

6.1.3 Technical Term of Reference for Development of Web based Post-paid Billing Software

Development of Web based Post-paid Billing Software (Part-2)



1. Background

West Zone Power Distribution Company Limited (WZPDCL) is responsible to supply of electricity to customer premises through 52 offices under 6 circle offices in the western part of the country (Khulna & Barishal division and greater Faridpur area comprising 21 districts and 21 Upazila excluding REB area). WZPDCL has two types metering system of electricity consumer as Postpaid meter and Prepaid meter.

The existing postpaid billing system of operates using a distributed server-client topology. As a result, there are 52 separate billing servers installed in 52 different field offices. Each of these 52 servers maintains its own individual database. One or more client PCs are connected to the billing server computer. The postpaid billing software used by WZPDCL is developed in Visual Basic 6 and is desktop-based. SQL Server 2008R2 is used as the database management system.

Due to the distributed nature of the system with 52 billing servers, 52 separate applications, and 52 separate databases—centralized data storage, report generation, data transparency, and data security cannot be ensured effectively. The operation and maintenance of the postpaid billing software require additional time and incur higher financial costs. Data security is also a very big risk as the data is distributed in all billing stations with no scope for data consolidation at any point.

Moreover, these systems are developed using old/obsolete technologies with minimum stability, scalability, maintainability and functional maturity. On top of that, due to imbalanced engagement model and agreement related complexities, the manual billing system vendors are exploiting WZPDCL in a very unusual manner, which is considered to be very non-standard of the global software industry practices.

WZPDCL wants to implement new Web based Postpaid billing software system as well as conversion of existing 52 nos. distributed database to single centralized database system integrated with new web-based application.

Hosting the postpaid billing application on server, database on ODA (Oracle Database Appliance) and another Server for third-party access (MFS, Bank etc.) and another Server for MIS application. Field-level Circle Offices and Electricity Supply Offices would then be able to access and use the application and database through intranet.

2. Objectives

The primary objectives of the software are:

- To develop web based Postpaid billing software.
- To develop web-based Management Information System (MIS) application for generating report.
- Any type of customized report can be generated and managed centrally as per requirements.
- Banks involved in electricity e-bill collection will be able to verify bills online using the interface of the billing software.
- To ensure faster, systematic, better consumer service delivery.
- To eliminate or drastically reduce reading manipulation etc. types of fraudulent activities;
- To ensure accurate, faster, tamper-proof billing (processing, generation, delivery, payment processing etc.) and revenue collection using centralized, state-of-the-art technologies;
- Assurance in real time backup facilities.
- Assurance in data security.
- To ensure online based Commercial Operation Procedure (COP).
- Postpaid billing system can be integrated with Online new connection application, Miscellaneous application, Complain Management System (CMS), Accounting Software and prepaid metering

system. So that, we can generate automatic centralized report all types of consumers (prepaid/postpaid).

3. Review of Existing Service

Currently WZPDCL is practicing very manual, distributed, highly error and fraud prone billing process, because of which every year WZPDCL is losing of huge volume of revenue along with never achieved customer satisfaction level.

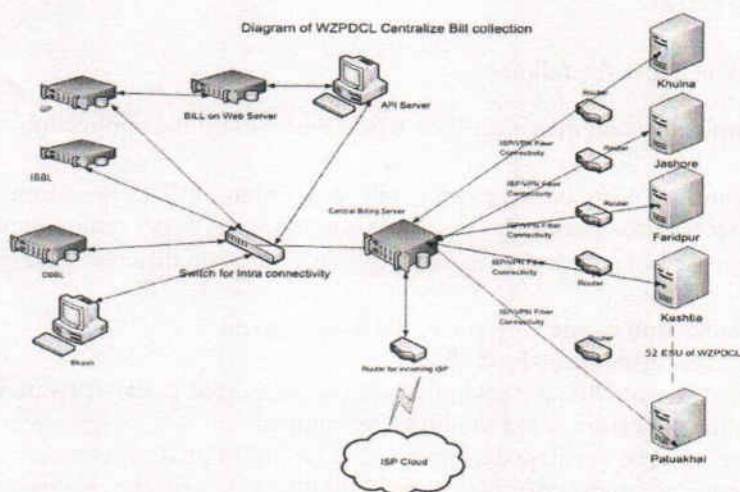
3.1 Existing Service

The existing postpaid billing system of operates using a distributed server-client topology. As a result, there are 52 separate billing servers installed in 52 different field offices. Each of these 52 servers maintains its own individual database. One or more client PCs are connected to the billing server computer. The postpaid billing software used by WZPDCL is developed in Visual Basic 6 and is desktop-based. SQL Server 2008R2 is used as the database management system.

