is defined in the attached XML files. Furthermore the communication channel must be encrypted by 256bit SHA and seeded by a true random number generator. Each meter should also have a unique key installed.

Server Address:

Port: 2100, custom port

Protocol: Text/Encrypted XML

7.20 Smart Card Data Format

SLE4428 or 100% compatible 1K Byte EEPROM Memory Card must be used in the card based meter. The memory card will have encrypted and no encrypted memory parts. The encrypted bytes must be generated by the meter SDK/API as supplied by the manufacturer. The manufacturer is free to use any encoding scheme to secure the data but must contain all the data as mentioned in the following table:

Data	Bytes	Memory address (Bytes)
Non Encrypted Data		
Binary Pattern (1010110011110000)	2	1-2
Version	1	3
Meter ID	10	4-13
Consumer ID	10	14-23
Utility ID	2	24-25
Sanctioned Load (kW)	6	26-31
Meter Type	1	32
Sanctioned Load Exceeded	1	33
Last Recharge Amount	2	34-35
Last Recharged Date (DMY)	3	36-38
Last Transaction ID	10	39-48
Unused/Future Provision	55	49-100
Encrypted Data as Generated by the Meter Manufacturer SDK/API		
<p>The following Data must exist within the encrypted Data:</p> <p><u>Data To Meter:</u> Meter ID, Consumer ID, Utility ID, Sanctioned Load, Load Control, Recharge Amount, Weekend, Emergency Account, Friendly Hour (start/end), Peak Hour (start/end) Buzzer Volume, Rates, Rate starts at unit, Rate at Peak, Rate at Offpeak, Activation Date, Holidays, Month, Day, Load Change, Start Time (hour/minute), Sanctioned Load, Etc. and more as required.</p> <p><u>Data From Meter:</u> Tamper Status, RTC Status, LR Status, Usage Data for the last 6 months individually, Month, Year, KWh, Taka Recharged, Taka Used, Average Power, Reactive Power, Maximum Power, Volt Ampere, KWh in Peak, KWh in Offpeak, KVarh in Peak, KVarh in Offpeak, Total charge in Peak, Total charge in Offpeak, Number of power failures, Number of time sanctioned load exceeded, Load control,</p>	923	101-1024

Data	Bytes	Memory address (Bytes)
Non Encrypted Data		
Tamper, Number of times tampered, Date/Time of Tamper, Etc. and more as required.		

The tenderer developed POS software must be able to reach and write these values to and from the smartcard as well as acquire encode values from manufacturer provided SDK.

7.21 Meter Connection Procedure

The following procedure is envisioned: Configure the meter with server IP, port and any authentication key required. Bring the meter online and send a query_test command from the server. The meter should respond with firmware version which will verify connectivity. The send the "conf" command to meter from server.

7.22 Establishment of Network

The tenderer who will implement will be responsible for establishment of the network for the entire system. These include but are not limited to:

- Network connecting POS to MIC
- Network connecting UVS & UCC and utility POS to MIC if/when required
- Network connecting Data Network Service Provider (mobile operators) to MIC
- Arrange contract with Data Network Service Provider (mobile operators) for a secure private data network and provide data network SIM/RIM to POS operators.
- Ensure security of the network. Setup APN where required
- Ensure uptime of network
- Manage network, test performance, throughput and bottleneck of network
- Maintain automated network failure detection and failover. Develop a failure notification service model
- Follow network address scheme as defined below:

Each utility company will be assigned a unique number starting with 1 (max: 119, total: 119). Each mobile operator will be assigned a unique number starting with 230 (max 254, total: 25). Each financial institution will be assigned a unique number starting with 120 (max 229, total: 110). For our example, we will assume the following numbers to illustrate an example.

Utility company x: 1

Utility company y: 2

Mobile Operator m: 230

Mobile Operator n: 231

Financial Institution p: 120

Financial Institution q: 121

All utility servers will reside in a unique subnet of the 172.16.x.x network.

Example:

Utility company x application server address: 172.16.1.1

Utility company y application server address: 172.16.2.1

Mobile company m application server address: 172.16.230.1

Mobile company n application server address: 172.16.231.1

Financial Institute p payment server address: 172.16.120.1

Financial Institute q payment server address: 172.16.121.1

Other 253 IPs are available for other network servers for later or additional use

7.23 Tariff Management

7.23.1 Tariff Definition

The System Manager shall be able to define tariff objects. Each tariff has a unique tariff ID associated with it. The following information is required to define a tariff.

Tariff ID	A unique tariff identifier
Effective Date	This is the date on which the tariff becomes effective.

Subject	Tariff Category	PFC Calculation
Power Factor Correction Charges	'A' & 'D' Category, 3phase, 400V, 20KW & above	0.95
	'C' Category, 3phase, 400V	PFC= power factor obtained from meter
	'E' Category, 3phase, 400V	

Subject	Tariff Category	Time
Time of Use	'C' & 'E' Category,	Peak – 17:00 to 23:00 Off Peak-23:00 to 17:00

Service Charges SC	Fixed charges are levied per month. These charges are different for single and three phase customers in a particular tariff category.
Minimum Charges MC	There will be no minimum charges for prepaid customers, but conventional customers pay a minimum charge, which varies per tariff category.
Sanctioned Demand Charges DC (Fixed Charge)	A fixed charge per kW of the sanctioned demand is levied per month.
Maximum Demand Charges	Integrated over ½ hourly periods Maximum Demand in KW.
VAT	Value added tax is levied on electricity charges and must be catered for in the system.

- The tariff code, effective date, kWh_x (in units of kWh), R_x together with a fixed monthly service charge SC and a fixed monthly sanctioned demand shall be used to define all prepaid tariffs used in the system.
- The SMS shall make provision for up to 500 tariff definitions
- The SMS must verify the tariff data entered and shall not allow discontinuities in the energy levels or negative rates for energy and fixed charges.
- There shall be a facility to copy tariffs to new tariff codes for editing purposes. The edit facility shall include a mechanism to increase the values of any of the variables R_x, SC and DC by a fixed percentage.
- Tables of Supply Group Codes and tariffs shall be securely stored at the SMS.

-
- f) No penalty Charges for PFC factor above 0.95 to 1.0. PFC is computed as above and average power factor is measured by meter based on only reactive energy. The monthly average power factor from meter is used for the factor and applied on the energy charge.

Please refer to WZPDCL's tariff document for details of the tariffs provided by BERC (Memo no. 28.01.0000.012.04.003.20-652 and 653, Dated: 27February, 2020).

Meter must have the provision to store the PFC charge data and display the PFC charge data.
Meter must have the provision to update the PFC charge calculation procedure through online.

7.23.2 Tariff Algorithm

The prepayment system could be implemented stepped tariffs. The tariffs will be implemented at the vending equipment/meter. The algorithm must ensure that:

- a) The Stepped tariffs are implemented in meter as accurately as is the case for conventionally billed customers.
- b) Customers are not restricted to the amount and frequency of electricity token purchases provided purchases do not exceed 12 times the calculated monthly average consumption without penalty.
- c) If any tariff changes, tariff update with effective date sent to meters through smart card at the time of purchase for smart card meters. The updated tariff will be sent using special numbers for keypad meters. For both meters, after utility decides the tariff update, all purchase of credit (with keypad number or smart card) will carry and tariff change flag. So that the meter will not accept any credit addition until it gets the tariff update.
- d) Customers will purchase only credit following credit transfer principles.
- e) Before any new purchase in a particular month the fixed charges are deducted for the first time and the rest of the money paid by customer will be sent to meter through card or number as credit.
- f) For consecutive purchase in the same month, credit values without any fixed charge will be sent to the meter.
- g) Slab reset service charges; power factor penalty (PFC) should be monthly basis.
- h) The tender shall provide a detailed description of the algorithm including:
 1. All assumptions made.
 2. An explanation of how the averaging algorithm operates.
 3. Examples of how the algorithm works.
 4. Examples of how to explain the algorithm to customers.
 5. Examples of how to deal with customers queries.
 6. Description of how the algorithm manages tariff rate and tariff structure change.
 7. Description of mechanisms to apply corrections.
 8. Description of how to deal with the situation where a customer buys at two different locations between data transfers.
 9. Online data transfer is required so that customers can buy token from any vending system and different locations.

**Specification for
Single Phase
SmartPre-payment Energy Meters**

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7.24 Scope

This specification covers the design, manufacture, testing and supply of static single-phase direct connected pre-payment energy meters of accuracy Class 1.

7.25 Scope of Supply

The tenderer shall be responsible for supply, installation, testing & commissioning with related services packing, loading, shipment, custom clearance if necessary, and transportation, insurance and unloading at site. The supplied meters will be operated by existing purchasers' software (API attached in part-2 of this STD). Interfacing of the offered meter is the responsibility of the tenderer.

Item No.	Name of Goods or Related Services	Description	Unit of Measurement	Quantity
1.	Supply and installation of Smart Pre-payment Energy Meter including necessary accessories packing, loading, shipment, custom clearance if necessary, and transportation, insurance and unloading at site	Single phase, 230 Voltage (phase to neutral), 5(60)A	Each	102000

Single phase prepayment meters shall be installed and commissioned according to the minimum guidelines as set out in technical specification. Prior to installation of meters customers shall be forewarned by delivery of a notice explaining what will happen. Public relations will be responsibility of the utility companies.

The installation team shall have a work order sheet instructing them what to do. The following information shall be printed on the works order from:

Customer Name	:	Supplied by the Utility and verified by Survey
Customer address	:	Supplied by the Utility and verified by Survey
Old Account Number	:	Supplied by the Utility
Old Meter Number & Reading	:	Supplied by the Utility
Tariff Code	:	The specific tariff to be allocated to the customer must be identified by the tariff code
Old Meter Reading	:	Old Meter Reading must be recorded at the time of pre-paid meter installation and verified by the concern customer.
Commissioning date	:	Date of pre-paid meter commissioning shall be noted.

There are different categories of installations that will be required:

1. Removal of induction & conventional digital meter and direct installation of prepayment meter with additional wiring or service line work required.
2. Removal of induction & conventional digital meter, re-routing of wiring with replacement of service connection and installation of pre-payment meter. Potential joints shall not be allowed in service drop cable.
3. Removal of service line (if required) and meter. Replacement of service connection and installation of meter.
4. New customer installation including service connection and installation of pre-payment meter.

The following guide lines must be followed by the supplier during installation of the meters:

1. The meters shall be sealed with Ferrule Type/Twist type seals compatible with the meters that uniquely identify the utility person who sealed the meters.
2. Meters shall be tested and commissioned by the installation supervisor using the data from the works order form to program the tariff details.
3. At the time of meter installation the customer's induction & conventional digital meter reading shall be captured on the order by the installation supervisor and the data returned to the SMS. The date of commissioning is also entered onto the work order form. If new service cable is re-installeed, the amount of new re-installed service cable shall be recorded and concern customer's signature must be taken on workorder sheet.
4. Customers shall be registered at the SMS using the returned work order form within 24 hours of commissioning.
5. The service connections shall not be replaced unless the survey indicates service line with joints or inadequately rated service lines or bad in selected line.
6. All meters shall be installed indoors at a location convenient to the customer as well as service personnel away from sources of heat and moisture.
7. The installation shall be symmetrical, vertical and parallel to respective walls and floors. From the points where the service enters customers building, it shall be enclosed in a 25 mm (dia) PVC pipe until it enters the metering house.
8. The piping shall be clamped or saddled at a maximum of 250 mm intervals.
9. At the time of installation on site training and instruction shall be given to the customer.
10. All other necessary accessories will be supplied by the Contractor.
11. At the time of meter installation picture of old and new meter with reading will be taken and shall be provided to the utility.
12. At time of installation, summary sheet of the customer (including both old meter and new meter information) will be prepared as utility prescribed format and will be submitted to the utility.

7.26 General Technical Requirements

7.26.1 Service conditions

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

SI.No.	Condition	Specification
1	Maximum ambient temperature (°C)	50
2	Minimum ambient temperature (°C)	5
3	Maximum daily average temperature (°C)	35
4	Maximum annual average temperature (°C)	30
5	Mean annual rainfall (mm)	2500

SI.No.	Condition	Specification
6	Minimum annual rainfall (mm)	1461
7	Maximum annual rainfall (mm)	4127
8	Maximum relative humidity (%)	100
9	Average relative humidity (%)	80
10	Maximum wind velocity (km/h)	180
11	Maximum altitude above mean sea level (meters)	200

7.26.2 Environmental Requirements

The meter shall conform to the environmental capability requirements as documented in IEC 62052-11, 62053-21 and 62053-23. In addition to that, the following minimum requirements shall be met.

- i) The meter shall be protected against malfunction due to the ingress of vermin, by conformal coating of the printed circuit boards in the meter.
- ii) Any openings shall be as small as practically possible to prevent the ingress of dirt and vermin and to limit the potential for vandalism or tamper following IP 51 and IP 54.

7.26.3 Standards and codes of practice

All material and equipment supplied and all works carried out shall comply in every respect with the technical codes of the International Organization for Standardization (ISO) and with the recommendations of the International Electrotechnical Commission (IEC), which apply to the electrical equipment.

Goods and special guarantees beyond the scope of ISO and IEC shall conform at least to one of the following standards and codes in the following priority:

1. VDE and DIN standards
2. BS or ASTM
3. Other internationally accepted standards which ensure a quality equal to or higher than the standards mentioned above, but only if these are submitted in the English language edition.

The following documents shall be read in conjunction with this specification. In case of conflict, however, this document shall take precedence. Nothing in this specification shall lessen the contractors obligations detailed in any other documents forming part of the contract.

IEC 514	Acceptance inspection of Class 1 alternating current watt-hour meters.
IEC 735	Testing equipment for electrical energy meters.
IEC 62052-11	Electricity metering equipment (AC)- General requirements, tests and test Conditions- Part 11: Metering equipment
IEC 62055	Part 21: Framework for standardization Part 31: Particular requirements- Static payment meters for active energy (classes 1).
IEC 62053-21, 62053-23	Alternating current static watt-hour meters (classes 1)

IEC 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts
IEC 1038	Time switches for tariff and load control
IEC 1107	Data exchange for meter reading, tariff and load control and direct local data exchange
IEC 58	Shock and vibration, humidity, solar radiation and salt mist etc
ISO 9001	Code of practice for quality systems part 1: Model for quality assurance in design/development, production, installation and servicing.
IEC 62054	Real Time Clock (RTC)
Others	All other relevant IEC specifications for metering equipment

7.27 Specific Technical Requirements

The meters to be supplied against this specification shall meet the requirements specified in this clause.

7.27.1 Electrical requirements

Meter supplied shall meet the following electrical requirements.

Sl.No	Description	Specification
1	Connection	1-phase, 2-wire, direct connected (unidirectional)
2	Number of element	01 (one) minimum
3	Rated voltage	230 V phase to neutral
4	Variation in voltage	-30% to +30%
5	Continuous over voltage	Should withstand 400 volts for 48 hours without causing any damage or degrading of its operating life, or causing changes of more than 0.01 kWh in its credit registers (excluding the possible decrement of credit due to power being consumed).
6	Base current, I_b	≤ 5 A
7	Maximum continuous current, I_{max}	≥ 60 A
8	Starting current	20 mA (0.4% I_b)
9	Rated frequency	50 Hz
10	Variation in frequency	$\pm 4\%$
11	Power factor	0.5 lag – unity – 0.8 lead
12	Class index	1.0
13	Clock	Built-in real time clock with 10 years battery backup
14	Display	LCD; Visibility should be sufficient to read the meter mounted at height of 0.5 to 2.0 m. Pin type; trans-reflective HTN or STN type industrial grade; temperature range -20°C to $+70^{\circ}\text{C}$
15	Period of display	Continuous
16	Digits	WxH: 6 mm x 10 mm (minimum)

Sl.No	Description	Specification
17	Maximum viewing angle	160 degrees
18	Number of display digits	5+1
19	Display parameters	<ul style="list-style-type: none"> i) kWh for the current billing period ii) Total kWh used since installation iii) Current electricity rate iv) Credit level v) Date and time vi) Instantaneous load vii) Instantaneous voltage, current & p.f. viii) Maximum Demand for current month (in kW)
20	Power consumption in the voltage circuit	≤ 2 Watts and 5 VA
21	Harmonic energy	Meter shall record total energy including harmonic energy
22	Memory	Non volatile memory that retain information up to 10 years in the absence of power
23	Power limiting	Meter shall disconnect the load when a pre-programmed threshold power is reached. The threshold shall be programmable in steps of 500W or less.
24	Limit of Current	Shall be Programmable within the range of 0.02A >60 A
25	Tamper detection	Sensor to detect that terminal cover have been opened
26	Load disconnection	Latching relay
27	Audible alarm	Buzzer
28	Lightning Protection	In accordance to IEC 62053-21
29	Sealing Condition	The meter body will be hermetically sealed/ ultrasonically welded to avoid unauthorized opening of meter cover.
30	Communication	RS485, GPRS(3G/4G)/ NB-IoT and G3-PLC (FCC)/ BROADBAND PLC and RF (Plug and Play)
31	Communication Protocol	DLMS/COSEM
32	Vending	Vending facility through online, Mobile SMS, Mobile Apps, POS, ATM/Bank booth etc.
34	Load Control Switch (Latching Relay)	<ul style="list-style-type: none"> a. Smart meter shall be equipped with integrated load control switches (latching relay) at both phase and neutral to control flow of electricity to the load data the instance of connect/ disconnect commands as per functional need of the system. b. Both Load switches (latching relay) shall operate simultaneously for connect/disconnect purpose and shall be mounted inside the meter with suitable arrangement. c. The rating of switches used shall be in line with meter rating.

7.27.2 Mechanical requirements

The enclosure shall be tamper resistant and shall be suitable for indoor mounting. The meter shall be such that the internal components in the active part of the meter shall be protected against unintentional damage or tamper during handling and installation.

Furthermore, Meter supplied shall meet the following mechanical requirements.

Sl. No.	Description	Specification
	Meter Case	<p>The meter shall be constructed by employing flame retardant and high impact strength material. The base, body and frame including terminal block shall be of heat resistive; shock proof and rust proof good quality hard material e.g. unbreakable engineering or stamped metal or molded phenol resin which shall be capable of withstanding of 145° C. The base will be provided with 3 (three) screw mounting holes, 1 (one) slotted meter support bracket at the top and 1 (one) round hole on each side in the bottom half of the base for securely mounting the meter to the meter board.</p> <p>The meter cover shall be of molded black phenol resin or alternatively stamped metal or toughened glass or Poly-Carbonate. The meter cover shall be provided with a window of Poly-Carbonate or toughened glass. For display of LCD display.</p> <p>The meter shall be effectively sealed to prevent entrance of moisture, rain and dust into its internal parts.</p>
2	Terminal	<p>Side/bottom entry connection type; minimum 4 terminals to accommodate 10 mm² duplex; terminal cover shall be extended type;</p> <p>Terminal block shall be polycarbonate grade 500R or equivalent bakelite; brass or copper current terminals; two flat-head brass screws at each terminal; terminal bore diameter 6 mm;</p>
3	Minimum free space between bottom of terminal and terminal cover	60 mm
4	Connections diagrams and terminal marking	Every meter shall be indelibly marked with a diagram of connection Meter terminals shall be marked, this marking shall appear on the diagram
5	Insulation level	Shall withstand a power frequency test of 4kV and impulse withstand test of 6 kV
6	Protection against penetration of dust and water	Conform to the degree of protection of IP51 or better
7	Top cover sealing	Hermetically sealed or ultrasonically welded.
8	Pulse output	Flashing LED visible from the front.
9	Maximum pulse frequency	Shall not exceed 2.5 kHz
10	Protection against magnetic field	Accuracy shall not be affected by AC/DC magnetic field on all the sides of meter. Meter working shall not be affected by permanent magnet of 0.5 mT.
11	Temperature range	Limit range of operation: -25°C to 55°C Limit range of storage and transport: -25°C to 70°C
12	Name plate	Every meter shall have clearly visible, indelibly and distinctly marked name plate containing the following information:

Sl. No.	Description	Specification
		i) Manufacturer's name ii) Meter type iii) Number of phases and number of wire iv) Meter serial number and year of manufacture v) Rated voltage of the system vi) Basic current and maximum current vii) Reference frequency in hertz viii) Meter constant in imp/kWh ix) Class index of the meter x) Over-current breaking capacity (in kA) xi) UTILITY logo xii) Contract No. xiii) Reference Standard
13.	Optical Port	Meter should have standard optical port for local read and configuration. Meter should have two wired active RS485 port for remote communication.

7.27.3 Latching relay specifications

The specification for the single phase latching relay is as follows:

Sl. no	Description	Requirements
1	Manufacturers Name & Address	Gruner, Germany/ Schneider Electric, USA/ Johnson Electric, Germany/ KG Technologies, USA
2	No. of coils	2 (two)
3	Rated coil voltage	12 VDC
4	Rated coil power	6 W
5	Pulse to set	30 ms
6	Contact Material	Silver alloy
7	Maximum Switching Power	15000 VA
8	Maximum Switching Voltage	250 V AC
9	Maximum Switching Current (rms)	80A
10	Contact resistance	$\leq 2 \text{ m}\Omega$
11	Electrical Cycle	1×10^4
12	Mechanical Cycle	1×10^5
13	Insulation resistance	$\geq 1000 \text{ M}\Omega$
15	Dielectric Strength between contacts	$\geq 2000 \text{ VAC}$
16	Dielectric Strength between contact and coil (50 Hz)	$\geq 3000 \text{ VAC}$
17	Dielectric Strength between contacts assembly	$\geq 4000 \text{ VAC}$

Sl. no	Description	Requirements
18	Ambient temperature	-40 °C ~ +55 °C
19	Operating humidity	40 to 90%
20	Temperature rise at rated current (assuming 30°C room temp.)	60°C

7.27.4 Meter sealing

- a) Provision shall be for sealing the meter at least two Ferrule steel seals
- b) The stainless steel seals shall be applied in such a way that it will not be possible to undo/loosen the mounting screws used to secure the meter without breaking these seals.
- c) The stainless steel seals shall be applied in such a way that they will be easily visible when viewing an installed meter from the front.
- d) The terminals shall also be have Ferrule/TT sealing arrangement.

7.27.5 Tamper detection

A tamper sensor shall be provided to detect that terminal cover has been opened both in power supply and without power supply.

7.27.6 Optical Interface

The meter shall have an IEC 62056-21 compliant optical communication port. This should allow the utility to access via front for variety of customer information stored inside the meter and to upload it into a hand held unit (HHU).

7.27.6 Remote Communication

The meter shall have remote communication option (equipped with GPRS/EDGE/EVDO/HSPA modem) which will be able to interface with RS485 for data communication with the central server from meters.

and

The meter shall have communication function with G3-PLC (FCC)/ BROADBAND PLC and RF through DC which will be able to communicate with the central server using GPRS(3G/4G)modem.

The meter shall have both GPRS(3G/4G))/ NB-IoTand G3-PLC (FCC)/ BROADBAND PLC and RF communication compatibility (Plug ang Play).

The PC Software must have provision to communicate with the Meter (both single Phase and three phase) through online.

7.28 Electromagnetic compatibility

(a) Immunity to electromagnetic disturbance

The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not damage or substantially influence the meter. The disturbances to be considered are:

- i. Electrostatic discharges
- ii. Electromagnetic HF field

iii. Fast transient burst

(b) Radio interference suppression

The meters shall not generate conducted or radiated noise which could interfere with other equipment.

7.29 Accuracy requirements

(a) Limits of error due to variation of the current

The percentage errors shall not exceed the limits for the relevant accuracy class stipulated in IEC standard.

(b) Limits of error due to other influence quantities

The additional percentage error due to the change of influence quantities shall not exceed the limit for the reference accuracy class stipulated in IEC standard.

(c) Limits of error due to ambient temperature variation

The limits of error shall not exceed the limits stipulated in IEC standard.

(d) Starting and running with no-load

Initial start-up of the meter: The meter shall be fully functional within 5 seconds after the voltage is applied to the meter terminals.

Running with no load: When the voltage is applied with no current flowing in the current circuit the test output of the meter shall not produce more than one pulse.

Starting: The meter shall start and continue to register at $0.4I_b\%$ at power factor of 1.

(e) Meter constant

The relation between the test output and the indication in the display shall comply with the marking on the name-plate.

7.30 Functional Requirement

7.30.1 Security

All credit and meter management tokens shall be meter specifically encrypted to guarantee security of the system. Encrypted tokens shall not be reusable. Tokens to display status and test the meter may be un-encrypted and reusable.

7.30.2 Token validation

If a token not meant for the meter is applied, the meter should display a message to that effect. Similarly, if a valid token is re-entered into the meter then the meter must display an appropriate message.

7.30.3 Meter personalization

In addition to factory personalization and personalization via encrypted tokens, it shall be possible to personalize the meter from a hand held unit (HHU) provided the HHU is authorized/ programmed to communicate with the meter.

7.30.4 Meter modes

The meter shall be required to support at least two modes of operation, namely the prepayment mode and the meter test mode.

7.30.5 Prepayment mode

The basis of this mode is that credit is transferred to the meter, and provided the meter remains in credit, the meter provides supply. The credit register is decremented against current consumption with the countdown total being displayed on the meter display.

7.30.6 Meter test mode

The meter should support a test mode that is activated either from a dedicated test token, or using the HHU. This test should be automated in the meter and should include a full diagnostic test, testing of the all the active and inactive functionality, metering accuracy test (1 minute load test), and connection validation tests. Meter test mode shall also display following information:

- i) Meters software version
- ii) Current limit
- iii) Switch open and close count
- iv) Token acceptance & rejection count

7.30.7 Load disconnection

- a) The load shall be disconnected by a latching relay under the following conditions:
 - i) The credit in the meter has expired and grace facilities also expired.
 - ii) The load power threshold has been exceeded.
 - iii) The meter is in a tampered state.
 - iv) Neutral missing at source side.
- b) The meter shall indicate whether the load is connected or not and shall display the reason for disconnection.
- c) The customer shall not have the option to switch the contactor manually. Under over – current conditions the mechanism to automatically reconnect the load must ensure that the number of switching cycles is limited. The meter shall attempt to reconnect the load up to 5 times at 30-second intervals. If the over-current condition still exists the meter shall wait a period of 30 minutes before attempting to reconnect the load.

7.30.8 Load control

Meters shall have the options to control loads with the following features:

Sl. No.	Requirement	Description
1	Allowed loads for given time periods	There shall be provision in the meter to define the allowable loads for given time periods within a day
2	Activation date of load allocation	There shall be provision in the meter to accommodate the date of activation of the defined load allocation
3	Load Limit step	Load limit shall be defined in step of 500 W.

7.30.9 Tamper detection

Tamper shall be detected with and without power supply.

When the meter detects a tamper condition, it should enter a shutdown state, with an appropriate message. The customer should be disconnected immediately. The tamper status shall be reset by using a uniquely coded tamper reset token that may only be used once.

Meter should detect reverse flow of power and measure correctly by forward registration.

Meter should measure current in phase and neutral both so that current bypass tamper taken care off.

Meter should provide tamper log data with date and time and same should be sent to main system through two way token or through meter reading port.

Removal of battery shall be considered as a temper.

7.30.10 Energy accounting

7.30.11 Credit register

The credit register is the “operating account” of the meter being decremented by the metering process. The specific requirements of this register are:

- a) This register must be decremented for the equivalent of every credit unit consumed.
- b) When the available credit has been consumed, the meter must open the contactor and isolate supply from the customer (unless the Friendly hours or Emergency Credit option is invoked).
- c) This register can become negative from use of emergency credit.
- d) The balance of this register should be written to the token.

7.30.12 Friendly hours, weekend, holidays

The meter shall accommodate the “Friendly hours”, “Weekend” and “Holidays” features. These are time periods during which the meter shall not cut-off power to consumer if the credit becomes negative. Details of the features are described in the following table.

Sl. No.	Requirement	Description
1	Friendly hours	There shall be provision to define ‘Friendly hours’ in the meter. The utility shall be able to define the ‘Friendly hours’ and shall be communicated to the meter through token.
2	Weekend	There shall be provision to define ‘Weekend’ in the meter. The utility shall be able to define the weekend and shall be communicated to the meter through token.
3	Holidays	There shall be provision to define ‘Holidays’ in the meter. At the end of a year the utility shall be able to define new holiday dates and these shall be communicated to meter through token.

7.30.13 Emergency credit

Provision shall be made in the meter for an Emergency Credit facility that allows the customer to draw on an emergency credit should the credit in the register be consumed.

The specific requirements of this facility are:

- a) When the credit register value reaches a programmable Emergency Credit Threshold the meter should sound an audible alarm, and prompt the user to accept the use of the Emergency Credit facility (card insertion or button depression). The meter should not supply energy against emergency credit unless acknowledged by the customer.
- b) If all the available credit in the credit register is expired and power disconnected, the facility to activate the Emergency Credit should remain an option to the user.

-
- c) The meter should remain in service until the Emergency Credit Limit has been reached, after which the supply should be disconnected.
 - d) If the Emergency credit limit is set to zero, the Emergency Credit Threshold shall function as a low credit warning and provide the user with a visual and audible alarm that credit is low. The user shall have the option to silence the alarm by inserting a card or pressing a button to accept the alarm.
 - e) If emergency credit has been previously consumed, then the value of emergency credit used shall be deducted from the next token inserted into the meter.
 - f) Once emergency credit has been exhausted, no further credit facilities shall be available until the full emergency credit allocation has been paid for.

7.30.14 Consumption during current billing period

- a) This register records the cumulative energy consumption for the current billing period.
- b) The registers shall be updated at least every 10 Wh.
- c) The value of this register shall be written to the token (if applicable).

7.30.15 Historic consumption

For this option there are six energy registers that store the total energy consumed for the previous six months.

- a) These registers are cycled at during the month-end process, with the oldest data being deleted.
- b) The value of these registers written to the token (if applicable).

7.30.16 Cumulative energy consumption

- a) This register records the cumulative consumption since the meter was commissioned.
- b) The units of storage are kWh, rounded to two decimal points (10 Wh).
- c) The value of this register shall be written to the token (if applicable).

7.30.17 Tariff

All tariff calculation must be done within the meter.

The meter is required to support stepped tariffs structures as well as time-of-use and maximum demand.

The tariff structure consists of the following records:

- i) Each tariff must be uniquely identified using the tariff code
- ii) Each tariff shall have an activation date, being the date on which the tariff becomes effective.
- iii) Each tariff has up to seven steps (in kWh) for different levels of energy pricing.
- iv) The rate describes the cost per kWh for energy consumption in that step.

7.30.18 Tariff management in the meter

- a) Tariffs shall be entered into the meter via the two-way token or HHU. The meter should not allow tariffs to be manually entered using the push buttons.
 - When the meter is active, the current cannot be overwritten.
 - The meter must time and date stamp when the tariff is loaded into meter.
- b) In general, when a tariff has expired in the meter, the tariff is automatically deleted by the meter.

7.30.19 Tariff security and verification

The meter shall write the active tariff code to the token on each insertion.

7.30.20 Tariff switchover

When the meter detects that a new tariff is applicable (using the tariff activation date), the meter should execute the following steps:

- i) The meter shall begin the billing against the new tariff.
- ii) The current tariff code shall be updated to reflect the new tariff code.
- iii) The old (expired) tariff should be deleted.
- iv) New tariffs will only be activated at 00:00 on the first day of a month.

7.30.21 Billing

Billing operates on a monthly basis. Energy consumption charge is deducted within the meter for at least every 10 Wh. All other charges including service charge, minimum charge, vat and taxes are deducted at the POS.

7.30.22 Month-end calculation

At the end of each month, the meter should perform a month-end calculation that consists of the following minimum steps:

- a) The cumulative monthly energy registers must be reset, and the historic registers must be updated.
- b) The meter must determine whether a new tariff will become active, and if so, must delete the old tariff.

7.30.23 Date and time management

The meter shall be equipped with a real time clock supporting the date and time as per IEC standard. Pseudo-clock using mains crossing detection is not acceptable. The maximum drift of the clock shall be less than 30 seconds per month. The battery and/or auxiliary power source shall operate maintenance free for a period of at least 10 years and meter shall have battery replacement facility.

The meter must be equipped with a battery monitoring system that monitors the battery's condition and initiates a "Change Battery Alarm" to the point of sale when the battery approaches the end of its operating life. If the battery is not replaced, the failure of the battery is deemed to constitute a meter failure, and the meter should be shut down.

Date and time may be changed using special token carrier. Date and time changes shall be flagged, written to the token carrier and transferred to the POS at the next purchase.

7.30.24 Human machine interface displays

7.31 General requirements

- a) The design philosophy of the meter display subsystem should be that a suitable message or indication must be displayed or annunciated for every meter event and alarm without exception.
- b) The meter should make provision for the customer or utility personnel to scroll through the displays.
- c) The meter should have a default display that displays the following minimum information:
 - i) The Remaining Credit
 - ii) The Total Consumption, kWhr to date
 - iii) The power limit
 - iv) The current Tariff

7.32 Liquid crystal display

- a) A liquid crystal display is required to display status alarm and event information.
- b) An illuminated display with a minimum lifetime of ten years is required.
- c) The size (number of rows and characters per row) should be appropriate for the display and interpretation of the messages and meter information, and should be legible from a distance of at least 500 cm with a viewing angle of no less than 30°.

7.33 Fault and status display

The meter should provide a visible indication of the status of the incoming supply.

7.34 Rate LED

The meter should include a consumption rate indicator LED that emits visible red light.

7.35 Status/alarm/event displays

In addition to the displays required above the meter must display the following minimum information in an intuitive way such that an inexperienced user can understand and interpret the information intelligibly. Laminated instruction cards are to be provided for each unit.

- i) Meter ID.
- ii) Out of Credit message
- iii) Invalid token entered
- iv) Duplicate token entered
- v) Meter tamper state
- vi) Meter failure and/or fault code

The Tenderer must submit a detailed specification of the way in which the display are structured and laid out.

7.36 Meter identification cards

- a) In case of keypad meters, each meter shall be supplied with a meter identification card, which complies with NRS 009-4: 1995.
- b) The printed details and graphic design of the cards shall be submitted to the utility prior to producing the cards.

7.37 Testing and approval

- a) It will be the responsibility of the tenderer to submit to the Employers representative for approval a complete Acceptance Test Procedure (ATP) for system verification.
- b) Once the Employer's representatives approve the ATP, the testing and performance validation tests on 2% (random samples) of the supplied meters will commence. The Employer's representative at the utility's premises will witness these tests.

7.38 Quality assurance

Tenderers shall comply with and be certified to the following ISO levels:

ISO 9001 Quality systems

Model for quality assurance in design development production installation and servicing

Model for quality assurance in final inspection and test

Tenderers shall submit copies of certification with their proposal to this effect.

7.39 SOFTWARE REQUIREMENT

7.39.1 Data Exchange Format

The meter must be able read and write data to the smartcard in specific format if it is a smartcard based meter or decode information from encoded keys typed through the keypad if it is a keypad based meter.

7.39.1 Keypad Numbering Scheme

The meter number scheme will be the unique and be followed by a conversion of all the utilities. The number scheme will not be the scheme described but the description will be the basic of the conversion of the meter number scheme which will be supplied after signing of the contract

While the manufacturer is free to use any number scheme they see fit, the number scheme must be secure and use minimum number of digits and must always contain the following fields in encrypted form:

Meter ID

Recharged amount

Sanctioned Load

Sequence Number

The meter must check the validity of these fields before recharging the credit. The sequence number is an auto generated number starting from 1 for each recharge or keypad numbers. A keypad number will only be accepted if the previous number has been keyed in. For example if a consumer goes to POS to recharge 300Tk and gets keycode xxxyyzzz (which contains sequence number n). The next month he goes again to recharge 250Tk and gets keycode pppqqrrr (which contains sequence number n+1). Keycode pppqqrrr will only be accepted if xxxyyzzz has been keyed in previously i.e. meter will only accept a keycode containing sequence number 'n' if at some point keycode containing sequence number 'n-1' has been keyed in. This is to ensure that keycodes are not discarded by a consumer intentionally.

Periodically it may be necessary to generate a keycode that contains more data. The keycode scheme must be able to accommodate the following data if and when required:

Meter ID

Recharged amount

Sanctioned Load

Sequence Number

Load Change

- Sanctioned Load
- Start Time

Rate

- Start Unit
- Peak Rate
- Off peak Rate
- Activation Date

Holiday

- Month
- Day

It is assumed that the keypad number with only the meter id, amount, load and sequence number will be a lot shorter than the keycode containing all the rate information.

7.39.2 Smart Card Data Format

SLE4428 or 100% compatible 1K Byte EEPROM Memory Card must be used in the card based meter. The memory card will have encrypted and no encrypted memory parts. The encrypted bytes must be generated by the meter SDK/API as supplied by the manufacturer. The manufacturer is free to use any encoding scheme to secure the data but must contain all the data as mentioned in the following table:

<u>Data</u>	<u>Bytes</u>	<u>Memory Address (Bytes)</u>
Non Encrypted Data		
Binary Pattern (1010110011110000)	2	1-2
Version	1	3
Meter ID	10	4-13
Consumer ID	10	14-23
Utility ID	2	24-25
Sanctioned Load (kW)	6	26-31
Meter Type	1	32
Sanctioned Load Exceeded	1	33
Last Recharge Amount	2	34-35
Last Recharged Date (DMY)	3	36-38
Last Transaction ID	10	39-48
Unused/Future Provision	55	49-100
Encrypted Data as Generated by the Meter Manufacturer SDK/API		
The following Data must exist within the encrypted Data: <u>Data To Meter:</u> Meter ID Consumer ID Utility ID Sanctioned Load Recharge Amount Weekend	923	101-1024

<u>Data</u>	<u>Bytes</u>	<u>Memory Address (Bytes)</u>
Emergency Account Friendly Hour (start/end) Peak Hour (start/end) Buzzer Volume Rates <ul style="list-style-type: none"> • Rate starts at unit • Rate at Peak • Rate at Offpeak • Activation Date Holidays <ul style="list-style-type: none"> • Month • Day Load Change <ul style="list-style-type: none"> • Start Time (hour/minute) • Sanctioned Load <u>Data From Meter:</u> Tamper Status RTC Status LR Status Usage Data for the last 12 months individually <ul style="list-style-type: none"> • Month • Year • KWh • Taka Recharged • Taka Used • Average Power • Reactive Power • Maximum Power • Volt Ampere • KWh in Peak • KWh in Offpeak • KVarh in Peak • KVarh in Offpeak • Total charge in Peak • Total charge in Offpeak • Number of power failures • Number of time sanctioned load exceeded Tamper <ul style="list-style-type: none"> • Number of times tampered • Date/Time of Tamper 		

7.39.3 Encrypted Data Generation SDK

Encrypted Data Generation SDK/API as described in Part B of the Tender Document. Here it should be mentioned that the Encrypted Data Generation SDK/API is a perception only it could be changed or modified with respect to the manufacturer that varies.

The meter manufacturer must provide SDK/API to generate encrypted that suitable for the meter to process and understand the API interface that has been developed in JAVA and operating system is on Linux.

The manufacturer must provide:

- Library compiled in GCC Linux that can be integrated in Java Program.
- Sample project and source code illustrating usage of provided java program
- Documentation of each function, input and output.

Work with utility to make sure that all software follows the defined standards, agree on change with all partners if required.

The following functions and parameters must be implemented:

Function Lists:

Function meter_encode:

Command

meter_encode

Parameters

Parameter	Data Type
Recharge_amount	Integer
Sanctioned_load	Float
Sequence Number	Integer
Rate	Array
Holiday	Array
Loss	Array
Load Change	Array
Meter_id	String
Expected_output	Unsigned char (1=keycode, 2=binary data)
Meter_id	String
Sanctioned Load Weekend Emergency Account Friendly Hour (start/end) Peak Hour (start/end) Buzzer Volume Rate, Holiday, Loss, Load Change includes: Rates <ul style="list-style-type: none"> • Rate starts at unit • Rate at Peak • Rate at Offpeak • Activation Date Holidays <ul style="list-style-type: none"> • Month • Day 	Array

Loss <ul style="list-style-type: none"> • Loss Type • Loss Rate Load Change <ul style="list-style-type: none"> • Start Time (hour/minute) • Sanctioned Load 	
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Response

Parameter	Data Type
Status	Boolean
Amount	Float
Encoded_Data	Byte array
Keycode	String
Meter_id	String

Function meter_decode:

Command

meter_decode

Parameters

Parameter	Data Type
Meter_id	String
Encoded_Data	Byte array

Response

Parameter	Data Type
Status	Boolean
Tamper Status RTC Status LR Status Usage Data for the last 6 months individually <ul style="list-style-type: none"> • Month • Year • KWh • Taka Recharged • Taka Used • Average Power • Reactive Power • Maximum Power • Volt Ampere • KWh in Peak • KWh in Offpeak • KVarh in Peak • KVarh in Offpeak • Total charge in Peak • Total charge in Offpeak • Number of power failures • Number of time sanctioned load exceeded 	Array

<ul style="list-style-type: none"> • Loss Charge <ul style="list-style-type: none"> ○ Type of Loss ○ Loss charge in Peak ○ Loss charge Offpeak 	
<p>Tamper</p> <ul style="list-style-type: none"> • Number of times tampered • Date/Time of Tamper 	

7.39.4 Meter Numbering

The meter number scheme will be the unique and be followed by a conversion of all the utilities. The number scheme will not be the scheme described but the description will be the basic of the conversion of the meter number scheme which will be supplied after signing of the contract

It must be possible to program the meter with an 11 digit meter number. The first two digits will be utility ID. The second digit will correspond to meter_type. 1=Smart Card based, 2=Keypad type, 3=online. The next 8 digits will be a sequence number used to identify each meter and will consist of numbers (0-9).

7.40 Tariff Management

7.40.1 Tariff Definition

The System Manager shall be able to define tariff objects. Each tariff has a unique tariff ID associated with it. The following information is required to define a tariff.

Tariff ID	A unique tariff identifier
Effective Date	The date on which the tariff will be effective.

Step Structure	Step	Rate
	0 - kWh ₁	R ₁
	kWh ₁ - kWh ₂	R ₂
	kWh ₂ - kWh ₃	R ₃
	kWh ₃ -	R ₄

Subject	Tariff Category	PFC Calculation
Power Factor Correction (PFC) Charges	`A' & `D' Category, 3phase, 400V, 20KW & above	0.95
	`C' Category, 3phase, 400V	PFC= power factor obtained from meter
	`E' Category, 3phase, 400V	

Subject	Tariff Category	Time
Time of Use	`C' & `E' Category,	Peak – 17:00 to 23:00 Off Peak-23:00 to 17:00

Service Charges	Fixed charges are levied per month. These charges are different for single phase and three phase meters in a particular tariff category.
Minimum Charges	There will be no minimum charges for Pre-Paid System.
Sanctioned Demand Charges (Fixed Charge)	A fixed charge per kW of the sanctioned demand is levied per month.

Maximum Demand Charges	Integrated over ½ hourly periods Maximum Demand in KW.
VAT	Value added tax is levied on electricity charges and must be catered for in the system.

- a) The tariff code, effective date, kWh_x (in units of kWh), R_x together with a fixed monthly service charge Service Charges and a fixed monthly sanctioned demand shall be used to define all prepaid tariffs used in the system.
- b) The MIC shall make provision for up to 500 tariff definitions.
- c) The MIC must verify the tariff data entered and shall not allow discontinuities in the energy levels or negative rates for energy and fixed charges.
- d) There shall be a facility to copy tariffs to new tariff codes for editing purposes. The edit facility shall include a mechanism to increase the values of any of the variables R_x, SC and DC by a fixed percentage.
- e) Tables of Supply Group Codes and tariffs shall be securely stored at the MIC.
- f) No penalty Charges for Power Factor above 0.95 to 1.0. Power Factor Correction Charge is computed as above and average power factor is measured by meter based on only reactive energy. The monthly average power factor from meter is used for the factor and applied on the energy charge.

Please refer to WZPDCL's tariff document for details of the tariffs provided by BERC (Memo no. 28.01.0000.012.04.003.20-652 and 653, Dated: 27February, 2020).

Meter must have the provision to store the PFC charge data and display the PFC charge data.
Meter must have the provision to update the PFC charge calculation procedure through online.

7.40.2 Tariff Algorithm

The prepayment system could be implemented stepped tariffs. The tariffs will be implemented at the vending equipment/meter. The algorithm must ensure that:

- b) The Stepped tariffs are implemented in meter as accurately as is the case for conventionally billed customers.
- c) Customers are not restricted to the amount and frequency of electricity token purchases provided purchases do not exceed 12 times the calculated monthly average consumption without penalty.
- d) If any tariff changes, tariff update with effective date sent to meters through smart card at the time of purchase for smart card meters. The updated tariff will be sent using special numbers for keypad meters. For both meters, after utility decides the tariff update, all purchase of credit (with keypad number of smart card) will carry and tariff change flag. So that the meter will not accept any credit addition until it gets the tariff update.
- e) Customers will purchase only credit following credit transfer principles.
- f) Before any new purchase in a particular month the fixed charges are deducted for the first time and the rest of the money paid by customer will be sent to meter through card or number as credit.
- g) For consecutive purchase in the same month, credit values without any fixed charge will be sent to the meter.
- h) Slab reset service charges, power factor penalty (PFC) should be monthly basis.
- i) The tender shall provide a detailed description of the algorithm including:
 1. All assumptions made.
 2. An explanation of how the averaging algorithm operates.

