TERMS OF REFERENCE
For
E-Port Management System

বাংলাদেশ স্থল বন্দর কর্তৃপক্ষ
Bangladesh Land Port Authority

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1. Background

Digital Bangladesh is ensuring an ICT based society where information will be available to everyone through online. The motto of digital Bangladesh is to establish technology based digital governance, e-commerce, e-agriculture, e-production, e-education etc. It will make people think globally and connect them with the whole world economically, socially, politically, academically and even culturally.

In line with Digital Bangladesh vision, Land Port Authority is committed to introduce e-Service in its operational activities. The Land Port Authority has taken initiative to transform the operational procedure of land port to digital system. In this process, stakeholders like CNF, Exporter, Importer and management will come to know all the process and present status through web portal/online and mobile. Thus land ports can ensure best effort by providing modern warehousing facilities and online payment system for the importers.

1.1 About the Organization

Bangladesh Land Port authority was established in 2001 with a view to increase trade and business with the neighboring countries. This organization is facilitating export-import through land route. At present, the number of land ports in Bangladesh is 23. Trade between India and Bangladesh has been increasing day by day. To keep patch with this increasing trend of trade and business, we need to update the operational procedures of port activities so that the service recipients can afford services within a time frame as well as with minimum cost.

1.2 Existing Service

Presently all the processes are done manually such as goods unloading, weighting, truck tracking, importer tracking, stocking, etc.

- Goods export/import, warehousing and delivery
- Beneficiaries are exporter, importer and C&F agent
- Service provides at land port Beanapole, Burimari, Bhomra ,Nakugoan and Akhaura Land Port
- Yearly service provides on an average 3000 consignment per land port
- The average TVC-Time: (Approval, Bill Processing and Delivery) 1 to 7 days, Cost: depends on quantity and stay, Visit- 13 to15 times.

1.3 Problems and Challenges

Current process takes more time and the importers are the sufferers. So, this needs to transform to digital system to make transparency and make the entire job faster than before.

- Indian trucks are being unexpectedly delayed due to long queue in the entry point of Bangladesh
- Weight measurement is not transparent as the operation process management is manual
- Goods are not keeping in proper shade category
- Delay in goods loading and unloading
- Manual shed management

- Goods status information is not available for importer/exporter, C&F and management due to manual process
- Goods kept in the shed more than the time paid for
- No way to justify custom release order

2. Objectives

Service Recipient:

- Provide better services to all service recipient i.e. exporter, importer and C&F agent
- Provide faster and transparent service
- Provide instant update and tracking of the service
- Reduce visit

Service Provider:

- Ease of work and service management
- Better efficiency in documentation and related activities
- Increase work efficiency and reduce work load
- Ability of efficient business planning
- Reduce physical movement thru automation
- Reduce mistake thru digitalization

Monitoring Authorities

- Introduce easy and transparent monitoring system
- Availability of all required information at key stroke

3. Scope of Work

Service Recipient

- Online application for services
- Instant status of imported/exported goods through web portal and mobile application
- Ability to make online payment
- Ability to submit complain through web portal or mobile app.

Service Provider

- Web based documentation process
- Digitalization of loading /unloading process of goods and tracking
- One stop service delivery
- Effective and efficient database with access to all relevant stakeholders

Monitoring Authority

- Monitoring Dashboard to get a snapshot of current status

- Ability to generate all necessary report thru web portal
- Web based complaint management system
- Web based monitoring and tracking of employee activities

4. Functional Requirements

4.1 System Features

The following is a general summary of the functionality required in each Business Process.

4.1.1 Information on Imported Goods

No.	System Features	Features Description	Actor	Media
01	Information entry and issuing security pass for Indian vehicle driver	• Indian cargo with imported goods arrives at the land port in Bangladesh. It is stopped at the border area. Indian cargo driver submit the necessary papers/documents to TI(Traffic Inspector) • Information about imported goods and vehicle will entry from manifest details provided by truck driver • A unique import number will auto generate that will use in the whole process for tracking the imported goods and vehicle. • Indian driver's photo will be captured through digital camera • Barcode enable security pass with driver photo and unique import number will be printed • Authorized person can get information by the unique import number through online	TI	Web apps/ Mobile Apps/ Color Printer
02	Confirmation notification about Imported goods entrance (inside Bangladesh)	• Send Mobile SMS and email to importer with unique import number • Status information will be available for concern importer, C&F and land port management	TI	Mobile SMS/Mobile app/Web app
03	Weight measurement management	• Imported goods are weighted by TI by weigh scale machine • Weight information will be generated from weigh machine. • A receipt will print with necessary weight information	TI	Digital weigh Scale/ web apps/ Printer
04	Weight notification	• Goods weight will be available and notify to concern importer, C&F and management	TI	Web apps/Mobile apps

