Bangladesh Telecommunication Regulatory Commission (BTRC)

Technical Specification and Terms of References (ToR)
for
Supply, Installation, Commissioning and Operation
of
Online License Issuance and Management System (LIMS)

TABLE OF CONTENTS

1. Background 2
2. Objectives 2
3. Eligibility Criteria 3
4. Scope of Work 3
   4.1 Functional Requirements 3
   4.2 Business analysis 5
   4.3 UI Design 5
   4.4 Architecture design 5
      4.4.1 Data Architecture 5
      4.4.2 Application Architecture 5
      4.4.3 Technology Architecture 5
   4.5 Testing & QA 6
   4.6 Deployment, Implementation and Training 6
   4.7 Duration of the Project 6
   4.8 Maintenance & Support 6
5. Security Checklist 7
6. E-Service Non-Functional Requirements 8
   6.1 Application Compliance Requirements 8
      6.1.1 Web Application 8
      6.1.2 Sizing, Performance and Scalability Requirements 9
      6.1.3 Business Continuity 9
   6.2 Interoperability and Data Exchange 10
   6.3 System Audit 10
   6.4 UI/UX 10
   6.5 Coding Conventions 11
7. Documentation 11
8. Quality Attributes and Assurance 11
9. Copyright 12

1. BACKGROUND

Bangladesh Telecommunication Regulatory Commission (BTRC) an independent Regulatory Commission established under the Bangladesh Telecommunication Act, 2001, (Act no18 of 2001) published by the parliament in the Bangladesh Gazette extraordinary in new on April 16, 2001. BTRC started his journey from 31st January 2002 to conduct the activities of the said act. With an initiation of it activates, necessary authority, responsibilities and related concern of the ministry of posts and Telecommunications were vested on to BTRC. According to the Telecommunication act, the Commission is assigned with various responsibilities. Out of those, issuing licenses for establishing, operating, regulating, maintaining telecommunication establishments and providing various telecom services in the country are the major ones. Besides, fixing tariff/charges on the subscribers, ensuring the services for the subscribers and to ensure people's right are also tasks of BTRC. The social and economic behavioral pattern of the telecom service providers are also monitored by the BTRC to ensure that the users are not subjected to harassment and not indifferent in nature.

After the amendment of Bangladesh Telecommunication Regulation Act 2001 in 2010, issuance of any telecom license would require prior government approval. At the same time, such approval will also be required for transferring ownership of to cancel any license. Earlier, different tariffs, call charge and other charges used to be determined by BTRC, now in such cases, which needs prior governmental approval. The Legal & Licensing (LL) Division implements all the decisions of the Commission relating to issuance, renewal, amendment, suspension and cancellation of license; drafts regulations and guidelines; vets all legal documents of the Commission and takes measures for Court cases filed by or against the Commission.

Currently, BTRC is providing 30 categorized licenses/certificates for their different types of services. Among them 15 types of licenses/certificates are open to issue whenever it is applied for. A huge volume of license holders is already existing into country which is increasing. For better management and service delivery, BTRC is intends to introduce and delivery an online based platform titled as "**Online License Issuance and Management System**" for dissemination of all types of information of these 15 types of licenses/certificates, like, license expiry information, document expiry information, due amount, license renewal information, notice etc. with minimal cost, time and hassle.

2. OBJECTIVES

The applicants for telecom licenses are spread throughout the country. The objectives of this "**Online License Issuance and Management System**" are to provide completely zero visit, faster and cost-effective license issuance and management system to the applicant. This system will be applicable to those types of services for which an applicant can get license/certificate whenever they apply for with proper documents and fees/charges. This assignment is (but not limited to):

- An applicant for a license can complete the application process through online by creating an account for his or her organization and get the license on zero visit to the BTRC office.
- The application will be processed through this Online License Issuance and Management System which shall be integrated with e-Nothi system for further processing.
- Applicants shall be able to deposit various license-related fees, such as license processing fees, license fees, license renewal fees, etc. into BTRC's account through online payment method.