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Currently, the connectivity of 52 office servers with the central billing server at WZPDCL headquarters is through broadband VPN, so only the customer's monthly bill and online bill information is stored on the central server. In addition, any other information related to the customer's bill such as outstanding information, previous history, offline bill information, etc. is not possible to store centrally because it is distributed across 52 locations and the data size is large.

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3.2 Challenges of Existing system:

- As the existing billing software and database are distributed separately across 52 offices, it is not possible to generate and manage central reports. Each office has to purchase individual hardware (server, computers) and software for billing work. As a result, a large amount of money is being spent on hardware, software and management to store billing data.
- Since the existing database is distributed, there is no real-time communication between the central server and the database of 52 field offices, which is causing difficulties in collecting electricity bills through the online system. For example, if a customer pays the same bill multiple times through multiple mobile operators/banks, the system accepts it. As a result, there is difficulty in reconciling the bills collected every month. This increases customer dissatisfaction.
- Since the existing billing software is desktop-based, a separate interface has to be used to exchange data between the central billing server at the headquarters and the billing servers of the 52 field offices through broadband VPN connectivity. If connectivity is lost for any reason, data cannot be exchanged. Additional manpower has to be deployed. Moreover, there is a possibility of data loss.
- Data accessibility, manageability and analyzability is close to zero for WZPDCL because of this deployment architecture and access unavailability.
- These systems are developed using old/obsolete technologies with poor stability, scalability, maintainability and functional maturity.

4. Scope of Work

The scope of work for the works to develop new Web Based Postpaid billing application, develop web-based Management Information System (MIS) application for generating all types of report, conversion of existing 52 nos. distributed database to single centralized database system integrated with new web-based application and develop API to integrate Mobile Financial Services (MFS) and Banks for collecting electricity bill on online platform as well as collecting consumer data from Online new connection and transfer migrated consumer data to prepaid metering system, collecting Monthly Operation Data (MOD) from Prepaid metering system.

Detailed scope of work includes the following:

To design, develop, implement and manage a Web Based Postpaid billing application which will cover the following features:

- All tasks regarding postpaid electricity bill generation, bill processing, bill delivery, bill collection as per tariff of electricity consumers and reporting as per requirements.
- Electronic bill payment processing engine along with different payment channels management.
- Bill collection monitoring and Fraud Management.
- Software should be dynamic and robust.
- All operators (MFS and Online Banking) should be connected to the software through API.
- For any operation execution, a log should be maintained.
- The application must be developed using ASP.NET Core MVC framework.
- All features those are mandatory for postpaid billing system as per requirements of govt bodies (BERC, Power Division, SREDA, WZPDCL etc.) must be fully implemented in the centralized web-based application.
- Applications development must be completed within 06 (six) months (including software requirement analysis) from date of contract signing.

To design, develop and implement a Web based Management Information System (MIS) application for generating all types of report which will cover the following features:

- All tasks of reporting regarding postpaid electricity bill as per requirements.
- Software should be dynamic and robust.
- The application must be developed using ASP.NET Core MVC framework.
- All types of reporting those are mandatory for postpaid billing system as per requirements of govt bodies (BERC, Power Division, SREDA, WZPDCL etc.).
- Reports can be generated and printed centrally from the server located at the head office. Additionally, the 6 circle offices and 52 field offices will also be able to generate and print their respective reports.
- The software should have provision for report generation as per requirements.
- There should have provision to generate dynamic customized report.
- Reports should be in Excel, CSV, PDF format.
- Applications development completing within 06 (six) months from date of contract signing.

To design, develop, implement and manage a Centralized database system which will cover the following features:

- Conversion of existing 52 nos. distributed database (SQL server 2008R2) to single Oracle 19C Enterprise centralized database system without any data loss.
- Postpaid billing system can be integrated with Online new connection and prepaid metering system. So that, we can generate automatic centralized report for all types of consumers (prepaid/postpaid).
- Database must be developed in Oracle 19C Enterprise.