4.1.2 Posting and Unloading Goods

No.	System Features	Features Description	Actor	Media
01	Allocating shed/yard for unloading	• Importer will reach to TI (posting) for shed allocation and unloading the goods. • TI will Check shed availability as per goods category and measurement • shed/yard allocate for the goods • Issuing shed/yard pass for unloading and storing goods	TI (Posting)	Web apps/ Printer
	Allocation Notification	• Allocation Notification will be available to the concern Shed/Yard In-charge, Importer and management	System	Web apps/ Mobile apps
02	Unloading Goods	• Importer/C&F will submit unloading pass to TI(Concern Shed) • TI will check the goods information based on submitted unique import number mentioned in shed pass, RFID tagging	Importer / C&F, TI	Web apps
02	Requisition for goods unloading to shed (measure by ton)	• TI will generate requisition slip and send it to outsource contractor about demand of equipment/labor for unloading the goods • Unloading cost auto calculate depend on goods weight (Ton) • Labor cost and equipment cost are different and auto calculate based on weight (ton). • Requisition slip will be printed • Outsource company will submit bill for labor and equipment cost (basis of ton) to concern shed/yard In-charge • Preserve costing information against every unique import number	System, TI	web apps/ Mobile Apps/ Printer
03	Unloading repots	• Unloading reports will be generated in any date range with other required filtering	System	Web apps/ Printer

4.1.3 Shed/Yard Management

No.	System Features	Features Description	Actor	Media
01	Shed/Yard and its space Management	• Data entry Information about shed/ yard and its space • Shed/Yard has many categories like for Chemical, Electronics, Machineries, etc. are different. Space allocations are two types. They are height, width based and weight based • Space should be defined by different color based on used and free space graphically	TI (Shed/ Yard)	Web apps

No.	System Features	Features Description	Actor	Media
		and numerically		
02	Availability check of Shed/Yard	• Concern TI and Management can check availability of space in shed/yard category wise based on required space.	System	Web apps
03	Allocating space in Shed/Yard	• Calculate space requirement for goods • Suggest available space for the goods graphically and numerically category wise and shed/yard wise • Allocate Space for the goods • All other necessary information will entry from manifest	System/ TI	Mobile apps/ web apps
04	Reports on Shed/Yard	• Latest storage status of every shed/yard	System	web apps/ Printer
05	Dash board on Shed/Yard Allocation	• Latest storage status for shed/yard regarding used space and free space numerically and graphically	System	web apps
06	Status Notification	• Notification will be generated to importer, border (TI), management while goods unloading. • Notify Storing information with shed detail to importer, border (TI), management	System	web apps/ mobile apps
07	Previous Data Entry	• When the software will live it will require previous data update • It should have option to entry shed/yard data already occupied	System	Web apps

4.1.4 Assessment and Billing Management

No.	System Features	Features Description	Actor	Media
01	Application for delivery	• After completing the custom formalities Custom department issue a custom release order. • After getting custom release order importer/ C&F apply for delivery of goods to DD/AD (Traffic) with customs release order, bill of entry, invoice, packing list, manifest. Etc. The process will be online. • Importer/ C&F and AD/DD (Traffic)/TI can enter information for delivery apply	C&F, Management, Custom	Web app
02	Application receive notification	• Application receive confirmation will be sent to concern importer/ C&F	System	Web app/ Mobile app
03	Verification of Custom release order	• Verification of Custom release order with custom database through online	System	Web app/API
04	Verification of other documents	• Verification of other documents submitted with application by concern official	Management	Web app

