# TSRTC

***TENDER FOR IMPLEMENTATION OF***
***ONLINE PASSENGER RESERVATION SYSTEM (OPRS)***
***& iTIMs SOFTWARE***
***FOR A PERIOD OF FIVE YEARS***

***<u>VOLUME –2</u>***
***FUNCTIONAL AND TECHNICAL SPECIFICATIONS***

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## 1. EVOLUTION OF ONLINE PASSENGER RESERVATION SYSTEM IN TSRTC

Initially, advance reservation system project was implemented through ACTIS (Advance & Current Ticket Issuing System) in the year 1999. ACTIS project was originally developed in COBOL. The software was subsequently developed with Oracle 8 as back end and VB 6.0 as front end. Novel Netware 4.1 was used as networking operating system.

In this system, the ticketing terminals within the Bus Station were connected to the server through a LAN and the remote terminals were connected to the server through modem and dial-up or leased lines. This project enabled the passengers to book their tickets for any service with any boarding point from any counter of that City only.

Interconnectivity system was subsequently established between four major Bus Stations viz. Mahatma Gandhi Bus Station (MGBS), Hyderabad – Vijayawada, MGBS – Visakhapatnam, MGBS – Tirupathi to issue anywhere to anywhere ticketing between these four Bus Stations. The connectivity was established through Dial Up system.

As a part of its philosophy to offer better services to the esteemed passengers, Online Passenger Reservation System (OPRS) was first introduced in the year 2008.

The OPRS Project was designed and executed to meet the passenger requirement and the Corporation's vision to become the choice transport Corporation to the traveling public by providing them regular, reliable, comfortable and cost effective passenger service and value added services, with an exceptional track record of safety.

## 2. ABOUT CURRENT OPRS

Initially, the OPRS project was implemented with a capacity to serve 1,000 concurrent users.

In view of the tremendous growth in the ticketing activity as a result of the increased patronage of passengers for advance reservation services, the system was upgraded. The OPRS project was upgraded in the year 2011 to serve 5,000 concurrent users, with a headroom of 20%, taking growth into consideration.

Advance and current ticketing activity is carried out through this system.

The OPRS application is a browser based solution in 3-tier architecture and is hosted on the URL https://tsrtconline.in.

Apps (Android and iOS) are available (in AppStore and PlayStore) to enable the passengers to carry out ticket transactions.

A facility is also provided for commuters to book buses on hire basis for marriages, functions, picnics and other occasions. Google Maps integration is available for calculating distance, which is one of the parameters for calculating the fare.

TSRTC has been allotted 1,000 Special Entry Darshan Tickets (SEDT) per day, by Tirumala Tirupathi Devasthanams (TTD). Passengers travelling to Tirupathi can book SEDTs along with their journey tickets, through OPRS.

The important features of the project are given hereunder:

**Booking of tickets through OPRS**
Tickets can be booked/cancelled, pre/postponed by the passengers through OPRS, at TSRTC counters / Authorized Ticket Booking Agents (ATB Agents) / B2B Corporate Agents (currently disabled) / TSRTC online booking portal & Apps / B2C Franchisees' portals & Apps, for all the identified services for which advance reservation facility is provided.

**TSRTC Counters**: Tickets can be booked at TSRTC operated counters wherein the passengers pay cash and collect tickets printed on type numbered pre-printed stock. Static QR Code UPI based payments and card based payments (through POS devices) are also accepted. Eligible amounts are refunded in the case of cancellations. Tickets on type numbered pre-printed ticket stock are currently being issued at some bus stations. Receipt of ticket stock at the Bus Stations, Stock management, and allotment of stock to the operators and accountal of ticket stock etc. is done through the OPRS System. However, TSRTC has recently taken a decision to do away with pre-printed ticket stock at TSRTC counters and to issue tickets on A4 papers. Shortly only A4 paper tickets will be issued at all TSRTC counters.

**ATB Agents**:
ATB Agents operate on pre-paid model. The Agents top up their accounts in advance through net banking/UPI payments and the top up amounts are credited to TSRTC account. The Agents can issue tickets as long as sufficient top up amount is available for issue of tickets. Agents are paid commission for the tickets issued and cancelled and the commission is added to the Agents' accounts. The passengers are issued tickets printed on A4 size plain paper.

In case of cancellation, the eligible amount is refunded by the Agent, and the Agent's accounts is topped up by an equal amount.

**B2B Corporate Agent**: The Corporation has earlier appointed a B2B Corporate Agent for issue of tickets through OPRS, who in turn appointed sub agents. Operation is similar as in the case of ATB Agent but only a single account is maintained for all the agents, and top up is made only by the Corporate Agent. Commission on similar lines to ATB Agents was paid to the B2B Agent. Currently there are no active B2B Agents. Based on the requirement, the Corporation may revive this system.

**E-tickets**: Tickets can be booked online by the passengers for which payments are made through Debit cards/credit cards/net banking and UPI payments. The ticket amount is transferred to the TSRTC account by the payment gateway provider. In case of cancellation, the eligible amount is transferred to the account of the passenger duly debiting the same to TSRTC's account. E-tickets can be booked through TSRTC's online ticket booking platform and TSRTC's ticket booking Apps.