To design, develop, implement and manage API which will cover the following features:

- Develop a common API to integrate mobile financial operators/Banks with web-based software for collecting electricity bill on online platform.
- Mobile Financial operators/Banks engaged in the collection of electricity bills should be provided an interface of the web-based software so that monthly electricity bills can be checked online based on the customer's account number.
- Develop an API to integrate Prepaid Metering system.
- All customers who will be transferred to the prepaid system will have their information transferred to the prepaid software system. Along with this, prepaid consumer's all required data will be brought to the postpaid system.

4.1 Development and Implementation Methodology

Development methodology i.e. SDLC plays a very important role to clear the ultimate project objectives precisely, to stable the project requirements, to monitor the progress with measurable deliverables and managing the entire project efficiently. Here the vendor is requested to propose and submit a best possible suited SDLC approach for this project considering the project scopes, requirements of application, objectives, organizational environmental factors and behavior, project timeline, ultimate deliverables and various resources to be used.

4.2 System Requirement Analysis

Requirements finalization will be a very important milestone of vendor's proposed development methodology. It is expected that, the selected vendor will carry out detailed requirement study and analysis on the each and every scope of work that mentioned in the TOR. Under this scope of work, the selected vendor has to analyze the detail functions, processes, documents, actors, sites and infrastructure of the relevant prevailing system precisely of the concerned organization. At this phase, vendor's ultimate objective will be finalization of the work requirements in details under the scope of TOR and approval of the concern organizational authority. Here vendor is requested to propose and submit a system requirement analysis plan which should cover the scope of work at this phase, relevant activities to be performed, timeline, deliverables to be produced, dependencies and resources to be used.

4.3 System Design

Basically, at this phase the detail functional scope defining and designing as per the standard of software engineering approach for the proposed system tasks are being performed. This is very vital and important phase of any SDLC. Considering the ultimate development and implementation scope, the proposed system design should be robust, scalable, user friendly and interoperable enough.

At this system designing phase vendor may perform different following designing related task and will produce various standard System designing Documents (SDD)

- Identifying module, components, tasks, I/O and functional features.
- Specifying technical and functional requirements.
- User Interface design.
- Description of UI and requirements.
- Preparing the use cases.
- Defining Integration and interoperability scope.
- Designing system architecture.
- Determine process and data flow.
- Database design.
- API Design.
- Finalizing tools, technologies and frameworks to be used etc.

Here vendor is requested to cover details system designing plan in their technical proposal which may include relevant activities, approaches, methods, documentations and deliverables.

4.4 Development

At this stage vendor must take prior acceptance or approval from the concerned authority on tools, technologies and framework that will be used for the development of the Application. Based on approved SRS and SDD vendor will prepare a comprehensive development plan for the Application which should include a schedule consisting development item wise start date, test date, review date, completion date etc. At the development stage, vendor must follow the standard code convention, code level documentations, header of each file, algorithms, interfaces, code compression and API's should be supplied with proper description and



documentations. All kinds of standard testing tasks that are required to be performed at the development phase should be mentioned in the plan. Considering the scope mentioned in the TOR for this application, vendor is requested to include a preliminary development plan (standard approach) in their technical proposal.

4.5 Integration

Considering the above-mentioned Integration requirements and scopes for this application, vendor must include a phase in their proposed Development and implementation methodology approach. At this stage, the vendor will perform all necessary tasks regarding integration to make the application interoperable.

4.6 Testing

The vendor must propose a testing plan for this work starting from development to deployment. This testing plan should cover all the standard suitable testing approaches for this application which may include phase wise testing activities like test scripting, test cases, testing tools, testing process, test log, result and report formats i.e. expected test deliverables based on the application development requirements. The vendor should submit testing plan, which may include standard test approaches. Vendor will bear the all-testing cost.

Some are mentioned below as examples for reference

- Unit Test
- Functional Test
- Installation testing
- Compatibility testing
- Smoke and sanity testing
- Regression testing
- Stress Testing
- Acceptance testing.
- Alpha testing
- Beta testing.
- Functional vs non-functional testing.
- Concurrency testing.
- Destructive testing.
- Software performance testing is mandatory.
- Usability testing.
- Accessibility testing.
- Security testing is mandatory (VAPT etc.) from any reputed third-party organization having ISO 27001/CREST certified.
- All test result should be certified by BUET/KUET.
- All testing cost shall be borne by the Vendor.