-
3. Examples of how the algorithm works.
 4. Examples of how to explain the algorithm to customers.
 5. Examples of how to deal with customers queries.
 6. Description of how the algorithm manages tariff rate and tariff structure change.
 7. Description of mechanisms to apply corrections
 8. Description of how to deal with the situation where a customer buys at two different locations between data transfers.
 9. Online data transfer is required so that customers can buy token from any vending system and different locations.

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**Specification
for
Three Phase Online Smart Pre-payment Energy
Meters**

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7.41 Scope

This specification covers the design, manufacture, testing and supply of static three phase direct connected pre-payment energy meters of accuracy Class 1.

7.42 Scope of Supply

The tenderer shall be responsible for supply, installation, testing & commissioning with related services (including supply necessary accessories except cable) packing, loading, shipment, custom clearance if necessary, and transportation, insurance and unloading at site. The supplied meters will be operated by existing purchasers' software (API attached in part-2 of this STD). Inerfacing of the offered meter is the responsibility of the tenderer.

Item No.	Name of Goods or Related Services	Description	Unit Measurement	Quantity
1.	Supply and installation of Smart Pre-payment Energy Meter including necessary accessories packing, loading, shipment, custom clearance if necessary, and transportation, insurance and unloading at site	Three phase, 400 Voltage (phase to phase), 10(100)A	Each	3000

Three phase prepayment meters shall be installed and commissioned according to the minimum guidelines as set out in technical specification. Prior to installation of meters customers shall be forewarned by delivery of a notice explaining what will happen. Public relations will be responsibility of the utility companies.

The installation team shall have a work order sheet instructing them what to do. The following information shall be printed on the works order from:

Customer Name	:	Supplied by the Utility and verified by Survey
Customer address	:	Supplied by the Utility and verified by Survey
Old Account Number	:	Supplied by the Utility
Old Meter Number & Reading	:	Supplied by the Utility
Tariff Code	:	The specific tariff to be allocated to the customer must be identified by the tariff code
Old Meter Reading	:	Old Meter Reading must be recorded at the time of pre-paid meter installation and verified by the concern customer.
Commissioning date	:	Date of pre-paid meter commissioning shall be noted.

There are different categories of installations that will be required:

1. Removal of induction and conventional meter and direct installation of smart pre-paid meter with additional wiring or service line work required.
2. Removal of induction and conventional meter re-routing of wiring with replacement of service connection and installation of smart pre-paid meter. Potential joints shall not be allowed in service drop cable.
3. Removal of service line (if required) and meter. Replacement of service connection and installation of meter.
4. New customer installation including service connection and installation of pre-payment meter.

The following guide lines must be followed by the supplier during installation of the meters:

1. The meters shall be sealed with Ferrule Type/Twist type seals compatible with the meters that uniquely shall identify by the utility person who sealed the meters.
2. Meters shall be tested and commissioned by the installation supervisor using the data from the works order form to program the tariff details.
3. At the time of meter installation the customer's induction and conventional post-paid meter reading shall be captured/ noted on the order by the installation supervisor and the data returned to the MIC. The date of commissioning is also entered onto the work order form. If new service cable is re-installeed, the amount of new re-installed service cable shall be recorded and concern customer's signature must be taken on workorder sheet.
4. Customers shall be registered at the MIC using the returned work order form within 24 hours of commissioning.
5. The service connections shall not be replaced unless the survey indicates service line with joints or inadequately rated service lines or bad in selected line.
6. All meters shall be installed indoors at a suitable location convenient to the eye-level of customer as well as service personnel away from sources of heat and moisture.
7. The installation shall be symmetrical, vertical and parallel to respective walls and floors. From the points where the service enters customers building, it shall be enclosed in a minimum 30 mm (dia) PVC pipe until it enters the metering house.
8. The piping shall be clamped or saddled at a maximum of 250 mm intervals.
9. At the time of installation on site training and instruction shall be given to the customer.
10. All other necessary accessories will be supplied by the Contractor.
11. At the time of meter installation picture of old and new meter with reading will be taken and shall be provided to the utility.
12. At time of installation, summary sheet of the customer (including both old meter and new meter information) will be prepared as utility prescribed format and will be submitted to the utility.

7.43 GENERAL TECHNICAL REQUIREMENTS

7.43.1 Service conditions

The meters to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

SI. No.	Condition	Specification
1	Maximum ambient temperature (°C)	50
2	Minimum ambient temperature (°C)	5
3	Maximum daily average temperature (°C)	35
4	Maximum annual average temperature (°C)	30
5	Mean annual rainfall (mm)	2500
6	Minimum annual rainfall (mm)	1461
7	Maximum annual rainfall (mm)	4127

Sl. No.	Condition	Specification
8	Maximum relative humidity (%)	100
9	Average relative humidity (%)	80
10	Maximum wind velocity (km/h)	180
11	Maximum altitude above mean sea level (meters)	200

7.43.2 Environmental Requirements

The meter shall conform to the environmental capability requirements as documented in IEC 62052-11, 62053-21 and 62053-23. In addition to that, the following minimum requirements shall be met.

- i) The meter shall be protected against malfunction due to the ingress of vermin, by conformal coating of the printed circuit boards in the meter.
- ii) Any openings shall be as small as practically possible to prevent the ingress of dirt and vermin and to limit the potential for vandalism or tamper following IP 51 and IP 54.

7.43.3 Standards and codes of practice

All material and equipment supplied and all works carried out shall comply in every respect with the technical codes of the International Organization for Standardization (ISO) and with the recommendations of the International Electrotechnical Commission (IEC), which apply to the electrical equipment.

Goods and special guarantees beyond the scope of ISO and IEC shall conform at least to one of the following standards and codes in the following priority:

1. VDE and DIN standards
2. BS or ASTM
3. Other internationally accepted standards which ensure a quality equal to or higher than the standards mentioned above, but only if these are submitted in the English language edition.

The following documents shall be read in conjunction with this specification. In case of conflict, however, this document shall take precedence. Nothing in this specification shall lessen the contractors obligations detailed in any other documents forming part of the contract.

IEC 514	Acceptance inspection of Class 1 alternating current watt-hour meters.
IEC 735	Testing equipment for electrical energy meters.
IEC 62052-11	Electricity metering equipment (AC)- General requirements, tests and test Conditions- Part 11: Metering equipment
IEC 62055	Part 21: Framework for standardization Part 31: Particular requirements- Static payment meters for active energy
IEC 62053-21, 62053-23	Alternating current static watt-hour meters (classes 1)
IEC 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts
IEC 1107	Data exchange for meter reading, tariff and load control and direct local data exchange

IEC 58	Shock and vibration, humidity, solar radiation and salt mist etc
ISO 9001	Code of practice for quality systems part 1: Model for quality assurance in design/development, production, installation and servicing.
IEC 62054	Real Time Clock (RTC)
Others	All other relevant IEC specifications for metering equipment

7.44 SPECIFIC TECHNICAL REQUIREMENTS

The meters to be supplied against this specification shall meet the requirements specified in this clause.

7.44.1 Electrical requirements

Meter supplied shall meet the following electrical requirements.

Sl. No	Description	Specification
1	Connection	3-phase, 4-wire, direct connected (unidirectional)
2	Number of element	3 (Three)
3	Rated voltage	400 V phase to phase
4	Variation in voltage	+30% to -30%;
5	Continuous over voltage	Should withstand 500 volts for 48 hours without causing any damage or degrading of its operating life, or causing changes of more than 0.01 kWh in its credit registers (excluding the possible decrement of credit due to power being consumed).
6	Base current, I_b	≤ 10 A
7	Maximum continuous current, I_{max}	≥ 100 A
8	Starting current	40 mA (0.4% I_b)
9	Rated frequency	50 Hz
10	Variation in frequency	$\pm 4\%$
11	Power factor	0.5 lag – unity – 0.8 lead
12	Class index	1.0
13	Clock	Built-in real time clock with 10 years battery backup
14	Display	LCD; Visibility should be sufficient to read the meter mounted at height of 0.5 to 2.0 m. Pin type; trans-reflective HTN or STN type industrial grade; temperature range -20°C to $+70^{\circ}\text{C}$
15	Period of display	Continuous
16	Digits	WxH: 6 mm x 10 mm (minimum)
17	Maximum viewing angle	160 degrees
18	Number of display digits	5+1
19	Display parameters	i) kWh for the current billing period ii) Total kWh used since installation iii) Current electricity rate

Sl. No	Description	Specification
		iv) Credit level v) Date and time vi) Instantaneous load vii) Instantaneous phase voltage viii) Instantaneous phase current ix) Instantaneous pf x) Peak –Off Peak Reading xi) Maximum demand of current month
20	Power consumption in the voltage circuit	≤ 5 Watts and 10 VA
21	Harmonic energy	Meter shall record total energy including harmonic energy
22	Memory	Non volatile memory that retain information up to 10 years in the absence of power
23	Power limiting	Meter shall disconnect the load when a pre-programmed threshold power is reached. The threshold shall be programmable in steps of 500W or less.
24	Limit of Current	Shall be Programmable within the range of 0.04A ≥ 100 A
25	Tamper detection	Sensor to detect that terminal cover have been opened
26	Load disconnection	Latching relay
27	Audible alarm	Buzzer
28	Lightning Protection	In accordance to IEC 62053-21
29	Sealing Condition	The meter body will be hermetically sealed/ ultrasonically welded to avoid unauthorized opening of meter cover.
30	Communication compatibility (plug and play)	Both GPRS(3G/4G)/ NB-IoT and G3-PLC (FCC)/ BROADBAND PLC and RF
31	Communication Protocol	DLMS/COSEM
32	Vending	Vending facility through online, Mobile SMS, Mobile Apps, POS, ATM/Bank booth etc.
33	Register	Solid state LCD Display type register. The display shall be programmable, automatic and include: -Tampering indication in the register -cumulative KWh (Peak & Off-peak) -Cumulative total KVarh (Q1+Q4) (Peak & Off-peak) for both Lead and Lag -Maximum Demand (KW) with time & date -Number of MD reset (automatically & Manually) -cumulative Maximum Demand (KW) for billing month -peak 17:00-23:00 hrs and off peak 23:00-17:00 (programmable) Bangladesh Standard Time. The software for Time of Use (TOU) shall be so developed to accommodate future tariff and can be customized, if the

Sl. No	Description	Specification
		<p>purchaser changes the tariff. The software shall be compatible with windows operating system.</p> <p>-Maximum Demand (MD) in KW shall be registered using the technique of cumulating on integration period controlled by built-in process and the MD shall be continuously recorded and the highest shall be indicated. The highest MD shall be added to the cumulative store, which shall be automatically initiated after an interval of one month/ one billing period by means of built-in timing device.</p> <p>-Integration period shall be 30(thirty) minutes.</p>
34	Load Control Switch (Latching Relay)	<p>a. Smart meter shall be equipped with integrated load control switches (latching relay) at both phase and neutral to control flow of electricity to the load at the instance of connect/ disconnect commands as per functional need of the system.</p> <p>b. Both Load switches (latching relay) shall operate simultaneously for connect/disconnect purpose and shall be mounted inside the meter with suitable arrangement.</p> <p>c. The rating of switches used shall be in line with meter rating.</p>

7.44.2 Mechanical requirements

The enclosure shall be tamper resistant and shall be suitable for indoor mounting. The meter shall be such that the internal components in the active part of the meter shall be protected against unintentional damage or tamper during handling and installation.

Furthermore, Meter supplied shall meet the following mechanical requirements.

Sl. No.	Description	Specification
1	Meter Case	<p>The meter shall be constructed by employing flame retardant and high impact strength material. The base, body and frame including terminal block shall be of heat resistive; shock proof and rust proof good quality hard material e.g. unbreakable engineering or stamped metal or molded phenol resin which shall be capable of withstanding of 145° C. The base will be provided with 3 (three) screw mounting holes, 1 (one) slotted meter support bracket at the top and 1 (one) round hole on each side in the bottom half of the base for securely mounting the meter to the meter board.</p> <p>The meter cover shall be of molded black phenol resin or alternatively stamped metal or toughened glass or Poly-Carbonate. The meter cover shall be provided with a window of Poly-Carbonate or toughened glass. For display of LCD display.</p>
		The meter shall be effectively sealed to prevent entrance of moisture,

Sl. No.	Description	Specification
		rain and dust into its internal parts.
2	Terminal	Side/bottom entry connection type; minimum 8 terminals to accommodate 16 mm ² duplex; terminal cover shall be extended type; Terminal block shall be polycarbonate grade 500R or equivalent bakelite; brass or copper current terminals; two flat-head brass screws at each terminal; terminal bore diameter 8.5 mm;
3	Minimum free space between bottom of terminal and terminal cover	60 mm
4	Connections diagrams and terminal marking	Every meter shall be indelibly marked with a diagram of connection Meter terminals shall be marked, this marking shall appear on the diagram
5	Insulation level	Shall withstand a power frequency test of 4kV and impulse withstand test of 6 kV
6	Protection against penetration of dust and water	Conform to the degree of protection of IP51 or better
7	Top cover sealing	Hermitically sealed or ultrasonic welded
8	Pulse output	Flashing LED visible from the front.
9	Maximum pulse frequency	Shall not exceed 2.5 kHz
10	Protection against magnetic field	Accuracy shall not be affected by AC/DC magnetic field on all the sides of meter. Meter working shall not be affected by permanent magnet of 0.5mT.
11	Temperature range	Limit range of operation: -25°C to 55°C Limit range of storage and transport: -25°C to 70°C
12	Name plate	Every meter shall have clearly visible, indelibly and distinctly marked name plate containing the following information: <ul style="list-style-type: none"> i) Manufacturer's name ii) Meter type iii) Number of phases and number of wire iv) Meter serial number and year of manufacture v) Rated voltage of the system vi) Basic current and maximum current vii) Reference frequency in hertz viii) Meter constant in imp/kWh ix) Class index of the meter x) Over-current breaking capacity (in kA) xi) UTILITY logo
13	Optical Port	Meter should have standard optical port for local read and configuration. Meter should have active RS485 port for remote communication.

7.44.3 Latching relay specifications

The specification for the three phase latching relay is as follows:

Sl. No	Description	Requirements
1	Manufacturers Name & Address	Gruner, Germany/ Schneider Electric, USA/ Johnson Electric, Germany/ KG Technologies, USA
2	No. of coils	2 (two)
3	Rated coil voltage	12 VDC
4	Rated coil power	9 W
5	Pulse to set	30 ms
6	Contact Material	Silver alloy
7	Maximum Switching Power	25,000 VA
8	Maximum Switching Voltage	250 V AC
9	Maximum Switching Current (rms)	120A
10	Contact resistance	$\leq 2 \text{ m}\Omega$
11	Electrical Cycle	5×10^3
12	Mechanical Cycle	1×10^5
13	Insulation resistance	$\geq 1,000 \text{ M}\Omega$
14	Dielectric Strength between open contacts	$\geq 2,000 \text{ VAC}$
15	Dielectric Strength between contact and coil (50 Hz)	$\geq 3,000 \text{ VAC}$
16	Dielectric Strength between contacts assembly	$\geq 4,000 \text{ VAC}$
17	Ambient temperature	$-40 \text{ }^\circ\text{C} \sim +55 \text{ }^\circ\text{C}$
18	Operating humidity	40 to 90%
19	Temperature rise at rated current (assuming 30°C room temp.)	60°C

7.44.3 Meter sealing

- Provision shall be for sealing the meter at least two Ferrule steel seals
- The stainless steel seals shall be applied in such a way that it will not be possible to undo/loosen the mounting screws used to secure the meter without breaking these seals.
- The stainless steel seals shall be applied in such a way that they will be easily visible when viewing an installed meter from the front.
- The terminals shall also be have Ferrule/TT sealing arrangement.

7.44.4 Tamper detection

A tamper sensor shall be provided to detect that terminal cover has been opened both in power supply and without power supply.

7.44.5 Optical Interface

The meter shall have an IEC 62056-21 compliant optical communication port. This should allow the utility to access via front for variety of customer information stored inside the meter and to upload it into a hand held unit (HHU).

7.44.6 Electromagnetic compatibility

(a) Immunity to electromagnetic disturbance

The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not damage or substantially influence the meter. The disturbances to be considered are:

- i. Electrostatic discharges
- ii. Electromagnetic HF field
- iii. Fast transient burst

(b) Radio interference suppression

The meters shall not generate conducted or radiated noise which could interfere with other equipment.

7.44.7 Accuracy requirements

(a) Limits of error due to variation of the current

The percentage errors shall not exceed the limits for the relevant accuracy class stipulated in IEC standard.

(b) Limits of error due to other influence quantities

The additional percentage error due to the change of influence quantities shall not exceed the limit for the reference accuracy class stipulated in IEC standard.

(c) Limits of error due to ambient temperature variation

The limits of error shall not exceed the limits stipulated in IEC standard.

(d) Starting and running with no-load

Initial start-up of the meter: The meter shall be fully functional within 5 seconds after the voltage is applied to the meter terminals.

Running with no load: When the voltage is applied with no current flowing in the current circuit the test output of the meter shall not produce more than one pulse.

Starting: The meter shall start and continue to register at 0.4% I_b at power factor of 1.

(e) Meter constant

The relation between the test output and the indication in the display shall comply with the marking on the name-plate.

7.44.8 Remote Communication

The meter shall have remote communication option (equipped with GPRS/EDGE/EVDO/HSPA modem) which will be able to interface with RS485 for data communication with the central server from meters.

and,

The meter shall have communication function with G3-PLC (FCC)/ BROADBAND PLC/ RF through DC which will be able to communicate with the central server using GPRS(3G/4G) modem.

The meter shall have RS485 communication port.

The meter shall have both GPRS(3G/4G))/ NB-IoT and G3-PLC (FCC)/ BROADBAND PLC and RF communication compatibility (Plug and Play).

The PC Software must have provision to communicate with the Meter (both single Phase and three phase) through online.

7.45 FUNCTIONAL REQUIREMENT

7.45.1 Security

All credit and meter management tokens shall be meter specifically encrypted to guarantee security of the system. Encrypted tokens shall not be reusable. Tokens to display status and test the meter may be un-encrypted and reusable.

7.45.2 Token validation

If a token not meant for the meter is applied the meter should display a message to that effect. Similarly, if a valid token is re-entered into the meter then the meter must display an appropriate message.

7.45.3 Meter personalization

In addition to factory personalization and personalization via encrypted tokens, it shall be possible to personalize the meter from a hand held unit (HHU) provided the HHU is authorized/programmed to communicate with the meter.

7.45.4 Meter modes

The meter shall be required to support at least two modes of operation, namely the prepayment mode and the meter test mode.

7.45.5 Prepayment mode

The basis of this mode is that credit is transferred to the meter, and provided the meter remains in credit, the meter provides supply. The credit register is decremented against current consumption with the countdown total being displayed on the meter display.

7.45.6 Meter test mode

The meter should support a test mode that is activated either from a dedicated test token, or using the HHU. This test should be automated in the meter and should include a full diagnostic test, testing of the all the active and inactive functionality, metering accuracy test (1 minute load test), and connection validation tests. Meter test mode shall also display following information:

- i) Meters software version
- ii) Current limit
- iii) Switch open and close count
- iv) Token acceptance & rejection count

7.45.7 Load disconnection

- a) The load shall be disconnected by a latching relay under the following conditions:
 - i) The credit in the meter has expired and grace period also expired.
 - ii) The load power threshold has been exceeded.
 - iii) The meter is in a tampered state.
 - iv) Neutral missing at source side.
- b) The meter shall indicate whether the load is connected or not and shall display the reason for disconnection.
- c) The customer shall not have the option to switch the contactor manually. Under over – current conditions the mechanism to automatically reconnect the load must ensure that the number of switching cycles is limited. The meter shall attempt to reconnect the load up to 5 times at 30-second

intervals. If the over-current condition still exists the meter shall wait a period of 30 minutes before attempting to reconnect the load.

7.45.8 Load control

Meters shall have the options to control loads with the following features:

Sl. No.	Requirement	Description
1	Allowed loads for given time periods	There shall be provision in the meter to define the allowable loads for given time periods within a day
2	Activation date of load allocation	There shall be provision in the meter to accommodate the date of activation of the defined load allocation
3	Load Limit step	Load limit shall be defined in step of 500 W.

7.45.9 Tamper detection

Tamper shall be detected with and without power supply.

When the meter detects a tamper condition, it should enter a shutdown state, with an appropriate message. The customer should be disconnected immediately. The tamper status shall be reset by using a uniquely coded tamper reset token that may only be used once.

Meter should detect reverse flow of power and measure correctly by forward registration.

Meter should measure current in phase and neutral both so that current bypass tamper taken care off.

Meter should provide tamper log data with date and time and same should be sent to main system through two way token or through meter reading port.

Removal of battery shall be considered as a tamper.

The meter shall operate normally under the following conditions:

Phase Sequence Reversal: The meter should work accurately irrespective of phase sequence of the supply.

Shorting / By Passing: The meter shall have capability to record bypassing / shorting and opening of current coil(s) of one or any two phases with date, time.

Missing Potential: The meter shall be capable of detecting and recording occurrences and restorations of missing potential (1 phase or 2 phases) which can happen due to intentional/ accidental disconnection of potential leads with date and time along with total no. of such occurrences for all phases during the above period.

7.45.10 Energy Accounting

7.45.11 Credit register

The credit register is the "operating account" of the meter being decremented by the metering process. The specific requirements of this register are:

- This register must be decremented for the equivalent of every credit unit consumed.
- When the available credit has been consumed, the meter must open the contactor and isolate supply from the customer (unless the Friendly hours or Emergency Credit option is invoked).
- This register can become negative from use of emergency credit.
- The balance of this register should be written to the token.

7.45.11 Friendly hours, weekend, holidays

The meter shall accommodate the “Friendly hours”, “Weekend” and “Holidays” features. These are time periods during which the meter shall not cut-off power to consumer if the credit becomes negative. Details of the features are described in the following table.

SI.No.	Requirement	Description
1	Friendly hours	There shall be provision to define ‘Friendly hours’ in the meter. The utility shall be able to define the ‘Friendly hours’ and shall be communicated to the meter through token.
2	Weekend	There shall be provision to define ‘Weekend’ in the meter. The utility shall be able to define the weekend and shall be communicated to the meter through token.
3	Holidays	There shall be provision to define ‘Holidays’ in the meter. At the end of a year the utility shall be able to define new holiday dates and these shall be communicated to meter through token.

7.45.12 Emergency credit

Provision shall be made in the meter for an Emergency Credit facility that allows the customer to draw on an emergency credit should the credit in the register be consumed.

The specific requirements of this facility are:

- a) When the credit register value reaches a programmable Emergency Credit Threshold the meter should sound an audible alarm, and prompt the user to accept the use of the Emergency Credit facility (card insertion or button depression). The meter should not supply energy against emergency credit unless acknowledged by the customer.
- b) If all the available credit in the credit register is expired and power disconnected, the facility to activate the Emergency Credit should remain an option to the user.
- c) The meter should remain in service until the Emergency Credit Limit has been reached, after which the supply should be disconnected.
- d) If the Emergency credit limit is set to zero, the Emergency Credit Threshold shall function as a low credit warning and provide the user with a visual and audible alarm that credit is low. The user shall have the option to silence the alarm by inserting a card or pressing a button to accept the alarm.
- e) If emergency credit has been previously consumed, then the value of emergency credit used shall be deducted from the next token inserted into the meter.
- f) Once emergency credit has been exhausted, no further credit facilities shall be available until the full emergency credit allocation has been paid for.

7.45.13 Consumption during current billing period

- a) This register records the cumulative energy consumption for the current billing period.
- b) The registers shall be updated at least every 10 Wh.
- c) The value of this register shall be written to the token (if applicable).

7.45.14 Historic consumption

For this option there are six energy registers that store the total energy consumed for the previous six months.

- a) These registers are cycled at during the month-end process, with the oldest data being deleted.
- b) The value of these registers written to the token (if applicable).

7.45.15 Cumulative energy consumption

- a) This register records the cumulative consumption since the meter was commissioned.
- b) The units of storage are kWh, rounded to two decimal points (10 Wh).
- c) The value of this register shall be written to the token (if applicable).

7.46 Tariff

All tariff calculation must be done within the meter.

The meter is required to support stepped tariffs structures as well as time-of-use and maximum demand.

The tariff structure consists of the following records:

- i) Each tariff must be uniquely identified using the tariff code
- ii) Each tariff shall have an activation date, being the date on which the tariff becomes effective.
- iii) Each tariff has up to seven steps (in kWh) for different levels of energy pricing.
- iv) The rate describes the cost per kWh for energy consumption in that step.

7.46.1 Tariff management in the meter

- a) Tariffs shall be entered into the meter via the two-way token or HHU. The meter should not allow tariffs to be manually entered using the push buttons.
 - When the meter is active, the current cannot be overwritten.
 - The meter must time and date stamp when the tariff is loaded into meter.
- b) In general, when a tariff has expired in the meter, the tariff is automatically deleted by the meter.

7.46.2 Tariff security and verification

The meter shall write the active tariff code to the token on each insertion.

7.46.3 Tariff switchover

When the meter detects that a new tariff is applicable (using the tariff activation date), the meter should execute the following steps:

- i) The meter shall begin the billing against the new tariff.
- ii) The current tariff code shall be updated to reflect the new tariff code.
- iii) The old (expired) tariff should be deleted.
- iv) New tariffs will only be activated at 00:00 on the first day of a month.

7.46.4 Billing

Billing operates on a monthly basis. Energy consumption charge is deducted within the meter for at least every 10 Wh. All other charges including service charge, minimum charge, vat and taxes are deducted at the POS.

7.46.5 Month-end calculation

At the end of each month, the meter should perform a month-end calculation that consists of the following minimum steps:

- a) The cumulative monthly energy registers must be reset, and the historic registers must be updated.
- b) The meter must determine whether a new tariff will become active, and if so, must delete the old tariff.

7.46.6 Date and time management

The meter shall be equipped with a real time clock supporting the date and time as per IEC Standard. Pseudo-clock using mains crossing detection is not acceptable. The maximum drift of the clock shall be less than 30 seconds per month. The battery and/or auxiliary power source shall operate maintenance free for a period of at least 10 years and meter shall have battery replacement facility.

The meter must be equipped with a battery monitoring system that monitors the battery's condition and initiates a "Change Battery Alarm" to the point of sale when the battery approaches the end of its operating life. If the battery is not replaced, the failure of the battery is deemed to constitute a meter failure, and the meter should be shut down.

Date and time may be changed using special token carrier. Date and time changes shall be flagged, written to the token carrier and transferred to the POS at the next purchase.

7.47 Human machine interface displays

7.47.1 General requirements

- a) The design philosophy of the meter display subsystem should be that a suitable message or indication must be displayed or annunciated for every meter event and alarm without exception.
- b) The meter should make provision for the customer or utility personnel to scroll through the displays.
- c) The meter should have a default display that displays the following minimum information:
 - i) The Remaining Credit
 - ii) The Total Consumption, kWh to date
 - iii) The power limit
 - iv) The current Tariff

7.47.2 Liquid crystal display

- a) A liquid crystal display is required to display status alarm and event information.
- b) An illuminated display with a minimum lifetime of ten years is required.
- c) The size (number of rows and characters per row) should be appropriate for the display and interpretation of the messages and meter information, and should be legible from a distance of at least 500 cm with a viewing angle of no less than 30°.

7.47.3 Fault and status display

The meter should provide a visible indication of the status of the incoming supply.

7.47.4 Rate LED

The meter should include a consumption rate indicator LED that emits visible red light.

7.47.5 Status/alarm/event displays

In addition to the displays required above the meter must display the following minimum information in an intuitive way such that an inexperienced user can understand and interpret the information intelligibly. Laminated instruction cards are to be provided for each unit.

- i) Meter ID.
- ii) Out of Credit message
- iii) Invalid token entered
- iv) Duplicate token entered
- v) Meter tamper state
- vi) Meter failure and/or fault code

The tenderer must submit a detailed specification of the way in which the display are structured and laid out.

7.47.6 Meter identification cards

- a) In case of keypad meters, each meter shall be supplied with a meter identification card, which complies with NRS 009-4: 1995.
- b) The printed details and graphic design of the cards shall be submitted to the utility prior to producing the cards.

7.47.7 Testing and approval

- a) It will be the responsibility of the tenderer to submit to the Employers representative for approval a complete Acceptance Test Procedure (ATP) for system verification.
- b) Once the Employer's representatives approve the ATP, the testing and performance validation tests on 2% (random samples) of the supplied meters will commence. The Employer's representative at the utility's premises will witness these tests.

7.47.8 Quality assurance

Tenderers shall comply with and be certified to the following ISO levels:

ISO 9001 Quality systems

Model for quality assurance in design development production installation and servicing

Model for quality assurance in final inspection and test

Tenderers shall submit copies of certification with their proposal to this effect.

7.48 SOFTWARE REQUIREMENT

Data Exchange Format

The meter must be able to communicate directly with the Master Information Center server using the built in GPRS/EDGE modem. The communication data format is XML. Furthermore the communication channel must be encrypted by 256bit SHA and seeded by a true random number generator. Each meter should also have a unique key installed. Utility must be able to program the following data into the meter before they are used:

Meter ID

Data Communication Port (default 2100, custom port)

Server IP Address

Server Port

Encryption Key (if necessary the more data could have been needed)

The meter will get a fixed IP address from the installed SIM card. The meter will always listen to the “Data Communication Port” for incoming data and will always send data to “Server IP Address: Server Port”. For incoming request, the reply data will go through the same connection similar to HTTP.

Example: if the server needs to communicate with the meter, it will originate a connection request to the IP address of the meter in port 2100 (default). It will be a simple text connection similar to telnet. If connection is established, the server will send the encoded XML request through this channel, after which the server will send two carriage returns. The meter will process the request, generate appropriate XML response and return it to the server by using this existing connection.

1. Incoming request from server to IP address and port 2100 of meter.
2. Server posts encoded XML data.
3. Server sends two carriage returns to denote that it has sent the entire request.
4. The meter decodes the data, processes the request and generates appropriate response and sends it back to server.
5. Bidirectional data transfer will use the same connection like HTTP.

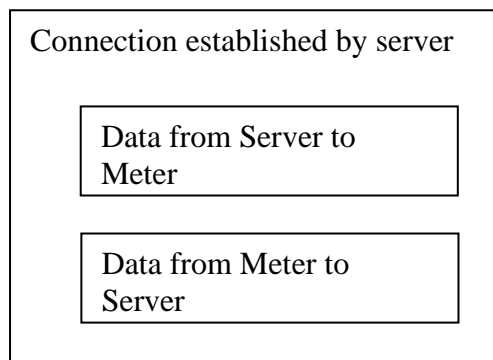


Fig: Data Exchange/Connection format for 3 Phase Meter

Meter Connection Procedure

Configure the meter with server IP, port and any authentication key required. Bring the meter online and send a query_test command from the server. The meter should respond with firmware version which will verify connectivity. (The send the “conf” command to meter from server.)

Meter Numbering

It must be possible to program the meter with an 11 digit meter number. The first two digits will be utility ID. The second digit will correspond to meter_type. 1=Smart Card based, 2=Keypad type, 3=online. The next 8 digits will be a sequence number used to identify each meter and will consist of numbers (0-9).

The source code of the software should be delivered to the employer. The proper documentation of the software should be proper and delivered to the employer before 15 (fifteen)days of the commercial operation of the the system.

The rights & the copy rights of the system and the pattern of the system will be the sole owner of the people’s republic of Bangladesh.

Tariff Management

Tariff Definition

The System Manager shall be able to define tariff objects. Each tariff has a unique tariff ID associated with it. The following information is required to define a tariff.

Tariff ID	A unique tariff identifier
Effective Date	The date on which the tariff will be effective.

Step Structure	Step	Rate
	0 - kWh ₁	R ₁
	kWh ₁ - kWh ₂	R ₂
	kWh ₂ - kWh ₃	R ₃
	kWh ₃ -	R ₄

Subject	Tariff Category	PFC Calculation
Power Factor Correction Charges	`A' & `D' Category, 3phase, 400V, 20KW & above	0.95
	`C' Category, 3phase, 400V	PFC= power factor obtained from meter
	`E' Category, 3phase, 400V	

Subject	Tariff Category	Time
Time of Use	`C' & `E' Category,	Peak – 17:00 to 23:00 Off Peak-23:00 to 17:00 Programmable (4 time slot)

Service Charges	Fixed charges are levied per month. These charges are different for single phase and three phase meters in a particular tariff category.
Minimum Charges	There will be no minimum charges for Pre-Paid System.
Sanctioned Demand Charges (Fixed Charge)	A fixed charge per kW of the sanctioned demand is levied per month.
Maximum Demand Charges	Integrated over ½ hourly periods Maximum Demand in KW.
VAT	Value added tax is levied on electricity charges and must be catered for in the system.

- The tariff code, effective date, kWhx (in units of kWh), Rx together with a fixed monthly service charge Service Charges and a fixed monthly sanctioned demand shall be used to define all prepaid tariffs used in the system.
- The MIC shall make provision for up to 500 tariff definitions.
- The MIC must verify the tariff data entered and shall not allow discontinuities in the energy levels or negative rates for energy and fixed charges.
- There shall be a facility to copy tariffs to new tariff codes for editing purposes. The edit facility shall include a mechanism to increase the values of any of the variables Rx, SC and DC by a fixed percentage.
- Tables of Supply Group Codes and tariffs shall be securely stored at the MIC.
- No penalty Charges for PFC factor above 0.95 to 1.0. PFC is computed as above and average power factor is measured by meter based on only reactive energy. The monthly average power factor from meter is used for the factor and applied on the energy charge.

Please refer to WZPDCL's tariff document for details of the tariffs provided by BERC (Memo no. 28.01.0000.012.04.003.20-652 and 653, Dated: 27February, 2020).

Meter must have the provision to store the PFC charge data and display the PFC charge data.
Meter must have the provision to update the PFC charge calculation procedure through online.

Tariff Algorithm

The prepayment system could be implemented stepped tariffs. The tariffs will be implemented at the vending equipment/meter. The algorithm must ensure that:

- a) The Stepped tariff is implemented in meter as accurately as is the case for conventionally billed customers.
- b) Customers are not restricted to the amount and frequency of electricity token purchases provided purchases do not exceed 12 times the calculated monthly average consumption without penalty.
- c) If any tariff changes, tariff update with effective date sent to meters through smart card at the time of purchase for smart card meters. The updated tariff will be sent using special numbers for keypad meters. For both meters, after utility decides the tariff update, all purchase of credit (with keypad number of smart card) will carry and tariff change flag. So that the meter will not accept any credit addition until it gets the tariff update.
- d) Customers will purchase only credit following credit transfer principles.
- e) Before any new purchase in a particular month the fixed charges are deducted for the first time and the rest of the money paid by customer will be sent to meter through card or number as credit.
- f) For consecutive purchase in the same month, credit values without any fixed charge will be sent to the meter.
- g) Slab reset service charges; power factor penalty (PFC) should be monthly basis.
- h) The tender shall provide a detailed description of the algorithm including:
 1. All assumptions made.
 2. An explanation of how the averaging algorithm operates.
 3. Examples of how the algorithm works.
 4. Examples of how to explain the algorithm to customers.
 5. Examples of how to deal with customers queries.
 6. Description of how the algorithm manages tariff rate and tariff structure change.
 7. Description of mechanisms to apply corrections
 8. Description of how to deal with the situation where a customer buys at two different locations between data transfers.
 9. Online data transfer is required so that customers can by token from any vending system and different locations.

7.49 Documents Submission:

The following Documents to be submitted with the tender otherwise bid will be rejected:

1. Manufacturer's Authorization if manufacturer is not the Tenderer.
2. Specifications Submission and Compliance Sheets sealed & signed by the manufacturer & the bidder.
3. Complete Type Test report with ref. number as per relevant international standard in English along with test results of the offered prepayment meter from anyone of the following Independent testing laboratory. Reports from other laboratories except the following will not be accepted.
 - a) KEMA, Netherland.
 - b) UL International New Zealand/Parkside Laboratories, New Zealand.
 - c) South African Bureau of Standards (SABS).
 - d) MET Laboratories Inc., USA
 - e) Office of the Gas and Electricity Market, UK /SGS, UK
 - f) European Measuring Instruments Directive (MID) recognized labs.
 - g) CESI, Italy.
 - h) Essef, France
 - i) CPRI, India

The Test Report includes the following tests as per relevant international standard with results (but not limited to):

- i. Impulse voltage test
 - ii. AC Voltage test
 - iii. Accuracy test
 - a) Test of variation of current
 - b) Test of meter constant
 - c) Test of starting condition
 - d) Test of no-load condition
 - e) Test of ambient temperature influence
 - f) Test of influence quantities
 - iv. Test of power consumption
 - v. Test of influence of supply voltage, short-time over currents, self-heating & heating.
 - vi. Electromagnetic compatibility (EMC) test
 - vii. Dry heat test
 - viii. Cold test
 - ix. Damp heat accuracy, cyclic test
 - x. Vibration test
 - xi. Shock test
 - xii. Spring hammer test
 - xiii. Test of protection against penetration of dust and water
 - xiv. Test of resistance to heat and fire.
4. The manufacturer shall submit the offered PLC (mentioned in specification compliance sheet) communication Test Report and certification of meters and data concentrators as per

latest Communication protocol from any accredited Independent Testing Laboratory demonstrating that the offered meter and DCU have passed interoperability tests.

5. The manufacturer shall submit the test report of the offered meter on pre-payment mode as per IEC 62055-31 or SANS 1524-1 from any accredited Independent Testing Laboratory that includes the following test with results (but not limited to):
 - i. Functionality Test
 - ii. Load switching Test
6. Year wise supply record of the manufacturer for the electric pre-payment meter are to be submitted with supported by authentic documents in the following format:

Sl. No.	Name, Address, Phone No., e-mail ID (company domain) & Fax No. of the Purchaser	Contract no. & Date	Contract Value	Supplied Prepaid meter (mentioning type, model, 1-pase/3-phase, keypad/smart, split/non-split)	Quantity	Date of Completion of Supply
1.						
2.						
...	

Minimum 30% of the Tendered quantity (As stated in TDS) are to be supplied by the manufacturer in a single contract within last 5(five) calendar years.

7. The tenderer/ manufacturer shall have Satisfactory Performance Certificate from the End User (must be a Utility of electricity) with at least 2(Two) contracts of "Design, Manufacture, Supply, Installation, Testing & Commissioning of Smart Pre-Payment meter & Online Smart Pre-Payment Metering System" of at least 1(one) from outside the manufacturers own country of the Smart Pre-Paid Meter with PLC communication during last 5 (five) calendar years. All end user certificates shall be in English in their letter head pad of the end users where detailed e-mail address, Telephone no., Fax no. will be furnished.
8. Printed Catalogue describing the technical specifications of the offered meter.

7.50 Technical Orientation and Quality Test Witness:

The Purchaser shall have the right to inspect/test the goods/materials to confirm their conformity to the specification. The purchaser shall be entitled at all reasonable time during manufacture to inspect, examine and test of goods/materials at the manufacturers' premises, workmanship and performance.

The following test shall be carried out as per latest version of SANS/IEC standard unless otherwise mentioned at the manufacturer premises or other places where the test facilities are available.

The Supplier shall, after consulting the purchaser, give the Purchaser reasonable notice in writing of the date and the place at which any material or equipment will be ready for testing as provided in the contract and unless the purchaser shall attend at the place so named on date, which the supplier has

stated in his notice, the supplier may proceed with the tests, which shall be deemed to have been made in the purchaser's presence, and shall forth with forward to the purchaser duly certified copies of test readings.

When the purchaser intends to attend the test he shall promptly inform the supplier accordingly in writing, so that he can take action. The purchaser shall give the supplier timely notice in writing of his intention to attend the test.

Where the supplier provides for tests on the premises of the supplier or of any manufacturer of the supplier, except where otherwise specified, shall provide free of charge such assistance, labor, materials, electricity, fuel, stores, apparatus and instruments as may be requisite and as may be reasonably demanded to carry out such test efficiently. These tests shall be performed as per relevant SANS/IEC standard and only routine tests as agreed upon, will be performed.

As and when the purchaser is satisfied that any materials/equipment shall have passes the tests referred to in this clause, purchaser shall notify the contractor in writing to that effect.

Should any inspected/tested goods fail to conform to the specification, the Purchaser shall have the right to reject any of the items or complete batch if necessary. In that case Supplier has to replace the Equipment and to make good of them without any financial involvement to the Purchaser. In case any of the Equipment found not conforming with the specification at the time of post landing Inspection, the supplier will in no way be relieved from the responsibility of replacing them or making them good at their own cost, despite the Equipment were found good at the time of Factory Acceptance Test. Nothing in this clause shall in any way release the supplier from any warranty or other obligations under the contract.

If the offered goods are manufactured outside the purchaser's country then Utility's Inspection Team shall have to conduct Technical Orientation and Quality Test Witness at the manufacturer's factory premises. The cost incurred for this purpose shall be borne by the supplier. The cost of Air Tickets (both way) from Bangladesh to Manufacturer's Country (place of Technical Orientation and Quality Test Witness), Hotel Accommodation, food, etc. will be borne by the Supplier. Other than this the Supplier will pay a standard amount of pocket money per day (Excluding journey period). The period for this purpose is about 07 (Seven) days without journey time. Technical Orientation and Quality Test Witness will be attended by at least 04 (Four) engineers from respective Utility offices. All the cost of this purpose shall be deemed is included in the offered price.

No goods shall be packed, prepared for shipment / delivery unless it has been approved including Test reports and written instruction has been issued by the Purchaser.

The tenderder has to mention the place of Technical Orientation and Quality Test Witness in the following table:-

Sl. No.	Item	Period of Technical Orientation and Quality Test Witness	Place & Country of Technical Orientation and Quality Test Witness

During Technical Orientation & Quality Test Witness, the Utility inspection team will select 03(Three) meters and 02 (Two) Nos. DCU random basis for testing the selected meters in an independent testing lab for the following tests: i) Dry heat test; ii) Damp heat, cyclic test; iii) electromagnetic compatibility (EMC) tests. The tenderer will arrange these tests in an Independent Testing Laboratory during Quality Test Witness.

7.51 Post Landing Inspection:

The Supplier shall inform the purchaser immediately after arrival of the goods at the designated store of Utility (as per delivery schedule). An Inspection team of Utility shall perform the post-landing inspection in presence of supplier's representative. The Supplier shall arrange the program of post-landing inspection. Any defect or damage have been found at post-landing inspection, the defective or damaged materials/ goods to be replaced by the supplier at his own cost within the stipulated time.

The purchaser's right to inspect, test (where necessary) and reject the goods after delivery at the designated store of Utility shall in no way be limited or waived by reason of the goods having previously been inspected, tested and passed by the purchaser prior to the good's delivery. The cost incurred for this purpose shall be borne by the supplier.

7.52 Packing:

Meters must be export packed and properly protected for shipment, rough transportation and storage. Specific care shall be taken for protection in store and reference is made to the climatic condition prevailing in Bangladesh.

Each unit shall be sealed in waterproof polyethylene bag having a silica gel packet placed inside the unit and then packed in polystyrene foam gasket closed by self adhesive tape rating of the meter shall be marked by marker pen or label on the form for easy identification.

Maximum 10 (ten) nos. of complete metering units are allowed to pack into a wooden packaging box lined with heavy gauge polyethylene. Between metering units a suitable packing material for protection and preventing their movement should be used. Silica gel should be provided inside each polyethylene wrapper. The packing case should be able to withstand accidental direct exposure to weather for reasonable period.

The supplier shall be responsible for damages due to inadequate packing. A packing list showing the contents of each packing shall be enclosed in a waterproof envelope secured outside of the packing case. A copy of the packing list shall also be enclosed inside the package.

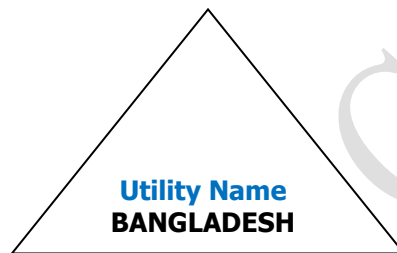
All packages imported are liable to be opened for customs examination at the port of landing and packing shall therefore be designed to facilitate opening and repackaging thereafter.

A red band (20 cm wide) shall be painted all around each package. Each package shall have the following information printed on it bold letters.

- Name of supplier.
- Port of loading.
- Port of destination.
- Name of consignee.
- Contract number.
- Brief description of stores.
- Number of packages. (total quantity)
- Gross and net weight.
- Dimension.

In addition each package shall be clearly marked or stenciled in red on two sides, the shipping mark Utility Name, BANGLADESH inscribed within a triangle marked shown below:

The shipping mark



On the other two sides, arrow marking with words "THIS SIDE UP" and "FRAGILE" shall be clearly marked or stenciled to indicate the face of the package to keep upward.

THIS SIDE UP



7.53 Hand Over of Project Site

The tenderer will supply, install, test, commission, the prepayment meter, train all utilities personals on installation testing, commissioning, operating troubleshooting, maintain and managing the prepayment meter and handover the feeder to respective utility. To hand over the project the tenderer must submit the following:

1. Summary Sheet of Old meter reading (with image) and New meter Reading according to customer proforma (which include customer's name, address, account no., Old meter no. Old meter reading, New meter no., etc.).
2. Customer summary data shall be submitted in a well organized format (provided by Utility) using a software.
3. Tenderer shall submit all the source code at the start of the project work and the last updated source code of the whole system at the time of project handover.
4. Tenderer shall provide the PC software for meter and DCU with minimum 12 nos. User ID and Password.