**B2C Franchisees**: The Corporation has appointed B2C franchisees for issue of TSRTC tickets through their ticket reservation portals & Apps. Access to OPRS system is provided to these franchisees through an API. Commission on similar lines to ATB Agents is paid to the B2C franchisees. Currently there are five active B2C franchisees.

**Intellligent Ticket Issuing Machines (iTIMs)**: Recently TSRTC has introduced intelligent Ticket Issuing Machines (iTIMs) which are qSPARC certified Android based devices. These devices are being used in the buses for issue of tickets by the Drivers, and at Ground Booking points for issue of tickets. iTIMs are integrated with OPRS. iTIMs support Card (Credit/Debit card) based and UPI payments. Tickets are also issued against cash payments. TSRTC is also contemplating open/closed loop cards for the exclusive use in TSRTC. This should also be supported. These devices are integrated with OPRS with real time syncing of complete ticket data.

**Payment Gateways**: Credit card/Debit card/Net banking/UPI transactions are carried out through Payment Gateways. Currently payment gateways from four different providers are being used for OPRS.

**SMS Gateway**: The OPRS system fires SMS messages to the passengers when they book/cancel, pre/postpone tickets at ATB/B2B Corporate Agents/online, whenever services are cancelled etc. These messages are sent to the passengers using the SMS gateway. Passengers are permitted to perform journey based on the strength of the SMS message. SMS messages are also fired for other predefined events.

**Benefits to End Customers:**

- Information is available on fingertips
- Ability to book/cancel tickets sitting at home using Credit/Debit Cards, UPI payments & Net Banking
- Can book tickets from anywhere to anywhere
- Ability to pay in cash or carry out transactions using credit/debit card, UPI & Net Banking.
- Ability to book/hire entire bus (es) for occasions like marriages, functions etc.
- Ability to book Tirumala Special Entry Darshan Tickets along with journey tickets to Tirupathi.

**Benefits to TSRTC:**

- Increase its load factors (i.e., sell more tickets per bus).
- Bring down the operational costs with better management of schedules.
- Provide better quality data to plan extra schedules during weekends, festivals and special occasions.
- Better cash flows due to Advance Cash Collection.
- Improve Customer service.
- Create a hi-tech image for TSRTC.
- Increased Revenues.

## 3. DEFINITIONS USED IN THIS DOCUMENT

- **Bus Depot:** Buses are attached to Bus Depots. Depots maintain and operate the buses.
- **Bus Station:** A Bus station is attached to a Bus Depot. Each Bus Depot can have many Bus Stations attached to it. Buses operate between Bus stations. Ticket Booking (both advance and current) is done here.
- **Service**: A service is any bus operating between two places at a particular time on a Route of a particular Bus Type. Each service has a unique number (Service number/ID) within the Corporation.
- **Service Number/ID**: Unique number given to a service.
- **Bus Type:** Garuda Plus, Rajadhani, Super Luxury, Deluxe, Express, Pallevelugu, Metro Luxury, Pushpak, City Metro Deluxe, City Metro Express, City Ordinary etc.
- **Net seats sold per day:** Net seats means, total seats sold per day minus cancelled seats and invalidated seats.
- **Boarding points:** Places where passengers board the buses. Places apart from Bus Stations can also be boarding points.
- **Alighting points:** Places where passengers alight from the buses. Places apart from Bus Stations can also be alighting points.
- **Waybill:** A document generated and given to the service driver/conductor at the originating/intermediate points. The details of passengers (ticket number, boarding point, alighting point, seat number, fare details etc.) who have a valid ticket/reservation to travel in that service are furnished in the waybill.
- **Intelligent Ticket Issuing Machines (iTIMs)**: iTIMs are Android based Ticket Issuing Machines with integrated printer. These are qSPARC certified devices. Cash and Cashless transactions (credit/debit card and QR code based UPI payments) for issue of tickets, can be carried out through these Devices. Ticketing is done through OPRS integration.
- **Warranty period**: Warranty period shall be counted from the date of commercial deployment of the OPRS project (date of **"go live"**) to the end of the contract period.

## 4. OBJECTIVES OF THE PROPOSED SYSTEM

**The proposed system shall meet the following objectives/requirements:**

The proposed system shall provide "Anywhere to anywhere and anytime web/App based advance/current reservation ticketing" and issue of tickets through Android based Intelligent Ticket Issuing Machines.

a. The system shall process information in an integrated manner and make best use of latest and cutting-edge technologies for enabling the online passengers, various ticket booking counters, Drivers using iTIMs and passengers booking tickets through TSRTC/B2C Franchisee Portals etc., to carry out ticketing transactions with high responsiveness.

b. The system shall be based on an open hardware and software architecture for interoperability with various applications in existence in TSRTC and those being planned or likely to be implemented in the future.

c. The system shall support 7,000 concurrent users on normal days and up to 20,000 during Dasara and Sankranthi festivals.

d. The system shall have sufficient headroom for future expansion.

e. The system should cater to fast query retrieval.