No.	System Features	Features Description	Actor	Media
	submitted with application			
05	Tariff information entry	• Tariff varies on categories of goods, period of stay, halt age charge, terminal charge, weight charge, loading and unloading charges, etc • Tariff Schedule is predefined	TI	Web app
06	Assessment & generate payment advice	• Automatically calculate tariff for the goods on the basis of tariff schedule and predefined charges • Bill challan will auto print for payment with detail of tariff and charges to Importer/ C&F	System	Web app/ Printer
07	Notify to importer/ C&F about payment	• Notification send to the importer with necessary bill information	System	Web apps/mobile apps
08	Integration with online payment gateway	• Importer/ C&F can pay through different type of cards and mobile payment	System	Web apps
9	Payment confirmation on receipt of payment	• Payment confirmation entry through different type of payment like through payment gateway – auto, bank payment – manual • Financial report will available to accounts department	System/ TI	Web apps
10	Loading order generate & issue exit pass	• After payment confirmation imported goods will delivery • A release order and exit pass will issue against unique import number with barcode	System/ TI	Web apps/ Printer
11	Notification about exit pass and release order	• Notification available and send to importer, C&F agent and TI (concern shed)	System	Web apps/ Mobile apps
12	Related Report	• Necessary Reports as required by management	System	Web apps

4.1.5 Loading and Delivery Management

No.	System Features	Features Description	Actor	Media
01	Delivery Request submission	• Importer/ C&F will submit release order and exit pass to TI (concern shed) for goods delivery • TI will Check the release order validity through system	TI (Shed), Importer/ C&F	Web apps
02	Requisition for	• TI will generate requisition slip and send it to	System,	web apps/

No.	System Features	Features Description	Actor	Media
	goods loading from shed (measure by ton)	outsource contractor about demand of equipment/labor for loading the goods • Requisition slip will be printed • Outsource company will submit bill for labor and equipment cost (basis of ton) to concern shed/yard in charge • Preserve loading cost information against every unique import number	TI	Mobile Apps/ Printer
03	Notification for ready to delivery	• Delivery notification send to importer, management	System	Web apps / mob apps/ mob sms
04	Delivery of Goods	• Importer/ C&F have to submit exit pass to port security personnel before leave the port. • Security personnel will use barcode reader to give permission for exit	System/ Security Personnel	Web apps
05	Goods Delivery Notification	• Delivery notification send to importer, management	System	Web apps / mob apps/ mob sms
06	Reports and Dashboard	• Reports and Dashboard as required by management of related information	System	Web apps/ Printer

4.1.6 Stakeholder Management

No.	System Features	Features Description	Actor	Media
01	Stakeholder Master Data Entry	• Importer and C&F are the stakeholders of this organization • Importer and C&F master data will entry • Their mobile number will require to send auto mobile sms notification • Their email address will require to send auto email notification	TI (Shed), Importer/ C&F	Web apps
02	Login Feature of Stakeholder	• Importer and C&F can register themselves online • Importer can get online panel for his own imported goods related information • Every status of imported goods will available in importer panel through online • Every status of his imported goods will available in mobile apps of registered importer		

4.1.7 General Requirements

No.	System Features	Features Description	Actor	Media
01	Security Management	• There will be a panel for user role assign • Administrator can select specific user for	All user	Web apps

No.	System Features	Features Description	Actor	Media
		specific entry form • Administrator can select specific user to see specific reports • Administrator can select specific user have permission to add, edit data • Administrator can select specific user only for read only access or modification access.		
02	Mobile Apps	• Mobile apps will develop for the importer and C&F agents use mainly • The apps will use to see every status of imported goods using unique import number • Auto notification will generate using mobile apps to concern importer • Importer will have the right to change his c&f access.	importer and C&F	Mobile Apps
03	Online and Offline System Support	• Central Server will be host in National Data Center • Every Land Port will have own local server • Local server will periodically synchronize with central server • Local Office can operate software without internet	System	Web Apps

4.1.8 Complain Management

No.	System Features	Features Description	Actor	Media
01	Complain submission procedure	• Importers and C&F agents are the stakeholder of this organization • There will be two type of complain submission personnel 1. Registered importer, C&F agent, 2. Anonymous user • Complain can send through web application and mobile application	C&F/Importer	Web apps/Mobile apps
02	Complain Management	• The complaint will send to concern Port In Charge for solution • Complain also cc to complain focal point official • If complain will not address within expected time will notice to chief of authority		Email/ Web apps
03	Dash board about complain status	• Management can see and monitor all the complaint status •	TI	WebApps
04	Complain submission procedure	• Importers and C&F agents are the stakeholder of this organization • There will be two type of complain	C&F/Importer	Web apps/Mobile apps

No.	System Features	Features Description	Actor	Media
		submission personnel 1. Registered importer, C&F agent, 2. Anonymous user • Complain can send through web application and mobile application		