7.54 Responsibility under operational support contract

<p>RESPNSIBILITY UNDER OPERATIONAL SUPPORT CONTRACT</p> <p>In addition to the requirements of the technical specifications, the following shall be the responsibilities of the Operational Support for the duration of the 3 (three) years Operational Support Contract.</p>
<p>Source Code</p> <p>The Source codes of the system shall be the property of the employer.</p>
<p>Software Use</p> <p>The tenderer shall comply with the requirements for interfacing of offered meter with the employers' softwares.</p>
<p>System Management</p> <p>The registration of customer details on the MIC & CDC management of any changes to customer details, the Operational Support shall perform editing of customer records and management of customer arrears. The Operational Support shall effect up to 5 tariff changes as required by Utility during the contract period. Data shall be uploaded/downloaded to the MIC/CDC from the UVS,POS, Meter & UCCs from the respectives to the MIC & CDCS every 24 x7 round the clock. The Operational Support shall provide customer reports detailing the number of prepayment customers at the start of each month to Utility. The Operational Support shall visit each consumer to perform a system audit at least once every 6 months.</p> <p>The Operational Support shall process all applications for new pre-paid customers within the Operational Support's operational area directly. New installations shall be completed by the operator and notified to Utility.</p>
<p>Technical Manual</p> <p>Tenderer should provide technical manual and operational manual of the system within 15 (fifteen) days from before commercial operation start.</p>
<ul style="list-style-type: none"> • The maintenance services shall be valid for 03 (three) years from the date of commissioning under warranty period.
<ul style="list-style-type: none"> • To keep the supplied Software in good working condition under warranty period.
<ul style="list-style-type: none"> • Maintenance service includes preventive maintenance services on Monthly basis, based on the specific needs of individual equipment or as determined by Tenderer/Employer and on-call remedial maintenance under warranty period. Maintenance work should be at utility offices. Incase it is not possible the maintenance work at utility premises, then tenderer will provide the maintenance work by their own arrangement.
<ul style="list-style-type: none"> • Maintenance Services includes the replacement of non-working parts of hardware without incurring any cost to the employer under warranty period.
<ul style="list-style-type: none"> • To provide all necessary labor and technical know-how, and replacement of mechanical, electrical or electronic parts, as required for the maintenance work of equipment under warranty period.
<ul style="list-style-type: none"> • To maintain necessary stock of spare parts which may have the chances of damage for immediate support/ replacement under warranty period.
<ul style="list-style-type: none"> • The maintenance, servicing & replacement works as necessary must start within 02 (Two) hours sharp after lodging complaints under warranty period.

<ul style="list-style-type: none"> • The tenderer shall has to report time to time like 2 times in a month and shall has to report the progress.
<ul style="list-style-type: none"> • Defect or any sort of damage in hardware shall have to be identified, repaired/replaced and put into normal working condition within 08 (eight) hours after lodging complaint with the tenderer. The Tenderer will be responsible for repair, correction, and replacement of the defective goods or parts without incurring any cost to the employer under warranty period.
<ul style="list-style-type: none"> • Utility shall impose penalty @Taka 500 per hour of delay after 16 hours of lodging complaint with the tenderer under warranty period.
<ul style="list-style-type: none"> • Pre-Paid Meter Maintenance: Faulty devices and peripherals shall be repaired on exchange basis whether warranty or otherwise at the cost of the operational support. All sorts of repairing and maintenance tasks for software, hardware, meter and network has to be performed by the contractor.
<ul style="list-style-type: none"> • On a monthly basis meter data collection, auditing and related all sorts of reports shall be prepared by the operational support contractor and copied to respective utility.
<ul style="list-style-type: none"> • If it is not possible to resolve the problem within 16 (sixteen) hours, the tenderer may provide required support/equipments/item/parts on temporary basis without incurring any cost to the employer so that Server, Computer, Line Matrix Printer & UPS shall work properly. But this type of arrangement must not exceed more than two weeks. In that case, penalty will not be imposed for this maximum two weeks under warranty period.
<ul style="list-style-type: none"> • For any further up gradation, if utility procures any part/ product /devices, then the tenderer should install, commission the parts/ products /devices without incurring any service charge to the employer under warranty period.
<ul style="list-style-type: none"> • For 3 years operation & maintenance support the tenderer shall employ the following personnel: <ul style="list-style-type: none"> a) Coordinator (min. Bachelor Degree with 15 years Working experience)- 1 no. b) System Administrator- 1 no. c) Network Engineer - 1 no. d) Hardware Engineer - 1 no. e) Programmer - 1 no. f) Database Administrator - 1 no. g) Electrical Supervisor-06 nos. having experience in meter installation h) UCC/ UVS operator- 06 nos. having experience in vending and UCC work. They will provide full time support to utility vending operator/ utility people for vending/ UCC related work.

[N.B. Smart card mentioned in any section of the tender document will be considered as null and void.]

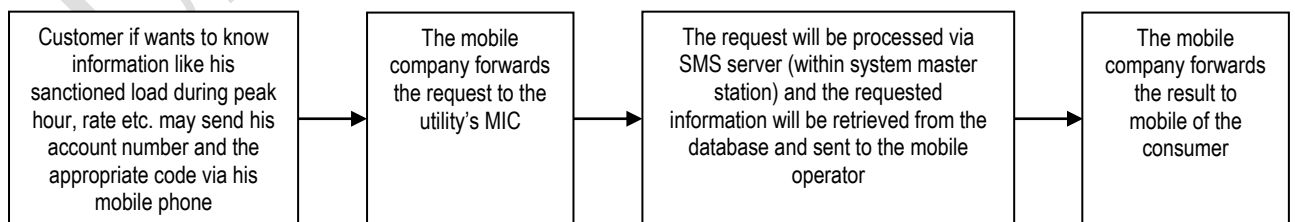
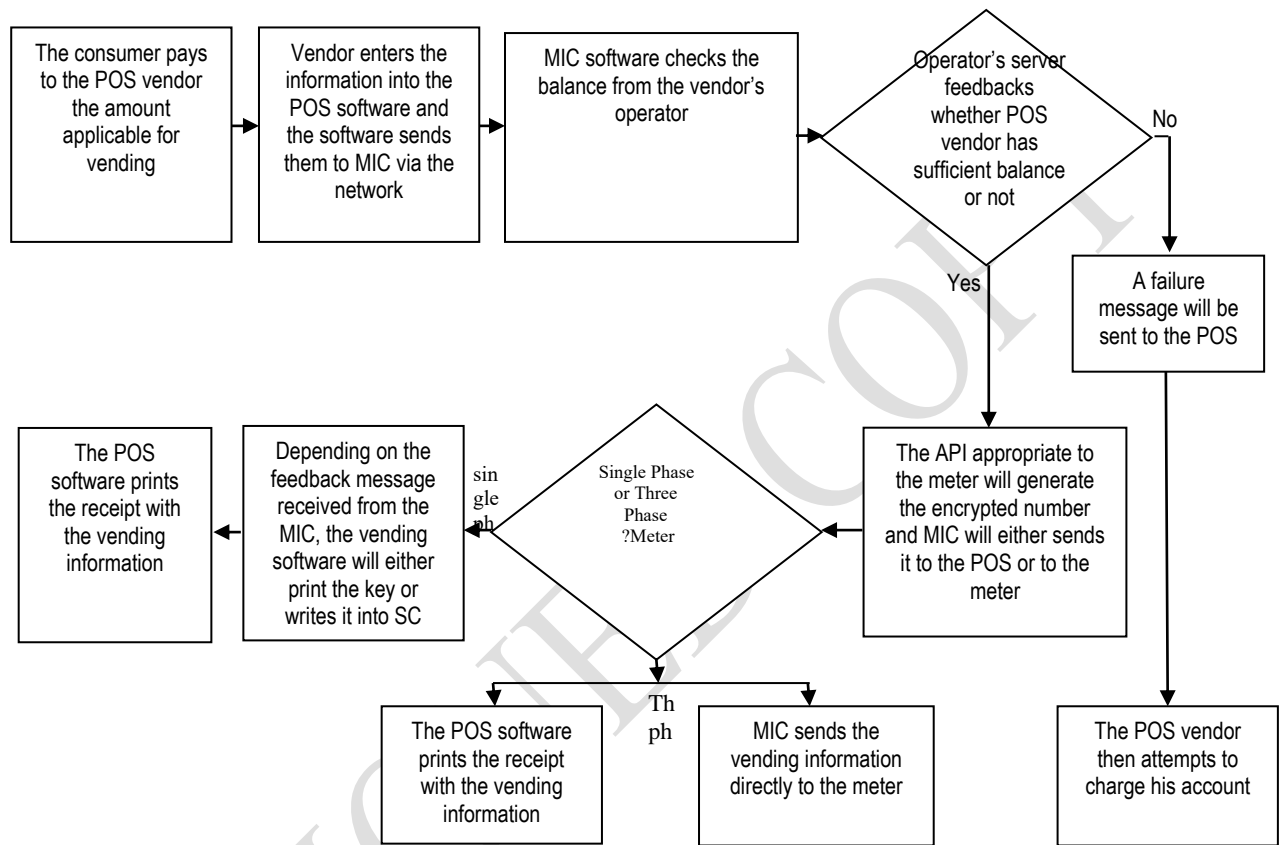
Section-8: Drawings

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Flow charts of the processes involved between different entities in the prepaid e-metering system

Overall Process Outline

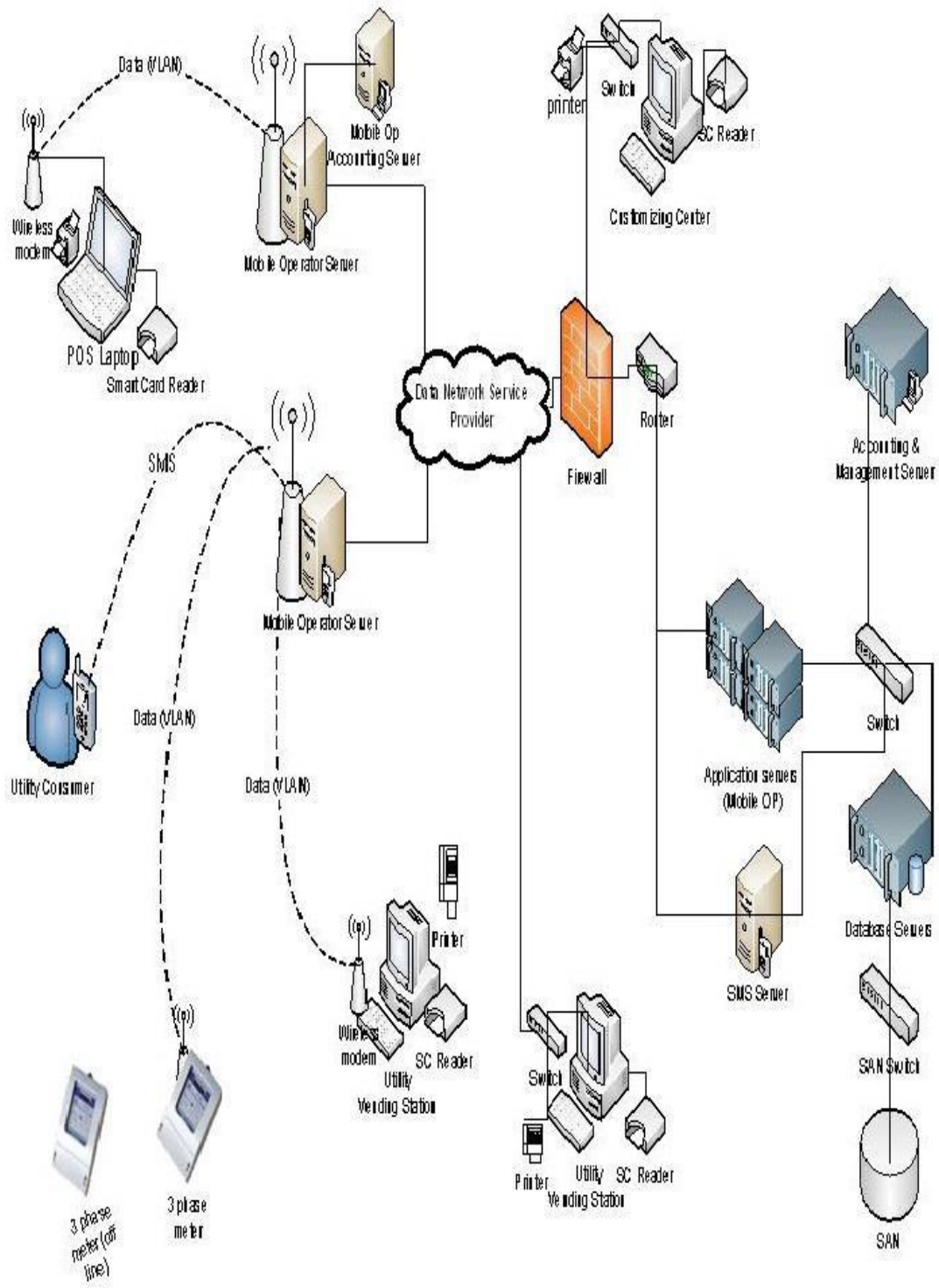
Main requirement: A receipt is essential as a proof of vending. Otherwise, in case of problem of actual vending into the meters, resolution of the dispute will be difficult. Therefore, a consumer for vending purpose must come either to a POS or to a Vending Station for recharging his/her meters (either single phase or three phases). Since the friendly hour and emergency credit facilities will be active within the meter so the failure of vending beyond the office hour will not harm the consumer.



Processes initiated at POS

1. Processes involved at the Utility's Vending Station
2. Same as the POS initiated processes except the checking monetary transactions because only cash transactions will be made at the vending stations.

3. Processes involved at Short Message Services from consumers' mobile



Annexure-1

Curriculum Vitaewith supported document to be submitted according to the following qualification of manpower.				
Key staff (minimum)with qualifications and experience shall be as follows:				
1	2	3	4	5
SL No	Position	person	Qualification	Experience in similar work (years)
1	Project Manager	01	B.Sc.Engg.(CSE/EEE)	Working experience with minimum 10(ten) years on project management plus minimum 4 years experience on Software base & network oriented project development.
2	Software Architect	2	B.Sc.Engg.(01CSE+01EEE)	Working experience with minimum 3 (three) years on project management & Organizational Software Architect management with minimum 2 (two) years experience
3	System Analyst	1	B.Sc.Engg(CSE/EEE) with related training.	Working experience with minimum 3 (three) years on system analysis & design, Oracle under AIX/UNIX/Linux/windows based, C#, Oracle Developer, PL/SQLand more.
4	Oracle Database Administrator	1	B.Sc.Engg.(CSE/EEE)with OCP(DBATrack)	Working experience with minimum 03 (three) years on DBA, Oracle under AIX/UNIX/Linux of field oriented project.
5	System Administrator	2	B.Sc.Engg(CSE/EEE)/ Masters in any Discipline with related training.	Working experience with minimum 03 (three) years on AIX/UNIX/RHCE & CCNA
6	Programmer	15	B.Sc.Engg(CSE/EEE)/ Masters in any Discipline.	Working experience with minimum 02 (two) years on C#, Oracle Database, Oracle Developer, PL/SQL
7	Core Developer	06	B.Sc.Engg(CSE/EEE)/ Masters in any Discipline.	Working experience with minimum 02(two) years on Pro*C/C, Oracle Database, Oracle Developer, PL/SQL.

8	Mobile Application & Network Developer	06	B.Sc.Engg (3 nos CSE/3 nos EEE)	Working experience with minimum 3(three)years with CCNA on with convensional wireless network like mobile network.
9	Network Engineer/Hardware Engineer	2	Bachelor in any Discipline with A+/CCNA/RHCE/MCSE certification	Working experience with minimum 3(three)years on interfacing with convensional wireless network like mobile network.
10	Push-Pull service	2	Bachelor in any Discipline	Working experience with minimum 02(two) years on interfacing with conventional wireless network like mobile network.
11	Software Tester	2	B.Sc.Engg(CSE/EEE) with related training.	Working experience with minimum 02years
12	Quality Controller	1	B.Sc.Engg(CSE/EEE) with related training.	Working experience with minimum 02years
13	Documentation	2	Bachelor in any Discipline	
14	Meter Installation	05	Diploma In engineering (Electrical)	Working experience with minimum 5(Five)years
	<ul style="list-style-type: none"> • Tenderer should attach the certificates of training as mentioned in the Column 5. • The Tenderer should submit the Bio-data to be signed by the employee as per attached format supported by documents. (Proposed team of personnel for Project Implementation (schedule-C)) 			

SCHEDULE C

Proposed team of personnel for Project Implementation

Proposed position for this Project:		
Personnel Information	Name	Date of birth
	Last Educational Qualification: Passing Year: Result: Name of the last Institute/University:	
Present Employment	Name of employer:	
	Joining Date:	
	Designation:	
	Address of employer:	
	Telephone:	Contact (Manager/Personnel officer):
	Fax:	E-mail:
Responsibilities:	Year with present employer:	

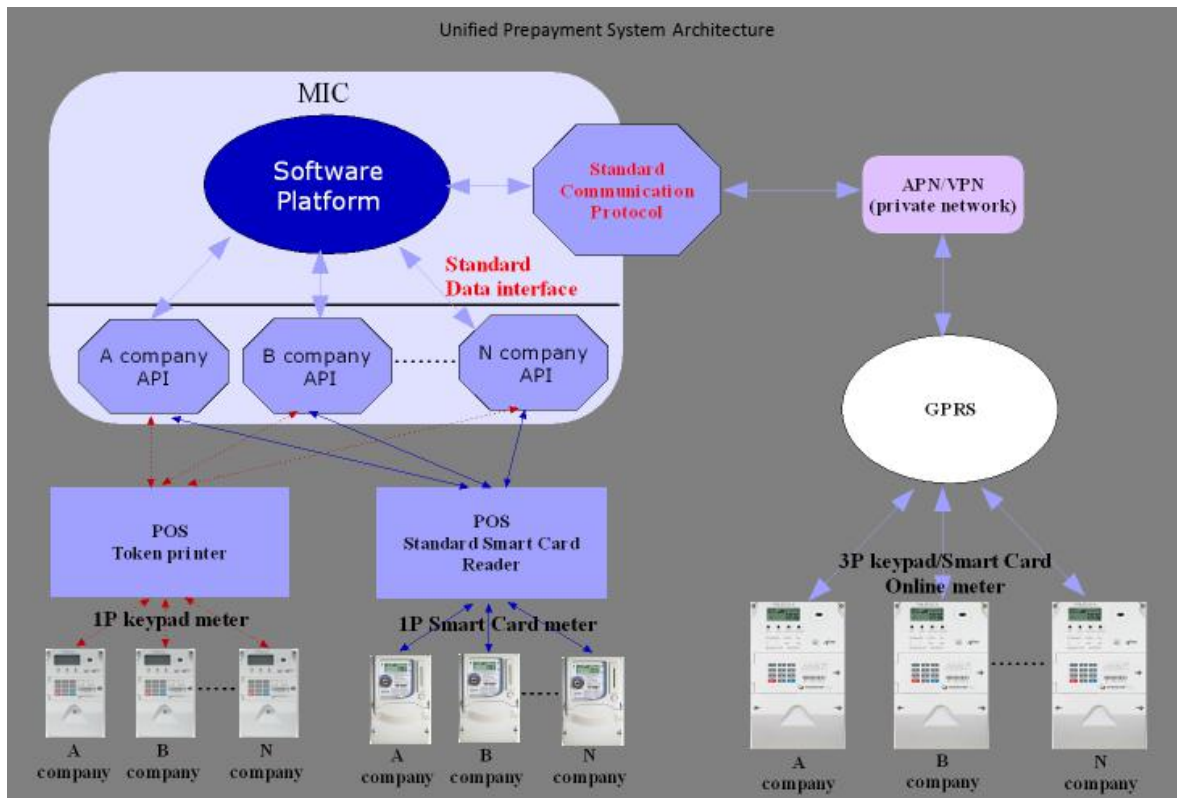
PART-2

(Unified Prepayment System API)

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1 Multi-factories Access Platform

1.1 Access Platform Architecture Design



Each manufacturer provides its own encryption / decryption API, integrated into the system software.

When dealing with business based on different meters from each manufacturer, the system automatically calls the corresponding manufacturers' encryption/ decryption API.

The system defines uniformly data exchange interface corresponding to different business, such as input and output parameters.

When dealing with business, for the keypad meter, the system will call the encryption/ decryption API, generate the corresponding Token, and print; for smart card meter, the system will call the encryption/ decryption API, write the corresponding Token to encrypted data area of the smart card.

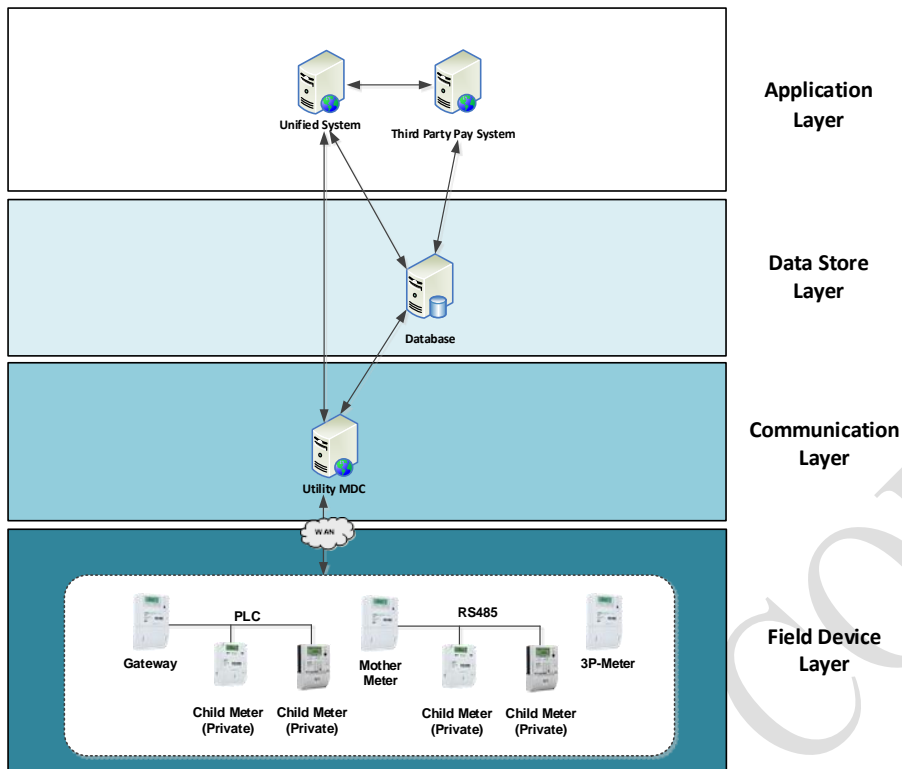
The encryption/decryption API from smart card manufacture must be able to generate Token which must contain the information of business type and length information. So that when smart card meter read the encrypted data in the card, the meter can separate the Token and identify the Token business itself.

POS read the smart cards from different manufactures via standard card read devices.

MIC communicates with GPRS meters of other factories according to standard data exchange mechanism.

Note: Token in this document means encrypted data.

1.2 Online Communication System Architecture



For online meter communication, all manufacturers should communicate with their online meters by WZPDCL's Head End System (HES).

And the related documents and updated API, please refer to

Annexure- A : Unified Meter Data Collection System: Addressing System;

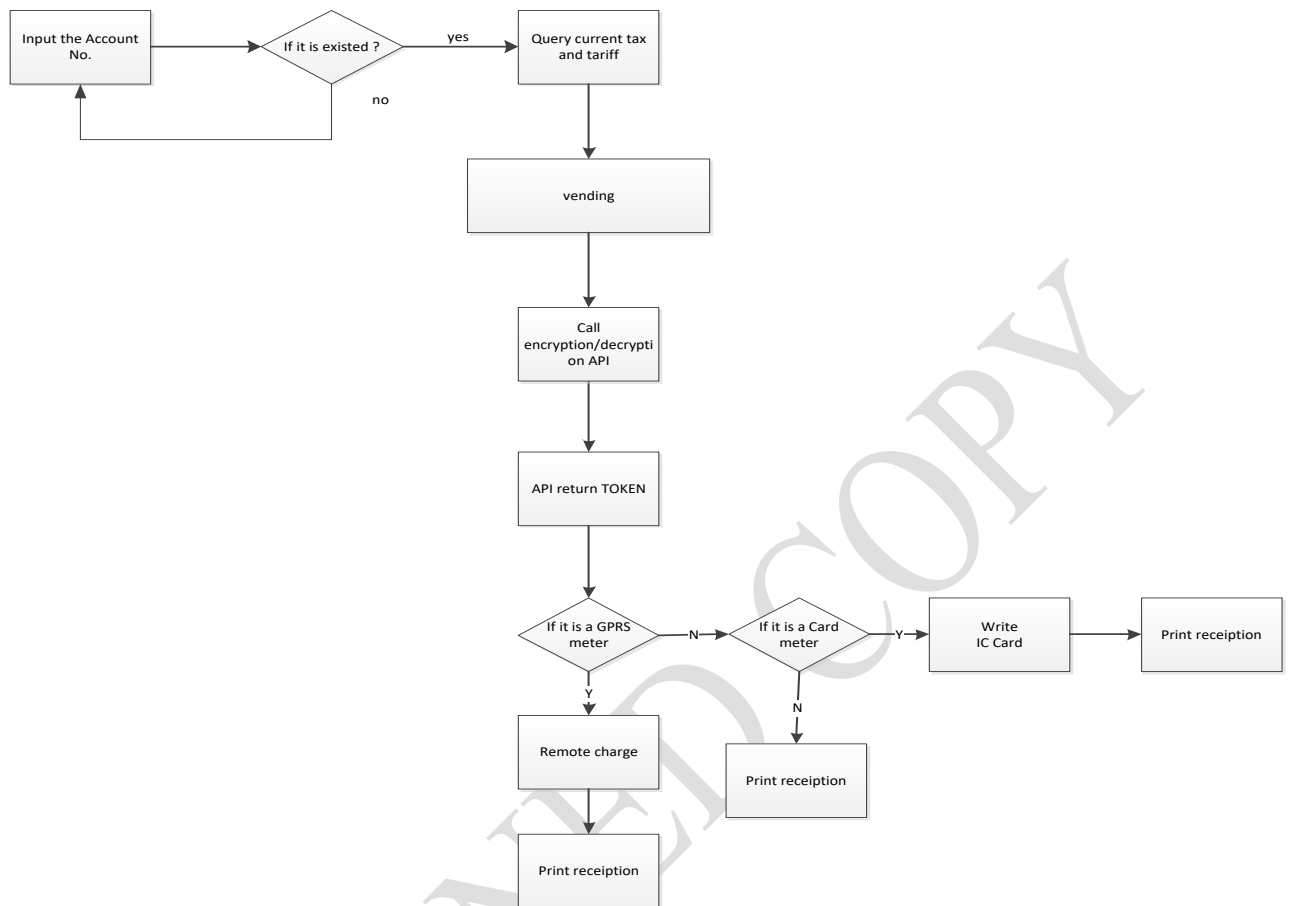
Annexure- B: Unified Meter Data Collection System: Meter Modeling;

Annexure- C: Unified Meter Data Collection System: DCU to HES;

Annexure- D: Unified System &HES Interface Specification;

2. Business Process

2.1 Vending as example:



3. Keypad Meters and Card Meter Access design

3.1 ErrorCode definition:

0 or empty: success

1: sequence number is not excepted

2: tariff Index argument error, not in scope

3: keyVersion argument not in scope

4: keyExpiredTime not in scope(0-255)

5: keyNo exceed 65535 or < 0

6: meterNo is not excepted

7: credit amount ≤ 0

8: unknown reason

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3.2 Standard Interface for Generating A Variety of Token

3.2.1 Token Standard Interface Define

Programming language	JAVA
Functionality	Token standard interface class
Package	com.hx.ami.spi
Interface	Token
Class definition	<pre> public interface Token { Generatecredit Token public String getCreditToken(String meterNo, String sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, double amount); Generate key change Token public String getKeyChangeToken (String meterNo, String sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, String nSgc, int nTariffIndex, int nKeyVersion,int nKeyExpiredTime, long nKeyNo); Generate Management Token Generate clear balance Token public String getClearBalanceToken (String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo); Generate clear event Token public String getClearEventToken (String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo); Generate max Power Limit Mode Token public String getMaxPowerLimitToken(String meterNo,String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, int activationModel, String date,int[] maxPowerLimits, int[] hours); Generate single Tariff Token public String getSingleTariffToken(String meterNo, String Sgc, int tarrifIndex,int keyVersion, int keyExpiredTime, long keyNo, int seqNo,String activatingDate, int activatingModel, int validDate, int rate); Generate step Tariff Token public String getStepTariffToken(String meterNo, String Sgc, int tarrifIndex,int keyVersion, int keyExpiredTime, long keyNo, int seqNo,String activatingDate, String validDate, int[] rates, int[] steps); Generate Tou Tariff Token public String getTOUTariffToken(String meterNo, String Sgc, int tarrifIndex,int keyVersion, int keyExpiredTime, long keyNo, int seqNo,String activatingDate, </pre>

	<pre> int activatingModel, int validDate, int[] rates, int[] times); Generate Friend Mode Token public String getFriendModeToken(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, int friendMode, int[] times, int[] days); Generate Public Holiday Token generateHolidayModeToken(String meterNo,String sgcd, int ti, int kv, int ke, int seq, int keyNo,int holidayMode, String[] days); Generate Change Meter Mode Token public String getChangeMeterModeToken(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo,int mode); Generate Set Credit Amount Limit And Overdraw Amount Limit Token public String getSetCreditAmountLimitOrOverdrawAmountLimitToken(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, int amountType, int amountLimit); Generate Set Low Credit Warning Limit Token public String SetLowCreditWarningLimitToken(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, int amountType, int amountLimit); Generate LogoffReturn Token public String generateLogoffReturnToken (String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, int keyNo, int seqNo); Resolve the Return Token public String resolveReturnToke(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, String Token); 4) Generate Test Token public String getTestToken (int manufacturingID, int control); } </pre>

3.2.2 Charge Interface Definition

Functionality	To get credit Token
Application	To call the function and generate credit token when vending. seqNo : Each token has sequence number except change-key-token. seqNo will increase 1 for each token generated and change to 1 when above 200;

	<p>keyNo: when seqNo change from 200 to 1, keyNo add 1.</p> <p>keyExpiredTime: Global system parameter used as cipher fact. System can change it. Nothing to do with key expiration. Just a encryption fact.</p> <p>Key version: Global encryption fact, it will be changed in case all meter need to change keys.</p>			
Function name	getCreditToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	Meter number
	Sgc	String	String of 6 numbers	Supply group code System parameter.
	tarrifIndex	Int	1-99	Tariff index When custom change tariff, this value may change to any of 1-99
	keyVersion	Int	1-9	Key version Global encryption fact, it will be changed in case all meter need to change keys.
	keyExpiredTime	Int	0-255	Global system parameter used as cipher fact. System can change it. Nothing to do with key expiration. Just a encryption fact
	keyNo	Long	0-65535	Key Sequence, similar to key changed times, see above method descpt.
	seqNo	Int	1-200	Token Sequence
	amount	Int	0-99999999(scale&unit 0.01TK)	Credit amount
	Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode></pre>		

	<pre> <tokens> <token></token> ... <token></token> <tokens> </result> </pre> <p>Note: errorCode see 3. Chart definition. If succeeded, need return an array of <tokens>elements.</p>
Function definition	<pre> public String getCreditToken(String meterNo, String sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, int amount) { ... } </pre>

3.2.3 Key ChangeInterface Definition

Functionality	To get key change Token			
Application	<p>As soon as user wants to charge money , to generate the manage token and test token ,and judge if the encryption factor has been changed, if changed , to call function and generate change token.</p> <p>This function is called at four case: Meter installed and custom purchase energy at first time Called if tariff changed SeqNo change from 200 to 1. Called when operator press menu to change key.</p> <p>For the first time registration, parameter defines as below: tariffIndex=0; keyVersion=0; keyExpiredTime=0; keyNo=0;</p>			
Function name	getKeyChangeToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	MeterNo.
	Sgc	String	String of 6 numbers	Old Supply group code
	tariffIndex	Int	1-99	Old Tariff index
	keyVersion	Int	1-9	Old Key version
	keyExpiredTime	Int	0-255	Old Key expire time
	keyNo	Long	0-65535	Old Key Sequence
	nSgc	Int	String of 6 numbers	Current supply grop code
	nTariffIndex	Int	1-99	Current Tariff index
nKeyVersion	Int	1-9	Current Key version	

	nKeyExpiredTime	Int	0-255	Current Key expire time
	nKeyNo	Int	0-65535	Current Key Sequence
Return value	Return XML String Xml format: <?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result> Note: errorCode definition refer to chart 3. If succeeded, need return an array of <tokens>elements			
Function definition	public String getKeyChangeToken (String meterNo, String sgc, int tarriffIndex, int keyVersion, int keyExpiredTime, long keyNo, String nSgc, int nTariffIndex, int nKeyVersion, int nKeyExpiredTime, int nKeyNo) { ... }			

3.2.4 Management Token

3.2.4.1 Generate Clear Meter Balance Token

Functionality	To get clear balance Token			
Application	To clear balance			
Function name	getClearBalanceToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	MeterNo.
	sgc	String	String of 6 numbers	Supply group code
	tariffIndex	Int	1-99	Tariff index
	keyVersion	int	1-9	Key version
	keyExpiredTime	int	0-255	Key expire time

	keyNo	long	0-65535	Key Sequence
	seqNo	int	1-255	Token Sequence
Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>			
Function definition	<pre>public String getClearBalanceToken (String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo) { ... }</pre>			

3.2.4.2 Generate Clear Event Token

Functionality	To get clear event Token			
Application	To clear event			
Function name	getClearEventToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	Meterno.
	sgc	String	String of 6 numbers	Supply group code

	tariffIndex	int	1-99	Tariff index
	keyVersion	int	1-9	Key version
	keyExpiredTime	int	0-255	Key expire time
	keyNo	long	0-65535	Key Sequence
	seqNo	int	1-255	Token Sequence
Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>			
Function definition	<pre>public String getClearEventToken (String meterNo, String Sgc, int tariffIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo) { ... }</pre>			

3.2.4.3 Generate Setup MaxPowerLimitModeToken

Functionality	To get the set up MaxPowerLimitModeToken
Application	To set up MaxPowerLimitMode Token
Function name	getMaxPowerLimitToken

Parameter list	Parameter name	Type	Scope or length	Description
	meterno.	String	String of 12 numbers	Meterno.
	sgc	String	String of 6 numbers	Supply group code
	tariffIndex	Int	1-99	Tariff index
	keyVersion	Int	1-9	Key version
	keyExpiredTime	Int	0-255	Key expire time
	keyNo	Long	0-65535	Key Sequence
	seq	Int	1-255	Token Sequence
	activatingModel	Int	0-1 0: Normal Mode 1: Immediately switch mode	Active Mode This parameter always 1.
	activatingDate	String	YYYY-MM-DD	Active Date Change Date type to String type: adapt to all kinds development languages
	maxPowerLimits	int[]	1-2047 (array length :2) scale&unit:0.1kW	Max Power array
Hours	Int[]	0-23 (array length :2)unit:hour	Active time	
Return value	Return XML String Xml format: <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens></pre>			

	<pre> <token></token> ... <token></token> <tokens> </result> </pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>
Function definition	<pre> public String getMaxPowerLimitToken (String meterNo, String Sgc,int tarrifIndex, int keyVersion, int keyExpiredTime , long keyNo, int seq , int activatingModel, String date int[] maxPowerLimits, int[] hours) { ... } </pre>

3.2.4.4 Generate Setup Single Tariff Token

Functionality	To get the Setup Single Tarrif Token			
Application	To set up single tarrif			
Function name	getSingleTariffToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	Meterno.
	sgc	String	String of 6 numbers	Supply group code
	tariffIndex	Int	1-99	Tariff index
	keyVersion	Int	1-9	Key version
	keyExpiredTime	Int	0-255	Key expire time
	keyNo	Long	0-65535	Key Sequence
	seq	Int	1-255	Token Sequence

	activatingDate	String	YYYY-MM-DD	Active date Change Date type to String type: adapt to all kinds development languages
	activatingModel	Int	0-1 0: Normal Mode 1: Immediately switch mode	Active Mode always 1.
	validate	Int	0-7	Validate always 0.
	rate	Int	1-8191 (scale&unit: 0.01TK) By the integer bits and fractional bits, up to two decimal places, the maximum rate of price can be set to 81.91	Unit price
Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>			

Function definition	<pre> public String getSingleTariffToken(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime , long keyNo, int seq, String activatingDate, int activatingModel,int validDate, int rate) { ... } </pre>
----------------------------	--

3.2.4.5 Generate Setup Step Tariff Token

Functionality	To get the Setup Step Tarrif Token			
Application	To set up step tarrif			
Function name	getStepTariffToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	Meterno.
	sgc	String	String of 6 numbers	Supply group code
	tariffIndex	int	1-99	Tariff index
	keyVersion	int	1-9	Key version
	keyExpiredTime	int	0-255	Key expire time
	keyNo	long	0-65535	Key Sequence
	seq	int	1-255	Token Sequence
	activatingDate	String	YYYY-MM-DD	Active date Change Date type to String type: adapt to all kinds development languages
	validate	int	0-7	Effective date
	activatingModel	Int	0-1	Effective Mode

			0: Normal Mode 1: Immediately switch mode	Always 1
	rates	int[]	Length 4 1-8191(scale&unit: 0.01TK) By the integer bits and fractional bits, up to two decimal places, the maximum rate of price can be set to 81.91	Price array
	steps	int[]	1-4096 (the max array length :8) scale&unit:1 kWh	Step array

Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre> <p>for example:</p> <p>0-100 kWh rate: 2.3TK 100-200kWh rate: 2.7TK 200-300kWh rate: 3.2TK 300-∞ rate: 4.5TK</p> <p>rate[]={2.3,2.7,3.2,4.5} steps[]={100,200,300}</p> <p>If succeeded, need return an array of <tokens>elements</p>
---------------------	---

Function definition	<pre> public String getStepTariffToken(String meterNo, String Sgc, int tarrifIndex,int keyVersion, int keyExpiredTime, long keyNo, int seq,String activatingDate, int activatingModel, int validDate, int[] rates, int[] steps) { ... } </pre>
----------------------------	--

3.2.4.6 Generate Setup TOU Tariff Token

Functionality	To get the Setup TOU tariff Token			
Application	To set up TOU tariff			
Function name	getTOUtariffToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo.	String	String of 12 numbers	Meterno.
	Sgc	String	String of 6 numbers	Supply group code
	tariffIndex	Int	1-99	Tariff index
	keyVersion	Int	1-9	Key version
	keyExpiredTime	Int	0-255	Key expire time
	keyNo	long	0-65535	Key Sequence
	Seq	int	1-255	Token Sequence
	activatingDate	String	YYYY-MM-DD	Active Date Change Date type to String type: adapt to all kinds development languages
	activatingModel	Int	0-1 0: Normal 1: Immediately switch mode	Active Mode always 1.

	validate	Int	0-7	Effective Date
	rates	Int[]	Length 4 1-8191 (scale&unit: 0.01TK) By the integer bits and fractional bits, up to two decimal places, the maximum rate of price can be set to 81.91	Price
	times	int[]	Length 2 0-23	Hours period
Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>			
Function definition	<pre>public String getTOUtariffToken(String meterNo, String Sgc, int tarrifIndex,int keyVersion, int keyExpiredTime, long keyNo, int seq,String activatingDate, int activatingModel, int validDate, int[] rates, int[] times) { ... }</pre>			

3.2.4.7 Generate Setup friendly mode Token

Functionality	To get the Setup Friendly Mode Token			
Application	To set up friendly mode			
Function name	getFriendModeToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	MeterNo.
	Sgc	String	String of 6 numbers	Supply group code
	tariffIndex	int	1-99	Tariff index
	keyVersion	int	1-9	Key version
	keyExpiredTime	int	0-255	Key expire time
	keyNo	long	0-65535	Key Sequence
	seqNo	int	1-255	Token Sequence
	friendMode	int	0-1 0: friendly mode is enable 1:friendly mode is closed	Friendly mode
	Times	int[]	0-23 (array length :2)	Friendly time interval
	Days	int[]	0-6 means Saturday, Friday, Thursday, Wednesday, Tuesday, Monday and Sunday in sequence. (array length :7)	Weekly holiday Array value 0 means weekend and 1 means ordinary day
	N_of_allowable_days	int	0-99	No of allowable days that friendly hour will work after that without vending meter will

				not work in friendly hour
Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>			
Function definition	<pre>public String getFriendModeToken(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime , long keyNo, int seqNo, int friendMode, int[] times, int[] days) { ... }</pre>			

3.2.4.8 Generate Switch Meter Mode Token

Functionality	To get Switch Meter Mode Token			
Application	To set up switch meter mode			
Function name	getChangeMeterModeToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	MeterNo.
	Sgc	String	String of 6 numbers	Supply group code
	tariffIndex	int	1-99	Tariff index

	keyVersion	int	1-9	Key version
	keyExpiredTime	int	0-255	Key expire time
	keyNo	long	0-65535	Key Sequence
	seqNo	int	1-255	Token Sequence
	mode	int	0-1 0:switch to the ordinary meter mode; 1:switch to the pre-paid meter mode	Meter mode switch
Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>			
Function definition	<pre>public String getChangeMeterModeToken(String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, int mode) { ... }</pre>			

3.2.4.9 Generate SetCreditAmountLimitAndOverdrawAmountLimitToken

Functionality	To get set credit amount limit and overdrawAmountLimit Token			
Application	To set credit amount limit and overdrawAmountLimit.			
Function name	getSetCreditAmountLimitAndOverdrawAmountLimit			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	MeterNo.
	Sgc	String	String of 6 numbers	Supply group code
	tariffIndex	Int	1-99	Tariff index
	keyVersion	Int	1-9	Key version
	keyExpiredTime	Int	0-255	Key expire time
	keyNo	Long	0-65535	Key Sequence
	seqNo	Int	1-255	Token Sequence
	amountType	Int	0-1 0: creditAmountLimit 1: overAmountLimit	Balance Type
	amountLimit	Int	0~99999999 (scale&unit:0.01TK)	Amount
Return value	<p>Return XML String</p> <p>Xml format:</p> <pre><?xml version="1.0" encoding="UTF-8"?> <result> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result></pre>			

	Note: errorCode definition refer to chart 3. If succeeded, need return an array of <tokens>elements
Function definition	<pre> public String getSetCreditAmountLimitOrOverdrawAmountLimitToken (String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, int seqNo, int amountType, int amountLimit) { ... } </pre>

3.2.4.10 Generate Logoff Token

Functionality	To get reset Token			
Application	To reset meter			
Function name	generateLogoffReturnToken			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	MeterNo.
	Sgc	String	String of 6 numbers	Supply group code
	tariffIndex	Int	1-99	Tariff index
	keyVersion	Int	1-9	Key version
	keyExpiredTime	Int	0-255	Key expire time
	keyNo	Long	0-65535	Key Sequence
	seqNo	Int	1-255	Token Sequence
Return value	Return XML String Xml format: <?xml version="1.0" encoding="UTF-8"?> <result>			

	<pre> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result> </pre> <p>Note: errorCode definition refer to chart 3.</p> <p>If succeeded, need return an array of <tokens>elements</p>
Function definition	<pre> public String generateLogoffReturnToken (String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, int keyNo, int seqNo) { ... } </pre>

3.2.4.11 Generate Credit/ Management Return Token

Functionality	To get return Credit/Management Return Token			
Application	User should get the return token before credit Return ,and send the meter information to the electricity sale system, or else the electricity sale system will not sale electricity to user ,it will helpful for subsequent management.			
Function name	resolveReturnToke			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of 12 numbers	Meterno.
	Sgc	String	String of 6 numbers	SGCID
	tariffIndex	int	1-99	Tariff index
	keyVersion	int	1-9	Key version
	keyExpiredTime	int	0-255	Key expire time

	keyNo	long	0-65535	Key Sequence
	Token	String	Custom defined by each manufacturers	Token encryption character String

Return value

Return XML String

Xml format:

```
<?xml version='1.0' encoding='utf-8'?>
<result>
  <type>0</type>
  <balance>454.54</balance>
  <sequence>6</sequence>
  <event>
    <clockSetFlag>1</clockSetFlag>
    <batteryVoltageLowFlag>0</batteryVoltageLowFlag>
    <openCoverFlag>0</openCoverFlag>
    <openBottomCoverFlag>1</openBottomCoverFlag>
    <byPassFlag>0</byPassFlag>
    <reverseFlag>0</reverseFlag>
    <magneticInterfereFlag>0</magneticInterfereFlag>
    <relayStatusFlag>1</relayStatusFlag>
    <relayFaultFlag>0</relayFaultFlag>
    <overdraftUsedFlag>0</overdraftUsedFlag>
    <forwardActiveEnergyTol>11.23</forwardActiveEnergyTol>
    <tariffIndex>51</tariffIndex>
  </event>
</result>
```

Note:If token resolve fail then return null.

