Section 6. Procuring Entity's Requirements

Table of Contents

6.1 Scope of Supply of Plant and Installation Services by the Contractor

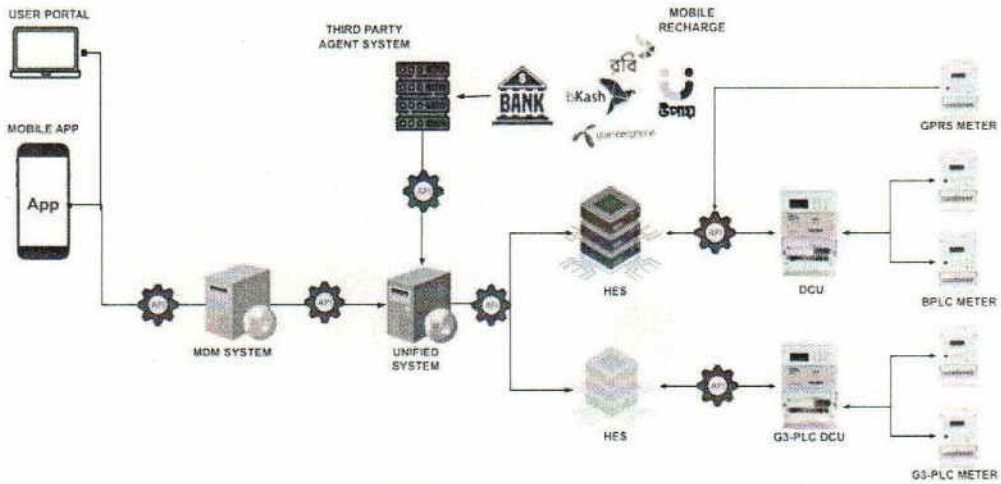
WZPDCL System Upgradation (for pre-paid system, Part-1)

6.1.1.1 General Scope

WZPDCL needs to upgrade the system running the Pre-Payment system. The main reason to upgrade the system is to increase the capacity, productivity and robustness to provide support to its customers. Below are the systems that needs to upgrade or develop:

1. Design, development and installation of Meter Data Management (MDM) System (New System).
2. Upgrade of Unified Pre-Payment Vending System (Existing System).
3. Upgrade of Agent Management System (AMS) (Existing System).
4. Design, development and installation of User Portal for Users (New System)
5. Design, development and installation of Mobile App (Android & iOS) Users (New System).

WZPDCL SYSTEM AND API STRUCTURE



Below is the description of the system.

6.1.1.2 Meter Data Management (MDM) System:

This is a new web-based system. This system will facilitate WZPDCL to take proactive actions from various type of business dash board providing meaningful information. This system shall have scalability and compatibility to integrate with WZPDCL's existing systems as well as advance systems and application platforms.

6.1.1.2.1 Basic Functions Requirement of Upgradation of Existing Smart Pre-payment metering system Software:

- Design, Supply, Installation, Testing, Commissioning of updated Smart Prepayment Metering System Software with Up-gradation of Unified Prepaid System, HES/MDM and Third-Party Agent Management System (AMS) on Turnkey Basis with 05 (Five) Years" Service (Operation & Maintenance) Agreement.
- Remote Meter data reading at configurable intervals (push/pull).
- Pre-paid functionality following Bangladesh Energy Regulatory Commission (BERC) rules and existing Unified prepaid metering system business logic.
- Net Metering, Mother-Child Metering Scheme.
- Alarm/Event detection, notification and reporting.
- Remote Load Limiter and connection/ disconnection at defined/ on demand conditions (Load Management).
- Remote firmware upgrade (both meter and DCU).
- Integration with other existing systems like unified prepaid metering system, Agent Management System (AMS), Head-End-System (HES)/ MDM System, online new connection system, WZPDCL's Postpaid Billing System.
- Security features to prevent unauthorized access to the Smart metering system including Smart meter & meter data etc.
- The proposed solution should allow the consumers to buy energy and recharge their smart meters through multi-channels like Web, mobile, Kiosk etc. When the threshold is reached solution should triggers notification to customer to recharge.
- The proposed solution should support all the WZPDCL's existing meter and new upcoming meters. It should have all the features and business logic to recharge and manage all the WZPDCL's existing meter and new upcoming meters.
- System architecture shall support 20 lakh meters initially and scalable up to 40 lakh meters.
- System shall be capable of collecting data from all the consumers at least once in a day under the utility defined frequency (15 min/30 min/1 hour etc.) The system shall collect the customer data at least once in a day; however, the data download frequency and integration period shall be depending on Utility business requirements.
- The proposed technology solution shall maintain information and relationships between the current installed meter location (apartment, shop, industry/ address etc.), Consumer information (Name, NID, Phone Number etc.), Consumer account no, Meter ID, Type of Meter (type of consumer, 1 phase/3phase, etc.), Meter configuration (Demand integration period, Load profile capture period etc.), GIS supplied information (longitude, latitude, connection with feeder/ transformer/ pole etc.) etc.
- Exception Generation - System shall generate exceptions based on configurable business rules including but not limited to the following:
  a. Meter tamper alerts
  b. If the consumption is less/more than pre-defined average consumption
  c. Negative Consumption