4.2 Users and User roles

No.	Types of user	User title	Possible no of user per day	Office	Major role
01	Operator	Traffic inspector, Warehouse super, Computer operator, Assistant Director Traffic	100	5 Land ports in Bangladesh	Data entry, Register maintaining , Photo capture insert, Measure of goods weight entry, Availability check of shed , Traffic assessment entry, Entry of unloading and loading information
02	Observer	Deputy director, Director traffic, Director admin, Member traffic, Director of accounts, Chairman	20	5Land ports and Head Office of Bangladesh Land port Authority	Observe no of traffic entry and exit, Amount of port income, Report check, Overall check Port management, Financial status, Delivery of no of consignment
03	Recipient	Truck driver, C&F, Importer	1200	All over the country	Online bill payment, Online application, Complain
04	Admin	Chairman ICT focal point, Port in charge and authorized person	10	5Land ports and Head Office of Bangladesh Land port Authority	User creation and role management

Vendor should submit a comprehensive plan and approach covering different types of users and their roles providing accessibility, privacy, confidentiality and transparency based on the given statics. Also have to mention the user friendliness login system.

4.3 Security and Privacy Requirements

The authentication and authorization of the system need to be robust enough ensure highest level of security. The system prevents all standard web vulnerabilities and provides industry standard security measurements. With a very strong Enterprise system's regular security audit and careful implementation of various measures least but not limited to the following must be taken to prevent any kind of security breach:

4.3.1 Application Security

- The system should be completely secure and foolproof with incorporation of industry standard proven data encryption techniques and methodologies. Those encryption techniques should be audited in timely manner to detect loopholes and updated with the latest patches, in order to ensure that the mechanisms are fitted with the latest security features.
- User sessions and cookies should be uniquely re-generated and stored securely each time they log in.
- URL restriction should be tight. The system should recognize a logged-in user with proper rights and only present the part of the system that falls within his/her authorization scope. Furthermore, trying to access a URL by guessing should also be prohibited
- The URLs for internal users should be relatively unique (only known to administrators and relevant personnel) and separate from the well-known portal URLs. The communication between the user's device and FBA interfaces should be SSL encrypted to prevent data hijacking through network protocols
- Configuration and other sensitive system-level artifacts should be securely stored
- The access control security function shall provide a facility for the system administrator to suspend an existing user's access rights for a specified period of time or indefinitely.

4.3.2 User Interface Security

- No system level file/information should be accessible throughout the web browser. The system should never allow executing direct files
- Facility can be provided to lock a user and unlock as and when required
- No invalidated input should be accepted in any web forms – all incoming data should be validated, checked and purified before acting on that
- In case of any system failure or error condition, no sensitive information (e.g. database credential) should be displayed on the site. All kinds of errors should be suppressed, logged, gracefully handled and should only be accessible by the administrators with proper rights
- SQL/XML/Code injection, Session hijacking/fixation, Output Escaping, Cross-Site Request Forgery, Cross-Site Scripting, Enforced Same Origin Policy, Parameter Tampering, Directory Traversal, Denial of Service etc. should be prevented, logged, and reported

4.3.3 Data Security

- No personally identifiable information may be exposed within and outside the system without proper authorization as privacy of the user data must be dealt with utmost priority.
- Any attempt to breach the security will be recorded with all the relevant data
- If the system is accessed in the time not defined by the Administrator, e.g. in the case of production deployment, all options will be locked and the user will not be able to use the system.
- Reports can be retrieved for all audit logs.

4.3.4 Network Security

- The system must communicate using Transport Layer Security

- Public-key encryption methods are used as part of SSL encryption and are expected to be part of the System.

4.3.5 Financial Transaction Security

- Provide mechanisms by which the system will provide checks and controls to prevent fraud, hacking and money laundering.
- System should have necessary checks and control for all integration and approval of money transactions.
- Security architect should be industry standards as such it compliant with banks and financial gateways security requirements.
- A security monitoring system should be in place. All activities must be visible for managing complete security of the system.

Apart from this the vendor should keep in account the following considerations also as well as vendor should provide a checklist based on system and hosting security plan (i.e. fraud, hacking, money laundering etc.) & have to provide the test report of that checklist.