f. Data integrity and consistency must be ensured while migrating data from the existing OPRS application to the new application.

g. The system architecture shall cater to scalability. The system is expected to be integrated with other major systems of TSRTC like ERP based Centralized Integrated Solution, Vehicle Tracking and Passenger Information System and other departments like TS Online, MeeSeva/e-Seva, iTIMs, Mobile/fixed reservation kiosks, SMS based enquiry and reservation, Railways/IRCTC, Telangana State Tourism Development Corporation, Tirumala Tirupati Devasthanam, Mobile wallets, e-wallets and other online payment modes etc. Hence, scalability at all layers of the system should be catered to, for meeting the performance requirements with increase in user base. Carrying out the required integration is in the scope of the project and shall be carried out by the successful bidder.

h. The system shall support integration with other Transport Operators/STUs, TTD SED tickets, other Temples Darshan Tickets and other tourism firms like Ramoji Film City etc.

i. The System should implement value added services, such as SMS and WhatsApp based ticketing, Arrival and Departure module, Out Depot Cash Remittance Module etc., as and when required by TSRTC.

j. The system shall implement Dynamic Fare System using Artificial Intelligence and Machine learning algorithms.

k. The OPRS project should seamlessly integrate with the ERP based Centralized Integrated Solution (CIS) which is implemented by TSRTC, wherein all systems such as Depot Computerization, Online Inventory management System, Financial Accounting System, Payroll and other Systems are revamped as a web based centralized system. The data pertaining to tickets sold (with all details), earnings (component-wise) realized etc., will be needed to be provided to CIS Project, service-wise/Trip-wise. There should be provision for integration and Electronic Data Interchange (EDI) and also integration with Metro and other organizations, the successful bidder shall carry out all the required activities in this regard.

l. To provide one (1) Database administrator and two (2) software developers capable of system maintenance and developing regular software requirements of OPRS, who will work exclusively at TSRTC's location.

m. The system shall be capable of providing advanced data analytics and dashboards for proper analysis of performance and also suggest the route wise planning based on the past history and current level of booking for each service.

**n. High Security - The system shall cater to high security levels. Access to the system is to be strictly on the basis of securely administered lists of users on TSRTC Booking Portal. Access to various modules should be Role based. Since numerous functions have to be addressed, security permissions have to be both at the levels of application and the database; hence a proper profiling engine is to be made to validate authorized Users.**

5. Bidders have to submit their optimal solutions for design, development, migration and implementation of the 'OPRS' as per the requirements of TSRTC; hosting in Cloud Services with required resources (hardware, memory, software, network, firewalls, load balancers, storage etc.); providing connectivity to the application etc. This shall include:

    a) A study of processes involved.

    b) Preparation of Project Plan.

    c) Hosting in Cloud Services (both DC and DR); providing connectivity to the application, providing connectivity between DC and DR etc. The bidder shall host the entire system in a cloud service approved by the MeitY (Ministry of Electronics and Information Technology) and TSRTC. The required infrastructure shall be obtained in the name of TSRTC exclusively for this project.

    d) The details of hardware, operating system, software, memory, networking, storage resources etc. to meet the SLAs and the requirements of the project shall be clearly specified in the cloud services agreement.

    e) The Installation and configuration of database, operating systems and any other applications as required.

    f) Installation, migration, commissioning and testing of the application.

g) Design and Preparation of Test Data and System Testing.

h) Take necessary steps and activities to migrate the existing data into the new system without any down time and any loss of data.

i) User training to be provided at different levels at all implementation stages.

j) The successful bidder shall provide a team of Software, Networking and DBA Engineers on 24 x 7 basis to design, develop, deploy and to attend day to day software and networking issues, and maintenance.

k) Transaction-wise backup of data shall be maintained at five different locations.

l) All the expenses for implementation of the project and any further requirements specified by TSRTC throughout the contract period shall be borne by the successful bidder.

m) Detailed documentation and User manuals for different levels of users shall be provided.

**6. The vendor must keep in view the following key requirements while suggesting the solution:**

a) The design specifications of the solution, shall be defined, complete in all respects, subject to requirements specified in subsequent sections and ensure efficient implementation inclusive of any process management review that may be required to provide the utmost benefit to TSRTC operational environment.

b) The solution should be extendable, open and flexible as per industry standards so that the architecture for this solution can be utilized for new applications at a later date. The system should also provide a mechanism for error handling and robustness to scale up on demand to support future applications without major changes.

## 6.1 Broad Scope of the Project

- The Passenger should be able to book tickets (advance/current) in any TSRTC operated counter, B2C Franchisee portal, ATB agent counter, B2B franchisee counter, iTIM/Mobile based ticketing in the bus, kiosks and Ticket Vending machines and any other kiosks, Point of Sales counters (cashless transactions through credit/debit cards/Wallets etc.), online through the TSRTC ticket booking portal https://tsrtconline.in and through the web portals of B2C franchisees, mobile apps etc., based on the business rules of TSRTC from time to time. The application shall provide all these features.
- To provide **"Anywhere to Anywhere"** advance booking which means Tickets can be booked 'anywhere to anywhere, anytime for onward and return journey'.
    - This facility will be available at all the OPRS Bus Stations having/likely to have TSRTC operated counters, and ATB Agent operated counters.