Return returnTokens:

Parameter	Scope of Length	Description
Type	0-1 0:credit return token 1:logoff return token	

	Balance		Balance of meter
	Sequence	0-1 0:credit return token 1:logoff return token	Sequence of meter
	clockSetFlag	0-1 0:unhappen 1:happen	Clock set event
	batteryVoltageLowFlag	0-1 0:unhappen 1:happen	Battery low voltage event
	openCoverFlag	0-1 0:unhappen 1:happen	Meter cover open event
	openBottomCoverFlag	0-1 0:unhappen 1:happen	Terminal cover open event
	byPassFlag	0-1 0:unhappen 1:happen	Bypass event
	reverseFlag	0-1 0:unhappen 1:happen	Reverse event
	magneticInterfereFlag	0-1 0:unhappen 1:happen	Magnetic interference event
	relayStatusFlag	0-1 0:connect 1:disconnect	Relay status
	relayFaultFlag	0-1	Relay fault event

		0:unhappen 1:happen	
	overdraftUsedFlag	0-1 0:no 1:yes	Emergency balance used or not
Function definition	<pre>public String resolveReturnToken (String meterNo, String Sgc, int tarrifIndex, int keyVersion, int keyExpiredTime, long keyNo, String Token) { ... }</pre>		

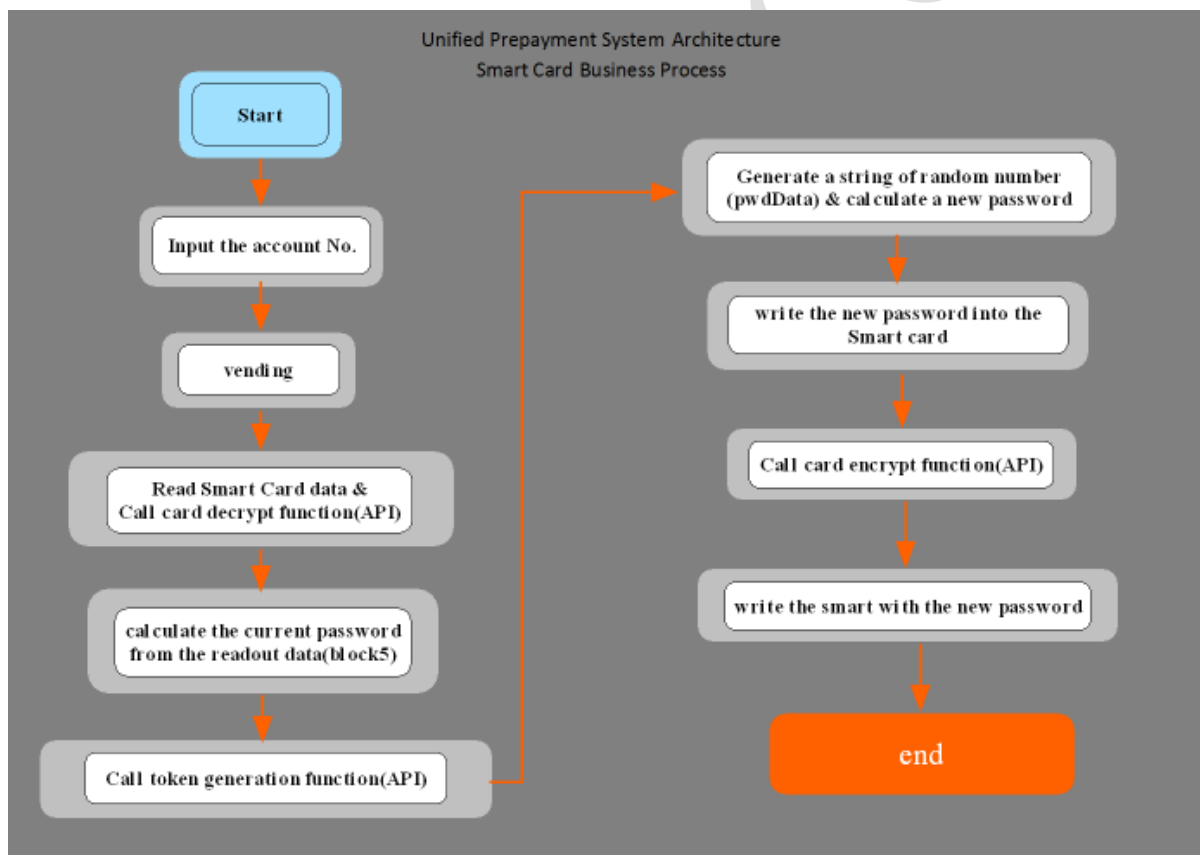
3.2.5 Test Function Interface Define

Functionality	To get test Token			
Application	To manage the user meter test and display, call the function and generate the test token.			
Function name	getTestToken			
Parameter list	Parameter name	Type	Scope or length	Description
	ManufacturingID	Int	2 numbers	Manufacturer code Hexing:14
	control	Int	0 : test all the contents 1 : test relay 2 : test LCD display 3 : teat total energy 4 : test max power limit 5 : display current meter status 6 : display current power 7: display meter version number 8: display current tariff unit price 9: display overload current limit 10: display credit numbers 11: display serial number of meter 12: display off numbers of relay 13: enter into accuracy test mode 18-36: save	Test token type
Return value	Return XML String Xml format: <?xml version="1.0" encoding="UTF-8"?> <result>			

	<pre> <errorCode></errorCode> <tokens> <token></token> ... <token></token> </tokens> </result> </pre> <p>Note: errorCode definition refer to chart 3. If succeeded, need return an array of <tokens>elements</p>
Function definition	<pre> public String getTestToken (int manufacturingID, int control) { ... } </pre>

4 Functionality of Read and Write With Card

Smart Cardbusiness process



4.1 Smart Card Data Format

<u>Data</u>	<u>Bytes</u>	<u>Memory Address (Bytes)</u>
Non Encrypted Data		
Answer To Reset	4	0-4
Binary Pattern	2	4-6
Version	1	6-6

Meter ID	10	7-16
Consumer ID	10	17-26
Utility ID	6	27-32
Sanctioned Load	6	33-38
Meter Type	1	39-39
Sanctioned Load exceeded	2	40-41
Last Recharge Amount	4	42-45
Last Recharge Date	3	46-48
Last Transaction ID	10	49-58
Encrypted Data as Generated by the Meter Manufacturer SDK/API		
The following Data must exist within the encrypted Data: <u>Data To Meter:</u> Meter ID Consumer ID Utility ID Tokens Credit Token Management Token Test Token <u>Data From Meter:</u> Tamper Status RTC Status LR Status Usage Data for the last 6 months individually Month Year KWh Taka Recharged Taka Used Average Power Reactive Power Maximum Power Volt Ampere KWh in Peak KWh in Offpeak KVarh in Peak KVarh in Offpeak Total charge in Peak Total charge in Offpeak Number of power failures Number of time sanctioned load exceeded Tamper Number of times tampered Date/Time of Tamper	940	100-1024

Retrun Token		
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4.2 SmartCard Standard Interface Define

Program language	JAVA
Functionality	Smart Card standard interface
Package	com.hx.ami.spi
Interface	SmartCard
Class definition	<pre>public interface SmartCard { //the encryption data for Smart card public String encryptSmartCardReturnData(int answerToReset, int binaryPattern, int version, String meterID, String customerID, String utilityID, long sanctionedLoad, int meterType, int lastRechargeAmount, String lastRechargeDate, String lastTransactionID, int cardType,String pwdData, int TokenTotalNumber, String[] tokens); note: the encryption data in the card address range:4-1019 size:1016bytes //Smart cardto decryptthe return data public String decryptSmartCardReturnData(String meterNo, String sgc, int tariffIndex, int keyVersion, int keyExpiredTime, long keyNo, String encryptedData); } Note:The input parameter: encryptedData length is 1024 bytes,the whole card data</pre>

4.3 Encrypt Data Write to SmartCard Function Define

Functionality	Decrypt Smart Card return data			
Application	To write the data to smart card , call function to encrypt function			
Function name	encryptSmartCardReturnData			
Parameter list	Parameter name	Type	Scope or length	Description
	answerToReset	Int	8	Answer To Reset Reserved position in IC card default set value 0
	binaryPattern	String	Hex string String of 4 chars	Fixed string 'ACF0' set value ACF0
	Version	Int	2	Version Manufacturer code Example: Hexing:14
	meterNo	String	String of numbers Length<=13	Meterno.
	customerID	String	String of 20 chars	Customer ID

	utilityID	String	String of 4 chars	UtilityID
	sanctionedLoad	long	0-65535	sanctionedLoad scale&unit:0.1kW
	meterType	String	String of 2 numbers	Meter Type 01:keypad meter 02:card meter 03:gprs meter
	lastRechargeAmount	Int	String of 4 numbers	Scale&Unit:0.01TK
	lastRechargeDate	String	String of 6 numbers	DDMMYY
	lastTransactionID	String	String of 20	
	cardType	String	String of 4 chars	OABC:user card OBAC:test card
	pwdData	String	String of 12 chars	Put the first 12 chars pwdData into <block5>
	tokenTotalNumber	Int	String of 2 numbers	Max value25
	tokens	String[]	Every element length:String of 20 numbers or Greater than 20 numbers	
Return value	Return String mapping in the card address range:4-1019 size:1016bytes 2032chars			
Function definition	<pre> public String encryptSmartCardReturnData(int answerToReset, int binaryPattern, int version, String meterID, String customerID, String utilityID, long sanctionedLoad, int meterType, int lastRechargeAmount, String lastRechargeDate, String lastTransactionID, int cardType,String pwdData, int TokenTotalNumber, String[] tokens) { ... } </pre>			

4.4 Decrypt Return Data From SmartCard Function Define

Functionality	Decrypt SmartCardreturn data			
Application	To read the response data from smart card , call function to decrypt the datas.			
Function name	decryptSmartCardReturnData			
Parameter list	Parameter name	Type	Scope or length	Description
	meterNo	String	String of numbers Length<=13	Meter number
	Sgc	String	String of 6 numbers	SGCID
	tariffIndex	Int	1-99	Tariff index
	keyVersion	Int	1-9	Key version
	keyExpiredTime	Int	0-255	Key expire time
	keyNo	long	0-65535	Key Sequence
	encryptedData	String	Custom manufacturers	Card String 1024bytes 2048char 4428 IC card length
Return value	Return XML String Xml format: <?xml version="1.0" encoding="UTF-8"?> <card> <block1> <answerToReset></answerToReset> <version></version> <meterID></meterID> <customerID></customerID> <utilityID></utilityID> <sanctionedLoad></sanctionedLoad> <meterType></meterType> <lastTransactionID></lastTransactionID> <lastRechargeDate></lastRechargeDate> <lastTransactionID></lastTransactionID> </block1> <block2> <cardType></cardType> <cardUsedFlag></cardUsedFlag> <tokenTotalNumber></tokenTotalNumber> </block2> <block3> <!--more than one token, split with ","--> <token></token> </block3> <block4>			

	<pre> <meterID></meterID> <consumerID></consumerID> <utilityID></utilityID> </block4> <block5> <psData1></psData1> <psData2></psData2> <psData3></psData3> <psData4></psData4> <psData5></psData5> <psData6></psData6> </block5> <block6> <!--more than one token, split with ","--> <tokenReturnCode></tokenReturnCode> </block6> <block7> <LastMonth1> <billingDate> 20150920105212</billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth1> <LastMonth2> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> </pre>
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	<pre> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth2> <LastMonth3> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth3> <LastMonth4> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> </pre>
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	<pre> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth4> <LastMonth5> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth5> <LastMonth6> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> </pre>
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```

<tokenReturnCode>255</tokenReturnCode>
<tokenReturnCode>255</tokenReturnCode>
</block6>
<block7>
  <LastMonth1>
    <billingDate>20150920105212</billingDate>
    <activeEnergyImport>0.0</activeEnergyImport>
    <takaRecharged>0.0</takaRecharged>
    <takaUsed>0.0</takaUsed>
    <activeMaximumPower>0.0</activeMaximumPower>
    <reactiveMaximumPower>0.0</reactiveMaximumPower>
    <activeEnergyImportT1>0.0</activeEnergyImportT1>
    <activeEnergyImportT2>0.0</activeEnergyImportT2>

    <reactiveEnergyImportT1>0.0</reactiveEnergyImportT1>

    <reactiveEnergyImportT2>0.0</reactiveEnergyImportT2>
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    <totalChargeT2>0.0</totalChargeT2>
    <numberOfPowerFailures>1</numberOfPowerFailures>

    <numberOfSanctionedLoadExceeded>0</numberOfSanctionedLoadExceeded>

    <monthAveragePowerFactor>0.0</monthAveragePowerFactor>
  </LastMonth1>
  <LastMonth2>
    <billingDate></billingDate>
    <activeEnergyImport></activeEnergyImport>
    <takaRecharged></takaRecharged>
    <takaUsed></takaUsed>
    <activeMaximumPower></activeMaximumPower>
    <reactiveMaximumPower></reactiveMaximumPower>
    <activeEnergyImportT1></activeEnergyImportT1>
    <activeEnergyImportT2></activeEnergyImportT2>

    <reactiveEnergyImportT1></reactiveEnergyImportT1>

    <reactiveEnergyImportT2></reactiveEnergyImportT2>
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    <totalChargeT2></totalChargeT2>
    <numberOfPowerFailures></numberOfPowerFailures>

    <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded>

    <monthAveragePowerFactor></monthAveragePowerFactor>
  </LastMonth2>
  <LastMonth3>
    <billingDate></billingDate>
    <activeEnergyImport></activeEnergyImport>
    <takaRecharged></takaRecharged>
    <takaUsed></takaUsed>

```

	<pre> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth3> <LastMonth4> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth4> <LastMonth5> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> </pre>
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	<pre> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth5> <LastMonth6> <billingDate></billingDate> <activeEnergyImport></activeEnergyImport> <takaRecharged></takaRecharged> <takaUsed></takaUsed> <activeMaximumPower></activeMaximumPower> <reactiveMaximumPower></reactiveMaximumPower> <activeEnergyImportT1></activeEnergyImportT1> <activeEnergyImportT2></activeEnergyImportT2> <reactiveEnergyImportT1></reactiveEnergyImportT1> <reactiveEnergyImportT2></reactiveEnergyImportT2> <totalChargeT1></totalChargeT1> <totalChargeT2></totalChargeT2> <numberOfPowerFailures></numberOfPowerFailures> <numberOfSanctionedLoadExceeded></numberOfSanctionedLoadExceeded> <monthAveragePowerFactor></monthAveragePowerFactor> </LastMonth6> </block7> <block8> <returnToken>07485085822316193422</returnToken> <updateFlag>fa</updateFlag> </block8> </card> </pre> <p>Note: Determine the element < errorCode> is greater than or equal to 0, if the conditions established, generate Token error. Otherwise, the build succeeds, you can call get an array of <tokens> elements.</p>
<p>Function definition</p>	<pre> public String decryptSmartCardReturnData(String meterNo, String sgc, int tariffIndex, int keyVersion, int keyExpiredTime, long keyNo, String encryptedData) { ... } </pre>

4.5 Smart Card Writing Password Algorithm

Below is the example of password block:

```
<block5>  
    <psData1>0c</psData1>  
    <psData2>71</psData2>  
    <psData3>53</psData3>  
    <psData4>12</psData4>  
    <psData5>f4</psData5>  
    <psData6>77</psData6>  
</block5>
```

Hex total = psData1* 255 + psData2* 100 + psData3* 155 + psData4* 10 + psData5* 55 + psData6;

Then the password will be last two bytes of the total; One exception is if all the data is equal to FF then password will be FFFF. <psData1>0c</psData1> here 0c is Hex format.

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4.6 The format of byte after decryption (Just for example):

Data	Leng.	Add.	Data Type	Is Encr.	Desc
Answer To Reset	4	0			Answer To Reset
Binary Pattern	2	4			Fixed Data 0b1010110011110000 = 0xACF0
Version	1	6	BCD	N	Manufacturers
Meter ID	10	7	BCD	N	Meter no.
Consumer ID	10	17	BCD	N	A/C No.
Utility ID	2	27	BCD	N	Utility ID
Sanctioned Load	6	29	BCD	N	Sanctioned Load
Meter Type	1	35	HEX	N	Meter Type
Sanctioned Load exceeded	1	36	HEX	N	Sanctioned Load exceeded
Last Recharge Amount	2	37	HEX	N	Last Recharge Amount
Last Recharge Date	3	39	BCD	N	
Last Transaction ID	10	42	BCD	N	Last Transaction ID
Card Type	2	100	HEX	N	OABC–Account Card, OBAC–Test Card B, OAAC–Test Card A
Card Used Flag	1	102	Boolean	N	Token in the card has been processed flag. Upon completion of Token processing, write the results, and then update the flag FA. POS point writingToken set the flag FF
Token Total Number	1	103	HEX	N	Token Total Number
CS	2	104	HEX	N	Data sum check
	6	106		N	Blank Area:FF
Token 1	10	112	BCD	N	Token area, arranged in strict

					accordance with the required number in order of priority. No Token fill the whole area F
Token 2	10	122	BCD	N	
Token 3	10	132	BCD	N	
Token 4	10	142	BCD	N	
Token 5	10	152	BCD	N	
Token 6	10	162	BCD	N	
Token 7	10	172	BCD	N	
Token 8	10	182	BCD	N	
Token 9	10	192	BCD	N	
Token 10	10	202	BCD	N	
Token 11	10	212	BCD	N	
Token 12	10	222	BCD	N	
Token 13	10	232	BCD	N	
Token 14	10	242	BCD	N	
Token 15	10	252	BCD	N	
Token 16	10	262	BCD	N	
Token 17	10	272	BCD	N	
Token 18	10	282	BCD	N	
Token 19	10	292	BCD	N	
Token 20	10	302	BCD	N	
Token 21	10	312	BCD	N	
Token 22	10	322	BCD	N	
Token 23	10	332	BCD	N	
Token 24	10	342	BCD	N	
Token 25	10	352	BCD	N	
	6	362		N	
Meter ID	20	368	BCD	N	Meter ID
Consumer ID	20	388	BCD	N	Consumer ID
Utility ID	6	408	BCD	N	Utility ID
CS	2	414	HEX	N	
	0	416		N	
Data A	1	416	HEX	N	
Data B	1	417	HEX	N	
Data C	1	418	HEX	N	

Data D	1	419	HEX	N	
Data E	1	420	HEX	N	
Data F	1	421	HEX	N	
CS	2	422	HEX	N	
	0	424		N	
					Meter operating results after Token, 0x00: success, 0xFF: default value, the other: the error code.
Token 1 Return Code	1	424	HEX	Y	
Token 2 Return Code	1	425	HEX	Y	
Token 3 Return Code	1	426	HEX	Y	
Token 4 Return Code	1	427	HEX	Y	
Token 5 Return Code	1	428	HEX	Y	
Token 6 Return Code	1	429	HEX	Y	
Token 7 Return Code	1	430	HEX	Y	
Token 8 Return Code	1	431	HEX	Y	
Token 9 Return Code	1	432	HEX	Y	
Token 10 Return Code	1	433	HEX	Y	
Token 11 Return Code	1	434	HEX	Y	
Token 12 Return Code	1	435	HEX	Y	
Token 13 Return Code	1	436	HEX	Y	
Token 14 Return Code	1	437	HEX	Y	
Token 15 Return Code	1	438	HEX	Y	
Token 16 Return Code	1	439	HEX	Y	
Token 17 Return Code	1	440	HEX	Y	
Token 18 Return Code	1	441	HEX	Y	
Token 19 Return Code	1	442	HEX	Y	
Token 20 Return Code	1	443	HEX	Y	
Token 21 Return Code	1	444	HEX	Y	
Token 22 Return Code	1	445	HEX	Y	
Token 23 Return Code	1	446	HEX	Y	
Token 24 Return Code	1	447	HEX	Y	
Token 25 Return Code	1	448	HEX	Y	
Recharge Date&Time	6	449	HEX	Y	SSMMHHDDMMYY, Meter recharge time, prepayment System

					writes all F
Recharge Amount	4	455	HEX	Y	unit:0.01, The amount of recharge
Token Return Code CS	2	459	HEX	Y	
	3	461	HEX	Y	
Billing Date&Time	6	464	BCD	Y	SSMMHHDDMMYY
Active energy import (Current Month)	4	470	BCD	Y	unit:0.01 kWh
Taka Recharged(Current Month)	4	474	HEX	Y	Unit 0.01
Taka Used(Current Month)	4	478	HEX	Y	unit 0.01
Active Maximum Power (MD)	3	482	BCD	Y	Active Maximum Power (MD)
Reactive Maximum Power (MD)	3	485	BCD	Y	Reactive Maximum Power (MD)
Active energy import T1(Current Month)	4	488	BCD	Y	Active energy import T1(Current Month)
Active energy import T2(Current Month)	4	492	BCD	Y	Active energy import T2(Current Month)
Reactive energy import T1(Current Month)	4	496	BCD	Y	Reactive energy import T1(Current Month)
Reactive energy import T2(Current Month)	4	500	BCD	Y	Reactive energy import T2(Current Month)
Total Charge T1(Current Month)	4	504	HEX	Y	Unit:0.01
Total Charge T2(Current Month)	4	508	HEX	Y	unit:0.01
Number of Power Failures	2	512	HEX	Y	Number of Power Failures
Number of Sanctioned Load Exceeded	2	514	HEX	Y	Number of Sanctioned Load Exceeded
Month Average Power Factor	2	516	BCD	Y	
Last 1 Month CS	2	518	HEX	Y	
	0	520		Y	
Billing Date&Time	6	520	BCD	Y	SSMMHHDDMMYY

Active energy import (Current Month)	4	526	BCD	Y	unit:0.01 kWh
Taka Recharged(Current Month)	4	530	HEX	Y	Unit:0.01
Taka Used(Current Month)	4	534	HEX	Y	Unit:0.01
Active Maximum Power (MD)	3	538	BCD	Y	
Reactive Maximum Power (MD)	3	541	BCD	Y	
Active energy import T1(Current Month)	4	544	BCD	Y	
Active energy import T2(Current Month)	4	548	BCD	Y	
Reactive energy import T1(Current Month)	4	552	BCD	Y	
Reactive energy import T2(Current Month)	4	556	BCD	Y	
Total Charge T1(Current Month)	4	560	HEX	Y	Unit:0.01
Total Charge T2(Current Month)	4	564	HEX	Y	Unit:0.01
Number of Power Failures	2	568	HEX	Y	
Number of Sanctioned Load Exceeded	2	570	HEX	Y	
Month Average Power Factor	2	572	BCD	Y	
Last 2 Month CS	2	574	HEX	Y	
	0	576		Y	
Billing Date&Time	6	576	BCD	Y	SSMMHHDDMMYY
Active energy import (Current Month)	4	582	BCD	Y	unit:0.01 kWh
Taka Recharged(Current Month)	4	586	HEX	Y	Unit:0.01
Taka Used(Current Month)	4	590	HEX	Y	Unit:0.01
Active Maximum Power (MD)	3	594	BCD	Y	
Reactive Maximum Power (MD)	3	597	BCD	Y	
Active energy import T1(Current Month)	4	600	BCD	Y	
Active energy import T2(Current Month)	4	604	BCD	Y	
Reactive energy import T1(Current Month)	4	608	BCD	Y	
Reactive energy import T2(Current Month)	4	612	BCD	Y	

Total Charge T1(Current Month)	4	616	HEX	Y	Unit:0.01
Total Charge T2(Current Month)	4	620	HEX	Y	
Number of Power Failures	2	624	HEX	Y	
Number of Sanctioned Load Exceeded	2	626	HEX	Y	
Month Average Power Factor	2	628	BCD	Y	
Last 3 Month CS	2	630	HEX	Y	
	0	632		Y	
Billing Date&Time	6	632	BCD	Y	SSMMHHDDMMYY
Active energy import (Current Month)	4	638	BCD	Y	unit:0.01 kWh
Taka Recharged(Current Month)	4	642	HEX	Y	Unit:0.01
Taka Used(Current Month)	4	646	HEX	Y	Unit:0.01
Active Maximum Power (MD)	3	650	BCD	Y	
Reactive Maximum Power (MD)	3	653	BCD	Y	
Active energy import T1(Current Month)	4	656	BCD	Y	
Active energy import T2(Current Month)	4	660	BCD	Y	
Reactive energy import T1(Current Month)	4	664	BCD	Y	
Reactive energy import T2(Current Month)	4	668	BCD	Y	
Total Charge T1(Current Month)	4	672	HEX	Y	Unit:0.01
Total Charge T2(Current Month)	4	676	HEX	Y	Unit:0.01
Number of Power Failures	2	680	HEX	Y	
Number of Sanctioned Load Exceeded	2	682	HEX	Y	
Month Average Power Factor	2	684	BCD	Y	
Last 4 Month CS	2	686	HEX	Y	
	0	688		Y	
Billing Date&Time	6	688	BCD	Y	SSMMHHDDMMYY
Active energy import (Current Month)	4	694	BCD	Y	unit:0.01 kWh
Taka Recharged(Current Month)	4	698	HEX	Y	Unit:0.01

Taka Used(Current Month)	4	702	HEX	Y	Unit:0.01
Active Maximum Power (MD)	3	706	BCD	Y	
Reactive Maximum Power (MD)	3	709	BCD	Y	
Active energy import T1(Current Month)	4	712	BCD	Y	
Active energy import T2(Current Month)	4	716	BCD	Y	
Reactive energy import T1(Current Month)	4	720	BCD	Y	
Reactive energy import T2(Current Month)	4	724	BCD	Y	
Total Charge T1(Current Month)	4	728	HEX	Y	Unit:0.01
Total Charge T2(Current Month)	4	732	HEX	Y	Unit:0.01
Number of Power Failures	2	736	HEX	Y	
Number of Sanctioned Load Exceeded	2	738	HEX	Y	
Month Average Power Factor	2	740	BCD	Y	
Last 5 Month CS	2	742	HEX	Y	
	0	744		Y	
Billing Date&Time	6	744	BCD	Y	SSMMHHDDMMYY
Active energy import (Current Month)	4	750	BCD	Y	unit:0.01 kWh
Taka Recharged(Current Month)	4	754	HEX	Y	Unit:0.01
Taka Used(Current Month)	4	758	HEX	Y	Unit:0.01
Active Maximum Power (MD)	3	762	BCD	Y	
Reactive Maximum Power (MD)	3	765	BCD	Y	
Active energy import T1(Current Month)	4	768	BCD	Y	
Active energy import T2(Current Month)	4	772	BCD	Y	
Reactive energy import T1(Current Month)	4	776	BCD	Y	
Reactive energy import T2(Current Month)	4	780	BCD	Y	
Total Charge T1(Current Month)	4	784	HEX	Y	Unit:0.01
Total Charge T2(Current	4	788	HEX	Y	Unit:0.01

Month)					
Number of Power Failures	2	792	HEX	Y	
Number of Sanctioned Load Exceeded	2	794	HEX	Y	
Month Average Power Factor	2	796	BCD	Y	
Last 6 Month CS	2	798	HEX	Y	
	0	800		Y	
Numbers of open cover	2	800	HEX	Y	
The last time of open cover	6	802	BCD	Y	SSMMHHDDMMYY
The last 2 time of open cover	6	808	BCD	Y	
The last 3 time of open cover	6	814	BCD	Y	
The last 4 time of open cover	6	820	BCD	Y	
Numbers of open cover CS	2	826	HEX	Y	
	4	828		Y	
Numbers of open terminal cover	2	832	HEX	Y	
The last time of open terminal cover	6	834	BCD	Y	
The last 2 time of open terminal cover	6	840	BCD	Y	
The last 3 time of open terminal cover	6	846	BCD	Y	
The last 4 time of open terminal cover	6	852	BCD	Y	
Numbers of open terminal cover CS	2	858	HEX	Y	
	4	860		Y	
Numbers of bypass	2	864	HEX	Y	
The last time of bypass	6	866	BCD	Y	
The last 2 time of bypass	6	872	BCD	Y	
The last 3 time of bypass	6	878	BCD	Y	
The last 4 time of bypass	6	884	BCD	Y	
Numbers of bypass CS	2	890	HEX	Y	
	4	892		Y	
Numbers of overload	2	896	HEX	Y	
The last time of overload	6	898	BCD	Y	
The last 2 time of overload	6	904	BCD	Y	
The last 3 time of overload	6	910	BCD	Y	
The last 4 time of overload	6	916	BCD	Y	
Numbers of overload CS	2	922	HEX	Y	
	4	924		Y	

Numbers of missing neutral event	2	928	HEX	Y	
The last time of missing neutral event	6	930	BCD	Y	
The last 2 time of missing neutral event	6	936	BCD	Y	
The last 3 time of missing neutral event	6	942	BCD	Y	
The last 4 time of missing neutral event	6	948	BCD	Y	
Missing neutral event CS	2	954	HEX	Y	
	4	956		Y	
Last Read Time	6	960	BCD	N	POS needs to reset the data after read the date, set all F
Return Token	10	966	BCD	N	POS needs to reset the tokens, set all F
Update Flag	1	976	Boolean	N	The meter is updated to return data, FF-no, FA-updated. POS card is required to write the flag is after read the data
CS	2	977	HEX	N	
Verify Writable	1	1020	HEX		PSC used to check the password is corrected
Error Counter	1	1021			Card Reserved fields
PSC	2	1022			Card Reserved fields

5 GPRS Meters Connection Platform Design

5.1 Concept Description of MIC Communication Access

Smart GPRS meters communicate with MIC using XML format based on TCP. It will use encryption and digital signature technical in TCP linker layer, and in data area of XML document, follow the standard DLMS protocol.

XML Communication Protocol Define

XML Format Define