d. Power outage indications received from the Smart meter

- Updated System shall facilitate programming of following meter parameters like and not limiting to:
  a. Setting of parameters for Tariff
  b. Prepaid parameter details on meter display
  c. Clock setting/time synchronization
  d. Load curtailment limit
  e. Event setting for connect/disconnect
  f. Number of auto reconnection attempt
  g. Time interval between auto reconnection attempt
  h. Remote firmware upgrade
  i. Push schedule for updating new tariff to meter
  j. Provision for adding more programming features in future
- Logs must be maintained for all attempts to log on (both successful and unsuccessful), any privilege change requests (both successful and unsuccessful), user actions affecting security (such as password changes), attempts to perform actions not authorized by the authorization controls, all configuration changes etc.

6.1.1.2.2 Integration Requirements of upgraded Smart Pre-payment metering system Software:

- Proposed technology solution shall support integration web-services and APIs to exchange data with other systems like postpaid billing system, online new connection system, Call center application, AMS, GIS and SCADA etc.
- Different Manufacturer's HES shall be integrated with MDM to transfer meter billing data, interval data and events data or instantaneous data.
- As a part of project solution there will be data collected from smart meters. Solution should ensure that there is scalability and compatibility to integrate with advance application platforms so that various type of business dash board providing meaningful information to take proactive actions can be made available.
- Proposed solution shall be able to integrate different manufacturer's meter for recharging and managing meter data.
- Proposed technology solution shall be able to integrate with various advance analytical tools and provide processing capabilities such as big data analytics.
- Solution should be capable to integrate with various mobile applications to provide proactive and real time operational alerts.
- Solution should have the capability to integrate with SMS and Email gateways to send various alarms and notifications. Group, prioritize, filter and send system generated alarms and events to defined email addresses, cellular text messages to phone numbers.
- Bidder will supply the network management software with requisite licenses and integrate with Updated Meter Data Management (MDM) System. HES shall perform the acquisition of data from the nodes, across the communication infrastructure automatically avoiding any human intervention and monitor parameters acquired from smart meters.
- Proposed technology solution shall have standard interfaces like CIM IEC 61968 (CIM 2.0) or any other open standard to integrate different manufacturer's HES.
- MDM system shall preferably interface with other systems on standard interfaces and the data exchange models and interfaces shall comply with CIM IEC 61968 (CIM 2.0) or any other open standard.
- Proposed system integration with other systems shall include but not limited to the following:
  - Integration with existing interfaces of Unified prepaid system

- Agent Management System for third party vending/ Integration with payment vendors
- HES for data exchange.
- Support of interface with HHU or manual reading system etc.
- Integration with Kiosk, online portal/Mobile/call center recharge of prepaid to buy energy from utility company.
- Online new connection application,
- Call center Application
    - Interactive Voice Record (IVR) system,
    - CRM,
    - Consumer Portal
- Supervisory Control and Data Acquisition (SCADA)
- GIS Systems integration

6.1.1.2.3 Analysis Requirements of upgraded Smart Pre-payment metering system Software:

The Proposed technology solution shall have analysis capability based on configurable business rules including but not limited to the following:

- Display consumption/load profiles by configurable period (15/30 min, hour, day, month, year etc.) day type (weekday, weekend, holiday, festival wise etc.) and by tariff, customer type, or any user specified collection of meters.
- Generate peak, off-peak & Super off-peak load patterns by aggregating all loads of Distribution Transformer (DT)/ Feeder/ consumer group.
- Perform DT/feeder wise energy audit.
- Perform load analysis for different groups and categories of consumers.
- Ability to provide the data to load forecasting, load research or demand response applications and perform error management like: Missed reads and intermittent meter reads before taking into forecasting, load research or demand response.
- Analyzing data to identify new patterns of usage, Setting fraud alert / transformer overload alerts / demand – supply gap alert etc.
- Ability to receive and store outage and restoration event data from smart meters and outage systems and to log all such events for analysis.
- The system shall have the ability to selectively choose which data to be maintained and which to be purged or archived as per requirement of Utility (user selectable).

6.1.1.2.4 Online portal Requirements of upgraded Smart Pre-payment metering system Software:

- Consumers shall be provided facility to recharge their account by logging on user interface using Mobile Apps and Web interface. User interface shall require consumer id., mobile number & password with OTP for secure login. This user interface shall be integrated with the present online payment gateway of utility.
- Can buy energy online and recharge their prepaid meter using third party vending system
- Consumers can view recharge history & present balance.
- Can initiate service requests for maximum demand updating, meter checking etc.

6.1.1.2.5 Reporting Requirements of upgraded Smart Pre-payment metering system Software:

The proposed solution should support the required reports to manage the prepaid customers. It should support the report requirement from both Utility and customers. Below are some of the required reports but not limiting to:

- Consumption (kwh) based monthly operational data (MOD) report
- Customer due for recharging the meter
- Connect/disconnect reports
- Revenue reports
- Customer reports
- Daily data collection report
- Usage exceptions reports
- Missing interval Read date and times (on hourly, daily, weekly & monthly basis)
- Physical meter events (install, remove, connect, disconnect) & meter reset report
- Meter flags (Tamper/ Overload etc.)
- Meter inventory
- Defective meters
- Threshold Exception
- SAIDI/ SAIFI Calculation report

System shall support users modifying standard reports to better meet specific reporting requirements.

- The system shall enable the Utility to deliver reports in standard digital format such as PDF, CSV, Excel, etc.
- All queries shall be generated through user driven drop down menu in GUI.As a reporting tool BI Publisher or updated technology shall be used for generation customizable report.

6.1.1.2.6 Advanced Security Features Requirement of upgraded Smart Pre-payment metering system Software:

- Use of Security Association (SA) hardware security module (HSM)/ software security module (SSM) appliance to store the utility key pair and DPM AES key-encryption-key (or KEK) in a highly secure environment.
- Use of RSA Data Protection Manager (DPM) appliance to store each endpoint's AES key, encrypted with the KEK, in a secure environment.
- Segments Keys which are utilized to secure broadcast mechanisms within the system.
- Individual Keys used for all direct communication between Command Center and the endpoint.
- Downstream Message Authentication where Command Center will digitally sign commands using the Utility Private Key stored securely in a HSM/SSM at the head end.
- Mobile Administration Tool Authentication to provide additional security measures around the mobile administration tools.

Data Migration existing System to New System: Migrate all data from existing system to new system without lost any type of data. After migration of data must perform User Acceptance Test (UAT) so that WZPDCL ensure all data available in the system.

6.1.1.3.0 Technical Specifications for WZPDCL MDM, HES & Unified Prepaid System Modernization

6.1.1.3.1 Architectural Modernization: Cloud-Native and Scalable Architecture

- The proposed solution shall adopt a modern cloud-native and distributed architecture capable of supporting high transaction volume, horizontal scalability, high availability, and future expansion.

- The proposed system shall support cloud-native or hybrid deployment architecture using microservices-based design principles and containerized deployment technologies such as Docker and Kubernetes or equivalent.

The system architecture shall:

- Support minimum 2 million smart meters initially.
- Be scalable up to 4 million meters without major architectural redesign.
- Support horizontal scaling for application, database, analytics, and integration layers.
- Support distributed processing architecture.
- Support active-active clustering architecture.
- Support automatic failover and self-healing capabilities.
- Support deployment in on-premise, private cloud, public cloud, or hybrid cloud environments.
- Ensure minimum 99.95% system availability.