- Cancellations, Pre/Postponements will be allowed at any of the OPRS Bus Stations and ATB/B2B Agent counters.
- To provide accurate and easy accounting system for Inter Depot Transactions and e-ticketing.
- To provide web enabled Advance Reservation with various types of concessions, discounts, cashbacks and loyalty programs using Mobile Wallet.
- To provide Arrival/Departure information through SMS, App and Web Interfaces or through any other mode available in the market from time to time, as per the requirement of TSRTC.
- In future, Non-stop services and short distance services may also be brought into the purview of OPRS during the period of contract and this requirement is also to be taken into consideration.
- Providing additional hardware resources based on need, System software, carrying out necessary changes in the application software as well as tuning of the system should be done by the successful bidder throughout the contract period.

The existing system (OPRS application) user interface and design etc., should be studied in detail and overall structure understood and incorporated in the new software under the overall scope of Anywhere to Anywhere and Anytime advance reservation.

6.2 **The following are the major requirements that are to be incorporated in the OPRS application. The system shall have the following features:**

6.2.1 The system should be conceptualized and architected in such a way that the passenger can book their tickets from "Any Where to Any Where at Any Point of Time" keeping in mind the short term and long term goals of TSRTC.

6.2.2 The administration module in the application should provide the TSRTC stake holders the power to manage the entire traffic and operations through the system.

6.2.3 The application should be designed in such a way that administration of all Categories of Users, e-ticket users, Rate and Fare, Flexi fares, Concessions/discounts, Combi-tickets, Routes, Services, Seasons, Franchises, Bus Stations, Depots, Regions, Zones, Divisions etc., can be efficiently managed to provide the end user with a foolproof system.

6.2.4 The system should have the web / browser based facility for Advance Booking, Current Booking, Cancellation (full/partial), Pre/postponement, Blocking/releasing seats, levies, concessions, iTIM, Mobile, e-wallet etc., based ticketing. The browser based application shall be mobile friendly.

6.2.5 E-wallet system has to be implemented for online users. The online users will transfer amount to the TSRTC account through net banking, from OPRS application, through secure login. Tickets will subsequently be booked against

this amount till the amount is exhausted. Top up facility has to be provided to replenish the wallet. In case of cancellations, the refund amount will be added to the wallet balance. Facility should be provided for giving Reward points and redemption of reward points.

6.2.6 The application shall be available on mobile phones for Android & iOS etc., through Mobile Apps, for carrying out ticket transactions and enquiry, by the passengers. The successful bidder shall develop the Apps, make them available in the respective App Stores and maintain them throughout the contract period.

6.2.7 Shall have a provision for TSRTC Call Centre to book tickets for failure transactions.

6.2.8 Shall provide APIs for the TSRTC Call Centre to get the Driver number once waybill is generated.

6.2.9 Link ticket facility shall be provided to enable the passengers to book multiple tickets in a single transaction for journeys wherein direct bus facility is not available between the origin and destination for their journey.

6.2.10 The system shall provide reconciliation of amounts realized and amounts for tickets sold.

6.2.11 Provision shall be made for display of status notification on Arrival, Departure of Buses, availability of seats on a Service, wait list of seats on TSRTC Portal. Such alerts must be capable of being delivered on any user devices such as mobile phones / PDA (Voice calls & SMS alerts), web notification, emails, broadcast to franchisees, call centers and IVR enabled information dissemination facilities, as per the requirement of TSRTC.

6.2.12 Package Tours, Accommodation, dinner on board and other value added services to be incorporated in the web portal/Apps where applicable, as per the requirement of TSRTC.

6.2.13 The system should support remote management. It shall be possible to monitor and tune the system remotely.

6.2.14 The OPRS system administration shall facilitate generation of various kinds of reports – HTML/Excel/Text/PDF and graphical. The reports will be of use to various stakeholders such as the Corporation, Identified Management Officials, Service Access, network, payment gateway, authentication, back office and other service providers. While some such reports could be planned in advance, the system should provide for creation of additional reports online.

6.2.15 System should facilitate payment for ticket booked through Credit Card, Debit Card, Net Banking, UPI etc., special coupons or any other payment mechanism as and when introduced. The system shall have necessary interfaces in conformance with the standards and protocols specified by such third party payment gateway service providers. Such payments received will provide appropriate interfaces for the backend accounting and financial systems to access the payment collection data.

6.2.16 Automatic releasing of predefined quota seats based on configurable time, place or condition with a provision for manual releasing.

6.2.17 Agent-wise commissions, agent-wise cancellations, cancellations before and after departure (based on the rules from time to time), universal stock accountal etc., and Agents cash remittance through prepaid and postpaid methods which should be configurable.

6.2.18 Integration and accessibility to various service delivery points such as ATB agents, Sub agents, B2B Agents/Sub Agents, B2C franchisees, e-Seva/Mee Seva, TS Online, GPRS based ticket issuing machine, mobile based advance & current reservation system and necessary accountal of tickets and revenues.