```
<?xml version='1.0'?>
<h:rt xmlns h='ProtocolHead'>
<h:pv>1</h:pv>
<h:addr>030140000170</h:addr>
<h:dir>down</h:dir>
<h:pt>1</h:pt>
<h:fc>3</h:fc>
<h:seq>7</h:seq>
<h:e>10</h:e>
<h:a>0</h:a>
<h:r>4858451100000000000000007</h:r>< h:d>
0A15CEDF16.....0A15CEDF16
</h:d>
<h:sg>0203</h:sg>
</h:rt>
```

XML Label Description:

All data of XML should be transferred using ASCII code.

Protocol Presentation	Protocol Description	Note
<? xml version='1.0' ?>	XMLfixed head format	
<h:rt xmlns h='ProtocolHead'>	To name the space under root element.Protocol Head means the first layer of protocol.	
<h:pv>1</ h:pv>	XMLprotocol internal version number of company. 1: the first version	
< h:f>100000000</h:f>	Address of transmit end, the label means which transmit end the data come from. The address will be 1 if the transmit end is master station; The address will be meter address if the transmit end is meter, whose length is not fixed and the max length is 32 pcs ASCII code.	
<h:dir>down</h:dir>	The direction of transmission. up: meter to server down: server to meter	
<h:pt>1</h:pt >	Data transport protocol in data area. 1: DLMS transport protocol 2: XML transport protocol (Company will develop in the future, as the second stage)	

<h:fc>1</h:fc>	<p>Function code: it is mainly for front-end processor distinguishes the data types. When front-end processor doesn't analysis the data or decrypt the encrypted data, it can response the frame transmitted from the meters. At the same time, the label can distinguish who is the transmit end.</p> <ol style="list-style-type: none"> 1: Link interface test(meter launches) 2: Link interface test response frame(master station responses) 3: Request – response frame (master station responses) 4: Request—confirm/deny frame (master station responses) 5: Report initially- confirm/deny frame (meter launches) 6: Report initially confirm frame needed (meter launches) 7: Report initially confirm frame needless (meter launches) 8: business password refresh (master station launches) 9: manufacturer request (mainly for upgrade remotely) (master station launches) 10: manufacturer respond (mainly for upgrade remotely) (master station launches) 	
< h:seq>3< h:seq>	<p>XML frame serial number, for defining which response frame was responded by the response end. The frame serial number is changed by primary end, it will add 1 when primary end launches one frame of message. The range of variation can be 0-99. Driven end regards the frame serial number of primary end as the response frame serial number.</p> <p>After messages transmitted by starting end, when the responded can't be received timely, the serial number of retransmission will be same if the starting end allows retransmission, and the max retransmission numbers is 3;</p> <ol style="list-style-type: none"> 2) If the driven end receives two starting frame with the same serial number in series, it means the response hasn't been received yet, then retransmission(and without dealing with the message again); 3) If starting end receives two response frames with the same serial number in series, then will not deal with the second response frame. 	
< h:e>10</h:e>	<p>Data encryption algorithm</p> <p>00: without using encryption algorithm, data transmitted using plaintext form</p> <p>10: AES-128 In GCM Mode</p>	

	11: AES-192 12: AES-256 20: DES 30: SHA 40: ECC	
< h:a>1</h:a>	Verify algorithm 0: without using verify 1: SHA-256	
< h:r>4827762</h:r>	Random number. The starting end will regard the random number as vector to encrypt the data area, the receiving end will regard the random number as vector to decrypt the data area. It has 12 bytes, as 24 bytes HEX character String in XML.	
< h:d >123456< /h:d >	Data area, if without using encryption algorithm, the flag is plaintext ; if using encryption algorithm, the flag is the plaintext will be encrypted.	
<h:sg>0203<h:sg>	When without using verify, the flag is useless; when using verify, the flag is verify code for plaintext of data area.	
</h:rt>	XML end flag.	

5.2 Function Code Description:

Link interface test: the function is distinguished in data area.

01: log in

02: quit

03: heartbeat

Link interface test response frame: the function is distinguished in data area.

01: log in

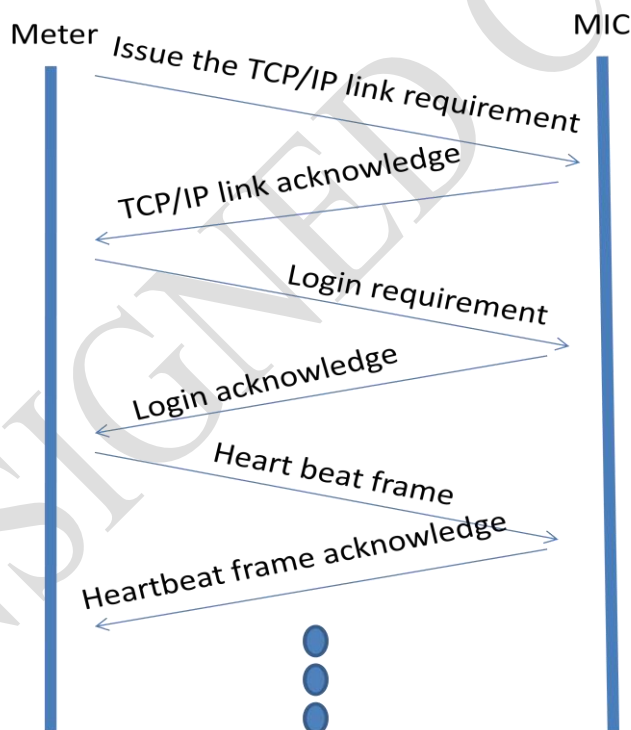
02: quit

03: heartbeat

In this system, meters as client side, MIC as server side, link build , log in request and heartbeat are transmitted by meters , and responded by MIC.

Log in frame: For transmitting a group of specific data to the MIC and confirming the link chaining relationship with master station , after meters connected with master station in TCP/IP.

Heartbeat frame: For transmitting a group of data to maintain the TCP/IP link chaining .



Request – response frame

Request – response frame is the request frame transmitted from master station and the response frame responded by meters.

The correct response means in XML layers, encryption and decryption runs correct or other data to be tested are correct, without including part or all deny for DLMS frames in DLMS layers.

Request- confirm\deny frame

Request- confirm\deny frame is the deny frame responded to the master station when errors happened on data that meters transmitted to the master station.

It will response confirm frame if the update key request to master station is correct.

Request- confirm\deny frame format:

Confirm frame	Function code:00	
Deny frame	Function code:01	Error code: 01: password error; 02: verify error;03: other error

Report initially-confirm\deny frame

For data meters transmitted to the master station , if need confirmation, front-end processor will using the function code to achieve confirmation and deny for meters.

The format refers to function code 3.

Report initially -confirm frame needed

For data meters reported to the master station initially, if need confirmed , sent according to the function code.

Report initially -confirm frame needless

For data meters reported to the master station initially, if confirmed needless , sent according to the function code.

Business password updated

To update the business password according to the function , sent by master station , encrypted by root key.

Manufacturer request

For self defined commands send from master station to the manufacturers.

Manufacturer response

For self defined commands responded from meters to the manufacturers.

It adopts plaintext transmission mode for data areas of function code 1,2,4,5.

Further information please check<The process of online meter communication >

Annexure –A

Unified Meter Data Collection System

Addressing System

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1. Introduction

1.1 Brief Introduction

The system interface architecture of the device is shown in the following figure; the electric energy meter, concentrator and front end system are simplified into several interfaces marked with correspondent code name respectively;

System Architecture



Device functions & Interoperability Interfacing Requirements are composed of 3 parts, including:

Package 0: Addressing System

Package 1: DCU to HES

Package 2: Meter Modeling

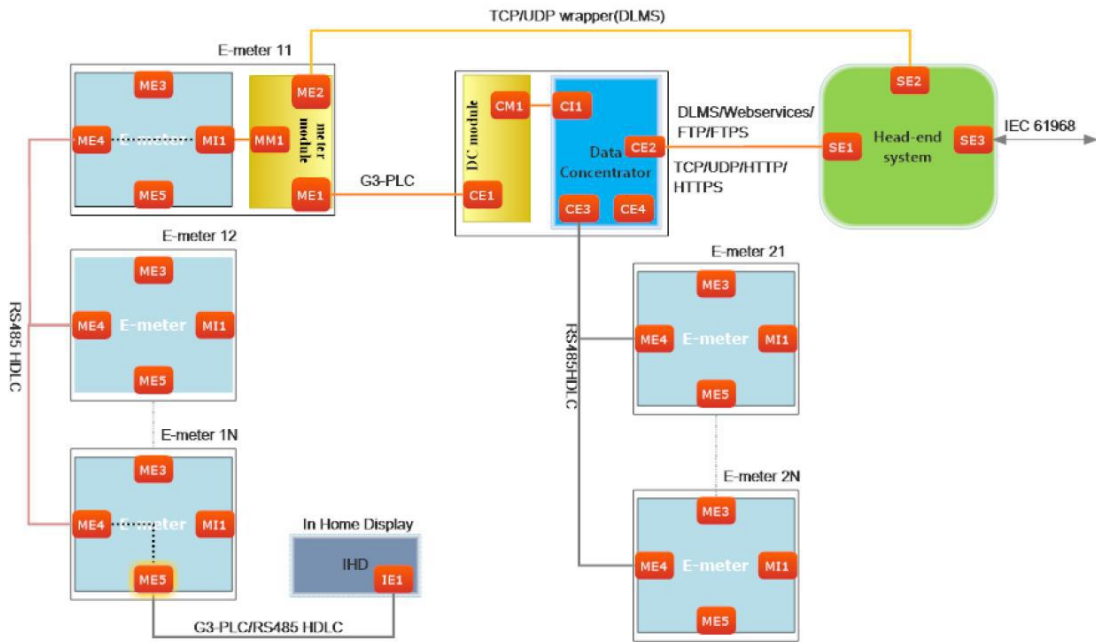
1.2 Reference Documents

Name
Blue_Book_12th_edition
Green_Book_8th_edition
Object_defs_v3.1_161215
White GlossaryOf DLMS COSEM Terms

2. Communications Architecture

The following diagram describes the communication architecture between HES, concentrator / collector, electricity energy meter and In Home Display unit;

System Architecture



2.1 Description of customer / server side architecture

The data exchange between the data acquisition system and the collected equipment, should refer to the communication mode of the client / server AP specified by DLMS. The client AP initiates the access request and the server AP responds, which is a question and answer communication mechanism; and the role of server AP is specified to be assumed by the meter or module.

By means of access management, one server AP can exchange data with one or more clientAPs at the same time, and a client AP can also access one or more server APs at the same time.

In addition to the normal question and answer mechanism, if there are abnormal events in the server AP, the event can be reported through the prescribed format.

The three-layer architecture of DLMS is shown in the following figure:

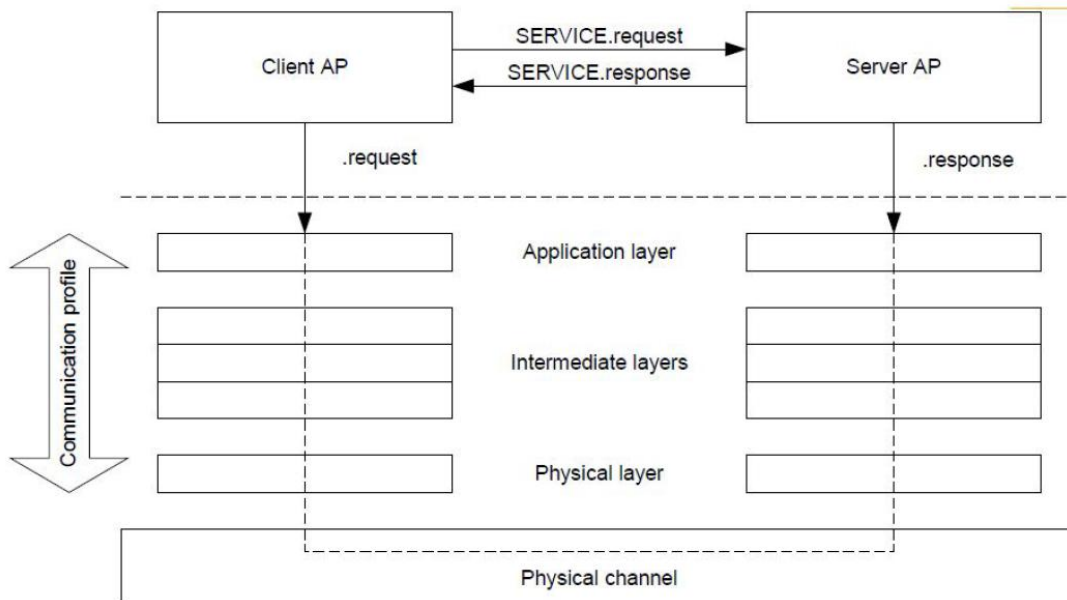


Figure 2 – Client/server relationship and protocols

Level 1: Physical Device Layer

Level 2: Logical Device Layer/ Intermediate Layer

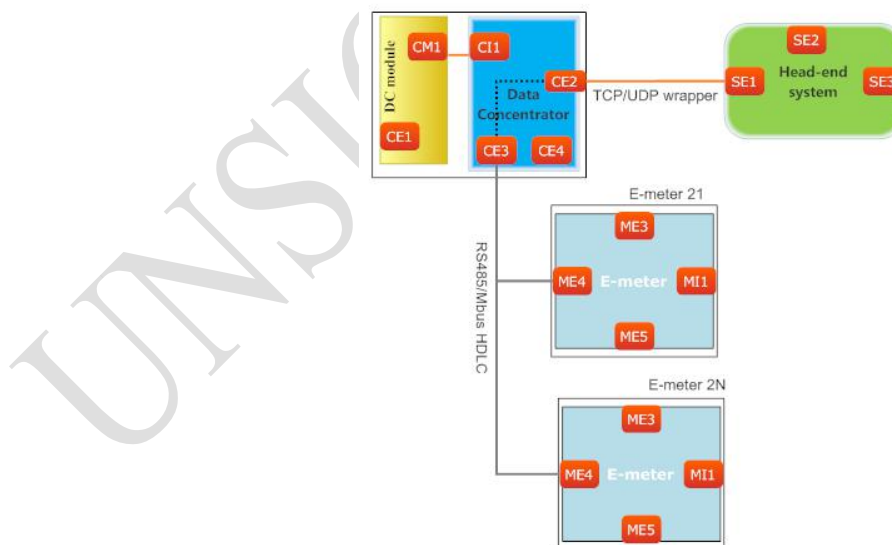
Level 3: COSEM Application Layer

2.2 Communication Structure Type

AMI system **client AP**-> **server AP**, there are six types in communication structure;

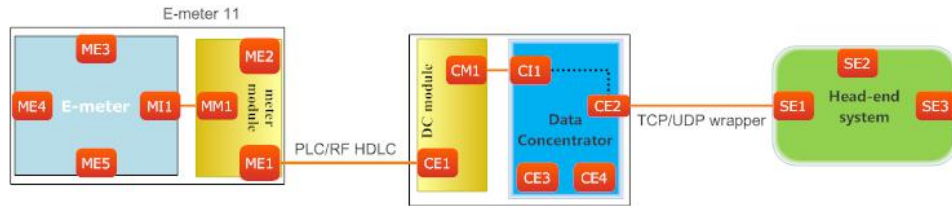
1. SE1(HES)->CE2(Data Concentrator/Collector)->CE3/CE4(Data Concentrator/Collector)->ME4(Electricity Energy Meter COSEM)

Addressing From I



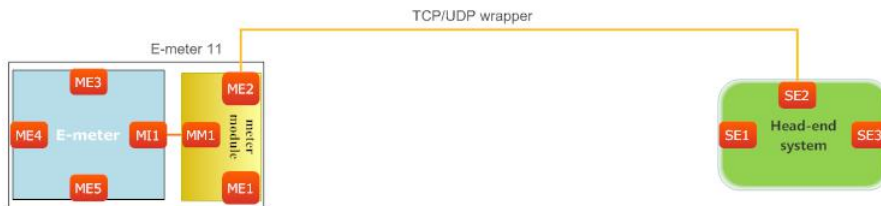
2. SE1(HES)->CE2(Data Concentrator/Collector)->CI1(Data Concentrator/Collector)->CE1(Data Concentrator/Collector) ->ME1(Electricity Energy Meter Communication Module)->MI1(Electricity Energy Meter COSEM)

Addressing From II



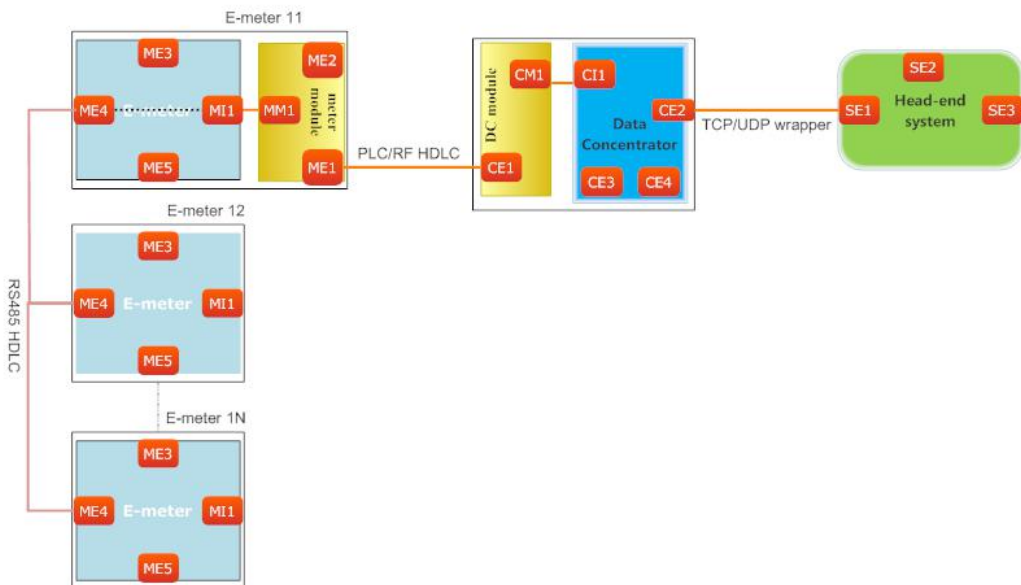
3. SE2(HES)->ME2(Electricity Energy Meter Communication Module)->MI1(Electricity Energy Meter COSEM)

Addressing From III



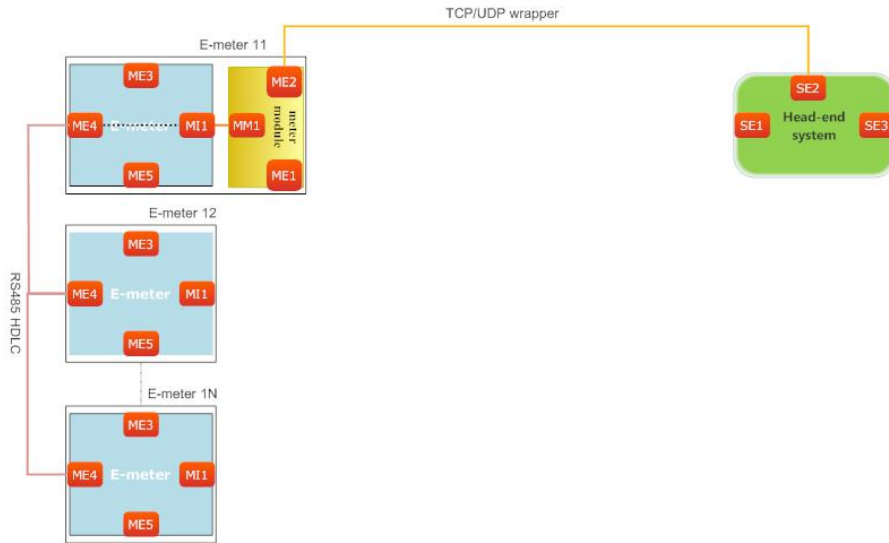
4. SE1(HES)->CE2(Data Concentrator/Collector)->CI1(Data Concentrator/Collector)->CE1(Data Concentrator/Collector) ->ME1(Electricity Energy Meter Communication Module)->ME4(Electricity Energy Meter COSEM)

Addressing From IV



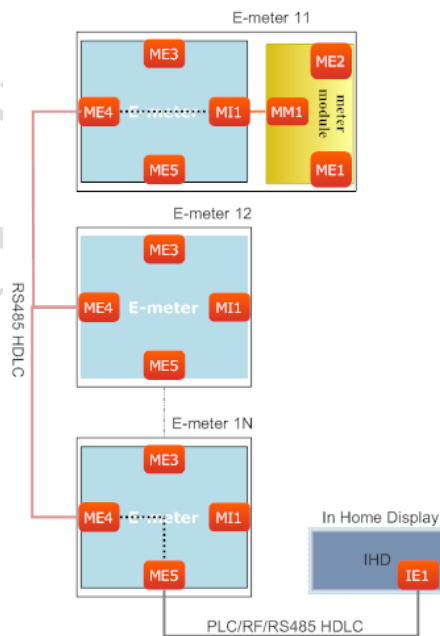
5. SE2(HES)->ME2(Electricity Energy Meter Communication Module)->ME4(Electricity Energy Meter COSEM)

Addressing From V



6. IE1(IHD)->ME5(Electricity Energy Meter IHD Interface)->ME4(Electricity Energy Meter COSEM)

Addressing From VI



2.3 Scope and Addressing Rules

As shown in the addressing system diagram, the range of addressing rules defined in this document mainly includes address assignment at the communication interface level of Wrapper, Gateway protocol and HDLC, and the corresponding conversion rules;

As shown in Chapter 2.2, the AMI system supports six types of typical AMI structures; It should be noted that the actual application is not limited to the above six types of form; Depending on the function changes of the device, the specific structure will change. For example, when the IHD can also serve as a server AP, the data can be forwarded through the ME5 interface via the meter by the data push service, and push it to HES;

In order to ensure the interoperability of the equipment and the unity of the system, for the same interface, no matter what kind of AMI structure is adopted, the way of accessing and addressing is the same.

3. Wrapper

3.1 Wrapper Address Format Description

Wrapper includes version, SSAP, DSAP and LEN, a total of 8 bytes in frame format as follows:

Version	SSAP	DSAP	LEN	COSEM APDU
---------	------	------	-----	------------

■Parameter Description:

Version: 2 bytes, Wrapper version, current version is 0x0001;

SSAP: 2 bytes, represents SAP address of sender;

DSAP: 2 bytes, values range is 0x0001 – 0xFFFF, represents destination address;

LEN: 2 bytes, values range is 0x0000 – 0xFFFF, indicates the byte length of the transmitted COSEM APDU;

COSEM APDU: communication data content, does not belong to the wrapper category.

4. HDLC

4.1 HDLC Address Format Description

The frame format of HDLC is described here only for the address field as follows:

0x7e	Frame Type and Frame Length	Destination Address Field	Source Address Field	Control Domain	Frame Header Verification	LLC Frame Header	User Data Information	Data Frame Check	0x7e
------	-----------------------------	---------------------------	----------------------	----------------	---------------------------	------------------	-----------------------	------------------	------

The address field is divided into two parts, the destination address field and the source address field.

For the client AP, the destination address is the address of the accessed device (server AP) and the source address is the client AP address.

For the accessed device, it is opposite when replying to the access frame of the client AP. The destination address is the client AP address, and the source address is the address of the accessed device;

The client AP address is defined as 1 byte; the range of values is: 0x00-0x7F; the definition and reference is in the low bytes of the 4.2.1 SSAP client AP address;

The server AP address can support 1 / 2 / 4 bytes lengths, as shown in the following table:

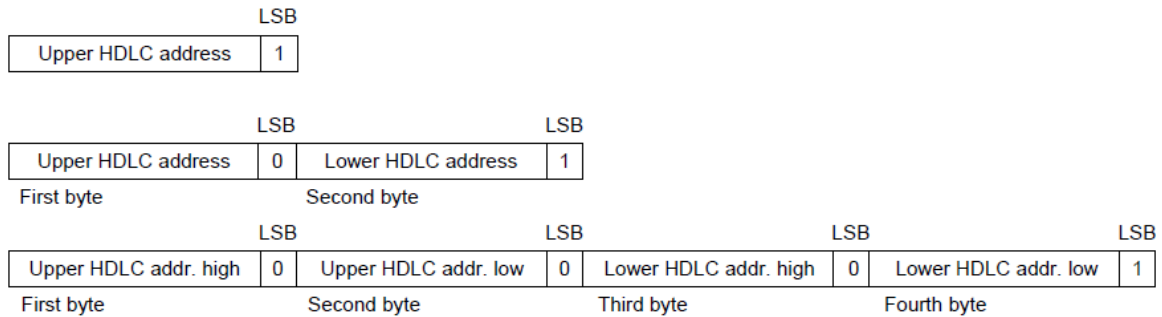


Figure 51 – Valid server address structures

Upper HDLC Address, used to express logical addresses,
 Lower HDLC address, used to describe a physical address, 1 or 2 bytes.
 Upper HDLC address, used to distinguish different logical devices within the same physical device.
 LowerHDLC address cannot appear if not needed. For example, through infrared local access devices, it only needs the default upper HDLC address(0x01) without knowing the physical address.

5. Gateway Protocol

The Gateway protocol is mainly used for gateway devices (concentrator / collector / communication module), transparent forwarding of multilevel networks, as shown in the following figure:

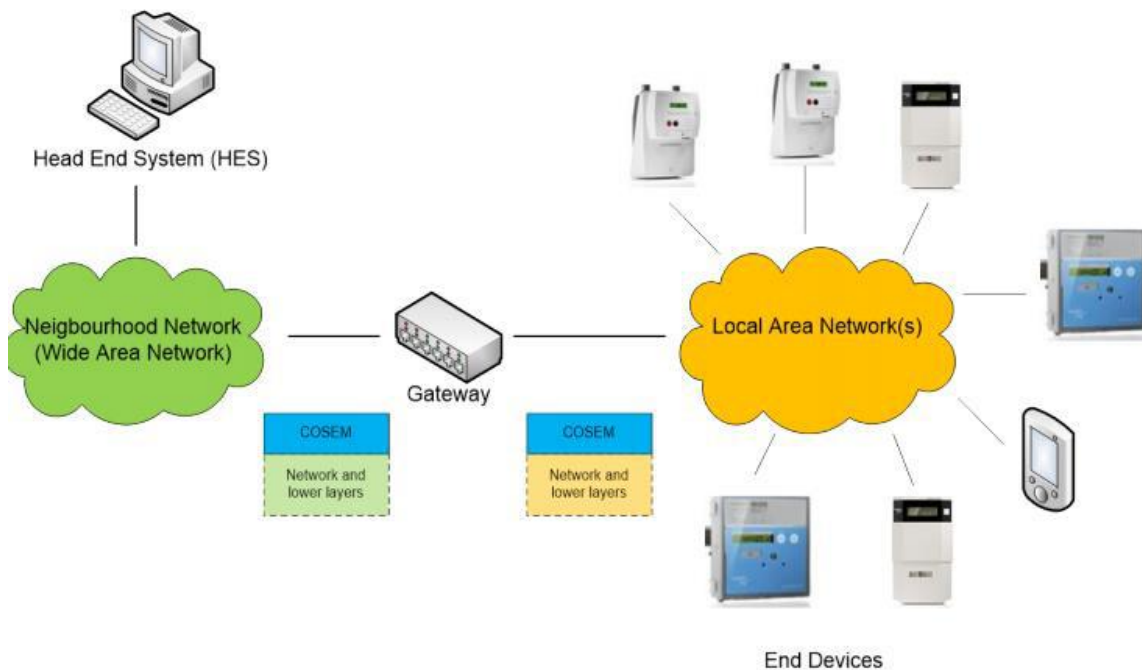


Figure 156 – General architecture with gateway

5.1 Gateway protocol Format Description

The definition of gateway protocol is as follows: Prefix for short;

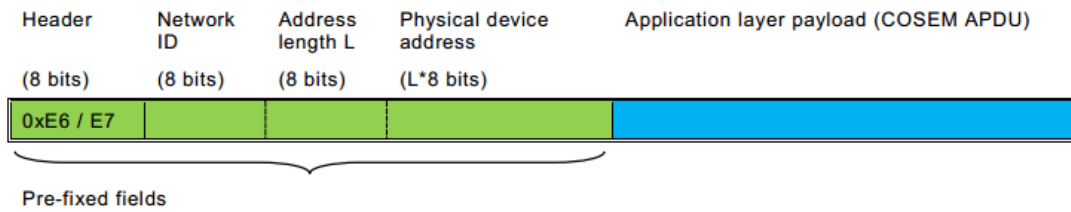


Figure 157 – The fields used for pre-fixing the COSEM APDUs

Parameter Description:

Header: 1 byte, indicating the data transfer direction, 0xE6 is a request or data report frame, 0xE7 is a response frame;

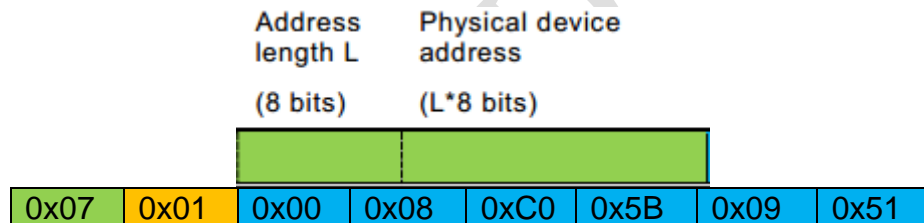
Network ID: 1 byte, network ID, indicating the forwarding of the lower channel number (network number);

Address length: 1 byte, target address length;

Physical device address: N bytes, the physical address of the target, whose length depends on the address length;

COSEM APDU: The communication data content, does not belong to the gateway protocol.

For example: the serial number of the equipment product is: 037586930001, then the physical address of gateway protocol is 0x0008C05B0951;



6. Address Delivery and Conversion Rules

This section mainly defines nesting rules in various level architecture of wrapper, Gateway protocol, HDLC and (APDU)COSEM when device is in forwarding and non-forwarding status.

6.1 Data Frame Nested Format

6.1.1 Non-Forwarding Rule

When the destination device is in the same accessed physical device (non-forwarding device), using the following structure to communicate according to the addressing structure in Chapter 2:

1. Wrapper+COSEM (APDU)

Version	SSAP	DSAP	LEN	COSEM APDU
---------	------	------	-----	------------

Among which, DSAP: $\leq 0x001F$

2. HDLC+COSEM(APDU)

0x7e	Frame Type and Frame Length	Destination Address Field	Source Address Field	Control Domain	Frame Head Check	LLC Frame Head	COS EM (APDU)	Data Frame Check	0x7e
------	-----------------------------	---------------------------	----------------------	----------------	------------------	----------------	---------------	------------------	------

The destination address: upper HDLC address $\leq 0x001F$;

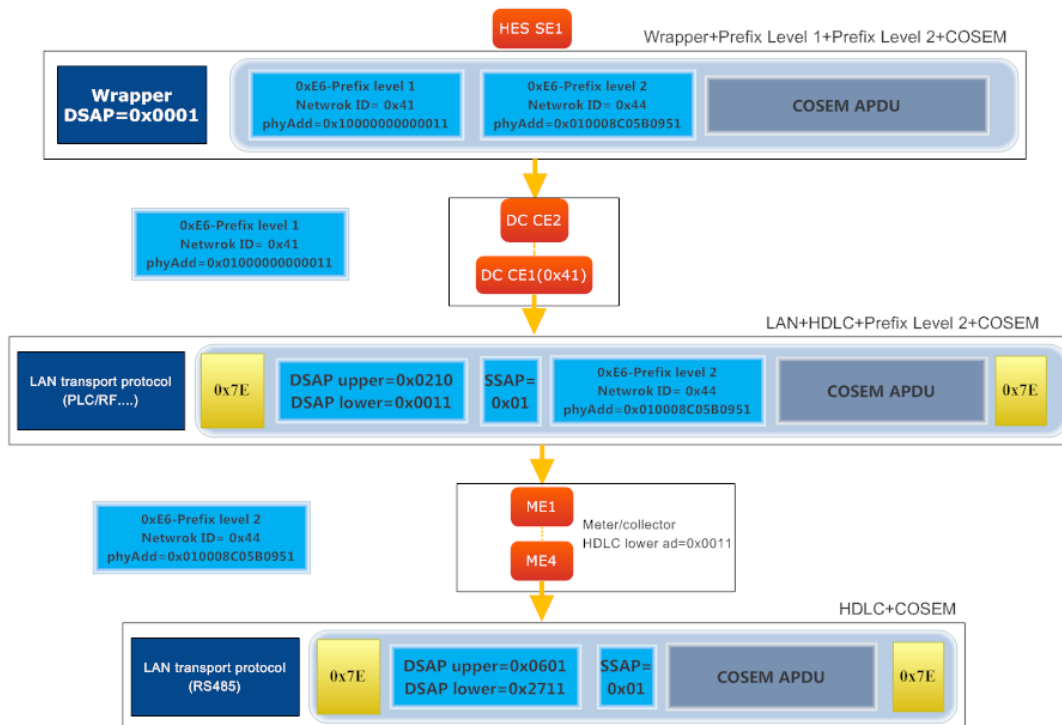
6.1.2 Gateway Protocol Forwarding

The Gateway forwarding is carried out according to the destination channel (network ID) in prefix and the physical address. In this forwarding protocol, the wrapper and HDLC are not nested, and the data domain content of all transmissions is prefix+APDU(COSEM); According to its own channel, the communication device packages MAC and data link layer for data communication;

6.1.2.1 Channel Occupancy Forwarding

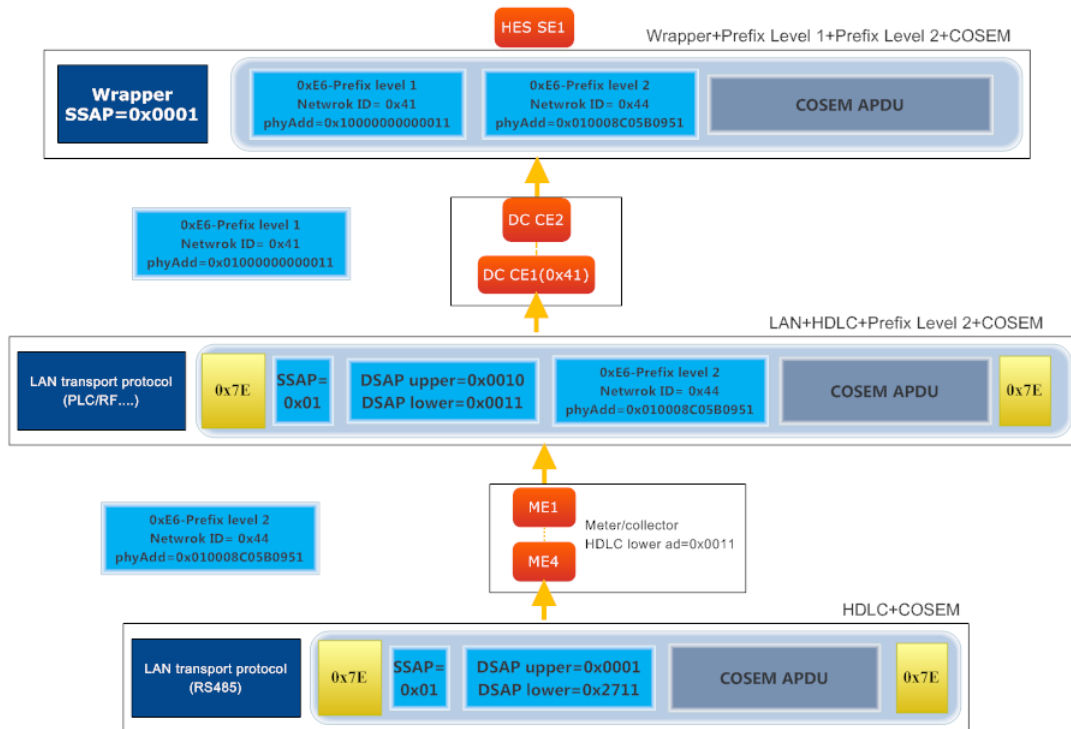
Corresponding to the channel occupancy forwarding, the superior equipment task is in the waiting status, and records and forwards the port information in task status and packs and delivers the data to the first level device after the data replies. Then the channel is released

Gateway Frame Architecture 1



Corresponding to the channel occupancy forwarding, the superior equipment task is in the waiting status, and records and forwards the port information in task status and packs and delivers the data to the first level device after the data replies. Then the channel is released.

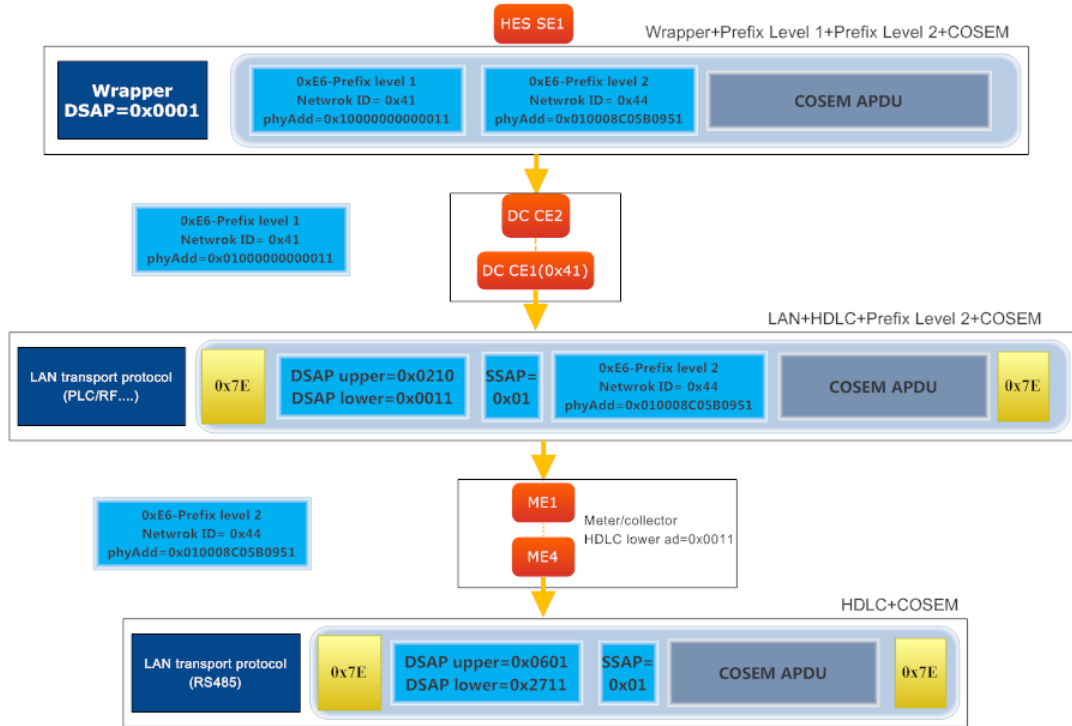
Gateway Frame Architecture 2



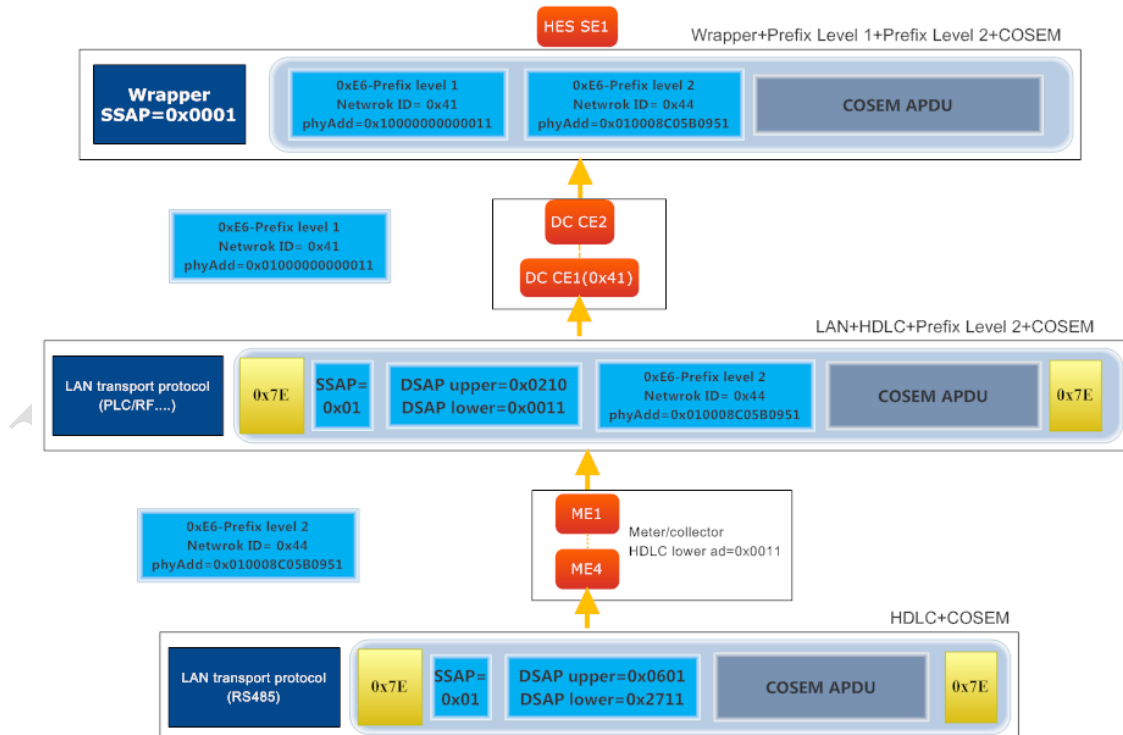
6.1.2.1 Address Conversion Forwarding

During the forwarding process, the forwarding port is marked to the next level of HDLC data frame, the forwarding task does not need to pause the current task of the channel passing through, and there is no need to wait for timeout. After the target replies the data, step by step reply will start according to the marked port number of each level;

Gateway Frame Architecture 3



Gateway Frame Architecture 4



Annexure-B

Unified Meter DataCollection System

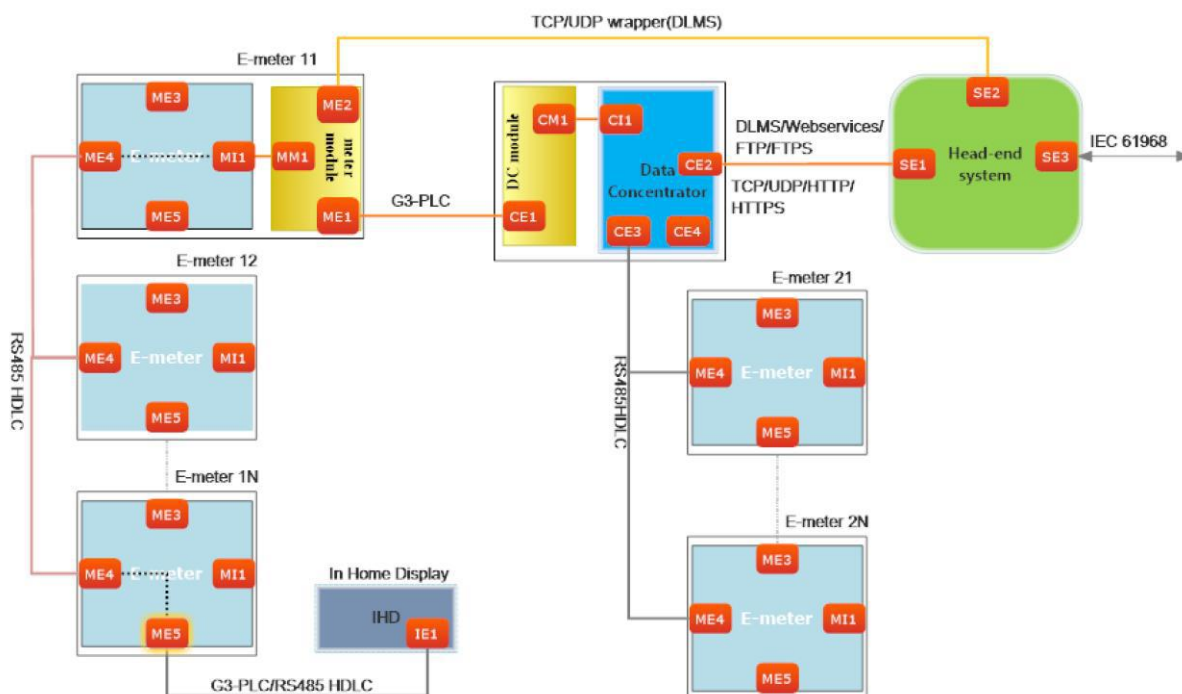
Meter Modeling

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1. Overview

The system interface architecture of the device is shown in the following figure; the electric energy meter, concentrator and front end system are simplified into several interfaces marked with correspondent code name respectively;

System Architecture



Device functions & Interoperability Interfacing Requirements are composed of 3 parts, including:

- Package 0: Addressing System**
- Package 1: DCU to HES**
- Package 2: Meter Modeling**

2. DLMS Client / Server Application Layer Description

2.1 Client / Server Architecture Description

The data exchange between the data acquisition system and the collected equipment, should refer to the communication mode of the client / server AP specified by DLMS. The client AP initiates the access request and the server AP responds, which is a question and answer communication mechanism; and the role of server AP is specified to be assumed by the meter or module.

By means of access management, one server AP can exchange data with one or more client APs at the same time, and a client AP can also access one or more server APs at the same time.

In addition to the normal question and answer mechanism, if there are abnormal events in the server AP, the event can be reported through the prescribed format. The three-layer architecture of DLMS is shown in the following figure::

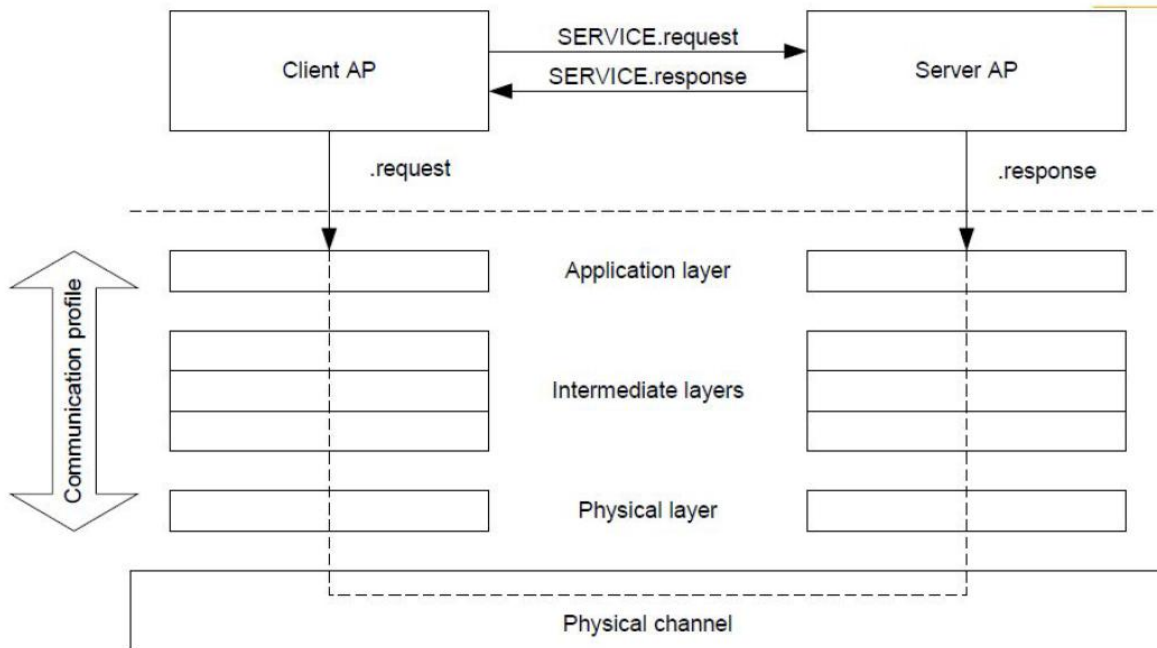


Figure 2 – Client/server relationship and protocols

Level 1: Physical Device Layer

Level 2: Logical Device/Intermediate Layer

Level 3: COSEM Application Layer

The physical device mentioned here may include multiple logical devices (for example, multiple logical devices in one physical device may communicate with different logical device addresses by using the same physical address, so as to be able to access meter or communication Module - two logical devices independently); For the energy meter, base meter, the default address of the logical device is:

ServerSAP = 0x01;

Each logical device has an object representing its logical device name, the default logical device name of OBIS:

(1, 0-0:42.0.0.255, Class ID: 1)

Each logical device supports up to 5 types of COSEM clients based on different communication interfaces and project requirements:

- Public Client (SAP: 016)
- Pre-established Client (SAP: 102)
- Management Client (SAP: 001)
- Reading Client (SAP: 002)
- Module Client (SAP: 096)

Public client (SAP: 016); Without any security level protection, it can only read the most basic information about the device, such as serial number, logical device name, SAP support list, etc .; can not program or set.

Pre-link client (SAP: 102); does not need to establish application layer connection; pre-link client link has been there, can not be disconnected, mainly is used to improve the reading efficiency of remote communications. In addition to pre-link and module client, all other clients need to establish application-layer connection through AARQ; support for reading of necessary data items and programming of a small amount of data.

Management Client (SAP: 001); has administrator rights to operate the electricity meter, can do all the operations.

Read client (SAP: 002); for reading data locally and remotely, able to read almost all data items, but without programming and setting permissions.

Module client (SAP: 096); MI1 interface for data exchange between the meter and the module, pre-link, can read and program some module-related data items; only the MI1 interface supports this client

Client	Functions	Descriptions
Public Client	Read the basic data	Used for local and remote communication; Security level: No security certification Establish the connection via AARQ
Pre-link Client	Read and set some specified data items	Used for remote communication, pre-link, security certification is not required;
Management Client	Own all the administrator permissions for the read/write/action	Used for local and remote communication Security level: HLS (LLS) Establish the connection via AARQ
Read Client	Used for data reading	Used for local and remote communication Security level: HLS (LLS) Establish the connection via AARQ
Module client	User built-in module access the meter quickly	Used for MI1 pre-link, security certification is not required;

2.2PDU maximum size (ServerMaxReceivePduSize)

Electricity Meter, the default maximum negotiated APDU size is 1024 bytes; however, depending on the project and the communication scheme, adjustments may be made

ServerMaxReceivePduSize = 1024 bytes (default) ;

3.3 DLMS Application Layer Service

Application layer service by default only supportsLN(logical Name);

ContextName = LONG_NAMES;

Version No.:

DLMS version= 6;

According to the description of the DLMS standard, the service types supported by the electricity meter are as follows:

Service	Conformance Block Bit
general-protection	1
general-block-transfer	2
block-transfer-with-get	11

block-transfer-with-set	12
multiple-references	14
data-notification	16
Get	19
Set	20
selective-access	21
action	23

For different clients, the default supported services are as follows:

Client	Functions
Public Client	Get block-transfer-with-get
Pre-link Client	get set action data-notification general-block-transfer general-protection
Management Client	get block-transfer-with-get set block-transfer-with-set selective-access multiple-references action general-block-transfer general-protection
Read Client	get block-transfer-with-get selective-access multiple-references general-block-transfer general-protection
Module Client	get block-transfer-with-get set block-transfer-with-set selective-access multiple-references action general-block-transfer general-protection

For each client number with different logical device, there is an application layer connection object, Class15 (Association LN), used to describe the link information such as current link list, link status etc., in addition, you can also conduct HLS Authentication and the key modification through class 15; link object:
 "Current Association" (0-0:40.0.0.255, Class ID: 15)- current link object
 "Public Association" (0-0:40.0.1.255, Class ID: 15)
 "Management Association" (0-0:40.0.2.255, Class ID: 15)
 "Pre-established Association" (0-0:40.0.3.255, Class ID: 15)
 "Reading Association" (0-0:40.0.4.255, Class ID: 15)

3. Communication Interface

3.1 MI1

The MI1 interface is used for the base energy meter to communicate with the remote communication module MM1 interface in the meter and it is in the server mode. The module types that this interface can support include but are not limited to the following categories:

- Cellular(GPRS/WCDMA/LTE)
- PLC
- RF
- Ethernet
- RS485

interface	phy layer	Intermediate layer	COSEM
MI1	SmartII interface SmartIII interface	HDLC: Address length support: 1/2/4 bytes Support UI frame service; The default baud rate: 9600b/s N,8,1	Public Cent Pre-link clientManagement Client Read client Module client

3.2 ME1

The ME1 interface is used for remote communication and communicates with the CE1 interface of the concentrator, and it is in the server mode. The specific communication architecture is determined by the specific module. It should be noted in the package 1 that the remote channel accesses PDU data of the electricity meter through the ME1 interface, and after processing in the physical layer and link layer in the module, the data will be converted into an HDLC data format and transmitted to the electricity meter through the MM1 interface, the module will not conduct any process to the PDU data. For the details of data conversion, please refer to package 2; the interface of ME1 includes but not limited to the following categories:

- PLC
- RF
- RS485

interface	phy layer	Intermediate layer	COSEM
ME1	PLC RF RS485	6lowPan HDLC Wrapper	Public Cent Pre-link clientManagement Client Read client

3.3 ME2

The ME2 interface is used for remote communication and communicates with the SE2 interface of the HES, and it is in the server mode. The specific communication architecture is determined by the specific module. It should be noted in the package 1 that the remote channel accesses PDU data of the electricity meter through the ME2 interface, and after processing in the physical layer and link layer in the module, the data will be converted into an HDLC data format and transmitted to the electricity meter through the MM1 interface, the module will not conduct any process to the

PDU data. For the details of data conversion, please refer to package 2; the interface of ME2 includes but not limited to the following categories

- Cellular(GPRS/WCDMA/LTE)
- Ethernet

interface	phy layer	Intermediate layer	COSEM
ME2	Cellular(GPRS/WCDMA/LTE) Ethernet	Wrapper IPv4 IPv6 TCP/UDP	Public Cent Pre-link clientManagement Client Read client

3.4 ME3

ME3 interface is used for local communication, here mainly refers to the optical interface; and it is in server mode; can be used for local maintenance and programming settings

- optical port

interface	phy layer	Intermediate layer	COSEM
ME3	IEC62056-21 E	HDLC: Address length support: 1/2/4 bytes The default baud rate: 9600b/s N,8,1	Public Cent Management Client Read client

3.5 ME4

The ME4 interface is used for reading other types of utility meters such as water meters, gas meters, heat meters etc.; and it is in the client mode; this interface includes but not limited to the following communication types

- RS485

interface	phy layer	Intermediate layer	App layer
ME3	RS485	1.HDLC: Address length support: 1/2/4 bytes The default baud rate: 9600b/s N,8,1	1.COSEM:

3.6 ME5

MEE interface is used for communicating with the indoor display unit; and it is in server mode; this interface includes but not limited to the following types of communications:

- PLC
- RF
- RS485

interface	phy layer	Intermediate layer	COSEM
ME3	PLC RF RS485	HDLC: 6lowPan Wrapper	Public Cent Management Client Read client

4.6 HDLC Physical Address

Rules of HDLC device address default are as follows:

1. The value of the last four bits is 16-9999; set directly to the meter; For example: address: 037586937378, then RS485 HDLC address: decimal: 7378; hexadecimal number: 0x1CD2

2. The value of the last four bits is 0-15; set to meter after adding 10000; - HDLC prescribes 0-15 address, this area is not allowed to set; For example: address is: 037586930001, then HDLC address is: decimal: 10001; hexadecimal number: 0x2711;

If there is a duplicate address on the same bus during field installation, you can reset it; the range of addresses allowed to be reset is: 0x2720-0x27E7;

3.7 Communication Interface Settings

Each communication channel can be configured with the following objects:

- HDLC Setup3 (23, 0-3:22.0.0.255);
- Depending on the communication module, it is not configured in the meter; Depending on the communication module, it is not configured in the meter; □
- HDLC Setup 0 (23, 0-0:22.0.0.255);
- HDLC Setup 4 (23, 0-5:22.0.0.255);

4. DLMS Device Identification

This section is intended to show how devices are named according to the requirements of DLMS / COSEM. Each device corresponds to a unique name (serial number); Provide basis for third-party equipment registration, identification.

Device serial number: "Device ID7" COSEM object (1-0: 0.0.0.255, Class ID: 1);

This encoding is unique and by default is a string of 11 digits. Depending on different power company's requirements, this encoding rule will change to supporting a maximum of 14 digits; this code is set by the manufacturer to the device at the factory and is also printed on the device's panel

System ID(system title): According to different project requirements, each device has a unique 8-byte system identification code, which is fixed to the device before shipment. It is used for mutual authentication and identification between different vendors, different device types, and different device serial numbers in the same system. For details, please see section 5.1.

Logical device name: "COSEM Logical Device Name" COSEM object (0-0: 42.0.0.255, Class ID: 1). As described above, each physical device may correspond to multiple logical devices. The logical device name is a logical device unique identifier, and the specific encoding format is in Section 5.2.

4.1 System ID (SYSTEM TITLE)

Electricity Meter, Power Concentrator, Collector, HES, each device has a unique system ID (8 bytes). According to the definition of DLMS / COSEM, the system ID is as follows

Byte1	Byte2	Byte3	Byte4	Byte5(4-7)	Byte5(0-3)	Byte6	Byte7	Byte8
I	H	M	DT	FT	SNM	SNM	SNM	SNM

Byte1-3: "IHM" ASCII code, vendor identification number registered by the manufacturer in DLMS.

DT: Device type (001-255)

001: 1P BS (Terminal Base) Meter

002: 1P ANSI (Socket Base) Meter

003: 3P Direct Connection Meter

004: 3P CT connection Meter

005: 3P CT/PT connection Meter
 006: 1P DIN Meter
 007-029: Reserved
 030: Data Concentrator
 031: Data Collector(RS485 type)
 032...39: Reserved
 040: Head-end System
 041...049: Reserved
 050: HHU
 051...255: Reserved

FT: Function type. The corresponding position 1 indicates that the device has this function

- bit0=1 Disconnecter exists
- bit1=1 Load Management exists
- bit2=1 MulUlity meter is supported
- bit3=0 reserved

SNM: The last 8 digits of the device serial number;Stored in 28-bit SMN in hexadecimal.

For example, if the device serial number of a single-phase BS-mounted electricity meter (DT: 001) is: 37912345678 (0x0BC614E), with load control function and supports the ME4 interface (FT: 0111),Then the device system title is (hexcode).

Byte1	Byte2	Byte3	Byte4	Byte5(4-7)	Byte5(0-3)	Byte6	Byte7	Byte8
49	48	4D	01	7	0	BC	61	4E

4.2 Logical Device Name (0-0:42.0.0.255, Class ID: 1)

The name of the logical device in COSEM is 16 bytes and is defined as follows:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
I	H	M	DT	DT	DT	FT	FT

Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16
SNM	SNM	SNM	SNM	SNM	SNM	SNM	SNM

The values of DT, FT and SNM here are the same as the system ID, but the expression format is ASCII; if DT = 0x01, the ASCII code is "001" in the name of the logical device, accounting for 3 bytes.

4.3 Device ID

In addition to the above, the device ID also contains at least the following COSEM objects, depending on the project, the specific definition will be different

Device ID1 0-0:96.1.0.255: Device hardware serial number

Device ID2:0-0:96.1.1.255: Device type identification code

Device ID3:0-0:96.1.2.255: Asset name

Device ID4:0-0:96.1.3.255: GPS info

Device ID5:0-0:96.1.4.255: End user name

Device ID6:0-0:96.1.5.255: Power company certification code

5. Device Automatical Registration

Automatic device registration refers to the process of pushing the device's logical device name and IP address to the HES through the Data-notification service after the device is installed, and the HES reply that the device is successfully registered after receiving.

Automatic registration of the device for the electricity meter, it means through the MT1 interface, using the setting content of the push setup –on installation (0-7.25.9.0.255, class 40) object, send the registration information to the MT1 interface via the service of Data-notification; MI1 interface uses HDLC UI frame to transmit registration information by default; only pre-link client supports Data-notification service by default in the device.

After receiving the data frame, the communication module establishes the data link as soon as possible and reports the information to the upper level device. After the higher level device (concentrator or HES) receives the registration information and confirms it, it replies and set the information of “E_instal”to the meter's user information display (0-0: 96.13.1.255, class 1).

Long press the wheel button on the device for 10 seconds (LCD prompt "install_S"), you can trigger the device to automatically report the register information; At the same time, you can also configure the time of automatic registration and retransmission times, etc. by setting the push setup –on installation.

Push objects of automatical registration by default:

Logical device name: (1, 0-0:42.0.0.255, 2);

IPv4 Setup –local IP address (42, 0-0:25.1.0.255, 3);

6. Tariff Management

The electric meter can conduct time-sharing measurement for active, reactive and apparent electricity consumption. It can define up to eight tariffs, which means that the meter can be divided into eight different tariff measurement storage unit. The daily maximum can be divided into 24 periods, each time period corresponds to a unique tariff tag.

The tariff conversion of the electricity meter is based on the daily tariff table as the basic unit, the meter can pre-store up to 16 sets of daily tariffs table, support for 50 special holidays by default; And then select corresponding daily tariff table according to the holiday tariff schedule, seasonal tariff schedule, weekly tariff table to achieve period tariff conversion in different holidays, different seasons, different workdays in a week.

During the tariff management process of the electricity Meter, the COSEM need to be involved as follows:

The objects need to be set during the tariff configuration:

- Special Days Table (0-0:11.0.0.255, Class ID: 11);-Current holiday table
- Passive Special Days Table (0-0:11.0.1.255, Class ID:11);-Spare holiday table
- Activity Calendar (0-0:13.0.0.255, Class ID: 20);-Activity calendar tariff schedule
- Default Energy Tariff in Case of Invalid Clock (0-0:96.14.9.255, Class ID: 1);-Time error default energy tariff
- Default Max. Demand Tariff in Case of Invalid Clock (0-0:96.14.10.255, Class ID: 1);- Time error demand tariff

Auxiliary Return (read) Object:

- Clock (0-0:1.0.0.255, Class ID: 8);-Time
- Tariffication Script Table (0-0:10.0.100.255, Class ID:9);-Tariff switch script
- Passive Tariffication Script Table (0-0:10.1.100.255, Class ID:9);-Standby tariff switch script
- Register Activation- Energy(0-0:14.0.1.255, Class ID: 6);- Activity energy register
- Register Activation- Maximum Demand (0-0:14.0.2.255, Class ID: 6);-Activity demand register
- Currently Active Energy Tariff (0-0:96.14.0.255, Class ID: 1);-Current energytariff

- Currently Active Maximum Demand Tariff (0-0:96.14.1.255, Class ID: 1);-Current demand tariff
- Energy Registers (... , Class ID: 3)-Energy register (1.8.0...)
- Maximum Demand Registers (... , Class ID: 4)-Demand register (1.6.0...)

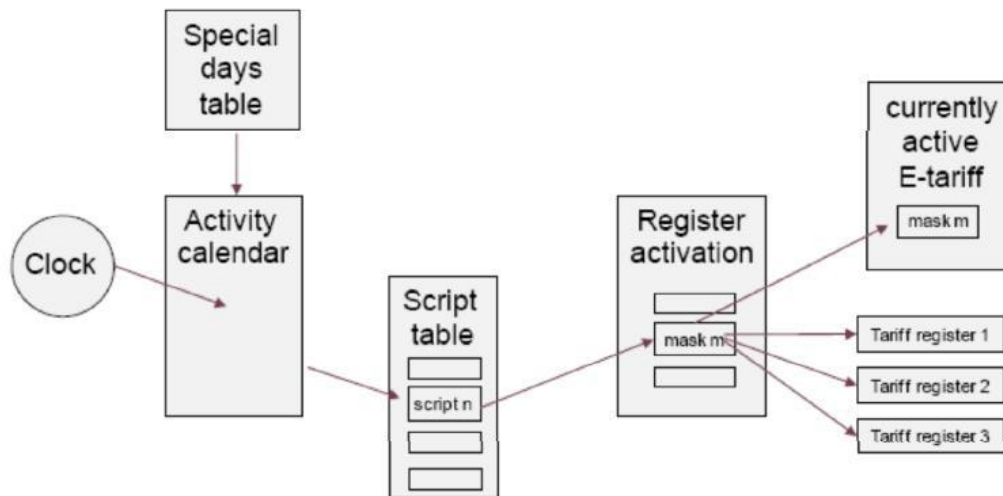


Figure 11: Tariffication Process

Tariff conversion diagram

6.1 Default Tariff

If the device clock fails, then the equipment needs to measure the consumption in accordance with the default tariff set; default tariff settings for the following two COSEM objects:

- Default Energy Tariff in Case of Invalid Clock (0-0:96.14.9.255, Class ID: 1);
 - Default Max. Demand Tariff in Case of Invalid Clock (0-0:96.14.10.255, Class ID: 1);
- The above two objects can be set up locally or remotely

6.2 Current Tariff

The current running tariff can be obtained by reading the following two objects

- Currently Active Energy Tariff (0-0:96.14.0.255, Class ID: 1);
- Currently Active Maximum Demand Tariff (0-0:96.14.1.255, Class ID: 1);

7. Meter Measurement Data

The acquisition of measurement data of the electricity meter can be carried out through "GET" or "data-notification" service. All the measurement data supported by the electricity meter can be found in the following locations according to different projects.

"Reigster IC 3 Energy"

"Reigster IC 3 parameters"-----"Related parameter of power operation"

"Ext. Reigster IC 4"

The default measurement accuracy is as follows:

Parameter	Unit	Resolution	Scalar
Current	A	0.01	-2
Voltage	V	0.1	-1
Energy (1P, 3P-DC and 3P-CT)	Wh/VARh	1	0
Energy (CT/PT Meter)	Wh/VARh	0.1	-1
Power Factor	-	0.001	-3
Frequency	Hz	0.01	-2
Harmonics Parameters	%	0.1	-1

8. Curve Type

8.1 Curve

The COSEM objects of all the curves can be found in the following positions in the «OBIS data item details» according to different projects, which are generally divided into four categories: event record curve, power quality curve, bill curve and ME4 interface curve.

- ”Profile IC 7 Event records”-Event record
- ” Profile IC 7 load profile”-Power quality
- ” Profile IC 7 billing profile”-Bill
- ” Profile IC 7 ME4 profile”- Submeter reading

The table contains information about the default capture objects, optional capture objects, capture cycles, and maximum memory for all curves in this project; in addition,

The curve supports two modes of reading in the "selective-access" service, in the time period and the point of point; the curve in the default state:

For the event record curve, it need to capture the event code, and the code definition of the event refer to “Event_list”.

9. Power Quality

Power quality monitoring mainly includes the following items:

- Undervoltage and overvoltage;
- Phase loss (outage);
- Average voltage;
- Sudden drop and raise in voltage (CT/PT Meters);
- THD(CT/PT Meters);
- Each harmonic (CT/PT Meters);

It should be noted that, for a certain phase voltage within the same period of time, undervoltage / overvoltage / phase loss / voltage interrupt occurs only in a situation; overvoltage / undervoltage / phase loss/ voltage interruption threshold for determination cannot overlap; if one phase is under undervoltage / overvoltage / phase loss / state when the voltage interruption occurs, so the electricity meter will be considered undervoltage / overvoltage / phase event has been finished.

110%-200%Un	overvoltage
51%-90%Un	undervoltage
11%-50%Un	phase loss
0%-10%Un	voltage interruption

9.1 Undervoltage / Overvoltage

The electricity meter needs to monitor all undervoltage and overvoltage phenomena; if the amplitude of the voltage fluctuation is greater than the set threshold and the duration exceeds the set time, it is judged that the undervoltage / overvoltage event occurs; if the voltage is within Undervoltage / overvoltage condition, returns to normal voltage and maintains above the set threshold, the undervoltage / overvoltage event is over. According to the requirements of the project, over-voltage and under-voltage threshold can be set, setting range, overvoltage 110% -200% of the reference voltage, undervoltage 51% -90% of the reference voltage, unit is %; Set objects are as follows:

- Threshold for Under Voltage (class 3, 1-0:12.31.0.255, 2);

- Threshold for Over Voltage (class 3, 1-0:12.35.0.255, 2);

The default overvoltage judgment time is 15S, the undervoltage judgment time is 60S; the settable range is 1-180S; the start and end events use the same judgment delay, which can be modified by the following two objects:

- Time Threshold for Over Voltage (3, 1-0:12.44.0.255, 2);

- Time Threshold for Under Voltage (3, 1-0:12.43.0.255, 2);

If an overvoltage or undervoltage event has occurred; then the start and end event record needs to be recorded in the below curve:

- Power Quality Event Log (7, 0-0:99.98.4.255); (Specific capture object, please see “OBIS data item details”)

In addition, the electricity meter also records the total number of overvoltage / undervoltage events, the last time they occurred, the percentage of the voltage at the last trigger event relative to the reference voltage, and is stored in the following objects:

- Number of Under Voltage in Phase L1 (1, 1-0:32.32.0.255);

- Number of Under Voltage in Phase L2 (1, 1-0:52.32.0.255);

- Number of Under Voltage in Phase L3 (1, 1-0:72.32.0.255);

- Dura on of Last Under Voltage in Phase L1 (3, 1-0:32.33.0.255);

- Dura on of Last Under Voltage in Phase L2 (3, 1-0:52.33.0.255);

- Dura on of Last Under Voltage in Phase L3 (3, 1-0:72.33.0.255);

- Magnitude of Last Under Voltage in Phase L1 (3, 1-0:32.34.0.255);

- Magnitude of Last Under Voltage in Phase L2 (3, 1-0:52.34.0.255);

- Magnitude of Last Under Voltage in Phase L3 (3, 1-0:72.34.0.255);

- Number of Over Voltage in Phase L1 (1, 1-0:32.36.0.255);

- Number of Over Voltage in Phase L2 (1, 1-0:52.36.0.255);

- Number of Over Voltage in Phase L3 (1, 1-0:72.36.0.255);

- Dura on of LastOver Voltage in Phase L1 (3, 1-0:32.37.0.255);

- Dura on of LastOver Voltage in Phase L2 (3, 1-0:52.37.0.255);

- Duration of LastOver Voltage in Phase L3 (3, 1-0:72.37.0.255);

- Magnitude of Last Over Voltage in Phase L1 (3, 1-0:32.38.0.255);

- Magnitude of Last Over Voltage in Phase L2 (3, 1-0:52.38.0.255);

- Magnitude of Last Over Voltage in Phase L3 (3, 1-0:72.38.0.255);

9.2 Phase loss

If the meter detects that the grid voltage is lower than the set phase loss threshold and the duration is greater than the set threshold, then the phase loss event is considered as occurring. If the grid voltage is restored to normal and continues for longer than the set threshold time, it is considered that the phase loss event has ended. The start and end events of phase loss in any phase of L1, L2, and L3 need to be recorded in the lower curve

- Power Quality Event Log (7, 0-0:99.98.4.255);
Configuration objects for phase-missing event thresholds:
- Threshold for Voltage Cut(Class ID: 3, 1-0:12.39.0.255,2);Default value: 50% Vref;setting range 11%-50%;
- Time Threshold for Voltage Cut (Class ID: 3, 1-0:12.45.0.255,2);Default value: 30 seconds, setting range 1-180 seconds;

9.3 Average Voltage

The electricity meter can monitor the average value of each phase voltage over a period of time, the calculation cycle can be set in the range of 1-60 minutes with the COSEM object, the default calculation period is 10 minutes, the calculation must be at least 1 cycles before an average, then all phases power down, it does not calculate; Related COSEM objects are as follows;

- MeasurementPeriod 3 for Instantaneous Value (3, 1-0:0.8.2.255, 2)-Calculation period, default 10min, 1-60分钟;
- Average voltage L1 (Class ID: 3, 1-0:32.24.0.255);-L1 average voltage
- Average voltage L2 (Class ID: 3, 1-0:52.24.0.255);-L2 average voltage
- Average voltage L3 (Class ID: 3, 1-0:72.24.0.255);-L3 average voltage

According to EN 50160's weekly average voltage pass rate requirements, and based on the average voltage calculated above, the electricity meter carry out the statistics of pass rate for each of the above calculated average voltage within the past seven days; If in the past 7 days (the default calculation period: start from 0:00 every Sunday), the average voltage greater than 5% exceeds the range of +-10% Uref, the it needs to record the voltage and quality difference events in the following curves.

- Power Quality Event Log (7, 0-0:99.98.4.255);

The event code corresponding to the voltage quality difference is as follows:

- Event Code 92: Bad Voltage Quality L1
- Event Code 93: Bad Voltage Quality L2
- Event Code 94: Bad Voltage Quality L3

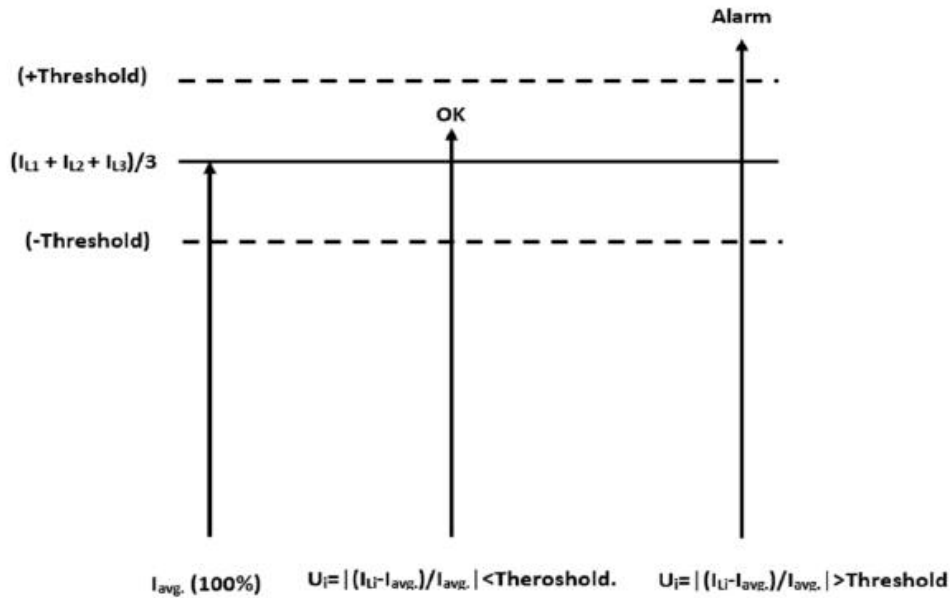
9.4 Harmonic/THD Measurement (3P CT/PT Meters)

For the CT / PT meter, the watt-hour meter has the function of measuring and recording the 31st harmonic component. At the same time, the THD harmonic content of each phase voltage and current can be recorded separately. The corresponding COSEM object can be found in the OBIS list class3

9.5 Load Imbalance (Three-phase Meter)

If the current of each phase is greater than the set unbalanced load judgment current threshold and the difference between the average current value of any one phase and the average value of the three-phase currents is greater than the set judgment threshold, then it is considered that the load imbalance occurs, In this state, the UBL of the status word Profile Status 1 (1, 0-0: 96.10.1.255) in all the curves will be set; at the same time, a load imbalance event will also be generated (specific event code referring to event code List) and recorded in the following curve

- Power Quality Event Log (7, 0-0:99.98.4.255);



As shown in the above figure, I_{Li} is the average current value of the previous calculation period of L_i phase; the calculation period of this average current is determined by the capture period set in the average curve (class ID: 7,1-0:99.133.0.255) Default value is 15 minutes). When a new average value is calculated, the electricity meter will judge whether it is in the unbalanced load power supply mode according to the above rules, and confirm whether to report the event according to the setting.

It should be noted that the calculation of the average must be full cycle; related settings COSEM object:

UnbalanceLoad Detection (1, 1-0:96.98.15.255)

The data structure of this object is as follows:

```

{
    long_unsigned minimum current that activate unbalance task inmeter (default
1A)
    long_unsigned Unbalance threshold (default 50%)
}

```

Current object used to determine the imbalance event:

Last Average Value of Current L1 (3,1-0:31.25.0.255,2)

Last Average Value of Current L2(3,1-0:51.25.0.255,2)

Last Average Value of Current L3(3,1-0:71.25.0.255,2)

10. Maximum Demand

Demand: the average power within the specified time.

Period of demand: a continuous equal interval of time for measuring the average power.

Maximum Demand: The maximum value of demand recorded during a specified period of time.

10.1 The Maximum Demand Calculation Instructions

- In the agreed time interval (usually a month or a meter reading settlement cycle), measure the forward active, reverse active, combined reactive 1, combined reactive 2, forward apparent, reverse apparent maximum demand; Sub-period forward active, reverse active, combined reactive 1, combined reactive 2, forward apparent, reverse apparent maximum demand and the date and time of maximum demand occurs.

- The maximum demand measurement can be programmed to choose slip mode or interval mode.

- Demand cycle and slip time can be set.

- Demand cycle can be selected in 5,10,15,30,60 min.

Slip demand cycle slip time can be selected in 1, 2, 3, 5min.

The demand cycle should be an integral multiple of 5 for the slip time. Factory default: demand cycle 15min, slip time 3min.

- The maximum demand measurement is continuous

The measurement of the maximum demand for each tariff period is carried out within the complete measurement period of the corresponding tariff period.

When power-on, reset, clock adjustment, period conversion, demand cycle changes, power flow direction conversion, etc. occurs on the voltage line, the meter should start from the current moment, measure the demand according to demand cycle.

When the first demand cycle is completed, start the maximum demand record according to the slip interval.

In the incomplete demand cycle, do not record the maximum demand

10.2 Maximum Demand Settlement

- Automatic settlement: At the appointed daily / monthly settlement day at zero hour, the meter automatically stores the maximum demand and the date and time of the maximum demand within the settlement day / month; and makes the current maximum demand register unit Reset, restart maximum demand calculation of the new meter reading settlement date / month.

- Manual settlement: When the meter parameters are set or the operating conditions are changed, the maximum demand for the current meter settlement date / month needs to be recalculated. You can calculate the maximum demand with the sealing device on the panel Key to make the energy meter store the maximum demand and the date and time of the maximum demand in the settlement cycle; and reset the current maximum demand register unit, and re-calculate the maximum demand of the new meter reading settlement day / month .

Note: Demand automatic settlement and manual settlement mode can be set, the two settlement methods can not be valid at the same time.

10.3 Maximum Demand Clearance

- The electric energy meter can achieve maximum clearance through the infrared communication interface. The maximum demand clearance has a programming switch and password limit.

- In automatic settlement mode, reset the maximum demand register unit in this settlement day / month by using the maximum demand settlement button with sealing device on the panel.

10.4 Maximum Demand Storage

Meter can store the maximum demand each month and the maximum demand occurred date and time of the past 13 months,

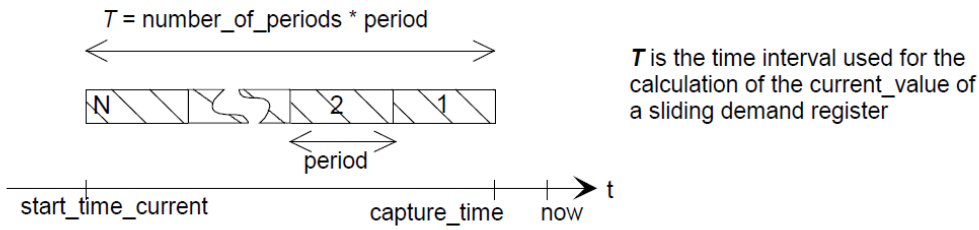
		Monthly Data	Daily Data
Forward Active Maximum Demand	Total, per phase, per rate	13 months	124 days
Reverse Active Maximum Demand	Total, per phase, per rate	13 months	124 days
Reactive Maximum Demand Combination 1	Total, per phase, per rate	13 months	124 days
Reactive Maximum Demand Combination 2	Total, per phase, per rate	13 months	124 days
Forward Apparent Maximum Demand	Total, per phase, per rate	13 months	124 days
Reverse Apparent Maximum Demand	Total, per phase, per rate	13 months	124 days

10.4 Maximum Demand Calculation Object (Class ID5)

For the above calculation, the class structure of Class ID5 is implemented. The structure contains the current average value, the previous average value, the previous average value generation time, the current period starting time, and the calculation period as shown in the following figure:

Demand register		0...n	class_id = 5, version = 0			
Attributes		Data type	Min.	Max.	Def.	Short name
1.	logical_name (static)	octet-string				x
2.	current_average_value (dyn.)	CHOICE			0	x + 0x08
3.	last_average_value (dyn.)	CHOICE			0	x + 0x10
4.	scaler_unit (static)	scal_unit_type				x + 0x18
5.	status (dyn.)	CHOICE				x + 0x20
6.	capture_time (dyn.)	octet-string				x + 0x28
7.	start_time_current (dyn.)	octet-string				x + 0x30
8.	period (static)	double-long-unsigned	1			x + 0x38
9.	number_of_periods (static)	long-unsigned	1		1	x + 0x40
Specific methods		m/o				
1.	reset (data)	o				x + 0x48
2.	next_period (data)	o				x + 0x50

The calculation cycle = period * number_of_periods demand for period and number_of_periods, can be individually set, when number_of_periods > 1, as the row difference calculation method, when the number_of_periods = 1 as interval calculation; number_of_periods set the range of 1-60; period can choose between 300, 600, 900, 1800, 3600 seconds; as shown below:



The demand object has two values: the current average value and the last average value.

The current average value refers to the calculated value from the beginning time of the current demand calculation cycle to the current time cumulative energy / T (period * number_of_periods).

The last average refers to the value calculated from the start time of the current demand calculation cycle and the energy / T (period * number_of_periods) accumulated at the end of the previous period;

Note: the last average value is updated after every period. When the last average value is greater than the value in the corresponding object in classID 4, the maximum demand in classID 4 will be updated.

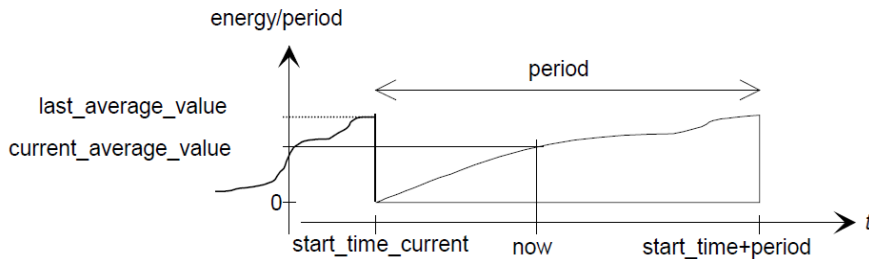
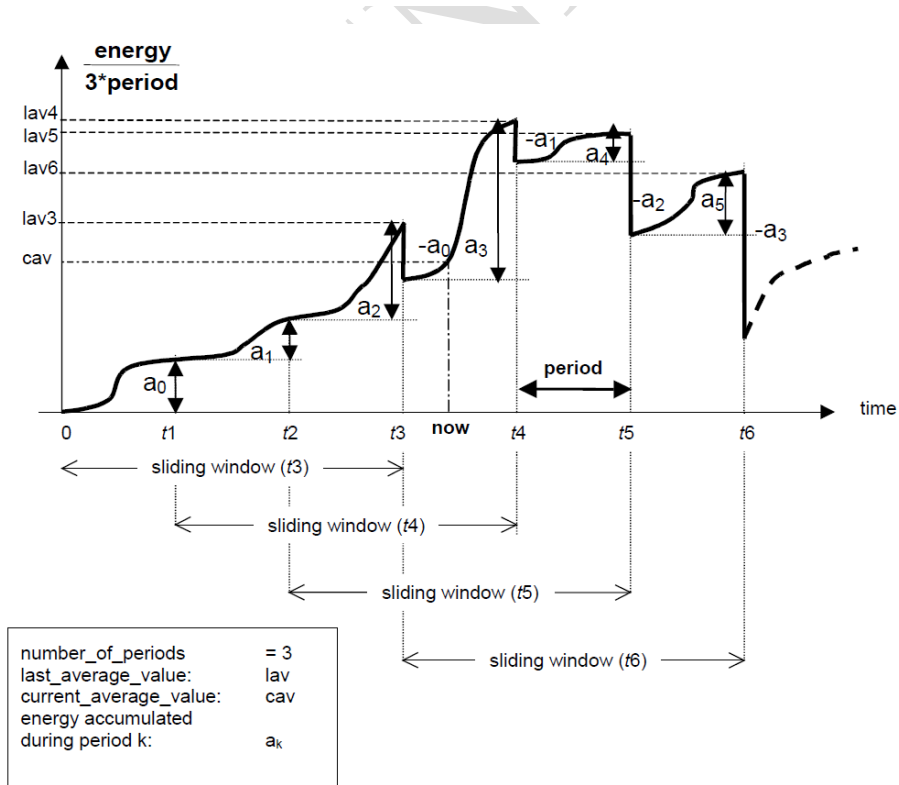


Figure 9 – The attributes in the case of block demand



11. Voltage Interruption

After the meter has been powered up for a minimum of 5S (configurable 1-120s, minimum 5S by default) and the voltage supply at any phase of the meter is below the minimum voltage supply (0.1 Uref by IEEE) A voltage interruption will occur. When the voltage interruption time is greater than or equal to the setting of "Time Threshold for Long Power Failure" (0-0: 96.7.20.255, Class ID: 3) (default 3 minutes, 1-30 minutes configurable range).It is considered as Long time voltage interrupt event;

If the voltage interruption time is less than the long power failure , it is considered that a short voltage interruption event. If the voltage interruption event occurs on all the voltages of the phases, the power down event occurs.

- Short Power Failure/Interruption (Simply "Power Failure");
- Long Power Failure/Interruption;
- Power Down;

Short Power Failure event will not be recorded, but the number occurrence is recorded in the following objects:

- Number of Short Power Failures in All Phases (0-0:96.7.0.255,Class ID: 1);
- Number of Short Power Failures in L1 (0-0:96.7.1.255,Class ID: 1);
- Number of Short Power Failures in L2 (0-0:96.7.2.255,Class ID: 1);
- Number of Short Power Failures in L3 (0-0:96.7.3.255,Class ID: 1);
- Number of Short Power Failure in Any Phases (0-0:96.7.21.255,Class ID: 1);

After a Long Power Failure event occurs at any phase or all phase voltages, at the end of the event; the end time of the event, the type of event, and the duration are recorded in the "Power Failure" event curve;

At the same time, the number of occurrence of such events and the duration of the last long voltage interruption shall be separately recorded in the data items of class 1 and class 3 below;

- Power Failure event log (1-0:99.97.0.255,Class ID: 7)
- Number of Long Power Failures in All Phases (0-0:96.7.5.255,Class ID: 1);
- Number of Long Power Failures in Phase L1 (0-0:96.7.6.255,Class ID: 1);
- Number of Long Power Failure in Phase L2 (0-0:96.7.7.255,Class ID: 1);
- Number of Long Power Failure in Phase L3 (0-0:96.7.8.255,Class ID: 1);
- Number of Long Power Failure in Any Phase (0-0:96.7.9.255,Class ID: 1);
- Duration of Last Long Power Failure in All Phases (0-0:96.7.15.255,Class ID: 3);
- Duration of Last Long Power Failure in Phase L1 (0-0:96.7.16.255,Class ID: 3);
- Duration of Last Long Power Failure in Phase L2 (0-0:96.7.17.255,Class ID: 3);
- Duration of Last Long Power Failure in Phase L3 (0-0:96.7.18.255,Class ID: 3);
- Duration of Last Long Power Failure in Any Phase (0-0:96.7.19.255,Class ID: 3);

The power up/power down events are recorded in "standard event log".

- standard event log (1-0:99.98.0.255,Class ID: 7)

Note:

1: overvoltage (110%-200%Uref), undervoltage (51-90%Uref), phase 10-50% (Uref) and voltage interruption ($\leq 10\%$ Uref) are mutually exclusive events which means only one event can happens at the same time. If voltage interrupt occurs at the time of undervoltage,the undervoltage event will end

12. Relay Control

The logic of the relay action in the electric energy meter is controlled by the following three ways:

- Remote Control;
- Manual;
- Locally (as internal process);

Remote control refers to the control of the relay through communication interface; manual control refers to control of relay by physical buttons on the meter; Local control refers to control of relay by judgment logic in the electric energy meter program, such as overload, overvoltage events which will activate the relay control; According to the definition of COSEM classID70, the relay control is divided into three states:

- Disconnected;
- Ready for Reconnection;
- Connected;

The conversion of the three states is shown in the following figure:

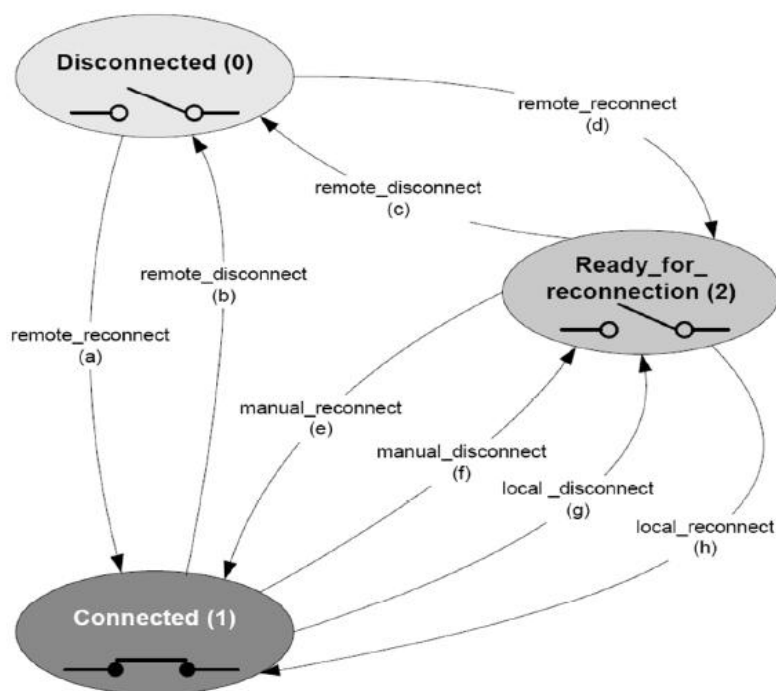


Figure 23: Disconnect Control, State Diagram and Transitions

As shown above, the three states of relay can be converted through 8 ways: "a" -- "H"; By configuring different control mode (70, 0-0:96.3.10.255, 4), the state switching method is selected, and the default state is control_mode = 6.

control _mode	Disconnection				Reconnection			
	Remote		Manual	Local	Remote		Manual	Local
enum:	(b)	(c)	(f)	(g)	(a)	(d)	(e)	(h)
(0)	–	–	–	–	–	–	–	–
(1)	x	x	x	x	–	x	x	–
(2)	x	x	x	x	x	–	x	–
(3)	x	x	–	x	–	x	x	–
(4)	x	x	–	x	x	–	x	–
(5)	x	x	x	x	–	x	x	x
(6)	x	x	–	x	–	x	x	X

NOTE 3 In Mode (0) the disconnect control object is always in 'connected' state.

NOTE 4 Local disconnection is always possible unless the corresponding trigger is inhibited.

Example: electric energy meter in mode 6, the current relay is disconnected. The remote system issues a remote reconnect command to the electric energy meter.

Mode 6 supports the path (d), the meter receives the command, the relay status will switch to ready_for_reconnection.

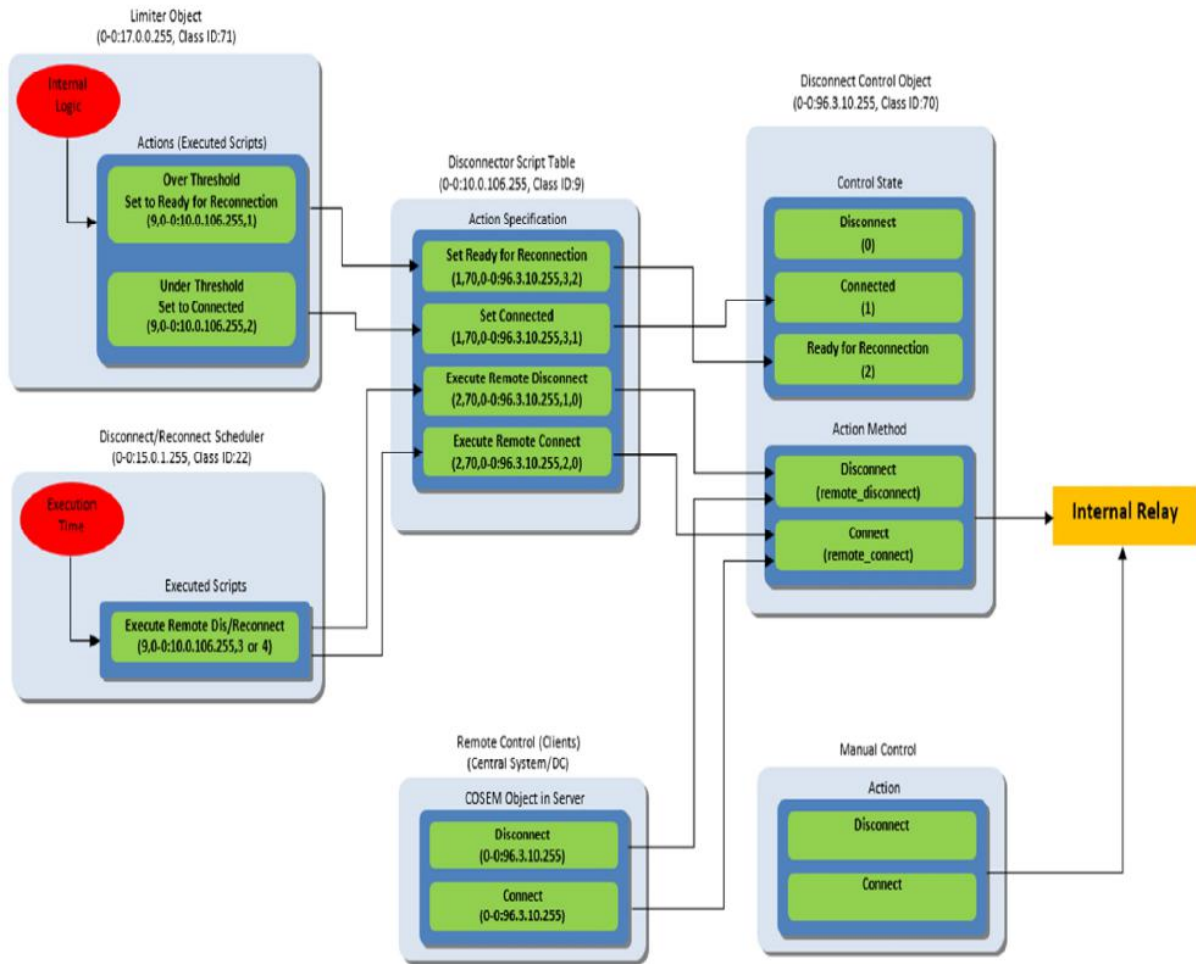
At this point if you want the relay closed (converted to connected) state, you need to operate through the path (e); the specific operation is done on physical keys;

12.1 Relay Control Related COSEM Objects:

The list of objects related to the relay control function is as follows:

- Disconnect Control (0-0:96.3.10.255, Class ID: 70)
- Disconnect/Reconnect Control Scheduler (0-0:15.0.1.255, Class ID: 22);
- Disconnect Script Table (0-0:10.0.106.255, Class ID: 9);
- Limiter (0-0:17.0.0.255, Class ID: 71);
- Reclosing Configuration (0-0:96.98.10.255, Class ID: 1);
- Supervision monitor L1 (21, 1-0:31.4.0.255);
- Supervision monitor L2 (21, 1-0:51.4.0.255);
- Supervision monitor L3 (21, 1-0:71.4.0.255);
- Limiter Activate Scheduler (22, 0-0:96.98.11.255);
- Limiter Threshold Scheduler (22, 0-0:96.98.12.255);
- Limiter Script Table (9, 0-0:96.98.13.255);

The following diagram is the logic block diagram of the relay control:



13. Billing

The electric energy meter can store the historical billing data history for 13 months. The bill function is described by class ID:22 calling script MDI Reset/End of Billing Period (class id:9, 0-0:10.0.1.255); the related OBIS code of the bill function is as follows:

- MDI Reset/End of Billing Period (class ID:9, 0-0:10.0.1.255);
- End of Billing Period 1 Scheduler (class ID:22, 0-0:15.0.0.255);
- Data of Billing Period 1 (monthly) (class ID:7, 0-0:98.1.0.255);
- Disable/Enable Manual Demand Reset (class ID:1,0-0:96.98.15.255);

The date of the bill is set through End of Billing Period 1 Scheduler (class ID:22, 0-0:15.0.0.255,4). By default, it is the 00:00:00 ("00000000", "FFFFFF01FF") on the first day of the month and the "FF" means not to specify. The action of settlement is as follows:

Maximumdemand in resetting month {class ID:4, 1-0:X.6.Y.255} (X is the power type, Y is the rate numbered) is all the data items in the register;

Freeze all required reading power data registers, store them in Data of Billing Period 1 (monthly) (class ID:7, 0-0:98.1.0.255);

Freeze all types of power data registers and store them in their monthly billing curves.

For the curve Data of Billing Period 1 (monthly) (class ID:7, 0-0:98.1.0.255,3), the capture objects can be configured according to project requirements, which is used for remote reading of monthly historical data. The list of capture objects is as follows:

The bill curve Data of Billing Period 1 (monthly) (class ID:7, 0-0:98.1.0.255,3) supports 50 capture objects, and storage of 13 historical bills can be set up according to different projects.

Different types of electric energy exist in the following curves respectively.

For specific projects, this kind of curve capture object cannot be set

Data of Billing of Period 1 (monthly) 1 (class, ID:7, 0-0:98.1.1.255) - all energy data

Data of Billing of Period 1 (monthly) 2 (class, ID:7, 0-0:98.1.2.255) - all demand data;

14. Meter Clock

Time by "Clock" COSEM object (0-0:1.0.0.255, Class ID 8), and time related items are as follows:

- Clock - time {class ID:8,0-0:1.0.0.255, 2}, - read and set the current time
- Clock -UTC{class ID:8,0-0:1.0.0.255, 3}, - minutes from UTC
- Clock - time state {class ID:8,0-0:1.0.0.255, 4}, - read-only
- Clock - summer time starting time {class ID:8,0-0:1.0.0.255, 5}
- Clock - summer time end time {class ID:8,0-0:1.0.0.255, 6},
- Clock - daylight saving time change time {class ID:8,0-0:1.0.0.255, 7}, - minutes of time change for daylight saving time conversion
- Clock - start summer time {class ID:8,0-0:1.0.0.255, 8}, - 1, activate summer time switching, 0, prohibit summer time switching
- Clock - time benchmark {class ID:8,0-0:1.0.0.255, 9}, - read-only

Time state corresponding bits:

bit 0 (LSB): invalid a value,

bit 1: doubtful b value,

bit 2: different clock base c,

bit 3: invalid clock status d,

bit 4: reserved,

bit 5: reserved,

bit 6: reserved,

bit 7 (MSB): daylight saving active

Time benchmarks:

enum (0) not defined,

: (1) internal crystal,

(2) mains frequency 50 Hz,

(3) mains frequency 60Hz,

(4) GPS (global positioning system),

(5) radio controlled

14.1 Time CalibrationEvent Record

When the time difference before and after calibration is greater than the value in the COSEM object "Clock Time Shi Limit" (Class ID 3,1-0: 0.9.11.255, 2), a calibration event record is generated and stored in the curve Standard Event log (0-0: 99.98.0.255, Class ID 7),

Two types of events need to be captured for the calibration event: 1.Clock Adjusted 1 (Event Code: 4) records the time before calibration; 2.Clock Adjusted 2 : 5) record the new time after calibration

If the time difference before and after proofreading is less than "Clock Time Shi Limit" (Class ID 3,1-0: 0.9.11.255, 2), no event record is generated; (Class ID 3,1-0 : 0.9.11.255, 2) The values can be configured in "Clock Time Shi Limit";

14.2 Display Item

For the LCD display item, the OBIS encoding of the time is as follows (this OBIS is used only for display):

- Local Time (1-0:0.9.1.255, Class ID 1);
- Local Date (1-0:0.9.2.255, Class ID 1);

15 . Firmware Update

The electric energy meter and its internal modules can run upgrade firmware through the communication interface; through the class IC DLMS/COSEM 18 image transfer service; electric energy meter / equipment can store two versions of firmware at the same time, support breakpoint and power off resume in the process of upgrading the firmware. Upgrade related objects are as follows:

- Image transfer (0-0:44.0.0.255, Class ID: 18);
- Image Transfer Activation Scheduler (0-0:15.0.2.255, Class ID: 22);
- Image Activation Script (0-0:10.0.107.255, Class ID: 9);
- Active Firmware Identifier (Metrology Relevant Firmware)(1-0:0.2.0.255, Class ID: 1);- version number
- Active Firmware Identifier 1 (Meter Application Relevant Firmware) (1-1:0.2.0.255, Class 1); - version number
- Active Firmware Identifier 2 (GPRS Communication Module Firmware) (1-2:0.2.0.255, Class1); - version number
- Active Firmware Signature (1-0:0.2.8.255, Class ID: 1); - verification and (digital signature)
- Active Firmware Signature 1 (1-1:0.2.8.255, Class ID: 1); - verification and (digital signature)
- Active Firmware Signature 2 (1-2:0.2.8.255, Class ID: 1); - verification and (digital signature)

The upgrade process is as follows:

Step1:Read image block size A (class 18 0.0.44.0.0.255 attribute 2) ;

Step2:Initiate image transfer(class 18 0.0.44.0.0.255 action 1);

Step3: transfer image block in size A from the first to the last (class 18 0.0.44.0.0.255 action 2)

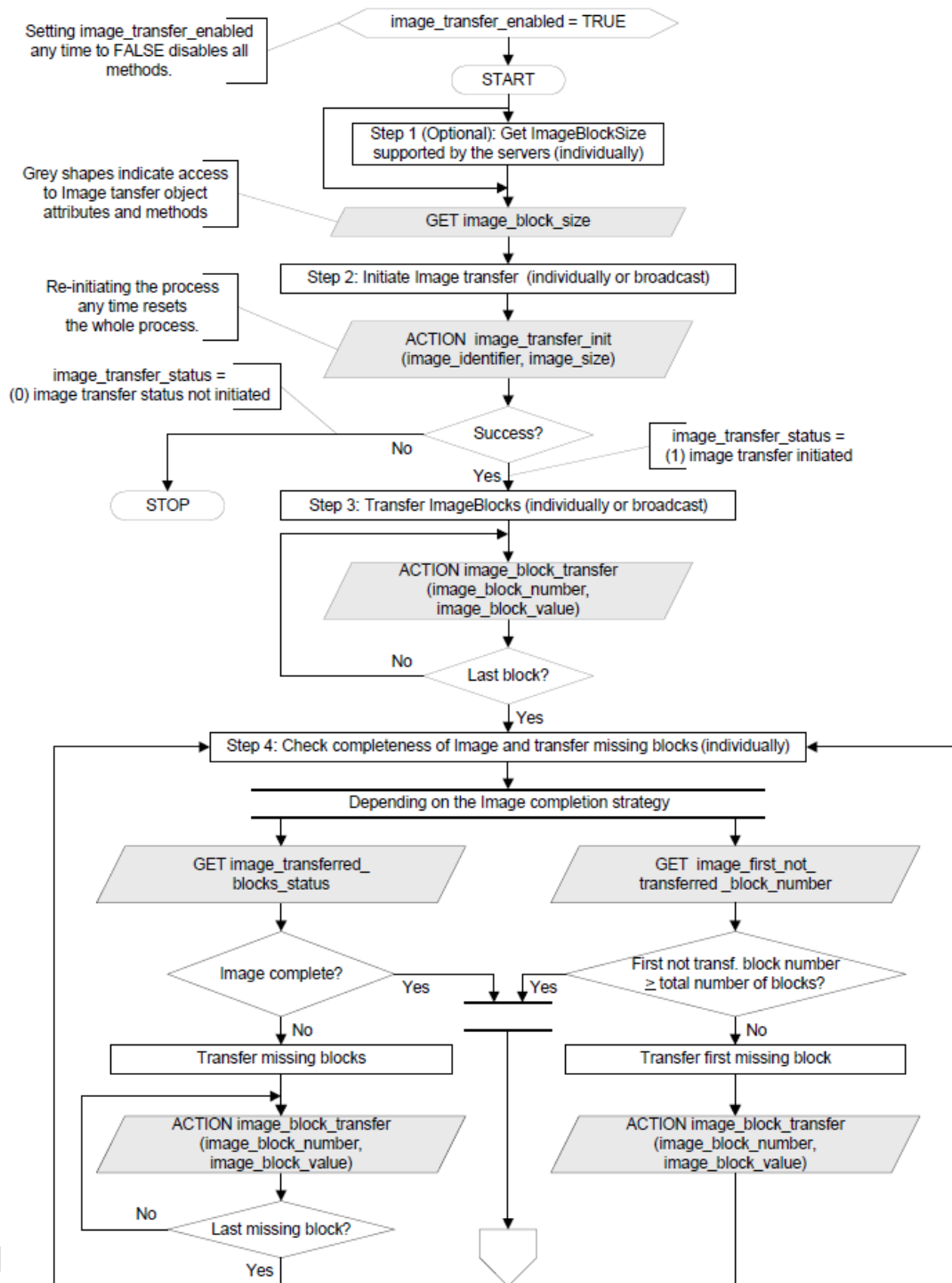
Step4:Read image transferred block status (class 18 0.0.44.0.0.255 attribute 3) ; if finished continue, otherwise transfer the missing blocks;

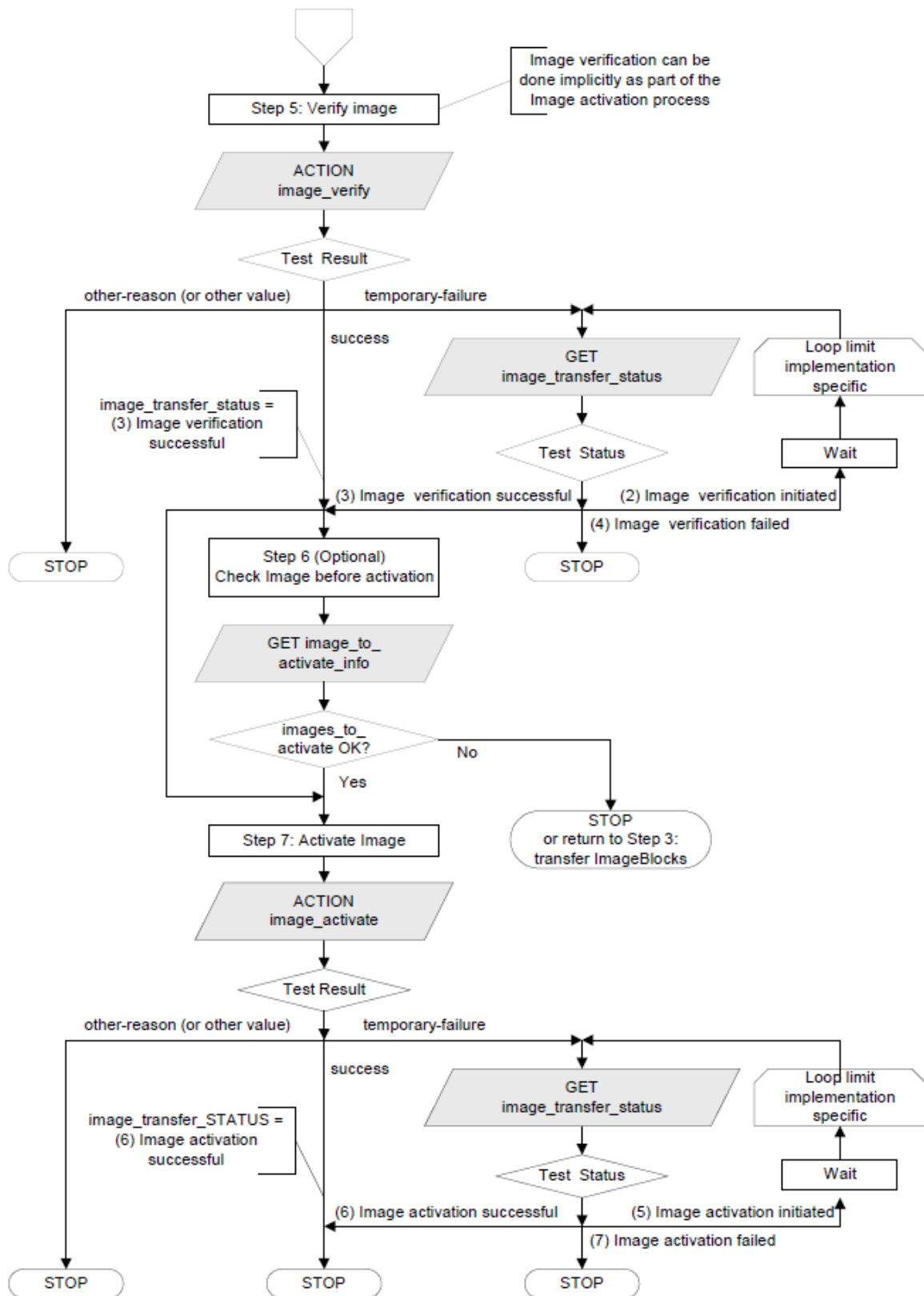
Step5:verify image (class 18 0.0.44.0.0.255 action 3);

Step6:set the new image activate time (class 22 0-0:15.0.2.255 attribute 4) or Activate Image Immediately(class 18 0.0.44.0.0.255 action 4)

Step7:end。

The flow chart is as follows:





15.1 Firmware Upgrade Event Record

There are the following types of events in the firmware upgrade process:

Firmware Ready for Activation event code: 17

Firmware Verification Failed, event code: 51

Firmware Activated, event code: 18

Firmware Ready for Activation event code: 17 event occurs when the upgrade package transfer is completed and verified.

If the verification fails then produce Firmware Verification Failed, event code: 51 event occurs.

When the new firmware is activated, a Firmware Activated, event code: 18 event is generated.

These three events are stored in Standard Event (log curve 0-0:99.98.0.255, Class, ID) in 7;

16. Event Management

Event log mainly records the time of occurrence of events, the types of events (event code), and the information when event occurred (depending on the type of events). There are mainly two kinds of information:

Normal event

Alarm event

Normal events are generally stored only through the event curve, and are not actively reported and alerted. Alarm events can be configured by configuring Alarm Filter 1 (1, 0-0: 97.98.10.255) / Alarm Filter 2 (1, 0-0: 97.98.11.255) to choose whether to take the initiative to report on specific events; The following is the event management related objects:

- Error register 1 (1,0-0:97.97.0.255);--Bit definition is the same as Alarm Register 1
- Alarm Register 1 (1, 0-0:97.98.0.255);
- Alarm Register 2 (1, 0-0:97.98.1.255);
- Alarm Descriptor 1 (1, 0-0:97.98.20.255);
- Alarm Descriptor 2 (1, 0-0:97.98.21.255);
- Alarm Filter 1 (1, 0-0:97.98.10.255);
- Alarm Filter 2 (1, 0-0:97.98.11.255);
- Alarm Monitor 1 (21, 0-0:16.1.0.255);
- Alarm Monitor 2 (21, 0-0:16.1.0.255);
- Push Script Table(9, 0-0:10.0.108.255);
- Push Setup-Alarm (40, 0-4:25.9.0.255);
- Standard Events Log (7, 0-0:99.98.0.255);
- Fraud Detection Events Log (7, 0-0:99.98.1.255);
- Disconnect Control Events Log (7, 0-0:99.98.2.255);
- Power Quality Event Log (7, 0-0:99.98.4.255);
- Communication Events Log (7, 0-0:99.98.5.255);
- Power Failure Events Log (7, 1-0:99.97.0.255);

16.1 Event Type And Curve Object

The default events are divided into the following seven categories:

- Standard Events Log (7, 0-0:99.98.0.255);
- Fraud Detection Events Log (7, 0-0:99.98.1.255);
- Disconnect Control Events Log (7, 0-0:99.98.2.255);
- Power Quality Log (7, 0-0:99.98.4.255);
- Communication Events Log (7, 0-0:99.98.5.255);
- Power Failure Event Log (7, 1-0:99.97.0.255);

Each event corresponds to different capture object.

The capture objects of event log are generally not configurable.

The storage method of event log curve is FIFO first in first out mode, and the maximum number of records depends on the project.

16.2 Events Reading

The events reading can be done selectively with class IC7 which supports reading of event log by point segment or time segment

If a new event occurs in the curve of one of the above types, the bit corresponding to "Unread_Log_Files_Status_Register" (1,0-0: 96.98.14.255,2) is set to 1,If this curve buffer is read, the corresponding bit is cleared.Remote system can read Unread_Log_Files_Status_Register and determine whether there is a new event occurred

16.3 Event Reporting

Alarm Register 1 (1, 0-0:97.98.0.255);

- Alarm Register 2 (1, 0-0:97.98.1.255);
- Alarm Descriptor 1 (1, 0-0:97.98.20.255);

- Alarm Descriptor 2 (1, 0-0:97.98.21.255);
- Alarm Filter 1 (1, 0-0:97.98.10.255);
- Alarm Filter 2 (1, 0-0:97.98.11.255);

The event reporting uses Data Notification Service of DLMS, when there is an event that needs to be reported, the alarm information is pushed to the system side. Every Alarm Register, Alarm Descriptor, and Alarm Filter are 32bit, and they have exactly the same definition of bits; each one representing an event type;



The above picture is the processing flow of event reporting:

1. Determine whether this type of event needs to be reported according to the configuration in Alarm Filter;
2. When there is an event that needs to be reported, the corresponding bit in Alarm Register is set to be "1".
3. If the corresponding bit of this event is "0" in the previous Alarm Register, then the corresponding bit in the Alarm Descriptor is "1";
4. Send alarm information to the superior system through Data Notification Service

16.3.1 Alarm Register

Alarm Register 1 (1, 0-0:97.98.0.255) of Alarm / Register 2 of (1, 0-0:97.98.1.255) corresponding to 32bit and a total of 64 types of events; Each bit indicates whether the current event is in the state, if the event has ended, then the corresponding bit in the Alarm Register is "0"

In addition, the value in Alarm Register can also be modified through the communication port, but only allowed to write "0".

If the event continues after being cleared, it will be reset to "1" by the meter.

16.3.2 Alarm Descriptor

- Alarm Descriptor 1 (1, 0-0:97.98.20.255);
- Alarm Descriptor 2 (1, 0-0:97.98.21.255);

Alarm Descriptor is used to describe whether the event has been successfully reported, when a bit is set to 1, it will send alarm information to the system side;

After receiving the report, the receiving system needs to write "0" to the corresponding bit in the Alarm Descriptor after receiving the report information, indicating that the report information has been received.

The system can also read the Alarm Descriptor to determine what events are in the reporting state.

16.3.3 Alarm Filter

- Alarm Filter 1 (1, 0-0:97.98.10.255);
- Alarm Filter 2 (1, 0-0:97.98.11.255);

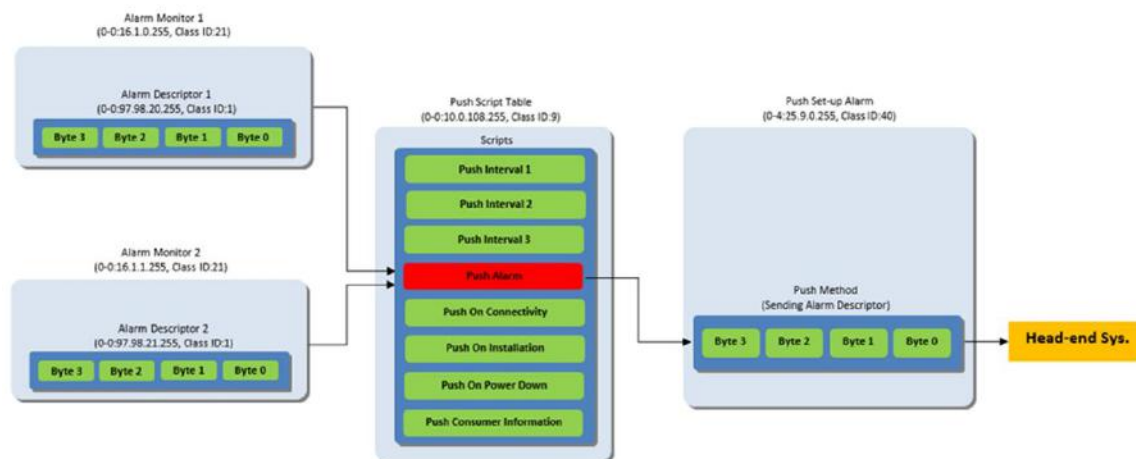
It is used to configure what events need to be reported.

16.3.4 Event Sending

Event reporting, as shown in Section 3.3, shows that Data Notification Service is only supported in the pre-linked client in default condition;

When events need to be reported, there is no need to establish links.

The following figure shows the event reporting process.



The message of event reporting is sent through the following objects:

- Alarm Monitor 1 (21, 0-0:16.1.0.255);
- Alarm Monitor 2 (21, 0-0:16.1.1.255);
- Push Script Table (9, 0-0:10.0.108.255);
- Push Setup Alarm (40, 0-4:25.9.0.255);

Alarm Monitor 1 (21, 0-0:16.1.0.255,3) and Alarm Monitor 2 (21, 0-0:16.1.1.255,3) monitor Alarm Descriptor 1 (1, 0-0:97.98.20.255,2) and Alarm Descriptor 2 (1, 0-0:97.98.21.255,2) respectively by default.

For Alarm Monitor 1 (21, 0-0:16.1.0.255,2) and Alarm Monitor 2 (21, 0-0:16.1.1.255,2) the default monitoring threshold value is "0"; when any value in the Alarm Descriptor is not "0", the default action script Push Script Table (9, 0-0:10.0.108.255) set in Alarm Monitor 1 (21, 0-0:16.1.0.255,4) and Alarm Monitor 2 (21, 0-0:16.1.1.255,4) is triggered, message reporting will be activated.

After the system end receives the report message, it will set the alarm bit in Alarm Descriptor to "0", then stop the alarm from generating again;

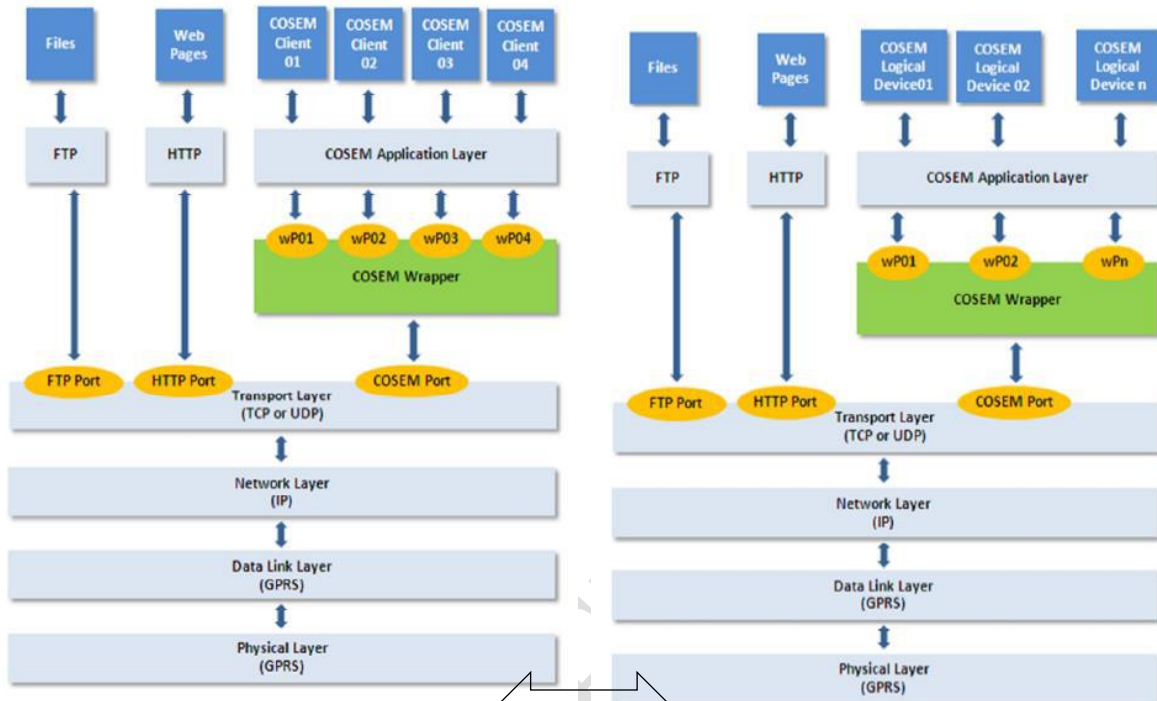
If for some reason the alarm information is not delivered, the alarm will be resent according to the retry delay Push Setup Alarm(40, 0-4:25.9.0.255,7) and the retry times Push Setup Alarm(40, 0-4:25.9.0.255,6);

The user can set the retry delay and the number of times;

17. GPRS Link

The link of GPRS is handled by the GPRS module, the corresponding class in the electric energy meter can only conduct read and setting, and do not realize the function.

When the GPRS module is powered on, the operation parameters are synchronized to the module. If the parameter changes, it is necessary to call the restart GPRS module script to load the parameters again. Structure is as shown below:



GPRS needs to configure all communication layers in the architecture diagram before establishing a communication link. The objects that need to be configured are as follows:

- Physical Layer Configuration:
GPRS Modem Setup (45, 0-0:25.4.0.255);
- Data Link Layer Configuration:
MAC Address Setup (43, 0-0:25.2.0.255);
PPP setup (44, 0-0:25.3.0.255)
- Network Layer Configuration:
IPv4 Setup (42, 0-0:25.1.0.255);
IPv6 Setup (48, 0-0:25.7.0.255)
- Transport Layer Configuration:
TCP-UDP Setup (41, 0-0:25.0.0.255);

17.1 Physical Layer Configuration(45, 0-0:25.4.0.255)

Configuring the following information by configuring COSEM object GPRS Modem Setup (0-0:25.4.0.255, Class ID 45):

GPRS-APN (Class ID 45, 0-0:25.4.0.255, 2); - If operators do not request, it can not be configured

GPRS-PIN_code (Class ID 45, 0-0:25.4.0.255, 3); - need not to be configured;

17.2 Data Link Layer Configuration

The data link layer contains objects MAC Address Setup and PPP Setup; configuration item:

MAC Address Setup (Class ID43, 0-0:25.2.0.255, 2) - MAC address needs not to be configured

"PPP Setup" -PPP authentication (Class ID 44, 0-0:25.3.0.255, 5) -- only supports PAP authentication, configures user-name and PAP-password, and needs not to be configured according to the operator's requirement.

17.3 Network Layer Configuration

The network layer is configured by class IC 42 IPv4 setup;

Configurable objects:

IPv4 Setup - local IP address (42, 0-0:25.1.0.255, 3); - can be set (static) or automatic acquisition (dynamic);

IPv4 Setup – DNS preferred (42, 0-0:25.1.0.255, 9); - the default is 8.8.8.8, and if a domain name access is required it needs to be set up;

IPv4 Setup - standby DNS (42, 0-0:25.1.0.255, 10); - the default is 0, and if a domain name access is required it needs to be set up;

17.4 Transport Layer Configuration

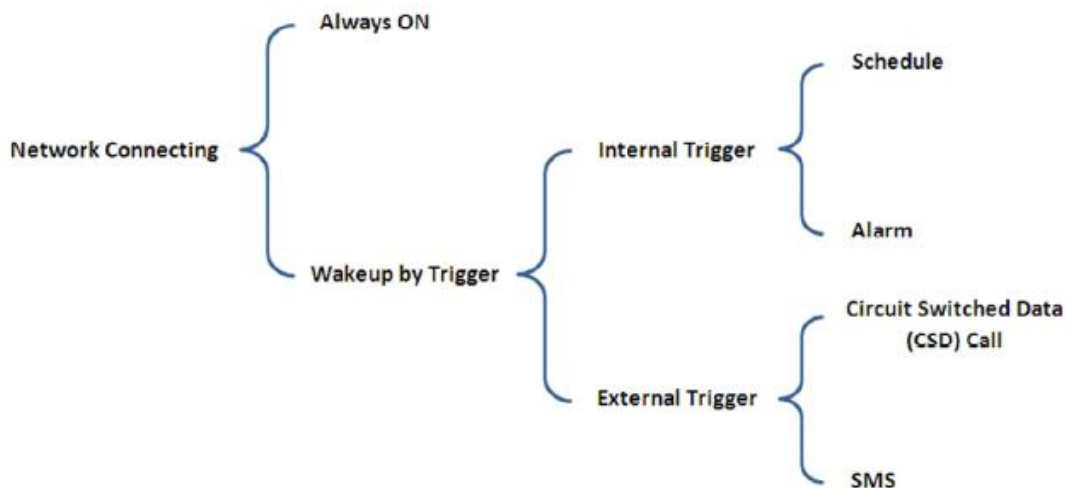
The transport layer is carried out by TCP-UDP Setup (41, 0-0:25.0.0.255), configurable items:

TCP-UDP Setup - local communication ports (41, 0-0:25.0.0.255, 2) - the default value is 4059, the remote port is consistent with the local;

TCP-UDP Setup – TCP timeout (41, 0-0:25.0.0.255, 6) -- beyond this time if no data is received from the system end then the connection is automatically disconnected.

180 seconds by default, configurable; if configured as 0, then no timeout;

17.5 GPRS Network Connection Mechanism



As shown above, GPRS network connection support always online and online wake-up ;Wake-up mode can be internal or external clock, external alarm SMS, call wake (auto answer);

For TCP connections, the device is the client by default and the target address is the server; Network connection mechanism is configured via "AutoreConnect" object (29, 0-0: 2.1.0.255).

"AutoConnect" - mode (29, 0-0:2.1.0.255, 2) - support 0101102103104 five modes can be configured;

"AutoConnect" - reconnect times (29, 0-0:2.1.0.255, 3) - number of reconnect can be configured;

"AutoConnect" - reconnect delay (29, 0-0:2.1.0.255, 4) - reconnect delay time is configurable;

"AutoConnect" - communication time window (29, 0-0:2.1.0.255, 5) - Automatic connection of communication time window, is effective in mode 102103;

"AutoConnect" - connection target (29, 0-0:2.1.0.255, 5) - connected target address, IP address, can be set up to maximum 5 numbers.

Auto Answer - Wake-Up Period (28, 0-0: 2.2.0.255, 3) - Configure the period during which the communication can be woken up;

Auto Answer (CSD Call / SMS) - Number of wake-up rings (28, 0-0: 2.2.0.255, 6) - Number of rings required to configure wakeup;

Auto Answer - Allow Wakeup Number List (28, 0-0: 2.2.0.255, 7) - Configure the communication number that allows wakeup;

The following example illustrates the process of setting the automaticGPRS link connection:

Step1: Set APN: "CNNET"; \

Step2: Set the PPP user name for PAP authentication: "CMC" and password "1234".

Step3: Set TCP local communication port: 4059, TCP timeout: 180S;

Step4: Set the number of AutoConnect reconnection 3, Reconnect delay: 60S;

Step5: Set AutoConnect time window: 23: 00-4: 00 everyday;

Step5: Set the AutoConnect link two target IP addresses: "8.8.8.8", "192.168.1.1";

Step6: Set AutoConnect mode: 103;

Step7: Call the restart GPRS module script (9, 0-0: 10.1.0.255) to resynchronize the parameters;

After setting, the meter will automatically link to the server through the set APN and PPP authentication username and password every day from 23:00 to 04:00.

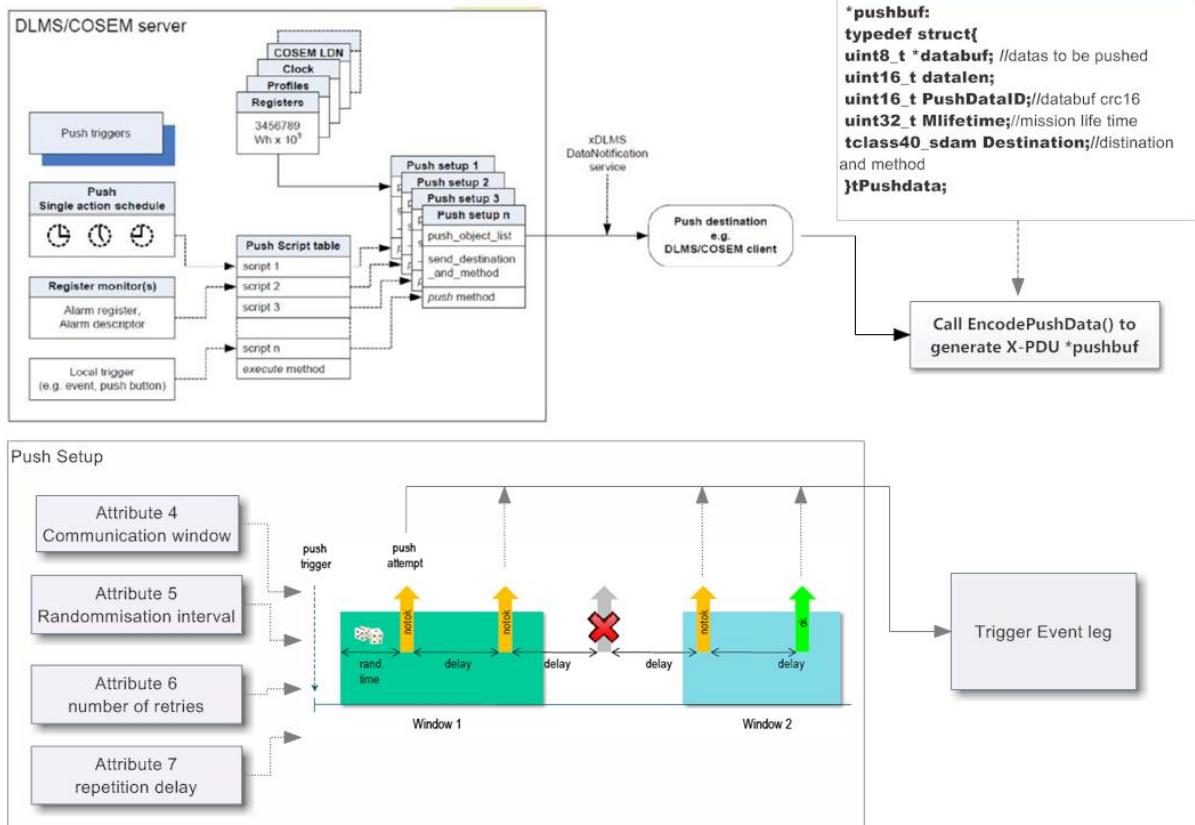
The preferred destination address is 8.8.8.8. If the link fails, after 60 seconds, try to link 192.168. 1.1, failure repeated up to 3 times; default link port: 4059;

If the system does not receive the data within 180 seconds, the link will be cut off automatically; If the maximum failure in this time window has reached 3 times, then no longer try to link until the next time window again try to take the initiative to link.

At any time, any message, incoming call, scheduled data push or alarm will trigger the automatic link and send the data to the target server. If the connection is not activated within 180s, it will be automatically disconnected if no data is received from the server connection;

18. Active Push (push)

Active push is mainly used for abnormal event reporting and scheduled active data upload. The active push adopts the DLMS / COSEM data notification service to push a set of configured data. The push service processing is performed in an electric meter. If there is a data frame to be sent Communication module directly through the MI1 interface using HDLC UI frame, pushed to the module, the module cache push data and complete the sending; the module can cache the maximum 3 frames push data, please refer to the specific package 2; Push service processing flow is as follows Figure:



As described in Chapter 18, if the device can wake up the remote data link function (such as GPRS) through event reporting or scheduled data push to send data to the remote server, the wake-up function can be configured through the following objects:

- Push action scheduler – Interval_1(0-1:15.0.4.255, Class ID: 22);
- Push action scheduler – Interval_2 (0-2:15.0.4.255, Class ID: 22);
- Push action scheduler – Interval_3 (0-3:15.0.4.255, Class ID: 22);
- Push Setup- Interval_1 (0-1:25.9.0.255, Class ID: 40);
- Push Setup- Interval_2 (0-2:25.9.0.255, Class ID: 40);
- Push Setup- Interval_3 (0-3:25.9.0.255, Class ID: 40);
- Alarm Monitor 1 (0-0:16.1.0.255, Class ID: 21);
- Alarm Monitor 2 (0-0:16.1.1.255, Class ID:21);
- PushSetup-On Connectivity (0-0:25.9.0.255, Class ID: 40);
- PushSetup-On-Alarm (0-4:25.9.0.255, Class ID: 40);
- PushSetup- On-Installation (0-7:25.9.0.255, Class ID: 40);

18.1 Scheduled Trigger Push:

According to the project requirements, you can configure different scheduled push frequency and push content, the following objects can be used to set scheduled push:

- Push action scheduler-Interval_n execution time (22,0-n: 15.0.4.255, 4); - Configure push time
- Push Setup- Interval_n Push object list (40, 0-n: 25.9.0.255,2); - Configure push content, default null
- Push Setup- Interval_n push target IP address (40, 0-n: 25.9.0.255,3); - configure the target IP address
- Push Setup- Interval_n Push Random Window Time (40, 0-n: 25.9.0.255,5); - Configure Random Window Time
- Push Setup- Interval_n Number of push retries (40, 0-n: 25.9.0.255,6); - Number of retries configured

-
- Push Setup - Interval_n Push Retry Delay (40, 0-n: 25.9.0.255,7); - Configure Retry Delay

For the scheduled trigger push, the system does not reply; the meter is pushed only once and is processed by the module successfully; the methods of different communication modules are greatly different in the way of ensuring the success of the push;

18.2 Alarm Trigger Push

Section 17.3 shows how to trigger the message push mechanism after an event occurs.

For the push triggered by the alarm, after the system receives the alarm event, the bit corresponding to the Alarm Descriptor in the device is set to 0.

The device determines whether the alarm has been successfully uploaded by judging the Alarm Descriptor, so as to trigger the resend times and resend Delay mechanism

18.3 GPRS Connection Trigger Push

When the device detects that a new TCP connection is set up (GPRS), it triggers the automatic registration information push.

This connection can be done through the scheduled automatic connection as described in chapter 18.5, or it can be a wake-up link. This part of the function is conducted by the energy meter.

After detecting a new GPRS connection, the GPRS module sends an action command (9, 0-0.10.0.108.255) to the wathour meter through the MM1 interface, script_identifier = 5, and triggers the push setup on connectivity service.

The wake-up registration configuration can be done with the following objects:

- Push Setup-On Connectivity - push object list (40, 0-0: 25.9.0.255, 2) -; to configure pushed objects;
- Push Setup-On Connectivity - push destination IP address (40, 0-0: 25.9.0.255,3); - configure destination IP address
- Push Setup-On Connectivity - push random window time (40, 0-0: 25.9.0.255,5); - configure random window time
- Push Setup-On Connectivity - push retries (40, 0-0: 25.9.0.255,6); - configure retries
- Push Setup-On Connectivity - push retry delay (40, 0-0: 25.9.0.255,7); - configure retry delay

For Push Setup-On Connectivity, the system end does not reply; if the device receives the push of the DLMS data from the system side to trigger resend times and resend delay mechanism;

By default, the system reads the Logical Device Name (1, 0-0: 42.0.0.255, 2) of the energy meter after the push message is received to maintain the link.

Default push content:

- Logical Device Name (1, 0-0:42.0.0.255, 2);
- IPv4 setup-GPRS (42,0-0:25.1.0.255, 3);

19. Security Mechanism

The device supports low level and high level two types of security mechanisms. The default factory configuration is low level. When the security level needs to be increased, the device does not need to be securely encrypted. To reduce the security level, you must encrypt the data Can be set by the following objects:

- Security Setup (Management Client/Pre-Establishment Client) (64, 0-0:43.0.0.255,2)

- Security Setup (Reading Client) (64, 0-0:43.0.2.255,2)
- Security Setup (Consumer Information) (64, 0-0:43.0.1.255,2)-CIP

The default factory key is as follows:

Security parameter	Default value (hex)
LLS default password	12345678
Global Authentication key	0xD0 D1 D2 D3 D4 D5 D6 D7 D8 D9 DA DB DC DD DE DF
Global Broadcast key	0x0F 0E 0D 0C 0B 0A 09 08 07 06 05 04 03 02 01 00
Global Encryption key	0x00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
Global CIP Authentication key	0xC0 C1 C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF
Global CIP Encryption key	0x10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F
Global Reading Authentication key	0 x E0 E1 E2 E3 E4 E5 E6 E7 E8 E9 EA EB EC ED EE EF
Global Reading Encryption key	0 x F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD FE FF
Master key	0X00 11 22 33 44 55 66 77 88 99 AA BB CC DD EE FF

Security Setups	Keys
Security Setup (Management Client/Pre-Establishment Client) (64, 0-0:43.0.0.255)	Unicast Global Key Broadcast Global Key Authentication Key Master Key
Security Setup (Reading Client) (64, 0-0:43.0.2.255)	Unicast Global Reading Key Authentication Reading Key
Security Setup (Consumer Information) (64, 0-0:43.0.1.255)	CIP Unicast Global Key CIP Authentication Key

For communication on the local port, you can limit the number of times the wrong authentication allowed and the time that the port is locked after the maximum number of times is reached by setting the Local Authentication on protection object (1,0-0: 96.98.20.255.2)

structure