4.4 Integration Requirements

As a government system or e-Service application, integration with the required and other prescribed national system is very important and essential. Only by proper integration making interoperable, an e-Service application can drive the ultimate citizen benefits with the optimum use of technology from service to e-Service transformation. Here vendor is expected to come up with an integration plan in their technical proposal considering and understanding the scope of the e-Service application as per this TOR. The possible integration scopes of this e-Service application are mentioned below as reference for the vendor.

System Name	Purpose	Dependent Organization
Integration with custom department database	• ASY CUDA ,Tariff, Vat etc share/ import from custom database (data will share by Integration with customs system) • Verifying documents of-Release order, Bill of entry issued by custom department. Custom department has automated system. To digitally verify above document it will require software integration with their automated system.	Custom House
Payment gateway	Software should have integration option for bill payment through different types of card like visa card, master card, etc.: mobile payment like bkash, rocket etc .	Different organization
Telco integration	Some notifications need to send to concern importers through mobile sms.	Any mobile operator

	Software should have this facility.	
Integration with weigh scale machine data	To measure weight of the goods weigh scale machine is used. This machine automatically generates weight of the goods and produce data. The software will capture the data and integrate with the system.	BLPA weight scale
Integration with custom department database	• ASY CUDA ,Tariff, Vat etc. share/ import from custom database (data will share by Integration with customs system) • Verifying documents of-Release order, Bill of entry issued by custom department. Custom department has automated system. To digitally verify above document it will require software integration with their automated system.	Custom House

4.5 Electronic Payment Requirements

- The system should be integrated with a payment gateway that can facilitate all types of electronic payment options and media available.
- Citizen should have the ability to make electronic payment for fees/tax using their existing bank accounts/debit card/mobile bank account.
- CDC and COC should also be able to pay other citizens fees/tax from their bank accounts/debit card/mobile bank account electronically.
- All stake holders (both national and international) should have the ability to make payment through web portal or mobile application.

4.6 Web Application Requirement

- The application which is a web based solution, has to be hosted in a centralized Web-server
- The application should be developed following Service Oriented Architecture (SOA)
- Application should support MVC framework.
- Considering the operating/client environment at different level of this application, it should be developed in such a way so that it requires low bandwidth to run.
- The web-based application should support cross browser platforms (popular web-browsers such Mozilla Firefox, Opera, Chrome, Internet Explorer, Safari etc.)
- Should have ability to seamless integration with future module/components/applications
- Application should be lightweight and rich client-side scripting
- UI should be developed based on the analysis of UX.
- Any web interface of this application should be fully responsive

4.7 Mobile Application Requirements

- The mobile application version of the system should be developed for Android.
- The mobile app should have capability of displaying system notifications
- Functionality for registration options for service recipients
- App should enable compact view of services for service recipients.
- There should be an option to auto synchronization with the central database with apps local data based on the availability of the internet connectivity.

4.8 Language Support

The e-Service system should support multilingual option i.e. Bangla and English for both the Web version and Mobile Apps. All the user interfaces will be able to display and input controls can take input both in Bangla and English. System/App users can choose and set his/her preferred language in profile setting for the system interfaces. The system should support Unicode for the Bangla Language.

4.9 Interoperability and Data Exchange

The selected vendor must develop this e-Service system following all the standards and protocols of interoperability, integration and data exchange with other systems. It is expected that the system will be based on open architecture and will be fully interoperable with the current and future systems.

The following are the key expectations on interoperability requirements:

a. The system should be designed for interoperability using industry standard protocols.
b. System must expose data by Advanced Message Queuing Protocol and REST via TLS
c. All imported data must undergo data validation to ensure full integrity.
d. Data exchange within the system at different levels via the internet shall be encrypted.
e. The system should have functionality to exchange data with other own systems or external institute systems.
f. The system shall have functionality to export/import files based on the standard template defined through web services and/or API

Full API documentation must be provided so that third party integrators can integrate their system with this system.

4.10 System Audit

This e-Service system will maintain an audit trail of any changes or updates made in any information that are considered as vital and should maintain the audit log with information such as

- Log the users who are accessing the system
- Log the parts of the application that are being accessed
- Log the fields that are being modified
- Log the results of these modifications
- Log attempted breaches of access
- Log attempted breaches of modification rights

- Timestamp.

Ensure an audit trail is kept for all transactions and all audit transactions logged are kept on the trail file or trail database from where system can generate different audit reports as and when required.