- Applicants shall be able to check the statuses of their application in this system dashboard and will receive notifications via SMS and e-mail of important steps.
- An e-license (preferably QR code) will be awarded to final selected applicants after completing all approval process. After receiving the e-license, all license related activities will be done through the company's dashboard.
- BTRC's Online License Issuance and Management System will automatically notify various time-based activities in the main dashboard and also send information to the applicants/licensees via SMS to the registered mobile number.
- Overall, the Time, Cost, and Visit (TCV) will be reduced for customers to obtain the license and it will help to provide quality services to the citizens as well as increasing the government's revenue in the field of telecommunications.

3. ELIGIBILITY CRITERIA

a) Must submit valid Trade License, TIN, VAT, Incorporation & updated income tax Certificate.
b) Must be a local company of having minimum 5 years of experience in Software development business in Bangladesh.
c) At least two software implementation experience in International or Government Organization
d) The firm must have experience of managing at least Five (5) web-based applications with GoB or with large scale corporate sector. Experience in Government sector will be given preference. URL of live applications needs to be provided.
e) Firm should have experience on online payment gateway implementation.
f) Firm must demonstrate its management capacity (website link or brochures and other documents describing similar assignments, experience, availability of appropriate professional staff and experience among applicant's staff, resources to carry out the assignment).
g) Firm should demonstrate its' logistical capability (well-equipped office space at Dhaka with necessary facilities).
h) Must submit last 3 (Three) year's financial audit report showing annual turnover.
i) Must have working capital/liquid assets/credit facilities not be less than at least BDT 50 Lacs.
j) Proven track record of a single project aging at least 2 years in the field of Web-based IT Solution/Portal Development & deployment that works on public cloud.
k) List (Name, designation, Number, years of experience, number of projects, expertise) of IT personals (Project Manager, System Analyst, Business Analyst, Database Administrator, Information Security Expert, Interoperability Expert, Sr. Software Engineer, Software Engineer, Quality Assurance Engineer, System Administrator, Network Engineer, Trainer, Technical Documentation Expert, Support & Maintenance Engineer) who can be engaged to performed the assigned task.

4. SCOPE OF WORK

To reach the ultimate objective of this platform Development and implementation can have following necessary modules, features and functionalities. **However, the selected vendor must perform a detailed requirement study and system analysis and prepare the necessary deliverable.**

4.1 FUNCTIONAL REQUIREMENTS

SL	Required Functionalities	Description
01	**Online Application for license issue/renew/cancel/suspension & verification**	a) Company registration with necessary document submission. b) OTP based mobile number verification and email verification. c) Document verification and company account creation d) Category wise license application form submission with necessary document submission e) Workflow based (Application -> Evaluation -> Inspection -> Commission -> Connected Ministry Acknowledgement -> Approval/Rejection) notification and document management for license approval or rejection process f) Approval/Rejection notification send to customer/company g) All payment through online payment method. h) License's expiry as well as related document's expiry notification send to customer/company and related departments for renewal i) License cancellation and suspension process. License cancellation can be happened either company by itself or departmental action from BTRC j) Official notice dissemination k) The application will be processed through e-Nothi system as well as through the License Management System. Even if there is a problem in the e-Nothi due to technical issues, it should be ensured that there is no interruption in the work on this license management system. l) Document exchange through e-Nothi integration in license approval workflow m) Integration with RJSC to verify company Share information. n) Real time Quick Response (QR) code generate for license validation o) All required soft document must be predefined file size and format. p) System should have the image/pdf file customization facility to resize or readjust the required documents. It will automatically adjust size and resolution of submitted documents.
02	**Back office management**	a) Role based user management b) License category setup c) License category wise required list of documents configuration d) Category wise license application will be directed to the desk officer through the selected path. e) Notice creation and push notification f) License category wise payment instruction g) Company submitted document verification and approval h) Workflow process management
03	**Data migration**	Existing data migration to new developed system
04	**Centralized data visualization board**	a) Category wise total number of Applied, issued, pending, cancellation and expire license list. b) Customer wise total number of documents expire information. c) Customer wise push notification for due payment. d) Number of Duplicate license issue and customer details.
05	**Android and iOS based Mobile apps**	Online license issue/renew/cancel/suspension & verification processes can do by Android and iOS based Mobile apps.
06	**Others**	a) Companies are applied for registration as well as application submission for license issue, renewal or cancellation from separate web portal. b) Another MIS portal will be used by BTRC management for work flow based approval system, online payment, e-Nothi integration, lincense issue,