```
{
unsigned: failed attempts (1-10 times)
unsigned: lockout time (1-180 minutes)
}
```

When communicating using the Broadcast key or unicast key, the device records frame counters in the following objects:

- Security - Receive Frame Counter - Unicast Key (Remote) (0-0:43.1.0.255);
- Security - Receive Frame Counter – Broadcast Key (Remote) (0-1:43.1.0.255);
- Security - Receive Frame Counter - Unicast Key (Local) (0-0:43.0.2.255);

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Annexure- C

Unified Meter Data Collection System

DCUto HES

1. General

1.1 Introduction

The system interface architecture of the device is shown in the following figure; the electric energy meter, concentrator and front end system are simplified into several interfaces marked with correspondent code name respectively;

System Architecture



Device functions & Interoperability Interfacing Requirements are composed of 3 parts, including:

Package 0: Addressing System

Package 1: DCU to HES

Package 2: Meter Modeling

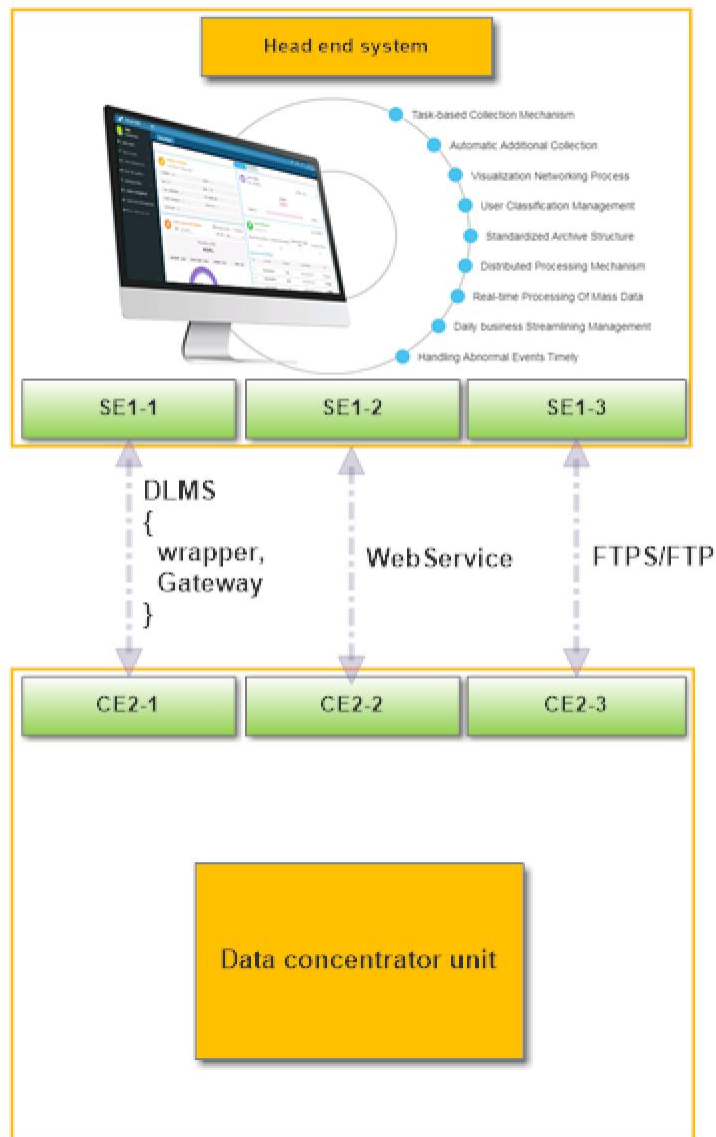
1.2 Reference Documents

Name
Blue_Book_12th_edition
Green_Book_8th_edition
Object_defs_v3.1_161215
White_Glossary OfDlmsCosemTerms

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2. Communication Structure

SE1-CE2 DCU to HES



Above figure is direct communication structure between HES and DCU, which contains 3 independent channels. In specific, the system itself is featured by its high flexibility and compatibility for various requirements. Interface CE2-1, CE2-2, CE2-3 of DCU could be configured to remote port with network at will.

As shown in the structure diagram, data exchange between data collection system and devices to be read supports 3 standard communication models:

- DLMS in IEC 62056
- WebService
- FTPS/FTP

3. DLMS

3.1 DLMS Communication Model

The data exchange between the data acquisition system and the collected equipment, should refer to the communication mode of the client / server AP specified by DLMS. The client AP initiates the access request and the server AP responds, which is a question and answer communication mechanism; and the role of server AP is specified to be assumed by the meter or module.

By means of access management, one server AP can exchange data with one or more client APs at the same time, and a client AP can also access one or more server APs at the same time.

In addition to the normal question and answer mechanism, if there are abnormal events in the server AP, the event can be reported through the prescribed format.

The three-layer architecture of DLMS is shown in the following figure:

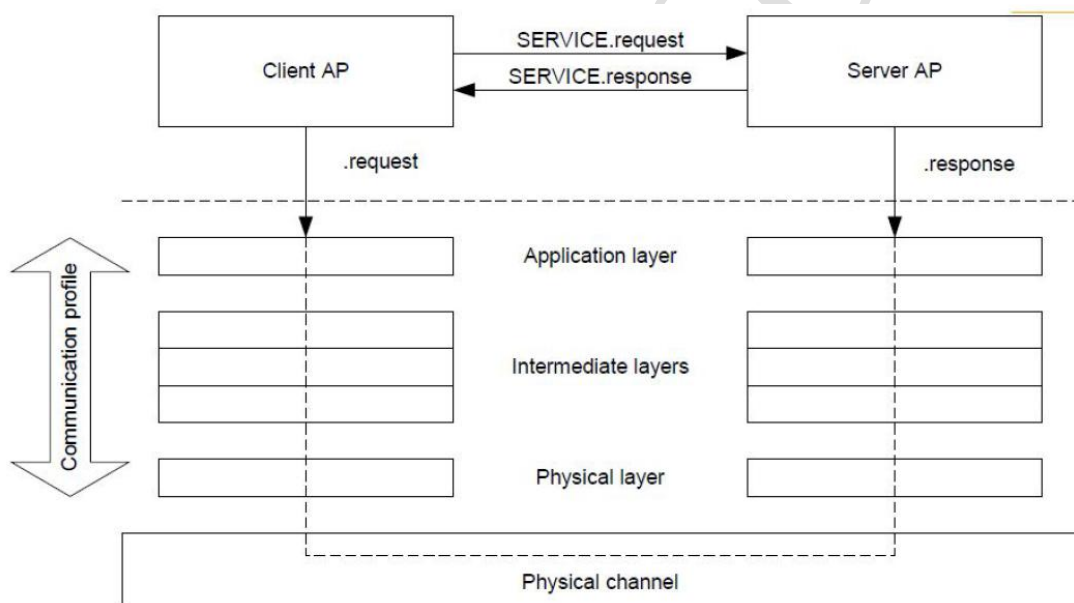


Figure 2 – Client/server relationship and protocols

Level 1: Physical Device Layer

Level 2: Logical Device/Intermediate Layer

Level 3: COSEM Application Layer

3.2 DLMS Application Layer Service

Application layer service default settings is supporting LN(logical Name) only;
ContextName = LONG_NAMES;

Version No.:

DLMS version = 6;

According to DLMS standard, meter supports service types as below chart:

Service	Conformance Block Bit
general-protection	1
general-block-transfer	2
block-transfer-with-get	11
block-transfer-with-set	12
multiple-references	14
data-notification	16
Get	19
Set	20
selective-access	21
action	23

For different clients, defaulted services supported are as below chart:

Client	Function
Public Client	Get block-transfer-with-get
Pre-linked Client	get set action data-notification general-block-transfer general-protection
Management Client	get block-transfer-with-get set block-transfer-with-set selective-access multiple-references action general-block-transfer general-protection
Read Client	get block-transfer-with-get selective-access multiple-references general-block-transfer general-protection
Module Client	get block-transfer-with-get set block-transfer-with-set selective-access multiple-references action

	general-block-transfer general-protection
--	--

For different client No. of each logical device, there is an application layer connection subject. Class 15 (Association LN) is used for describing present connection information including connection list and connection status, etc. Moreover, it could also modify key through Class 15 with HLS verification, connection subject list as below:

“Current Association” (0-0:40.0.0.255, Class ID: 15)-present connection subject

“Public Association” (0-0:40.0.1.255, Class ID: 15)

“Management Association” (0-0:40.0.2.255, Class ID: 15)

“Pre-established Association” (0-0:40.0.3.255, Class ID: 15)

“Reading Association” (0-0:40.0.4.255, Class ID: 15)

“Module Association” (0-0:40.0.5.255, Class ID: 15)

3.3 Wrapper

3.3.1 Wrapper Format

Wrapper includes 8 bytes for version, SSAP, DSAP and LEN. Frame format as below:

Version	SSAP	DSAP	LEN	COSEM APDU
---------	------	------	-----	------------

Parameters Descriptions:

Version: 2 bytes, Wrapper version, present version is 0x0001;

SSAP: 2 bytes, refer to sender SAP address;

DSAP: 2 bytes, range 0x0001 – 0xFFFF, refer to destination address;

LEN: 2 bytes, range 0x0000 – 0xFFFF, refer to bit length of COSEM APDU transmitted;

COSEM APDU: communication data content, out of range of wrapper.

3.3.2 SSAP Client Address

SSAP length is 2 bytes, refer to client address, defined as below:

High Byte	Low Byte
-----------	----------

High byte: master station address range 0x01 – 0xFF refer to various transformer master station address, 0x00 means not specified master station address (default);

Low byte: client address 0x10/0x02/0x01/..., refer to public/read/write/..client id, SSAP

3.3.3 DSAP Service Address

DSAP length is 2 bytes, refer to service address; mainly refer to device address accessed, division of DSAP is mainly used to identify logical device of the accessed device.

3.4 Gateway Protocol

Gateway protocol is mainly use for gateway devices (DCU/collector/communication module), which supports multiple layer network transparent transfer, as shown in below figure:

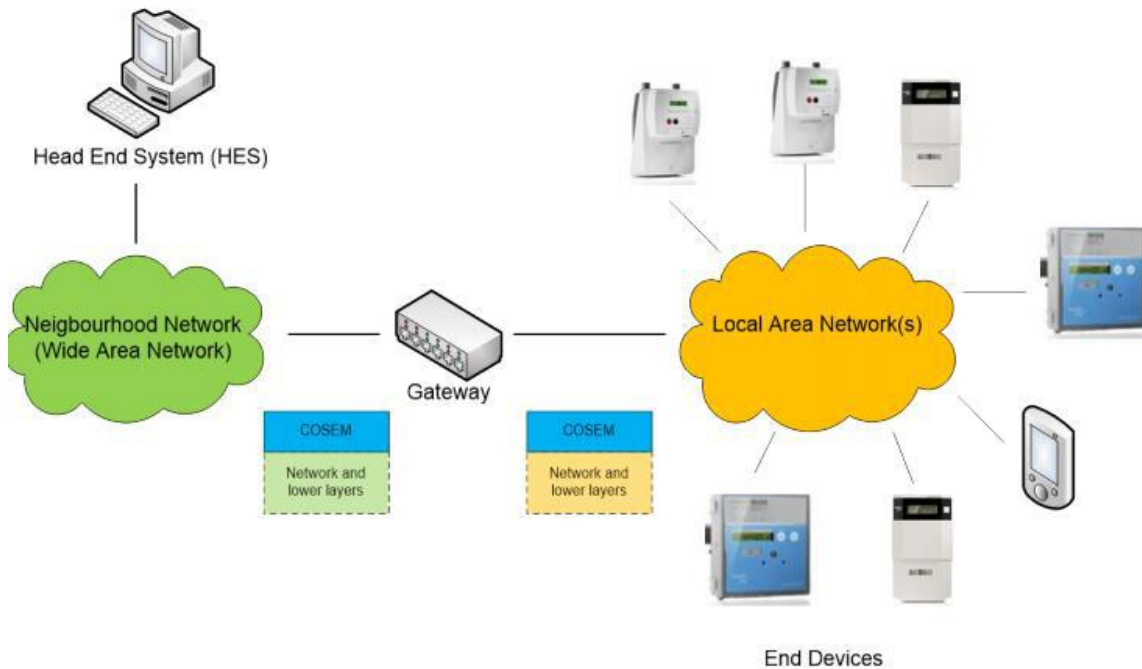


Figure 156 – General architecture with gateway

3.4.1 Gateway Protocol Format

Gateway protocol definition as below, Prefix for short;

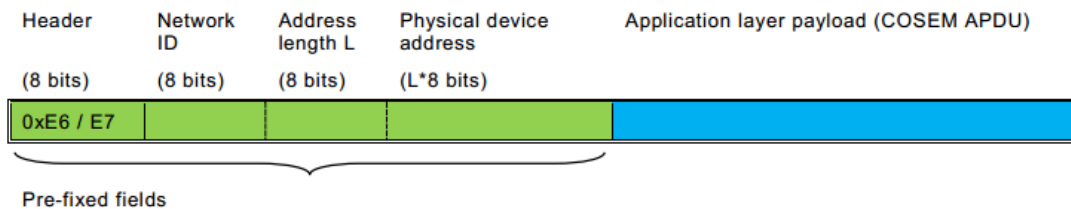


Figure 157 – The fields used for pre-fixing the COSEM APDUs

■Parameter Description:

Header: 1 byte, indicating the data transfer direction, 0xE6 is a request or data report frame , 0xE7 is a response frame;

Network ID: 1 byte, network ID, indicating the forwarding of the lower channel number (network number);

Address length: 1 byte, target address length;

Physical device address: N bytes, the physical address of the target, whose length depends on the address length;

COSEM APDU: The communication data content, does not belong to the gateway protocol.

3.4.1 Gateway Protocol Address

3.4.1.1 Network ID

Network ID		
NO	Address	
1	0x0000	Default fixed port (1 port only)
8	0x0041	XE1 port (module 1, PLC /RF/...);
9	0x0042	XE2 port (remote ports: 4G/3G/GPRS/Ethernet);
10	0x0043	XE3 port (RS485 1);
11	0x0044	XE4 port (RS485 2);

12	0x0045~0x006F	Port reserved
----	---------------	---------------

3.4.1.2 Physical device address

Gateway protocol destination address definitions as below:

Address length: 0x07; 7bytes physical address;

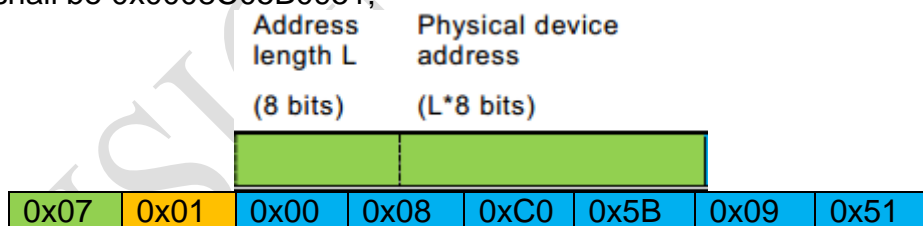
Physical device address: 7bytes.

1 byte, logic address;

Physical device upper address		
NO	Address	
1	0x00	No-station
2	0x01	Main logical device/(DCU/meter/collector)
3	0x02~0x0F	DLMS UA reserved
4	0x10	Communication module 1 function area
5	0x11	Communication module 1 firmware area
6	0x10~0x001F	Main logical device reserved
7	0x22~0x3F	DC reserved
8	0x41	XE1 port (module 1, PLC /RF/...);
9	0x42	XE2 port (remote ports: 4G/3G/GPRS/Ethernet);
10	0x43	XE3 port (RS4851);
11	0x44	XE4 port (RS4852);
12	0x45~0x6F	Port reserved

6 bytes, target physical address; product serial No. in 16 carry scale code;

E.g.: Device serial No.: 037586930001, then physical address in gateway protocol shall be 0x0008C05B0951;



3.5 DLMS Device Identification

Belows are for description about how devices are defined according to DLMS/COSEM requirements. Each device has an unique ID (serial No.) correspondently, which provides proof for registration of device in HES system;

Device ID: “Device ID7” COSEM object (1-0:0.0.0.255, Class ID: 1); this ID is unique, default in 11 digits, coding may be changed as per utility’s requirement, supports 14 digits in maximum. The ID is set in device at factory settings by manufacturer and shall be labeled on device nameplate;

System Title: As per requiremetn of various projects, each device has an unique 8 bytes system title/code, which has been written in device firmware at factory settings; it facilitates identification and verification of various manufacturers or device models in the same system.

Logical Device Name: “COSEM Logical Device Name” COSEM object (0-0:42.0.0.255, Class ID: 1). As mentioned in above context, each physical device

may correspond to multiple logical devices, logical devices name is the unique ID for identify logical device.

3.6 DLMS Device Automatic Registration

Device automatic registration refers to the process of sending device logical device name, IP address to HES through Data-notification service after device installed and HES responses with registration completion after receiving.

DLMS device automatic registration refers to configuration contents of subjects which adopted push setup –on installation (0-7.25.9.0.255, class 40) send registration information to the upper layer devices by Data-notification service. Default settings in device supports pre-linked Client for Data-notification service only.

Upper layer devices shall response after receiving registration information and confirm, and then set “E_instal” information to data item (0-0:96.13.1.255, class 1).

Press device scroll display button for 10 seconds, (LCD shows “install_S”), then trigger device automatic registration report; it also support configuration by push setup –on installation for automatic registration time and tryout times, etc.

In default settings, subjects are automatically registered and sent:

Logical Device Name: (1, 0-0:42.0.0.255, 2);

IPv4 Setup –local IP address (42, 0-0:25.1.0.255, 3);

4. Webservices

Webservice is realized in SOAP 1.1 format. SOAP Information transmission process from HTTP adopts HTTP over TLS1.2(HTTPS) for data encryption;

4.1 Webservices

HES could make main operations through webservices provided by DCU. All configuration and reading commands have user name and password protection. User name and password are configurable through local programming or through higher authorization in DLMS. Commands are as below:

Default User Name: DefaultUser

Password: helloworld

4.1.1 GWTransReq

“**GWTransReq**” : Gateway transmission request is used for transparent data transmission to down layer devices under each ports, response with “**GWTransResp**” for settings; After DCU completes execution of command, then inform HES with “**GWTransInfo**”.

4.1.2 ConfigDCUcom

“**ConfigDCUcom**” : set DCU for modification of meter reading configurations, such asDLMS Client No., HES address, etc. After configuration, response with “**ConfigDCUcomResp**” to HES.

4.1.3 GetConfigDCUcom

“**GetConfigDCUcom**” : Acquire DCU current operation parameters, shall correspondent with contents in “ConfigDCUcom”, then DCU response “**GetConfigDCUcomResp**” with correspondent parameters;

4.1.4SetDatatime

“**SetDatetime**” : set DCU current time; If NTP server is set, DCU would automatically synchronize clock, but HES could also directly set DCU clock through this service, then response with “**SetDatetimeResp**”

4.1.5 GetDatatime

“**GetDatatime**”: Acquire DCU current time; If NTP server is set, DCU would automatically synchronize clock, but HES could also directly set DCU clock through this service, then response with “**GetDatatimeResp**”.

4.1.6 SetDeviceDoc

“**SetDeviceDoc**”: Acquire or modify meter data under all or certain port, then response with: “**SetDeviceDocResp**”.

4.1.7 GetDeviceDoc

“**GetDeviceDoc**”: Acquire all meter data information and its correspondent address under each port, then response with “**GetDeviceDocResp**”.

4.1.8 GetOnlinelist

“**GetOnlinelist**” : Acquire currently online meter list of certain port, then response with “**GetOnlinelistResp**”.

4.1.9 AMRTask

“**AMRTask**”: Set automatic meter reading task of each port, able to set multiple automatic meter reading task, daily/monthly/customized cycle and select meter reading item list to place commands; then response with “**AMRTaskResp**”.

4.1.10 GetAMRTask

“**GetAMRTask**”: Acquire automatic meter reading task of each port and response with “**GetAMRTaskResp**”.

4.1.11 RestartAMRTask

“**RestartAMRTask**”: Freeze single or multiple automatic meter reading task and restart, then response with “**RestartAMRTaskResp**”.

4.1.12 GetDeviceData

“**GetDeviceData**”: Acquired device data from DCU after executing “AMRTask”; able to acquired single or all data, then response with “**GetDeviceData**”.

4.1.13 DeviceUpgradeTask

“**DeviceUpgradeTask**”: Set upgrade tasks for devices managed by DCU. After configuration, DCU shall download upgrade file in specific time from FTP and execute the task, then response with “**DeviceUpgradeTaskResp**”; After execution, DCU shall inform HES through “**DeviceUpgradeTaskInfo**”.

4.1.14 GetDeviceUpgradeSta

“**GetDeviceUpgradeSta**”: Acquire meter upgrade task execution status and response with “**GetDeviceUpgradeStaResp**”.

4.1.15 DCUUpgradeTask

“**DCUUpgradeTask**”: Set upgrade tasks for DCU. After configuration, DCU shall download upgrade file in specific time from FTP and execute the task, then response with “**DCUUpgradeTaskRes**”; After upgrade, DCU shall inform HES

“**DCUUpgradeTaskInfo**”.

4.1.16 ScheduleTask

“**ScheduleTask**”: Configure schedule task in single or multiple commands are available;

“**ScheduleTaskInfo**”: After task completed, DCU shall inform HES

“**ScheduleTaskResp**”.

4.2 XML Example

GWTransReq: TaskNum:00-99 Protocoltype:0:DLMS