## 7. Stake Holders:

### 7.1 Passenger:

- Passenger is a traveler who uses TSRTC services for travel.
- The System should address the requirements of any traveler and should address specific requirements of different types of commuters.
- Students are special categories of commuters who may be allowed special privileges, such as pricing, periodicity issue of tickets etc.
- Women commuters are special categories of commuters who may be allowed special privileges in terms of seating and/or ticket pricing, issue of seasonal passes etc.
- Children are special category commuters who may be allowed special privileges in terms of seating and/or pricing.

### 7.2 Special Passengers:

- The System should provide for special passengers and seat allotment and ticket pricing and cover people, such as, elected Representatives, Physically Challenged, Journalists, Senior Citizens and any other Group as decided by TSRTC from time to time. These policies should be dynamically configurable.
- Group passengers who may be given bulk allotment of seats including hiring of a Bus/Contract Carriages.
- The System should facilitate special concessions for selected/all services/service types, selective seats for a service, selected seats for all services; for selected days, for selected days of week/ selected days of month / given period / any random days etc., and any combination of the same.
- The System should facilitate special concessions/fares for group of passengers and for Schools and occasions like Jathara.

## 7.3 En-route and Local Authorized Ticket Booking Agents:

- The Agents should provide ticketing services either Current or Advance to passengers, provide reservation information to the passengers and offer their services to the traveling public.
- The System should be able to connect to Service Providers, like e-Seva/Mee Seva, TS Online, Mobile ticketing etc., to provide online ticketing services as well as secure and accurate statement of revenue collection made on behalf of TSRTC and provision should be made to enable the System to access and integrate with other Government Departments, such as Tourism, Endowments etc., to provide a Single Window facility for transport and accommodation etc.
- The agents operate on prepaid model. The system should be configurable for the agents' cash remittance (top up of their accounts) for prepaid or postpaid method.

## 7.4 Booking Clerks:

The Booking Clerks at various Bus Stations and also at Depots should be able to access the System to manage the services and ticketing process including viewing the service details, fare tables, cancellation (both full and partial), pre/postponement, generate Auxiliary Way Bills, Shift, Revenue etc., and also be able to carry out the ticketing process.

The tickets are given on type numbered preprinted stock. The application shall provide the required facility for receipt of ticket stock, issue to the counters/users, transfer of stock from one counter/user to another counter/user, tracking the stock ticket-wise until the stock is exhausted, accountal of stock etc.

TSRTC is in the process of doing away with pre-printed ticket stock at TSRTC operated counters. Tickets will be issued on A4 size paper.

## 7.5 B2B Corporate Agent:

This type of Agent operates on lines similar to an ATB Agent. However a Corporate Agent has sub agents who carry out the actual ticketing transactions. Top up amount is however maintained at one level i.e., by the Corporate Agent. Currently there are no B2B Agents.

## 7.6 B2C Franchisee:

- B2C franchisees operate on prepaid model.

- They offer ticketing for TSRTC services, along with services of other public/private sector operators, from their web portals/Mobile Apps.
- Access to OPRS is provided through an API.

### 7.7 TSRTC Management:

TSRTC Management should be able to access the OPRS application for various management activities, such as control, decision making and implementation of new policies etc.

Various Sub Systems within TSRTC, such as Centralized Integrated Solution (CIS), Vehicle Tracking & Passenger Information System (VTPIS), Bus Pass Project, Call Centre and various financial Modules should be able to interface and integrate with the OPRS at the application level.

It is expected that as a part of development of OPRS System, Bidder will study the existing Software used for reservation, cancellation, pre/postponement, e-ticketing and payment gateway, SMS gateway, iTIMs, Bus on Contract etc., and suggest appropriate changes in consultation with the various departments concerned, within TSRTC, and implement the same.

A demonstration of the existing Online Passenger Reservation System (OPRS) Software will be arranged to the intending bidders.

## 8. Architecture:

Since Bus Transport Industry is mostly local in nature, it is proposed to have centralized or a distributed Architecture for implementation of the OPRS software to enable Anywhere to Anywhere, Anytime advance/current reservation.

In order to provide better Anywhere to Anywhere, Anytime Ticketing and also to enable OPRS application Software to deliver reliable and error free service to passengers, the OPRS application has to be developed in 3-Tier Architecture wherein the Database will hold the Data, the procedures and packages and the application tier will hold the business logic and the presentation layer will be accessed through a Browser on the Ticketing Node, by online users, Agents etc., and through mobile Apps.

### 8.1 Service Oriented Architecture

A service-oriented architecture (SOA) will allow TSRTC to establish a flexible, robust infrastructure so the successful bidder can build, deploy and integrate services, independent of applications and the computing platforms on which they run, making the business processes more flexible.

A service-oriented architecture (SOA) will also ensure that services are able to be both provided and consumed, now and in the future as the system scales and further integration with existing or new systems is required. The use of SOA will also ensure that connectivity to services will be as flexible as required and that applications will not be tightly bound to each other.