		notification/notice dissemination, shareholder's share transfer etc. c) An integrated admin panel/back office also required to develop for data accelaration and content management for both andorid and iOS mobile applications

4.2 BUSINESS ANALYSIS

In the Business Analysis phase, the selected vendor will need to develop a detailed Baseline Business Description in this phase. In this phase system need to identify required activity such as project Goal and Objective, Business Process identify. Develop different types of Diagrams such as Business Footprint diagram, Business Service/ Information diagram, Functional Decomposition diagram, Use-case diagram, Organization Decomposition diagram, Process Flow diagram and Events diagram etc.

4.3 UI DESIGN

At this designing stage the UI/UX all type of accessibility should be considered such as display size, different device, and disability friendly etc. Vendor should design and develop UI/UX keeping in mind the user's aspect. Vendor should also use the event driven style sheet so that UIs will be configurable. Vendor should prepare the necessary wireframes before developing the final one. All design should be approved from BTRC team before developing the system.

4.4 ARCHITECTURE DESIGN

At this stage following activities are done by the vendor

4.4.1 DATA ARCHITECTURE

In the Data Architecture phase, selected vendor will need to provide Statement of Architecture Work, Validated data principles, Baseline Data Architecture, Target Data Architecture such as Business data model, Logical data model, Data management process models, Data Entity/ Business Function matrix etc. Data Architecture requirements such as Gap analysis results, Data interoperability requirements, Relevant technical requirements, Constraints on the Technology Architecture, Updated business requirements etc.

4.4.2 APPLICATION ARCHITECTURE

In the Application Architecture phase selected vendor will need to provide Statement of Architecture, Validated application principles, Baseline Application Architecture, Target Application Architecture such as Process systems model, Place systems model, Time systems model, People systems model etc. Gap analysis results, Applications interoperability requirements, Relevant technical requirements, Constraints on the Technology Architecture, Updated business requirements and Updated data requirements.

4.4.3 TECHNOLOGY ARCHITECTURE

In the Technology Architecture phase selected vendors will need to provide Statement of Architecture, Validated technology principles, Technology Components, Technology platforms, Environments and

locations, Expected processing load and, Physical communications, Hardware and network specifications and Baseline Technology Architecture.

4.5 TESTING & QA

The vendor performs testing and QA activity from starting of the development to deployment. This phase should cover all the standard suitable testing approaches, 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 and activity which may include standard test approaches. Some are mentioned below as examples for reference

- Unit Test
- Functional Test
- Compatibility testing
- Regression testing
- Stress Testing
- Usability testing
- Accessibility testing
- Security testing
- User Acceptance Test (UAT)

4.6 DEPLOYMENT, IMPLEMENTATION AND TRAINING

This is the phase of Software Development Life Cycle, when the consent is being given to "GO LIVE" of the developed system after completed all kinds of development, testing and hosting. This is very crucial and sensitive stage for 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, implementation plan covering the major activities to be performed, the deliverables to be provided etc.

4.7 DURATION OF THE PROJECT

Duration of Supply & Installation of web & mobile based License Issuance and Management System shall be **60 (Sixty) days**.