```
<?xml version="1.0"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:lh="http://localhost:8086/DcuSoap">
<soapenv:Body >
```

```

<lh:GWTransReq UserID="DefaultUser" Password="hellowrold" PortID="CE1"
DeviceID="37999900001">
<TaskNum>01</ TaskNum >
<!--one or more repetitions:-->
<Trans>
<Protocoltype>0</ Protocoltype >
<Databody>(encrypted COSEM)</ Databody >
</Trans>
<Trans>
<Protocoltype>0</ Protocoltype >
<Databody>(encrypted COSEM)</ Databody >
</Trans>
  </lh: GWTransReq >
</soapenv:Body>
</soapenv:Envelope>

```

DCU shall inform HES through GWtransInfo after completing task;
GWTransInfo:TaskNum:00-99 TransResult:0:succeed others: Error Code

```

<?xml version="1.0"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/ "
xmlns:lh="http://localhost:8086/DcuSoap ">
<soapenv:Body >
<lh:GWTransInfo UserID="DefaultUser" PortID="CE1" DeviceID="37999900001">
<TaskNum>01</ TaskNum >
<!--one or more repetitions:-->
<TransResp>
<TransResult>0</ TransResult >
<DataReap>(encrypted COSEM)</ DataReap >
</ TransResp >
< TransResp >
<TransResult>0</ TransResult >
<DataReap>(encrypted COSEM)</ DataReap >
</ TransResp >
  </lh: GWTransInfo>
</soapenv:Body>
</soapenv:Envelope>

```

SetDatatime :TaskNum:00-99

```

<?xml version="1.0"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/ "
xmlns:lh="http://locahost:8086/DcuSoap ">
<soapenv:Body >
<lh:SetDatatime UserID="DefaultUser" Password="hellowrold" >
<TaskNum>01</ TaskNum >
<Datatime>2018-01-02F00:00:00Z</ Datatime >
  </lh: SetDatatime >
</soapenv:Body>

```

```
</soapenv:Envelope>
```

DCU shall inform HES in SetDatatimeResp after execution;

SetDatatimeResp:TaskNum:00-99 Result:0:succeed others:error code

```
<?xml version="1.0"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/ "
xmlns:lh="http://localhost:8086/DcuSoap ">
<soapenv:Body >
<lh:SetDatatimeResp UserID="DefaultUser">
<TaskNum>01</ TaskNum >
<Result>0</Result >
  </lh: SetDatatimeResp>
</soapenv:Body>
</soapenv:Envelope>
```

For more examples, please refer to WSDL document.

5. FTP/FTPS

FTP/FTPS service is applicable for DCU remote upgrade. HES may configure FTP server address through webservice or DLMS protocol. DCU shall download update files from FTP service in specified time to finish upgrade during execution of upgrade task.

FTP/FTPS service is also applicable schedule automatic meter reading data upload to server. After finishing task, configuration completed.

Unified System &HES Interface Specification

CIM based Interoperable Standard

1. Overview

This document specifies an implementation profile for Unified System and MDC using common information model (CIM). CIM(IEC61968) mandates how the various messages may be transported from a system to another system. The current version of CIM deals with

webservices and JMS as the barriers of transported messages, This document describes how the message payloads are conveyed using web services. The goal is to provide the sufficient details which are needed for the interoperable implementation of CIM. To this aim, the communication architecture is proposed and the required communication interfaces are specified.

2. Communication Architecture

2.1 Introduction

MDC and an Unified System provide two service interfaces, depicted in Figure 1.1. Each MDC provides an interface called “doCommand”, to serve the operation and data collection commands from its corresponding Unified System. The synchronous responses to the commands are sent to the Unified System as a return value of calling doCommand. An Unified System may ask for an asynchronous response to its sent command by setting the tag of “AsyncReplyFlag” True in header of its input command. In this case, the asynchronous response is sent to the Unified System via “getResponse” service.

Note that, in case of asking for an asynchronous response, the return value of “doCommand” is a xml formatted data which contains the acknowledgement response and the business-level response which will be sent later to the Unified System by calling “getResponse” service.

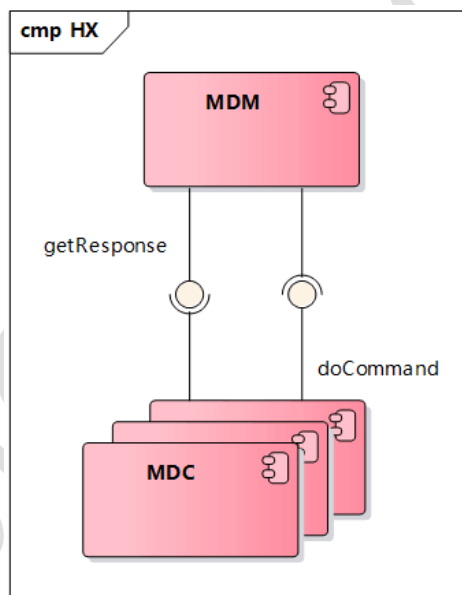


Figure1.1Communication Architecture

2.2 Service Interface

As mentioned, two different interfaces are provided by MDC and Unified System, described in the following table. In the both of the interfaces the types of the input parameters and the output results are native “string”. The contents of the input and the output strings conform to IEC61968 standard.

Table1.1: Service Interface Specification

Service Name	Provider	Input	Output	Description
--------------	----------	-------	--------	-------------

doCommand	MDC	A string parameter in XML format, conforming to IEC61968 standard for requests.	A string output result in XML format, conforming to IEC61968 standard for responses.	The commands are sent to MDC via this interface and the synchronous responses are returned as the service calls' results.
getResponse	Unified System	A string parameter in XML format, conforming to IEC61968 standard for responses.	No output(void type)	This command receives the asynchronous responses which are sent by MDC.Unified System doesn't need to response any message to MDC.

3. Transporting Message

3.1 Introduction

In accordance to this document, in order to establish interoperability between Unified System and MDC of meter manufactures, messages structure should be complied with IEC61968 standards. Since this standard is an open standard, there should be some kind of consensus between manufactures. After reaching consensus regarding message structures, MDC should be tested to verify the accuracy of the implementation.

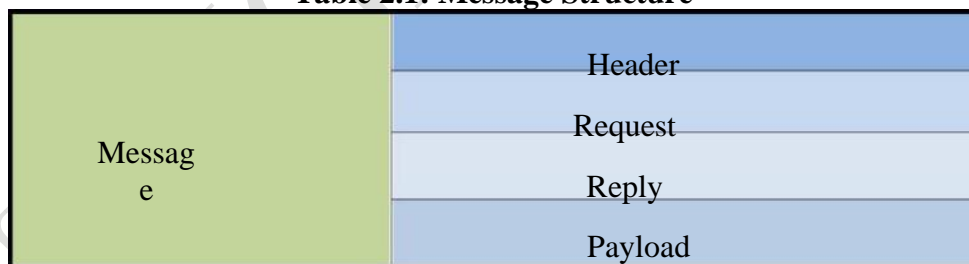
Manufactures should be considered following points:

Messages should be completely based on IEC61968 and there should be no innovation in messages.

All elements used in the messages should be based on the document.

According to IEC61968, general structure of messages is defined in the following tables:

Table 2.1: Message Structure



In the above structure, the presence of "Header" is Mandatory and its format is defined in Table 2.2:

Table 2.2: Format of the Header

Header	
Elements	Content
Verb	Identifies the action of the source Valid value: refer to other Section
Noun	Identifies the message type Valid value: Refer to other Section
Revision	Identifies the XSD version for the inbound meter reads Valid value: 2.0

Header	
Elements	Content
Context	
Timestamp	Time of sending the message by sender
Source	Source of Data Unified System/MDC(sender)
AsyncReplyFlag 1	true/false ²
ReplyAddress	Call back URL. String
AckRequired ³	true/false ²
User1	UserID string ----- Organization
MessageID	UUID01
CorrelationID	Request Message ID
Comment	String
Property4	Name "timeout(s)"/"timeout(m)"/"timeout(h)" ----- Value integer
Property5	Name "GetConnectedToTheMeter" ----- Value true/false ^{****}
Property6	Name "password" ----- Value string

- 1-This element is used just in request messages which are sent by Unified System.
- 2-It is true/false if the transaction is asynchronous/synchronous.
- 3-It is only used when the transaction is asynchronous, true means MDC need to return Acknowledgement to Unified System, false means no need.
- 4-This node can be used for identifying the amount of timeout for request messages.
- 5-This element is used when collecting data from the meter is required, not from server's database. (This element is not usually used.)
- 6-This node along with "User" node can be used Authentication process for the messages.

According to the IEC61968, two kinds of message is defined: request message, response message. Any IEC 61968-9 message, whether it is a request message, response message, is composed as an XML document. These different message types are distinguished by the top-level element in the XML document. This must always be one of <RequestMessage>, <ResponseMessage> accordingly.

3.2 Request Message

Request messages are used for sending queries or commands. For example, a request message might be sent from a Unified System to an MDC to obtain a set of meter readings. Response messages are used for returning the corresponding data or status information to a request message.

The elements used in the request message are observed in Table 2.4:

Table 2.4: Request Message

Request Message	Header	According to Table 2.2
	Payload	According to verb and noun

3.3 Response Message

Response messages are also used to indicate whether a given request succeeded or whether there were any failures in performing the command. In an asynchronous way, response messages will be used for sending simple acknowledgements in the context of webservice, MDC sends an acknowledgement to Unified System indicating that it received the message, MDC then goes away and in its own time performs a session with the meters of interest, reads the values and when it is ready, sends it back to Unified System in response message. As mentioned before, in an asynchronous message, there is a "response message" besides the acknowledgement. More details regarding the "Simple Acknowledgement" message is provided in Table 2.5:

Table 2.5: Simple Acknowledgement Message

Response Message (Acknowledgement)	Header	According to Table 2.2		
	Reply	Result	Error code	OK 0.3

The response message is defined with more details in Table 2.6:

Table 2.6: Response Message

Response Message	Header	According to Table 2.2		
	Reply*	Result	Error code	OK/Failed/Partial ** RefertoTable2.8
	Payload***	More details in next sections		

*This node is used in every response message.

**If error code is 0.0 the result isOK. Other Error codes are provided inTable2.7.

***Payload is only used when data is transferred.

Details for Reply element of response message are provided in Table below:

Note that there may be multiple Error node, showing different error.codes.

Table2.7: Reply

Reply	Result	OK/PARTIAL/FAILED	
	Error (Unbounded)	Code	RefertoTable2.8
		Level	INFORM/WARNING/FATAL/CATASTROPHIC
		reason	
		details*	String
operationId**			

*In this node, more detail about the error is provided.

**This is used for identifying the number of data packet in a PARTIAL reply, i.e. the Result=PARTIAL and operationId identifies which number of data packet is being sent.

In the following, there are some error codes which are sent from MDC in response to Unified System request:

Table 2.8: Error Codes

No.	Code	Description
1	0.0	Successful/no error
2	0.1	Partial result(additional results conveyed in separate messages)
3	0.2	Partial result(no further results to follow)
4	0.3	Acknowledgement
5	2.4	Invalid meter(not registered)
6	2.6	Invalid ReadingType
7	2.5	Invalid Noun

8	2.9	Invalid Verb
9	2.12	Invalid Usagepoint(s)
10	2.13	Meter/Usage Point mismatch
11	2.14	Invalid source
12	2.15	Invalid RequestID
13	2.33	Invalid PricingStructure(s)
14	3.2	Too many pending requests
15	4.1	Request timedout
16	4.2	Service not available
17	4.3	Local error in processing
18	5.3	Unable to process the request-transaction attempted and failed
19	5.5	Some or all of the requested readingtypes are unavailable in Unified SystemS
20	5.7	Some or all of the requested data is unavailable
21	5.8	Unable to process the request-.Mandatory field(s) missing
22	6.5	Request canceled by user
23	7.4	Authentication failure
24	7.5	Action not authorized for user
For other Reply Codes refer to annex B of IEC61968-9		

4. Meter Archive Synchronization

4.1 Introduction

This section aims at presenting message structures regarding adding an equipment.

4.2 Usecase Description

Firstly Unified System should be to validating the meter's information. After that Unified System will send the command of synchronizing the meter to MDC which contains meter's full profile. The details of Unified System's request to MDC are available in the following Tables:

Table 4.1: Meter Archive Synchornization (add meter)

Meter Addition			
Message type	Verb	Noun	Main elements
Request	create	MeterConfig	Header/Payload
Response	reply	MeterConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Table 4.2: Meter Archive Synchornization (modify meter)

Meter Modification			
--------------------	--	--	--

Message type	Verb	Noun	Main elements
Request	change	MeterConfig	Header/Payload
Response	reply	MeterConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Table 4.3: Meter Archive Synchroniztion (delete meter)

Meter Deletion			
Message type	Verb	Noun	Main elements
Request	delete	MeterConfig	Header/Payload
Response	reply	MeterConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Payload's elements regarding this request are presented in Table 4.4:

Table 4.4: MeterConfig

Payload of MeterConfig					
		mRID	Meter ID		
MeterConfig	Meter (unbounded)	Names	name Serial Number "serialNumber"		
		Names	name Meter Model (HX110-KP,INHE110-SP) "meterModel"		
		Names	name Meter Type (01:485,02:GPRS,04:PLC,06:RF) "meterType"		
		Names	name Meter Mode (01:Postpaid,02:Prepaid) "meterMode"		
		Names	name Manufacturer Code (14:HEXING,33:INHE,66:KAIFA) "manufacturer"		
		Names	name Value of current transformer ratio (1/1,100/5,200/5) "ctRadio"		
		Names	name Value of potential transformer ratio (1/1,100/5,200/5) "ptRadio"		
		Names	name Protocol Type (03:DLMS,15:HDLC) "protocolType"		
				NameType	name

If MDC need other parameters, Unified System be able to extend the element which named "Names".

4.3 Examples of XML Message

4.3.1 MeterConfig

```
<?xml version="1.0" encoding="UTF-8" ?>
<RequestMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/MeterConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>create</Verb>
<Noun>MeterConfig</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-03-14T20:04:39+04:30</Timestamp>
<Source>Unified System</Source>
<AsyncReplyFlag>>false</AsyncReplyFlag>
<AckRequired>>false</AckRequired>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>30</Value>
</Property>
</Header>
<Request>
<m:MeterConfig>
<m:Meter>
<m:mRID>014000000011</m:mRID>
<m:Names>
<m:name>014000000011</m:name>
<m:NameType>
<m:name>serialNumber</m:name>
</m:NameType>
</m:Names>
<m:Names>
<m:name>HXEP1000T</m:name>
<m:NameType>
<m:name>meterModel</m:name>
</m:NameType>
</m:Names>
<m:Names>
<m:name>14</m:name>
<m:NameType>
<m:name>manufacturer</m:name>
</m:NameType>
</m:Names>
<m:Names>
<m:name>1/1</m:name>
<m:NameType>
<m:name>ctRadio</m:name>
</m:NameType>
</m:Names>
<m:Names>
<m:name>1/1</m:name>
<m:NameType>
```

```

<m:name>ptRadio</m:name>
</m:NameType>
</m:Names>
<m:Names>
<m:name>03</m:name>
<m:NameType>
<m:name>protocolType</m:name>
</m:NameType>
</m:Names>
</m:Meter>
</m:MeterConfig>
</Request>
</RequestMessage>

```

4.3.2 ReplyMeterConfig

```

<?xml version="1.0" encoding="UTF-8" ?>
<ResponseMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/MeterConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>MeterConfig</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-06-24T02:30:00+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.0</code>
</Error>
</Reply>
</ResponseMessage>

```

5. DeviceArchive Synchronization

5.1 Introduction

This section aims at presenting message structures regarding adding an equipment.

5.2 Usecase Description

Firstly Unified System should be to validating the meter's information. After that Unified System will send the command of synchronizing the device to MDC which contains device's full profile. The details of Unified System's request to MDC are available in the following Tables:

Table 4.1: Device Archive Synchronization (add device)

Device Addition			
Message type	Verb	Noun	Main elements
Request	create	EndDeviceConfig	Header/Payload
Response	reply	EndDeviceConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Table 4.2: DeviceArchive Synchronzation (modify device)

Device Modification			
Message type	Verb	Noun	Main elements
Request	change	EndDeviceConfig	Header/Payload
Response	reply	EndDeviceConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Table 4.3: DeviceArchive Synchronzation (delete device)

Device Deletion			
Message type	Verb	Noun	Main elements
Request	delete	EndDeviceConfig	Header/Payload
Response	reply	EndDeviceConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Payload's elements regarding this request are presented in Table 4.4:

Table 4.4: EndDeviceConfig

Payload of EndDeviceConfig				
EndDeviceC onfig	EndDevcie (unbound)	mRID		Device ID
		Names	name	Serial Number
			NameType	name "serialNumber"
		Names	name	Protocol Type
NameType	name (16:DCU-DLMS) "protocolType"			

If MDC need other parameters, Unified System be able to extend the element which named "Names".

5.3 Examples of XML Message

5.3.1 EndDeviceConfig

```
<?xml version="1.0" encoding="UTF-8" ?>
<RequestMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>create</Verb>
<Noun>EndDeviceConfig</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-03-14T20:04:39+04:30</Timestamp>
<Source>MDM</Source>
<AsyncReplyFlag>>false</AsyncReplyFlag>
<AckRequired>>false</AckRequired>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>30</Value>
</Property>
</Header>
<Payload>
<m:EndDeviceConfig>
<m:EndDevice>
<m:mRID>014000000011</m:mRID>
<m:Names>
<m:name>014000000011</m:name>
<m:NameType>
<m:name>serialNumber</m:name>
</m:NameType>
</m:Names>
<m:Names>
<m:name>03</m:name>
<m:NameType>
<m:name>protocolType</m:name>
</m:NameType>
</m:Names>
</m:EndDevice>
</m:EndDeviceConfig>
</Payload>
</RequestMessage>
```

5.3.2 ReplyEndDeviceConfig

```
<?xml version="1.0" encoding="UTF-8" ?>
<ResponseMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```

xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>EndDeviceConfig</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-06-24T02:30:00+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.0</code>
</Error>
</Reply>
</ResponseMessage>

```

6. Mother-Child Meter Relation Synchronization

6.1 Introduction

According to IEC 61968-9, in order to perform a linkage between a meter and another device, "MasterDataLinkageConfig" service is used. The sketch of this service is provided in Table 5.1, Table 5.2 and Table 5.3. It is noteworthy to say that, sometimes a meter is linked to some submeters.

Table 5.1: Mother-Child Meter Relation Synchronization (install child meter to mother meter)

Child Meter Installation			
Message type	Verb	Noun	Main elements
Request	create	MasterDataLinkage Config	Header/Payload
Response	reply	MasterDataLinkage Config	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Table 5.2: Mother-Child Meter Relation Synchronization (change child meter to a new mother meter or change mother meter)

Child Meter Change

Message type	Verb	Noun	Main elements
Request	change	MasterDataLinkage Config	Header/Payload
Response	reply	MasterDataLinkage Config	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will be sent back to Unified System, showing the successfulness/unsuccessfulness.

Table 5.3: Mother-Child Meter Relation Synchronization (remove child Meter from mother meter)

Child Meter Deletion			
Message type	Verb	Noun	Main elements
Request	delete	MasterDataLinkage Config	Header/Payload
Response	reply	MasterDataLinkage Config	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will be sent back to Unified System, showing the successfulness/unsuccessfulness.

6.2 Usecase Description

Payload's elements regarding this request are presented in Table 5.4 and 5.5:

Table 5.4: MasterDataLinkageConfig (install and remove child meter)

Payload of MasterDataLinkageConfig				
MasterData LinkageCon fig	Meter (unbounded)	mRID	Meter ID	
		Names (unbounded)	name NameType	subMeter ID "subMeter"

Table 5.5: MasterDataLinkageConfig (change mother meter)

Payload of MasterDataLinkageConfig				
MasterData LinkageCon fig	Meter (unbounded)	mRID	Meter ID	
		Names (only one)	name NameType	masterMeter ID "masterMeter"

6.3 Examples of XML message

6.3.1 MasterDataLinkageConfig

```
<?xml version="1.0" encoding="UTF-8" ?>
<RequestMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```

xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>create</Verb>
<Noun>MasterDataLinkageConfig</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-03-14T20:04:39+04:30</Timestamp>
<Source>Unified System</Source>
<AsyncReplyFlag>>false</AsyncReplyFlag>
<AckRequired>>false</AckRequired>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>30</Value>
</Property>
</Header>
<Payload>
<m:MasterDataLinkageConfig>
<m:Meter>
<m:mRID>014000000011</m:mRID>
<m:Names>
<m:name>014000000012</m:name>
<m:NameType>
<m:name>subMeter</m:name>
</m:NameType>
</m:Names>
</m:Meter>
</m:MasterDataLinkageConfig>
</Payload>
</RequestMessage>

```

6.3.2 ReplyMasterDataLinkageConfig

```

<?xml version="1.0" encoding="UTF-8" ?>
<ResponseMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>MasterDataLinkageConfig</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-06-24T02:30:00+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>

```

```

</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.0</code>
</Error>
</Reply>
</ResponseMessage>

```

7. Gateway-Child Meter RelationSynchronization

7.1. Introduction

This section aims at presenting message structures regarding Installing an equipment.

7.2. Usecase Description

In order to perform a linkage between a meter and a EndDevice, "MasterDataLinkageConfig" service is used.

The details of Unified System's request to MDC are available in the following Tables:

Table 10.1:MasterDataLinkageConfig

MasterDataLinkageConfig			
Message type	Verb	Noun	Main elements
Request	create	MasterDataLinkageConfig	Header/Payload
Response	reply	MasterDataLinkageConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

If the accuracy of uninstallation is evident to Unified System, Unified System sends the command ofunregistering the meter to MDC.

The overview of this usecase is shown in Table below:

Table 7.2: Services used in meter uninstallation

MasterDataLinkageConfig			
Message type	Verb	Noun	Main elements
Request	delete	MasterDataLinkageConfig	Header/Payload
Response	reply	MasterDataLinkageConfig	Header/Reply

Note:

This transaction can be conducted only in synchronous modes. In synchronous mode, a reply will sent back to Unified System, showing the successfulness/unsuccessfulness.

Payload's elements regarding this request are presented in Table 7.2:

Table 7.3: MasterDataLinkageConfig

Payload of MasterDataLinkageConfig					
MasterData LinkageCon fig	EndDevice	mRID		Device ID	
		Names	name NameType	name	"Terminal" "DeviceType"
	Meter	mRID		Meter ID	
		Names	name NameType	name	"Meter" "DeviceType"

7.3 Examples of XML message

7.3.1 MasterDataLinkageConfig

```
<?xml version="1.0" encoding="UTF-8" ?>
<RequestMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>create</Verb>
<Noun>MasterDataLinkageConfig</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-03-14T20:04:39+04:30</Timestamp>
<Source>Unified System</Source>
<AsyncReplyFlag>>false</AsyncReplyFlag>
<AckRequired>>false</AckRequired>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>30</Value>
</Property>
</Header>
<Payload>
<m:MasterDataLinkageConfig>
<m:EndDevice>
<m:mRID>01400004</m:mRID>
<m:Names>
<m:name>Meter</m:name>
<m:NameType>
<m:name>DevcieType</m:name>
</m:NameType>
</m:Names>
</m:EndDevice>
<m:Meter>
<m:mRID>014000000011</m:mRID>
<m:Names>
<m:name>Meter</m:name>
<m:NameType>
<m:name>DevcieType</m:name>
</m:NameType>
</m:Names>
</m:Meter>
</m:MasterDataLinkageConfig>

```

```
</Payload>
</RequestMessage>
```

7.3.2 ReplyMasterDataLinkageConfig

```
<?xml version="1.0" encoding="UTF-8" ?>
<ResponseMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/MasterDataLinkageConfig#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
  <Header>
    <Verb>reply</Verb>
    <Noun>MasterDataLinkageConfig</Noun>
    <Revision>2.0</Revision>
    <Timestamp>2015-06-24T02:30:00+04:30</Timestamp>
    <Source>MDC-001</Source>
    <User>
      <UserID>...</UserID>
    </User>
    <MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
    <CorrelationID>1001</CorrelationID>
    <Property>
      <Name>password</Name>
      <Value>...</Value>
    </Property>
  </Header>
  <Reply>
    <Result>OK</Result>
    <Error>
      <code>0.0</code>
    </Error>
  </Reply>
</ResponseMessage>
```

8. Token Sending

8.1 Introduction

Some times we need intergrate for Prepay system, and it should have the ability to send Tokens to meters.

This section aims at presenting message structure regarding this usecase. General Usecase specifications along with the services used in this respect are provided in Table 5.1.

Table 6.1: Services used in Sending Tokens to Interface Billing

Sending Tokens			
Type of message	Verb	Noun	Mainelements
Request*	create	EndDeviceControls	Header/Payload
Acknowledgement	reply	EndDeviceControls	Header/Reply
Response**	reply	EndDeviceControls	Header/Reply

Note:

This transaction can be conducted only in asynchronous modes.

*The token is stored in payload's name node in sequence, the data format:

token1,token2,token3...

** This response used to Indicate the successfulness/unsuccessfulness of performing the command on

the meter in asynchronous transaction. The execution result of token is stored in reply's detail node, the data format: token1:result1, token2:result2..., the result code reference on table 6.2

Table 6.2: Result Code of Token

Code	Name
0	Token Processing Successful
1	Token Interpretation Error
2	Token Used
3	Token Expired
4	Key Expired
5	Recharge Value Exceed the Accumulate Amount Limit
6	Key Type Don't Allow Recharge
7	Test Token Generated by Non-specified Manufacturer
8	If input the 1st modified key Token, then input is not the 2nd modified key TOKEN
9	Key Type shouldn't change to 3
10	If the parent key type is not the initial one, the child key type can't be changed to initial key
11	Token serial number not correct
12	Token setting parameter invalid

8.2 Usecase Description

Table 6.3 shows payload's elements for Prepaycommand to MDC regarding this usecase:

Table 6.3: Payload for EndDeviceControls (Sending Tokens)

EndDeviceControls	EndDeviceControl(Unbounded)	reason	"sendTokens"	
		EndDeviceControlType ref	15.13.112.78	
		EndDevices	mRID	Meter ID
		Names	name	Token String

In this case, it provide two ways for bulking operations, one is you can set multily tokens for a meter, and the other one is you can set multily tokens for multily meters when the meters use the same tokens.

8.3 Examples of XML Message

8.3.1 SendTokens

```
<?xml version="1.0" encoding="utf-8"?>
<RequestMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceControls#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>create</Verb>
<Noun>EndDeviceControls</Noun>
<Revision>2.0</Revision>
<Timestamp>2016-01-01T00:00:00+04:30</Timestamp>
```

```

<Source>Unified System</Source>
<AsyncReplyFlag>true</AsyncReplyFlag>
<ReplyAddress>http://ip:port/AmiWeb/services/Metering</ReplyAddress>
<AckRequired>true</AckRequired>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>30</Value>
</Property>
</Header>
<Payload>
<m:EndDeviceControls>
<m:EndDeviceControl>
<m:reason>SendTokens</m:reason>
<m:EndDeviceControlType ref="15.13.112.78"/>
<m:EndDevices>
<m:mRID>014000000012</m:mRID>
<Names>
<name>Token1,Token2,Token3</name>
</Names>
</m:EndDevices>
</m:EndDeviceControl>
</m:EndDeviceControls>
</Payload>
</RequestMessage>

```

8.3.2 Acknowledgement

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
xmlns= "http://iec.ch/TC57/2011/schema/message"
xmlns:xsi= "http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation= "http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>EndDeviceControls</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-06-24T02:30:00+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.3</code>

```

```

</Error>
</Reply>
</ResponseMessage>

```

8.3.3 ReplySendTokens

```

<?xml version="1.0" encoding="UTF-8" ?>
<ResponseMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceControls#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>EndDeviceControls</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-03-14T20:04:39+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>601BD4C0-F3E2-4833-BF83-7494460E74BE</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>1</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.0</code>
<details>token1:0,token2:1,token3:2</details>
</Error>
</Reply>

```

9. On Demand Meter Reading

9.1 Introduction

This section aims at presenting message structures regarding the second usecase of MDC. In this usecase, the process of on demand meter reads is clarified in detail. Table 7.1 provides the general message structure of this usecase:

Table 7.1: Meter Reading

Meter Reading			
Type of message	Verb	Noun	Mainelements
Request	Get	MeterReadings	Header/Payload
Acknowledgement	Reply	MeterReadings	Header/Reply
Response	Reply	MeterReadings	Header/Reply/Payload

9.2 Usecase Description

Request elements regarding the on demand meter reading is depicted in Table 7.2. In this usecase, for demanding meter readings, the OBIS of DLMS should be included the request message which are available in Table 7.4 of this document.

Table 7.2: Request of GetMeterReadings

GetMeter Readings	EndDevice (Unbounded)	mRID		MeterID
	ReadingType (Unbounded)	Names	name NameType	OBIS of DLMS "ReadingType"

Payload of the response message can be observed in Table 4.3.

Table 4.3: Payload of MeterReading

MeterReading s	MeterReading (unbounded) Note: Each meter has its own "MeterReading"	Meter Readings (unbounded) Note: For each reading interval, one "Readings" is considered. Moreover, for each "Readings" there is a "ReadingType Ref"	mRID	MeterID
			reason timeStamp value ReadingTypeRef	"inquiry" Readvalue OBIS of DLMS

The ReadingTypes about instantaneous data reference on the blue document.

9.3 Examples of XML Message

9.3.1 MeterReadings

```
<?xml version="1.0" encoding="UTF-8" ?>
<RequestMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/GetMeterReadings#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>get</Verb>
<Noun>MeterReadings</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-03-14T20:04:39+04:30</Timestamp>
<Source>Unified System</Source>
<AsyncReplyFlag>true</AsyncReplyFlag>
<ReplyAddress>http://ip:port/AmiWeb/services/Metering</ReplyAddress>
<AckRequired>true</AckRequired>
<User>
<UserID>...</UserID>
</User>
```



```

<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>1</Value>
</Property>
</Header>
<Request>
<m:GetMeterReadings>
<m:EndDevice>
<m:mRID>014000000012</m:mRID>
</m:EndDevice>
<m:ReadingType>
<m:Names>
<m:name>3#1.0.31.7.0.255#2</m:name>
<m:NameType>
<m:name>ReadingType</m:name>
</m:NameType>
</m:Names>
</m:ReadingType>
</m:GetMeterReadings>
</Request>
</RequestMessage>

```

9.3.2 Acknowledgement

```

<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
xmlns= "http://iec.ch/TC57/2011/schema/message"
xmlns:xsi= "http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation= "http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>MeterReadings</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-06-24T02:30:00+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.3</code>
</Error>
</Reply>
</ResponseMessage>

```

9.3.3 ReplyMeterReading

```

<?xml version="1.0" encoding="UTF-8" ?>
<ResponseMessagexmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:gmr="http://iec.ch/TC57/2011/GetMeterReadings#"
xmlns:m="http://iec.ch/TC57/2011/MeterReadings#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>MeterReadings</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-03-14T20:05:08+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>601BD4C0-F3E2-4833-BF83-7494460E74BE</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>1</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.0</code>
</Error>
</Reply>
<Payload>
<m:MeterReadings>
<m:MeterReading>
<m:Meter>
<m:mRID>014000000012</m:mRID>
</m:Meter>
<m:Readings>
<m:reason>inquiry</m:reason>
<m:timeStamp>2015-03-14T20:05:03+04:30</m:timeStamp>
<m:value>141</m:value>
<m:ReadingType ref="#3#1.0.31.7.0.255#2"/>
</m:Readings>
</m:MeterReading>
</m:MeterReadings>
</Payload>
</ResponseMessage>

```

10. Meter Connect and Disconnect

10.1 Introduction

The current use case describes the process of remote disconnection or reconnection of electricity supply to a customer on a designated date.

The steps regarding this use case (disconnection) are:

1. The EndDeviceControl message is sent from the Unified System to the MDC to disconnect the meter.
2. Remote meter disconnect is performed.

General Usecase specifications along with the services used in this respect are provided in Table 8.1.

Table 8.1: Services used for Meter Disconnect and Reconnect

Disconnect					
Message type	Verb	Noun	Main elements	Sender	Receiver
Request	create	EndDeviceControls	Header/ Payload	Unified System	MDC
Acknowledgement	reply	EndDeviceControls	Header/Reply	MDC	Unified System
Response	reply	EndDeviceControls	Header/Reply	MDC	Unified System

Note that following the disconnection, there may be ameter reconnect sequence which is performed as below:

1. The EndDeviceControl message is sent from the Unified System to the MDC to reconnect the meter.
2. Remote meter reconnect is performed.

10.2 Usecase Description

Table 8.3 shows payload's elements for EndDeviceControls message:

Table 8.3: Request of EndDeviceControls

Payload of EndDeviceControls					
EndDeviceC ontrols	EndDevice Control(Un bounded)	reason	"Disconnect"/"Reconnect"		
		EndDeviceControlType ref	Control Code(refer to Table 8.5)		
		mRID	Meter ID		
		EndDevices(Unbounded)	Names	name	"Disconnect"/"Reconn ect"
			NameType	name	"ControlTyp e"

Details of the Simple acknowledgement from MDC to Unified System in the case of asynchronous transaction are provided in Table 2.5.

More details regarding EndDeviceControlType are provided in Table 8.5.

Table 8.5: Controlling code

ControlDescriptio n	Control Code	Type	Domain	SubDomain	Action
Remote disconnection	3.0.211.23	ElectricMeter	n/a	RemoteAcces s	Disconnec t
Remote connection	3.0.211.18	ElectricMeter	n/a	RemoteAcces s	connect

10.3 Examples of XML Message

10.3.1 MeterConenctDisconnect

```
<?xml version="1.0" encoding="utf-8"?>
<RequestMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceControls#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>create</Verb>
<Noun>EndDeviceControls</Noun>
<Revision>2.0</Revision>
<Timestamp>2016-01-01T00:00:00+04:30</Timestamp>
<Source>Unified System</Source>
<AsyncReplyFlag>true</AsyncReplyFlag>
<ReplyAddress>http://ip:port/AmiWeb/services/Metering</ReplyAddress>
<AckRequired>true</AckRequired>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>30</Value>
</Property>
</Header>
<Payload>
<m:EndDeviceControls>
<m:EndDeviceControl>
<m:reason>Disconnect/Reconnect</m:reason>
<m:EndDeviceControlType ref="3.0.211.23"/>
<m:EndDevices>
<m:mRID>014000000012</m:mRID>
<m:Names>
<m:name>Disconnect</m:name>
<m:NameType>
<m:name>ControlType</m:name>
</m:NameType>
</m:Names>
</m:EndDevices>
</m:EndDeviceControl>
</m:EndDeviceControls>
</Payload>
</RequestMessage>
```

10.3.2 Acknowledgement

```
<?xml version="1.0" encoding="UTF-8"?>
<ResponseMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
```

```

<Noun>EndDeviceControls</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-06-24T02:30:00+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>83c643e6-85c5-43c0-9e0a-fa1deb469b72</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.3</code>
</Error>
</Reply>
</ResponseMessage>

```

10.3.3 ReplyMeterConnectDisconnect

```

<?xml version="1.0" encoding="UTF-8" ?>
<ResponseMessage
xmlns="http://iec.ch/TC57/2011/schema/message"
xmlns:m="http://iec.ch/TC57/2011/EndDeviceControls#"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://iec.ch/TC57/2011/schema/message Message.xsd">
<Header>
<Verb>reply</Verb>
<Noun>EndDeviceControls</Noun>
<Revision>2.0</Revision>
<Timestamp>2015-04-25T11:11:03+04:30</Timestamp>
<Source>MDC-001</Source>
<User>
<UserID>...</UserID>
</User>
<MessageID>601BD4C0-F3E2-4833-BF83-7494460E74BE</MessageID>
<CorrelationID>1001</CorrelationID>
<Property>
<Name>password</Name>
<Value>...</Value>
</Property>
<Property>
<Name>timeout(m)</Name>
<Value>1</Value>
</Property>
</Header>
<Reply>
<Result>OK</Result>
<Error>
<code>0.0</code>
</Error>
</Reply>
</ResponseMessage>

```

11. Meter Reading Data

Daily frozen data, monthly frozen data and event data will be transferred by file from MDC to Unified System.

11.1. File Transfer Rule

- 1) The file interface interacts via FTP to transfer data, the file is in CSV format.
- 2) FTP set up two dedicated accounts for Unified System and MDC, limit access to client IP to ensure security.
- 3) FTP has two directories: one is "exportDir" which store the data file exported by MDC, another directory is "historyDir" which store historical data, the data file will move to "historyDir" which has been processed by Unified System, historical data store in the folder named: yyyyMMdd.
- 4) Naming rules of data file: the data file is divided into three types: daily frozen data(01_yyyyMMddHHmmss.csv), monthly frozen data(02_yyyyMMddHHmmss.csv) and event data(03_yyyyMMddHHmmss.csv).
- 5) In consideration of data processing efficiency, each data file contains maximum 100000 pieces of data.
- 6) The first line of data file is the name of each data field.
- 7) Data read and write synchronization: when exporting data, MDC produces a lock file with the suffix .lock which has the same name with the data file, the lock file will be deleted after MDC completes exporting the data file.
- 8) Data exporting frequency, daily frozen data and monthly frozen data: once a day, event data: once an hour.

11.2. Data Format

11.2.1. Daily Frozen Data

Column	Data Name	Data Type	Description
1	Meter No.	String(12)	sb_dlsj.sjid
2	Data Time	String(8)	sb_dlsj.sjsj,yyyyMMdd
3	Active Energy(+) Total	NUMBER(16,4)	sb_dlsj.zxygz,kWh
4	Active Energy(+) T1	NUMBER(16,4)	sb_dlsj.zxygz1,kWh
5	Active Energy(+) T2	NUMBER(16,4)	sb_dlsj.zxygz2,kWh
6	Active Energy(+) T3	NUMBER(16,4)	sb_dlsj.zxygz3,kWh
7	Active Energy(+) T4	NUMBER(16,4)	sb_dlsj.zxygz4,kWh
12	Reactive Energy(+) Total	NUMBER(16,4)	sb_dlsj.zxwz,kvarh
13	Meter Balance	NUMBER(16,4)	sb_dlsj.dbye,TK

11.2.2. Monthly Frozen Data

Column	Data Name	Data Type	Description
1	Meter No.	String(12)	sb_dlsj_ydj.sjid
2	Data Time	String(6)	sb_dlsj_ydj.sjsj,yyyyMM
3	Active Energy(+) Total	NUMBER(16,4)	sb_dlsj_ydj.zxygz,kWh
4	Active Energy(+) T1	NUMBER(16,4)	sb_dlsj_ydj.zxygz1,kWh
5	Active Energy(+) T2	NUMBER(16,4)	sb_dlsj_ydj.zxygz2,kWh
6	Active Energy(+) T3	NUMBER(16,4)	sb_dlsj_ydj.zxygz3,kWh

7	Active Energy(+) T4	NUMBER(16,4)	sb_dlsj_ydj.zxygz4,kWh
12	Reactive Energy(+) Total	NUMBER(16,4)	sb_dlsj_ydj.zxwgz,kvarh
13	Meter Balance	NUMBER(16,4)	sb_dlsj_ydj.dbye,TK

11.2.3. Meter Event

Column	Data Name	Data Type	Description
1	Meter No.	String(12)	sb_gj.sjid
2	Event Code	String(30)	sb_gj.gjbm
3	Event Start Time	String(14)	sb_gj.rqsj,yyyyMMddHHmmss
4	Event End Time	String(14)	sb_gj.jssj,yyyyMMddHHmmss

[N.B. If any changes made in API that will be disclosed to the tenderer before presentation/ demonstration of the functionality on the sample meters and pre-payment metering system.]