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4.7 Hosting

Vendor should submit primary hosting requirements for this application at Live Environment as well as Test Environment related to hardware, servers, network, security, storage, traffic, firewall, bandwidth etc. i.e. complete hosting infrastructure that will be requires for their developed application hosting considering the implementation scope. Based on their submitted requirements, regarding hosting West Zone Power Distribution Company Limited (WZPDCL) will provide detail hosting infrastructure, facility and environment.

4.8 User Acceptance Test (UAT)

User Acceptance Test (UAT) is a very vital and essential phase in the web base application development lifecycle. At this phase, all types of users must test the developed application by themselves and have to provide a details feedback/ test report. Based on the UAT report, vendor has to update the application accordingly to ensure user satisfaction by making it more user friendly. Here, it is expected that, considering the type of users and their role in the application, the vendor must propose a comprehensive UAT plan in their technical proposal which may cover the followings:

- UAT activities to be perform (planning, designing test cases selection of testing team, Executing test cases and documenting, Bug fixing, sign-off etc.).
- types of user wise roles and test items distribution
- resource requirement
- activity wise time requirement
- activity wise test case, test results/ deliverables
- detail user feedback / test reports
- System update plan
- UAT time limit 03 (three) months from handover the job or date of issue a Provisional Acceptance Certificate (PAC).

4.9 Management and Migration of Legacy Data

Under the process of existing 52 nos. distributed database (SQL server 2008R2) to single Oracle 19C Enterprise centralized database system transformation, during application activation or deployment, it may be necessary to move the legacy data of prevailing services. In this case, vendor may require performing different relevant activities that may include data collection, softcopy conversion, data filter, data cleansing, data verification, data process, data entry, data migration and overall data management. Here, it is expected that, the vendor will propose their detail data management and data migration plan for this work considering the estimation of legacy data mentioned below which will be required to migrate into the developed application.

Description	Location	Existing format	Target format	Amount of Consumer
existing 52 nos. distributed database	52 Locations	SQL server 2008R2	Oracle 19C Enterprise	18 Lac (approx.)

Table: Estimation of Legacy Data to be migrated

4.10 Deployment and Implementation

This is the phase of SDLC, when the consent is being given to "GO LIVE" of the developed system after completed all kinds of development, integration, testing and hosting. This is very crucial and sensitive stage for a government application because at this stage the system becomes public and expose to access towards all levels of users. The Pilot or full-scale implementation period starts formally in this stage only. Vendor is requested to propose their Deployment and Implementation plan covering the major activities to be performed, the deliverables to be provided etc.

4.11 Training and Knowledge Transfer

The vendor has to provide detail training for the following users:

- ✚ Training of Trainers (TOT) for about 100 trainers in 06 (Six) batches nominated by WZPDCL, having duration minimum 05 (Five) days.
 - ✚ Training for all (about 250) users in minimum 06 (Six) batches nominated by WZPDCL, having duration minimum 03 (Three) days.
 - ✚ Training for administration (Source Code & Database) for 12 Users (for technology transfer) 02 (two) batches nominated by WZPDCL, having duration minimum 15 (Fifteen) days.
 - ✚ Cost of providing all necessary facilities/items (Snacks, Lunch, allowance etc.) of the trainees.
 - ✚ **The duration of the training shall not exceed the number of man-months specified in the Price Schedule.**
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- The vendor must propose a detail training plan for the users of the application.
 - The vendor has to develop training modules and curriculums and conduct TOT course for the prospective Trainers. After that they will be able to provide training to Users of WZPDCLs if necessary.
 - The vendor should include necessary training methodology, documentation and training aids support in their training plan.
 - The training materials may include user manual, administration manual, quick start tutorial, online help, frequently asked questions.
 - The training plan must describe the sequencing, time, duration and resources involved in implementation of each of the consultant's proposed training activities.
 - The training plan should contain full course descriptions for all courses that to be carried out for respective users.
 - The vendor should develop multimedia training materials for all users. These materials shall be available for viewing and reviewing for all users through a web portal.
 - The training instructions should support both English and Bengali language.
 - The training activities should cover the training feedback, evaluation and report also.
 - The vendor also needs to propose their smooth, efficient and effective knowledge transfer idea and plan here in this technical proposal with the training plan.