5. Non-Functional Requirements

5.1 Hosting Requirements

Bangladesh Government is providing an extensive and standard hosting facility for all types of government organization applications and software that is named as National Data Center under Bangladesh computer council (BCC). It may be mentioned here that the vendor developed application will be hosted in government provided data center i.e. National data center (NDC) or [Full Organization Name] own data center. Therefore, at this stage, vendor is requested to submit a preliminary hosting plan for this e-Service application considering the issues mentioned below-

- Hosting requirement /environment (hardware, servers, network, security, storage, traffic, firewall, bandwidth etc.)
- Hosting architecture
- Data Growth and Scalability plan
- User handling/load balancing mechanism
- Licensing issues
- Scheduled backup & Restore Requirements
- Disaster recovery requirements
- Monitoring tools requirements

5.2 UI/UX

The vendor must propose a UI/ UX plan containing UI designing method and tools, prototype or Mockup design (if applicable) , UI review method , process for study and analyze UX , collaboration of basic web and mobile UX issues and expected result and outcome of UX, finalizing the UI/UX design. Apart from this, the vendor should consider the following issues as requirement at the time of UI/UX plan.

- The system interfaces should be highly user friendly, easy to navigate and ensure fast loading.
- The UI shall design by using well-established, supported and lightweight UI framework so that it follows widely used industry flow patterns
- UI shall be easily configurable if any changes are needed
- Menu, content and navigation shall be based on the user entitlements, roles and permissions.

5.3 Sizing, Performance and Scalability Requirements

- The system shall be capable of handling online functionalities for a database of at least 180000/year service recipients and in terms of service provide 5 Land Ports and 2000operators System Users.

- The system processing shall be scalable to support the volume estimates for a period of 10 years at a 20% annual growth rate.
- The system shall be designed to handle estimated large scale 1500 simultaneous connection (online users) when it is ultimately rolled out.
- The vendor must conduct an extensive load testing task taking above factors into consideration and submit a load testing results.
- The database architecture should be such that the system is available to user 24 x 7 x 365 days a year without any unapproved down-time.
- Page load time, login response-time, on-click‟ load time for the web application should be less than 3 seconds while this is accessed over the intranet.
- Average transaction response time, on-submit response-time, or any other database access/ search time should be less than 5 seconds when the system solution is accessed over the intranet.
- Considering the network infrastructure challenges in Bangladesh, the solution must support low bandwidth conditions for the services defined in the functional requirements.
- IN case of mobile application also, this should support very low bandwidth even in 2G network provided internet bandwidth.
- The proposed solution should be highly scalable to accommodate current and future requirements within the scope of the scope mentioned in the TOR
- Analyze the requirements whether both horizontal scaling (scale out) and vertical scaling (scale up) will be required for this e-Service application or not?
- The e-Service application should be provided with appropriate caching mechanism to handle very high-traffic scalability
- The vendor may propose here other relevant measures for the e-Service application scalability.

5.4 Business Continuity

Business Continuity plan will play a very important role by creating the systems of prevention and recovery to deal with potential threats and risk of the e-Service operation. Vendor is requested propose a Business Continuity Plan for this e-Service application. Regarding business continuity you may take in account the followings issues if applicable or suitable for this e-Service Application

- All standard backup facilities should be supported by the system which can be started with disk based backup facility, gradually moving to Storage Area Network (SAN) based backup system.
- Data and the Operating system core component will be separated. A ghost image of the Operating system will always be available in case of rebuilding the server. All data can be restored in the data drive once the Operating System is restored.
- System can also have an automated Backup mechanism by which users can schedule the backups and the system will take the backups without manual intervention.
- System must check for the media and generate a report on backup with date time and details of backup.
- If a restoration fails for any reason, the system should prompt with proper error messages and suggest what has to be done to rectify the situation via on-screen, logs, email and text messages.

- System should maintain an automated recovery system and all versions of backup will be maintained. At any given point in time, the versions and incremental backup details can be retrieved from the system.
- The system may be hosted in virtual servers or containers. A restore of a virtual server/container is much easier and faster compared to a single host server.

5.5 User Acceptance Test (UAT)

User Acceptance Test (UAT) is a very vital and essential phase in the e-Service development lifecycle. At this phase, all types of users must test the developed e-Service 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 e-Service 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

5.6 Copyright

All kinds of source code including code documentation and other approved documents (i.e. complete source code of ICBS, database schema, SDD, DFD, administrative manual, user manual etc.) and all kinds of deliverables developed by the firm under the scope of this TOR are the property of Bangladesh Rural Electrification Board and the firm have to handover these to BREB.