6.1.1.3.2 Real-Time Streaming and Event Processing: Event Streaming Platform

- The proposed solution shall support real-time ingestion and processing of meter events, alarms, outage notifications, vending transactions, and operational telemetry.

- The proposed solution shall support event-driven architecture using streaming technologies such as Apache Kafka or equivalent enterprise-grade event streaming platform.

- The streaming platform shall support:

    - Real-time event ingestion.
    - Real-time alarm processing.
    - Meter event correlation.
    - Fraud and tamper analytics.
    - Real-time outage notification.
    - Streaming integration with analytics platforms.
    - Event replay and persistence.
    - Distributed event processing.
    - Minimum 20,000 events per second processing capability.

6.1.1.4.0 MDM Functional Requirements:

6.1.1.4.1 Validation, Estimation and Editing (VEE)

- The MDM shall include configurable Validation, Estimation and Editing (VEE) functionality for interval, billing, and event data.

- The proposed MDM solution shall include configurable Validation, Estimation and Editing (VEE) capabilities for ensuring data quality and completeness.

- The VEE engine shall support:

- Missing data validation.
- Duplicate data detection.
- Interval data estimation.
- Rule-based validation.
- Threshold validation.
- Historical profile estimation.
- Manual and automatic editing workflows.
- Audit trail of edited records.
- Exception management workflows.

6.1.1.4.2 Advanced Analytics and AI/ML Capability

- The proposed system shall support advanced analytics and AI/ML-driven operational intelligence.
- The proposed solution shall support AI/ML-enabled analytics capabilities including but not limited to:

- Electricity theft detection.
- Consumption anomaly detection.
- Transformer overload prediction.
- Demand forecasting.
- Load pattern analysis.
- Consumer segmentation.
- Predictive maintenance.
- Revenue leakage analysis.
- Meter health scoring.
- Energy balancing analytics.

The system shall support integration with enterprise analytics and big data platforms.

6.1.1.4.3 Dynamic Tariff Support

The proposed system shall support:

- Time-of-Use (TOU) tariff.
- Critical peak pricing.
- Dynamic tariff configuration.
- Net metering settlement.
- Prepaid and postpaid tariff models.
- Multi-tier tariff configuration

6.1.1.5.0 Cybersecurity
6.1.1.5.1 Utility-Grade Cybersecurity Framework

- The system shall comply with modern utility cybersecurity standards.

- The proposed solution shall comply with the following cybersecurity standards and frameworks:

- IEC 62351.
- ISO 27001.
- OWASP Top 10.

- NIST Cybersecurity Framework.
- CIS Security Controls.

- The system shall support:

- Zero Trust Architecture.
- Multi-factor authentication (MFA).
- Role-based access control (RBAC).
- Attribute-based access control (ABAC).
- End-to-end encryption using TLS 1.3 or higher.
- PKI-based device authentication.
- Secure API gateway.
- Security Information and Event Management (SIEM) integration.
- Security Operations Center (SOC) integration.
- Immutable audit logs.
- Ransomware protection.
- Database encryption at rest.
- Intrusion detection and prevention.
- Centralized log monitoring.

6.1.1.5.2 Security Logging and Audit Trails

- The system shall maintain immutable audit trails for:

- User logins.
- Failed authentication attempts.
- Configuration changes.
- Privilege changes.
- Meter parameter changes.
- Firmware upgrade activities.
- API transactions.
- Data modifications.
- Security events.

Audit logs shall be retained for minimum 10 years.

6.1.1.6.0 API and Integration
6.1.1.6.1 API-First Architecture

- The proposed solution shall adopt modern API-first integration architecture.

- All system integrations shall support RESTful API architecture with OpenAPI/Swagger documentation standards.

The integration framework shall support:

- REST APIs.
- SOAP APIs.
- OAuth2 authentication.
- OpenID Connect.
- API gateway integration.

- Message queue integration.
- JSON/XML data formats.
- Webhooks.
- Event-driven integration.

All APIs shall be version-controlled and documented.

6.1.1.6.2 Utility Interoperability Standards

- The proposed solution shall support utility interoperability standards including:

- CIM IEC 61968.
- CIM IEC 61970.
- DLMS/COSEM.
- IEC 62056.
- MQTT.
- Multi-vendor HES interoperability.
- Open Smart Grid Protocols.