4.8 MAINTENANCE & SUPPORT

Bidder shall manage, operate, and maintain DC-DR system for the LIMS platform during the period of installation. After successfully completion of installation, the selected firm shall provide Warranty service for **24 (Twenty-Four) months** Service and Maintenance Support with free of cost. The availability of the system shall be >99.95% excluding the planned downtime. The system provided by the supplier shall maintain complete redundancy with respect to all equipment and connectivity. All planned downtime required by the bidder shall be communicated well advanced and has to be conducted in super off-peak hour when there is no certain activity.

After Warranty period, Selected Vendor will have to sign separate SLA and Non-discloser agreement for Service Level Agreement (SLA).

5. SECURITY CHECKLIST

Input Validation: There must be proper Input Validation with the protection of cross-site scripting (XSS), SQL injection, buffer overflow, etc. Bad input can also lead to Denial of Service (DoS) attacks on the application.

Output Escaping/Encoding: Output escaping/encoding is required to handles output. All output data must be escaped/ encoded unless they are known to be safe for the intended destination. Must have to consider for implementing Content Security Policy (CSP) if possible.

Authentication & Password Management: Must be used password policy to document and address key concerns when it comes to authentication and password management including proper password strength controls, password lifecycle, password reset process, password storage, protecting credentials in transit, browser caching, number of login attempts, etc. For unauthenticated/anonymous page submits, consider using CAPTCHA technology to prevent spam and automated attacks. Enforce multi-factor authentication in high-risk areas where possible.

Session Management: Session should be managed that ensures that authenticated users have a robust and cryptographically secure association with their session. It is recommended to use the server or framework's session management controls whenever possible. Also, the following areas should be considered: session invalidation during authentication, re-authentication, logout, and switching from HTTPS to HTTP. HTTP header tags like timeout, domain, path, http only, and secure should also be considered with regards to session management. If using single-sign-on, make sure the application logout function calls the single-sign-on logout function. Force user re-verification, not relying only on current session state, for high-risk user transactions to prevent CSRF.

Authorization & Access Control: Must be implemented authentication, authorization for the decision process where requests to (create, read, update, delete, etc) a particular resource (object) should be granted or denied. Access control should be used for authorization enforcement with the most popular being role-based access control (RBAC). Centralized authorization system should be used where role membership is centrally managed and audited, then map those roles to specific permissions within the application. Implement least privilege policy between all subjects and objects. Ensure that the access control list covers all possible scenarios. Enforce timely authorization checks on every request (from both server and client side) to prevent "time of check"/"time of use" (TOC/TOU) attacks.

Cryptographic Practices: Proper encryption should be used when handling sensitive data at any tier of the application. Choose carefully whether "two-way" shared key symmetric encryption, "two-way" public/private key asymmetric encryption, or "one-way" salted hash encryption is best for each case. Ensuring cryptographic modules is used by the application. Using of approved cryptographic modules for random number generators.

Error Handling, Auditing & Logging: The application should handle its own application errors and not rely on the server. Do not display sensitive, debug or stack trace information in the production environment. Ensure audit logging controls are in place to log both successful/failure security events, especially authentication/authorization attempts and access to sensitive data with useful audit information based on the "Who/What/When/Where" principal. Sensitive data should never be logged, instead use other unique and traceable identifiers.

Data Protection: Limit access to data based on the least privilege principal. Encrypt sensitive data and information like stored passwords, connection strings and properly protect decryption keys. All cached or temporary copies of sensitive data should be protected from unauthorized access and get purged as soon as they are no longer required. Not to allow sensitive production data in non-production environments.

Communication Security: When transmitting sensitive information, at any tier of the application or network architecture, encryption-in-transit should be used. SSL/TLS must be supported for data communication. Uses of trusted certificate authority to generate public and private keys whenever possible.

System Configuration/Hardening: Making sure that every piece of software from the OS, system components, software libraries, software framework, web servers, etc. are running the latest version and they are patched with latest security patches. Lock down the server and remove any unnecessary files and functions. Isolate implementation environments from production environments. Uses of version control software so that all code changes deployed to production are reviewed and have an audit trail.