As a part of Service Oriented Architecture framework the Business Logic will be separated into components. The components will be developed separately and clustered to operate them as a solution. The clustering will be a loose-coupling. This makes Operation & maintenance easy.

The following aspects have to be kept in mind while designing the appropriate architecture.

a) The system should scale with adding necessary hardware resources, software, networking and bandwidth for catering to the need of nonstop bookings at the local booking centers also through this system.
b) The MIS of the Non-stop booking should be synchronized with the centralized system at a periodicity to be defined in the SLA, when non-stop booking is brought into the OPRS project.

The bidder can also suggest alternate architecture, with due justification. The clear advantages, reliability etc., have to be clearly spelt out, after studying the working of the system and the needs.

Most suited architecture and plan of action for prevention of virus attack/corruption, hacking and loss of data is a prerequisite. Crisis and disaster management are an integral part and essential requirement so that minimum time is lost in the event of Disaster for Recovery of data and restarting the system. These issues have to be fully addressed at appropriate stages of the project.

Further, it is utmost desirable to work out the most feasible model for implementation of the software as the success of the project largely hinges upon the following:

- Development of software after in-depth study of the prevailing ground conditions. Its versatility for future upgradation, user-friendliness etc.
- Providing of hardware resources, networking resources, connectivity and bandwidth etc., at the Data Center and Disaster Recovery Centre to handle 7,000 concurrent users.
- Software compatibility with the present and future hardware.

- Transaction-wise Backup (in case of crash due to Hardware, storage, virus attack etc.), after sales support for the software/hardware so that down time is minimum.
- Setting up of Disaster Recovery center with sufficient capacity (at least 50% of DC capacity), providing of required bandwidth with redundancy and leased lines between DC and DRC.
- Availability of knowledgeable, trained and committed manpower from Software, Hardware and Networking for 24 x 7 monitoring, attending to problems, carrying out modifications from time to time etc.
- The bidder has to obtain certification to the effect that the Cloud Services Provider will support them for the entire contract period.

8.2 **Terms of reference are given below:**

**The Proposal has to be prepared after a clear understanding of the Scope of Work. The proposal shall outline the Architecture best suited for TSRTC, Technologies proposed and the reasons for proposing the same, infrastructure required in terms of Hardware, software and other resources and Communication facilities in detail. A detailed architecture shall be submitted covering aspects such as the Server requirements viz. Database servers, Application servers, Web servers etc.; storage requirements; Networking resources, Firewalls, load balancers etc.; Software requirements including Operating Systems, Application, Database, Directory, Cache, online payment facility, SMS facility and web & application Servers, mail servers, load balancers etc. Hardware resources that are proposed including the number of cores, VMs, CPUs, memory, storage etc., have to be given in detail. It shall also include acceptance and testing requirements of the hardware resources, software, and cover training, documentation and site requirements. Security, backup and restoration of application requirements need to be covered in detail. The successful bidder has to host the Solution in Cloud.**

**Hardware and Networking resources, connectivity, bandwidth etc., for DC and DRC proposed should have at least 20% headroom for future expansion.**

A transition strategy is a must as the new reservation System is phased in, as the methodology to populate the existing data should be in place and implemented to migrate the existing data into the new system.

The architecture of new OPRS is given below:

a. It shall be based on open, interoperable standards and should be highly scalable, open ended and capable of delivering high performance with security. The solution / application must be able to work in any Operating System / Open standards.

b. The architecture shall be completely web enabled.

c. The OPRS will work in a networked environment. It should be able to run with equal efficiency in a network having thin client architecture.

d. The vendor should design the web interface using latest available technologies, standard processes with high security. However, providing any software component that may be required, for functioning of the system, is the responsibility of the successful bidder and is included in the scope.

e. The successful bidder shall supply a certificate stating that the software is free from any virus, worm, Trojan, trap door or any other type of malicious code with security.

**The system will be essentially characterized by the following features:**

8.3 **Flexibility:**

The system should be adaptable to the changing commercial practices, reduce the total cost of ownership.

8.4 **Open Architecture:**

The system should be open to allow interoperability with general-purpose software and have facility to Export/Import data files from other applications and interact with other applications as mentioned earlier.

8.5 **Object-oriented:**

The system design should be based on object oriented approach.

8.6 **Integrated:**

The system should be fully integrated across departments and functional areas and also across geographical location of sites.

8.7 **Workflow-integration approach:**

The system should adapt workflow management techniques.

8.8 **Simplicity:**

The overall application should be developed keeping in mind simplicity as the key, so as to enable easy maintenance and operation of the application by the end user.

8.9 **Manageability:**

The OPRS application should cater for easy manageability by the system Administrator.

8.10 **Scalability:**

OPRS will be utilized across all the Bus Stations of the Corporation and in Bus Stations in neighboring States, apart from ATB Agents, B2B Agents, B2C Franchisees and online users. To be able to cater to all this load, it is a mandate requirement that the OPRS should be scalable at modular level. The System should scale to about 25,000 bus services and a minimum of 7,000 concurrent users. The recommended products proven in the field to scale well in order to meet large enterprise requirements have to be used. Key components such as hardware resources, application servers and network etc., should be of modular design to ensure scalability of the system. Major scalability may be required for Application and Database servers, but independent study may be taken for proper assessment.