The bidder shall ensure interoperability with multi-vendor smart meters and HES platforms.

6.1.1.7.0 Performance and Scalability Requirements

System Performance KPIs:

- The system shall meet defined utility-grade performance SLAs.

- The proposed system shall meet the following minimum performance requirements:

Performance Parameter	Minimum Requirement
Supported Smart Meters	2 Million Initially
Scalable Capacity	4 Million Meters
Daily Meter Reads	20 Million Reads
Event Processing	10,000 Events/Hour
Vending Transactions	10,000 Transactions/ Hour

- The proposed architecture shall allow future expansion up to the target meter capacity without requiring replacement of core software platforms.

6.1.1.8.0 Data Storage and Big Data Platform

- The proposed solution shall support enterprise-grade time-series data storage architecture.

- The data platform shall support:

- Hot and cold data storage.
- Distributed databases.

- High-speed interval data ingestion.
- Long-term archival.
- Data compression.
- Historical analytics.
- Data partitioning.
- Data replication.
- Backup and recovery.

The system shall support minimum 10 years retention of interval, billing, event, and audit data.

6.1.1.9.0 High Availability and Disaster Recovery

The proposed system shall support enterprise-grade high availability and disaster recovery architecture.

The bidder shall provide:

- Geo-redundant architecture.
- Automatic failover capability.
- Backup automation.
- Data replication.
- Periodic DR drills.

- The solution shall support:

Parameter	Requirement
Recovery Point Objective (RPO)	Maximum 15 Minutes
Recovery Time Objective (RTO)	Maximum 2 Hours
Backup Frequency	Hourly Incremental
Full Backup	Daily

6.1.1.10.0 Multi-Vendor HES Integration

The proposed MDM solution shall support integration with multiple HES platforms from different meter manufacturers and upcoming unified HES platform.

The solution shall:

- Support simultaneous multi-HES integration including upcoming unified HES integration.
- Support standard communication protocols.
- Support secure data exchange.
- Support real-time event ingestion.
- Support firmware upgrade coordination.
- Support remote meter management.
- Support scalable communication infrastructure.

6.1.1.11.0 Consumer Portal and Mobile Application

The proposed consumer portal and mobile applications shall support:

- Android and iOS platforms.
- Bangla and English language support.
- Push notifications.
- Low balance alerts.
- Outage alerts.
- Consumption analytics.
- Live balance display.
- QR code recharge.
- Digital wallet integration.
- Recharge history.
- Complaint registration and tracking.
- AI chatbot support.
- Secure OTP-based authentication.
- Biometric authentication support.
- E-bill and e-receipt generation.
- Real-time vending updates.

6.1.1.12.0 GIS and SCADA and Other system Integration

The proposed system shall support integration with:

- Geographic Information System (GIS).
- Supervisory Control and Data Acquisition (SCADA).
- Enterprise Resource Planning (ERP).
- Postpaid Billing System

The proposed solution shall support:

- Distribution transformer energy balancing.
- Outage analytics.
- Real-time feeder monitoring.
- Demand response readiness.

6.1.1.13.0 Open Standards Requirement

The bidder shall ensure that the proposed solution does not create operational dependency or proprietary lock-in preventing WZPDCL from independently operating, maintaining, upgrading, or integrating the system in the future.

The bidder shall provide:

- Complete system documentation
- Open API documentation.
- Database schema documentation.
- Interface specifications.
- Configuration documentation.
- Data export capability.
- Standard communication interfaces.

- Administrative access rights
- System backup and restoration procedures

WZPDCL shall retain ownership of all operational and historical data.

6.1.1.14.0 Data Governance Framework

The proposed solution shall support data governance and regulatory compliance requirements.

The system shall support:

- Data ownership controls.
- Data classification.
- Data retention policies.
- Consumer privacy protection.
- Secure data archival.
- Regulatory audit support.
- Digital evidence preservation.
- Data sovereignty requirements.

All consumer and operational data shall remain the property of WZPDCL.

6.1.1.15.0 System Monitoring Framework

The proposed solution shall include centralized monitoring and observability capabilities.