Database Security: The application should use the lowest possible level of privilege when accessing the database. Locking down the database by turning off any unnecessary features. Connection strings and database passwords should be kept in secure, separate and encrypted configuration files.

File Management: Ensure authentication is required before file uploads. Limit file types & prevent any file types that may be interpreted by the web server as well as validate the file types by checking the file header. Scanning of uploaded files for malware where possible.

6. E-SERVICE NON-FUNCTIONAL REQUIREMENTS

6.1 APPLICATION COMPLIANCE REQUIREMENTS

6.1.1 WEB APPLICATION

- 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

6.1.2 SIZING, PERFORMANCE AND SCALABILITY REQUIREMENTS

- The system shall be capable of handling online functionalities for a database of at least **15000** service recipients per year and approximate system users will be **500**.
- The system processing shall be scalable to support the volume estimates for a period of 5 years at a 20% annual growth rate.
- The system shall be designed to handle estimated 500 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 24x7 a year without any unapproved downtime.
- 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 internet.
- 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 internet.
- 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
- This 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.

6.1.3 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 this service operation. Vendor is requested propose a Business continuity plan for this application. Regarding business continuity you may take in account the following issues,

- 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 systemn
- Data and the operating system core component will be separated. A host 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 annual 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.

6.2 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 system. The following are the key expectations on interoperability requirements:

- The system should be designed for interoperability using industry standard protocols
- All imported data must undergo data validation to ensure full integrity
- Data exchange within the system at different levels via the internet shall be encrypted
- The system should have functionality to exchange data with other own systems or external institute systems
- 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

6.3 SYSTEM AUDIT

This 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.

6.4 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 issue 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.

6.5 CODING CONVENTIONS

The vendor must follow standard coding styles to produce high-quality code for further uses of the code in terms of reusability, refactoring, task automation, language factors etc. The vendor should submit a standard coding convention approach which may include different conventions like commenting, indent style, naming etc.

7. DOCUMENTATION

Detail and proper documentation of such ICT based project like e-Service Application development and implementation for Government is very vita and essential. Documentation is required for any such project as reference, knowledge transfer, analysis of development and implementation history, baseline information for any modification or change, guidance etc. In this issue, Vendor is expected the highest-level professionalism for delivering the standard documentation approach at each phase of e-Service development and implementation project. Vendor is requested here to include and extensive documentation plan of this project in their technical proposal which may cover the followings,

- Documents titles phase or activity wise
- Purpose of document
- About the format of documents (if possible, only index or fields)
- Type of expert and skilled resource will be used for documentation
- Document priority and dependency
- Time requirement for preparation (If applicable)

8. QUALITY ATTRIBUTES AND ASSURANCE

The quality attributes and assurance plan will describe the standards, processes and procedures in this system development life cycle which will be used to support the consistent delivery of high-quality, professional standard application and services provided in the support of an automated environment. The quality assurance process will be concerned with establishing the authority of the QA function, quality assurance standards, procedures, policies, and monitoring, and evaluation processes to determine quality in relation to established standards. Quality assurance activities will concentrate on the prevention of problems through the continuous improvement of processes.

In order to provide high quality products and services, each support team will adhere to processes procedures and standards. Quality Assurance (QA) is a process used to monitor and evaluate the adherence to processes, procedures and standards to determine potential product and service quality. It will involve reviewing and auditing the products and activities to verify that they comply with the applicable procedures and standards and will assure the appropriate visibility for the results of the reviews and audits.

The vendor is requested to provide an extensive quality assurance plan with measurable attributes for each phases of this system development life cycle in their technical proposal.

9. COPYRIGHT

The vendor should properly deliver all the entire approved source codes and other deliverables to the authority. The vendor cannot claim any royalty or authority of any short in case of replicating the source code or database or any other deliverables under this TOR for any future use that authority and the Government of Bangladesh may see fit.