A separate server/resources shall be provided to enable the Bus Stations/ATB Agents to generate Waybills, Reservation Charts and other Reports, without disruption, in situations where the load on the regular servers/resources is high. This is required to ensure timely dispatch of services.

8.11 **Reliability:**

Solution shall be implemented with clustering technology to ensure the system reliability. Portal server and Integration server are to be clustered at application level and Database server shall be clustered at Operating System level. Transaction-wise back up should be taken at five different places to restore the application at any point of time.

8.12 **Availability:**

System behavior in the event of failure of CPU, memory, applications - Availability shall be ensured with system level redundancy including the communication and network equipment.

8.13 **Stability & Robustness:**

System behavior on high stress / over use, wrong use - Load balancers shall be used in the solution to share the load and thereby ensure stable operation.

8.14 **User-friendliness:**

Intuitive portal design features of the Portal products will enhance the customer stickiness to the portal service. The portal content design will include advance graphic and plug & play modular display objects available with the Portal product and Java/relevant technologies.

Suitable Content Delivery Network shall be used for handling the load.

8.15 **Interoperability:**

Customer demand for enterprise interoperability solutions continues to escalate the need to maximize return on investments, and the need for standards-based solutions. OPRS, interoperability software can help enterprises get maximum value from their current resources and applications investments by extending both existing skill and code bases, allowing for maximum application reuse in the fastest time possible. OPRS shall support Web Services and XML/JSON based data exchange, which would make it easy to integrate with third party software, customer-created, or legacy security solutions. This way OPRS system assures the best approach for integration over discrete systems.

8.16 **Optimization:**

Server Load balancing techniques will get the best possible performance from the Web servers. OPRS shall choose the right CPU, memory, storage, cache, load balancing, etc., and increase the performance of the Portal. This can help significantly increase the efficiency of hardware, software and Internet service and improve reliability. In addition to the Hardware sizing and software tools to increase the OPRS portal performance, the system should also follow the following steps to optimize the web performance:

- Stop unwanted/unsecured content over the network.
- Secure OPRS network from web-based threats such as DoS, DDoS attacks, intrusions, etc.
- Manage Internet traffic to optimize network bandwidth.

8.17 **Additional Features**

a) **Security**: The security overlay for the access to the server must be provided centrally with suitable authentication and profiling engine. Suitable encryption mechanism must be used at the application layer. The functions shown in this document will be applicable to various users based on Role, which will be specified during Requirement analysis phase. Audit trail is must for all data updates/amendments and deletions for security audit. Encryption mechanism

wherever required must be built in. For all critical activities of master and service data, a log file shall be generated for every activity. For every change/modification of the service data in the application a related pop up message shall be displayed on the screen immediately.

The application and its various layers shall be so designed to be not prone to attacks like SQL Injection, Cross Site Scripting, Credential/Session prediction, OS commanding, Redirection, Insufficient session expiration, Cross Site Request Forgery (CSRF) etc.

b) **Backup and Recovery:** A rugged backup policy with detailed procedures should be formulated. The system should maintain a backup of all programs, data, documents, procedures, etc., on transaction and timely intervals. Verification procedures for backup taken should be in place. Appropriate Disaster Recovery tools should be provided for recovery of the system and database with minimum downtime of less than one hour.

c) **General & Adhoc Queries in Proposed Solution:** General queries that have not been explicitly mentioned in the user requirements based on data that is captured should be made available based on functionalities explained in next section(s). Provision to generate ad-hoc queries by joining data in a flexible and user-friendly manner should be made available.

Facility shall be provided to select/deselect fields/columns while generating the reports so that a report with fields for the requirement on hand is generated.

d) **Print and Online Help options:** Proposed system must have the facility to have print options for the reports and other specified forms in general / pre-printed formats agreed and approved by TSRTC. Online help for all users and administrators should be part of the software. For all the modules mentioned below, there must be adequate internationally accepted standard reporting features that enable high quality graphics and user interactivity. The reports must have facility to be ported in standard office automation suites like Excel, Word documents, Adobe Reader etc. Facility to export the reports to MS Excel, PDF and CSV formats shall be available.

## 9. Suggested Methodology for the Project Execution

- Team formation.
- Thorough study of all aspects of the existing OPRS project
- Visit(s) to the TSRTC Ticketing Counters/area of operation
- Understanding the business processes and data flows.
- Data collection methods, frequency of data flow and quality of data assessment.

- Planning for providing the required resources (hardware, software, networking, connectivity) for Data Centre and hosting the same in Cloud for 7,000 concurrent users
- Planning for providing the required resources (hardware, software, networking, connectivity) for Disaster Recovery and hosting the same in Cloud, for 7,000 concurrent users.
- Frequency review, daily, fortnightly, monthly and yearly.
- Conceptualization/Formulation/selection of application software and system Software based on business process understanding.
- Implementation Plan (penalties for delays, both for implementation and beneficiary organizations are applicable), Road Map (phasing of emerging applications) to be furnished.
- Sizing of hardware, networking etc., on phasing of applications proposed to be submitted.
- Assessment of Manpower requirements their training, modules of training as per the proposed applications.
- Final review and demonstration to TSRTC.