The monitoring platform shall support:

- Infrastructure monitoring.
- Application monitoring.
- API monitoring.
- Database monitoring.
- Real-time health dashboards.
- Alert management.
- SLA monitoring.
- Performance analytics.
- Predictive operational alerts.

6.1.1.16.0 System Testing Requirements

The following test shall be required (performed by bidder) :

- Factory Acceptance Test (FAT).
- Site Acceptance Test (SAT).
- User Acceptance Test (UAT).
- Performance Testing.
- Load Testing.
- Stress Testing.
- Penetration Testing.
- Vulnerability Assessment.
- Failover Testing.

- Disaster Recovery Testing.

All testing reports shall be submitted to WZPDCL for approval.

6.1.1.17.0 Training and Knowledge Transfer

The bidder shall provide comprehensive training and knowledge transfer programs for:

- System administrators.
- Database administrators.
- Security teams.
- Operations teams.
- Field engineers.

Training materials, operational manuals, API documentation, architecture diagrams, and maintenance procedures shall be handed over to WZPDCL.

6.1.1.18.0 Warranty, Support and Maintenance

The bidder shall provide minimum five (5) years comprehensive operation and maintenance support including:

- 24x7 technical support.
- Security patch management.
- Software updates.
- Database maintenance.
- Performance tuning.
- DC/DR support.
- Cybersecurity monitoring.
- Incident response support.
- Preventive maintenance.

- The bidder shall define SLA response and resolution timelines.
- The proposed solutions license shall be perpetual.
- Expiry of warranty, support, or O&M agreement shall not restrict WZPDCL from continuing operation of the system using the perpetual licenses provided under the contract.

6.1.1.19.0 **Perpetual Licensing Requirement: Ownership and Licensing Model**

The proposed solution shall be supplied under a perpetual licensing model for all software components supplied as part of the project.

The perpetual license shall include, but not be limited to:

- Meter Data Management (MDM) System
- Head-End System (HES) interfaces
- Unified Prepaid Vending System
- Agent Management System (AMS)
- Mobile Applications
- Consumer Web Portal
- Integration Middleware
- Reporting Tools
- Analytics Modules
- Database Licenses (if supplied by bidder)

- Monitoring and Management Tools
- API Gateway Components
- Security Management Components

The perpetual license shall grant WZPDCL:

- Unlimited and irrevocable rights to use the software permanently.
- Rights to operate the system without recurring annual license dependency.
- Rights to install and use the software in production, DR, testing, staging, and development environments.
- Rights to scale the system up to the specified meter capacity without requiring additional core platform license fees.
- Rights to continue operation after completion or expiration of the Operation & Maintenance (O&M) period.
- No Usage limitation, No Meter number limitation, No User limitation, No Renewal requirements.
- Subscription-only licensing models shall not be acceptable.

6.1.1.20.0 Deliverables

The bidder shall additionally provide:

- Detailed Solution Architecture.
- Network Architecture Diagram.
- Cybersecurity Architecture.
- Data Flow Diagram.
- Integration Design Document.
- API Documentation.
- Database Design Document.
- Capacity Planning Report.
- High Availability Design.
- Disaster Recovery Plan.
- Performance Benchmark Report.
- Cybersecurity Compliance Report.
- The Tenderer shall hand over the latest updated source code of the entire system to the Employer. The source code shall become the property of the Employer.

6.1.1.21.0 Data Sharing Scope Through API

The system shall have the capability to provide the following data through APIs.

- Distribution Transformer data (Phase voltages, Phase Currents, KW, KVAR, KWH & KVARH (Monthly/Weekly)
- Post Paid Energy Meter data (Phase voltages, Phase Currents, KW, KVAR, KWH & KVARH (Monthly/Weekly)
- Pre Paid Energy Meter data (Phase voltages, Phase Currents, KW, KVAR, KWH & KVARH (Monthly/Weekly)
- Data from Billing Server

6.1.1.22.0 Mutual Cooperation During Execution

A project titled "Modernization of Power Distribution Smart Grids Phase-I Project" is currently being implemented under WZPDCL. The scope of this project includes the implementation of SCADA and GIS systems. In the interest of WZPDCL's operational requirements, any data required for the execution of these activities shall be provided as and when requested.To ensure the smooth execution of the integration activities, a formal coordination mechanism, including joint meetings and an interface management plan, may be established.