6. Design, Development & Implementation Requirements

6.1 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 e-Service 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 e-Service 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.

6.2 System Design

Basically at this phase the detail functional scope defining and designing as per the standard of software engineering approach for the proposed e-Service 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.

6.3 Solution Architecture

Solution architecture is expected to define and describe an architecture of the proposed e-Service Solution in the context of the mentioned prevailing service delivery process i.e. Integrated Centralized Billing System (ICBS). The solution architecture should assist in the translation of the service to e-Service transformation requirements into a solution vision, high-level operations and/or ICT application specifications and a portfolio of implementation scope. The expected architecture of a solution, where the solution is a e-Service system that should offers a coherent set of functionalities to it's environment. As such, it should concern those properties of a solution that are necessary and should be sufficient to meet its essential requirements. The vendor shall propose comprehensive solution architecture on Digital Rural Electrification System which may cover the following items in their descriptive and diagrammatic presentation

- Goals/Results
- Service Recipients
- e-Service Operators/User (Service providers)
- e-Service Observers (Service administration and performance monitor)
- Database application components:
- Entity application component:
- Utility component
- System federation (Systems to be integrated)

- Process application component
- Interaction application component
- Application
- Accessible Points
- Networks
- Types or Layers of Service Delivery Points
- Hosting Site

6.4 Development & Implementation Methodology

The consultant must provide the complete system development and implement methodology including complete project implementation methodology. The proposed methodology should be justified for this project.

6.5 Testing

The vendor must propose a testing plan for this e-Service application starting from development to deployment. This testing plan should cover all the standard suitable testing approaches for this e-Service 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. 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
- Continuous testing
- Destructive testing
- Software performance testing
- Usability testing
- Accessibility testing
- Security testing

6.6 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.

6.7 Training and Knowledge Transfer

- The vendor must propose a detail training plan for the users of the e-service application.
- The vendor have to develop and provide so training to the Trainer (TOT), that TOT can provide training to Users of PBSs for nationwide implementation.
- The vendor should include necessary training methodology, documentation and training materials support in their training plan
- The training materials may include user manual, administration manual, quick start tutorial, online help, and 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 need to propose their smooth, efficient and effective knowledge transfer idea and plan here in this technical proposal with the training plan.

6.8 Maintenance and Support Service

The selected Vendor has to provide a period of 1 (One) year maintenance and support service. After the 1 year development and deployment phases ends the vendor has to provide maintenance and support service for the next 1(One) year. 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
- Helpdesk functionalities
- Configuration management
- Release management
- Incident management
- Problem management
- SLA (Service Level Agreement)
- Maintenance and support service related reporting
- Service Log Management

At the end of 1 year may evaluate the scope of support requirement and request a new contract for Support and Maintenance from the vendor.

6.9 Team Composition

The consultant will propose a development team and an operational team as deemed suited based on the project requirements and milestones. However, for proper execution of the project the consultant's proposal must include at least the following personnel.

Minimum requirement for the project are as follows:

SL	Position	No. of Person
1	Project Manager	1
2	Software Architect	1
3	System Analyst	1
4	Business Analyst	1
5	Information Security Expert	1
6	Database Designer/Administrator	1
7	System Administrator	1
8	Interoperability Expert	1
9	QA Expert	1
10	Sr. Programmer	1
11	Programmer	2
12	Jr. Programmer	3
13	Mobile App Developer	2
14	Technical Documentation Engineer	1
15	Network Engineer/Expert	1
16	UI/UX Expert	1
17	Implementation Engineer	2
18	Training Expert	2
19	Surveyor	1
	Totals	**25**

7. Duration of the Assignment

The selected vendor will need to work for the above-mentioned scope as per approved project management schedule. The selected vendor must complete e-Service application development and deployment i.e. development life cycle as per their proposed development methodology within 12 (Twelve) Months excluding the maintenance and support service period.

8. 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 materials,

services, applications, source codes, documents, plans, reports etc in a table format mentioning the stages, activities and timelines.

Some examples of the deliverables are mentioned here under for your reference.

- Project inception and management report
- System requirement specification (SRS)
- System design document (SDD)
- Complete source code
- Training plan and reports
- Training materials and user manuals
- Mobile Application
- Web application
- UAT Report
- Maintenance, agreement & SLA
- Hosting requirement specification