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4.12 Maintenance and Support Service

The selected Vendor has to provide a period of 05 (Five) years maintenance and support service. Maintenance and Support Service will start from after handover the job or date of issue a Provisional Acceptance Certificate (PAC). Here it is expected that, the vendor must provide detail maintenance and support service plan in the technical proposal, which may include the followings-

- Support service types and mode of services
- Service desk functionalities
- Configuration management
- Change management
- Service layers for support
- Tools will be used for Support service management
- Communication management and modality
- Release management
- Incident management
- Problem management
- SLA (Service Level Agreement)
- Maintenance and support service-related reporting
- Support service types
- Service Log Management
- Database & Storage Management

Apart from the above-mentioned issues, if vendor thinks any other issue to be included in their plan, it would be considered as added value addition.

4.13 Duration of the assignment

The selected vendor must complete the above-mentioned work (application development and deployment, Conversion of existing 52 nos. distributed database (SQL server 2008R2) to single Oracle 19C Enterprise centralized database system) within the stipulated time mentioned in GCC-29.1 excluding the maintenance and support service period.

The vendor shall submit detail action plan using a Gantt chart indicating the following tasks (not limited to):

- Total duration of the application development.
- Implementation plan to conversion of existing 52 nos. distributed database (SQL server 2008R2) to single Oracle 19C Enterprise centralized database system without any data loss.
- Total duration of the Maintenance and support service after implementation
- Proposed SDLC Phase-wise and deliverable-wise time distribution and duration.
- The schedule may cover Activity, Deliverables, and Time in Days, Dependencies etc.

5. Educational Qualification and Experience of Key Professional Staff

The vendor is expected to provide work distribution and team composition plan as deemed suited based on this project requirements and milestones and as per their proposed development and implementation methodology approach. The interested applicant should provide a team composition plan in their proposal describing the position, roles, tasks to be assigned, expected man-days of involvement, expected deliverables and required skill and expertise

However, for proper execution of the project firm/applicant may constitute the team focusing on following position and criteria.

SL No	Position	person	Qualification	Experience in similar work (years)
1	Project Manager	1	B.Sc.Engg.(CSE/EEE/ECE)	Working experience with minimum 5(Five) years on project management plus minimum 3 years experience on Software base & network oriented project development.
2	Software Engineer	1	B.Sc.Engg.(CSE/EEE)	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, Oracle Developer, PL/SQL and 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	1	B.Sc. Engg. (CSE/EEE)/ Masters in any Discipline (Science background) with related training.	Working experience with minimum 03 (three) years on AIX/UNIX/RHCE & CCNA
6	Programmer	1	B.Sc. Engg. (CSE/EEE)/ Masters in any Discipline (Science background)	Working experience with minimum 02 (two) years on C#, Oracle Database, Oracle Developer, PL/SQL

7	Mobile Application & Network Engineer	1	B.Sc. Engg (CSE/EEE)	Working experience with minimum 3(three)years with CCNA on with convensional wireless network like mobile network.
8	Network Engineer/Hardware Engineer	1	Bachelor in any Discipline (Engineering) with A+/CCNA/RHCE/MCSE certification	Working experience with minimum 3(three)years on interfacing with convensional wireless network like mobile network.
9	Documentation	2	Bachelor in any Discipline	-
10	Technician	10	HSC (Vocational)/Trade course	Working experience with minimum 5(Five)years

For the Duration of Support Service:

No	Position	Person	Total Works Experience (Years)	Experience in similar works (Years)
1	Coordinator	1	5	3
2	System Administrator	1	5	3
3	Network Engineer	1	5	3
4	Hardware Engineer	1	5	3
5	Programmer	1	5	3
6	Database Administrator	1	5	3
7	Electrical Supervisor	10	5	3
8	UCC/ UVS operator	10	3	2

Since, "Design, Manufacture, Supply, Installation, Testing & Commissioning" and "Support Service" have different timeframe, same person can be offered for both of these services as long as his/her qualifications match the respective requirements.

6. Expected Deliverables

Considering the scope of service and scope of work of this project and based on the proposed project development & implementation methodology, the vendor has to submit here a complete list of all types of deliverables will be produced throughout the entire project timeline whether those are