The Anywhere to Anywhere, Anytime Ticketing system will require management of the highest standard. Management processes must be appropriate to the Service type and must provide a high degree of visibility and responsiveness. A project plan will be required from the Bidder as a key element of responses.

This plan must cover the development phase of the project, including test activities and must include all aspects of project management, including but not limited to:

- Project definition and scope
- Work breakdown structure
- Risk breakdown structure
- Risk management process
- Assumptions
- Constraints to the project
- Acceptance Criteria
- Deliverables definition
- Project schedule
- Quality plan
- Resource plan
- Cost breakdown

- Identification of items to be supplied by Government or agents of Government
- Integration plan, test plan

The Anywhere to Anywhere, Anytime Reservation System will have the following other service providers to issue tickets.

- TSRTC Booking Clerks at TSRTC Bus Stations and Bus Stations in the neighbouring States;
- TSRTC Authorized Ticket Booking Agents within and outside Telangana State;
- TSRTC B2B Agents/Sub-Agents;
- E-Seva/Mee Seva Counters, TS Online;
- Website/Online Users;
- Intelligent ticket issuing machines;
- Mobile phone based advanced and current ticketing in the buses;
- Ticket Vending machines;
- Mobile Apps for Android, iOS etc.
- Provision for Value added services to be added on regular basis;
- Mobile ticketing, SMS based ticketing to be implemented for reservation in the very near future.
- Online payment options
- SMS/WhatsApp gateway integration.
- Integration to third party ticket portals like Redbus, Abhibus, Makemytrip.com, BusIndia.com, IRCTC etc.
- Hotel/accommodation booking facility.
- Package tours
- Capability to add Kiosk booking infrastructure at strategically viable locations.

Support includes but is not limited to

- Development team during the entire contract period to support / implement changes requested by TSRTC, attend to issues etc.
- 24 x 7 support for application maintenance
- 24 x 7 maintenance teams, including DBA's and Network Administrators to monitor the application and attend to issues;

The hybrid Architecture is the suggested Architecture to ensure business continuity and a good throughput and also enabling centralized data availability of reservation tickets for analysis, audit etc.

## 10. INFRASTRUCTURE

10.1 The solution shall be hosted on a cloud approved by MeitY having a Data Centre (DC) and a Disaster Recovery Centre (DR), located in India, and all the charges must be borne by the successful bidder.

10.2 The Cloud Services Provider (CSP) shall be MeitY empanelled (as on bid submission date) and shall offer all services from India. The proposed data center (DC and DR) must be Tier III or above for better availability of cloud services. Documentary evidence shall be submitted.

10.3 The proposed Datacenter for DR should be at least 100 KM from the Primary Datacenter, and should not be in same River Flood plain and preferably in different seismic Zones.

10.4 The compute instances shall provide a baseline level of CPU performance with the ability to burst above the baseline.

10.5 Required Internet/networking bandwidth, in redundancy for the Data Center and Disaster Recovery Center shall be provided.

10.6 Redundant connectivity shall be provided between DC and DRC.

10.7 Successful bidder shall be responsible for deploying & managing the cloud resources. Bidder should ensure that all cloud services such as compute, storage, network and other resources are hosted within India region only and all TSRTC's data must reside within India region only.

10.8 The architecture shall be highly scalable and capable of delivering high-performance as and when transaction volume increases. The deployment architecture should provide the flexibility of Scaling-up (vertical scaling) and Scaling-out (horizontal scaling) on Application and Web Servers, Database Servers, and all other solution components.

10.9 All Cloud services should be provisioned in high availability and redundant manner to avoid single point of failure at any point of time.

10.10 Any Relational / Non-relational database(s) proposed as part of the solution should be offered as Platform as a Service (PaaS) provided by the CSP

10.11 Proposed cloud architecture should include all required Network / security services. It must include minimum but not limited to the following: Virtual Network, Application Load balancers, DNS, IPsec VPN connectivity, Web Application Firewall, Network Firewall, Managed threat protection / EDR, Log monitoring.

10.12 Bidder should include Backup service for all applications and database. Bidder should configure and schedule the backup as per requirement of TSRTC. Backup frequency should be daily, weekly, monthly etc. Bidder shall perform backup restoration activity on quarterly basis as and when required by TSRTC.

10.13 Bidder shall provide and implement tools and processes for monitoring the availability, performance and utilization of various cloud resources such as VMs/storage/database/network etc. and responding to system outages with troubleshooting activities designed to identify and mitigate operational issues.

10.14 Bidder shall provide business continuity services (DR) from the secondary site with 100% of capacity in case the primary site becomes unavailable. In case of disaster, bidder shall ensure the activation of services from the DR site with RPO <= 15 Minutes and RTO <= 2 Hours.

10.15 At the end of contract period, bidder shall take the responsibility of migrating the existing landscape to a separate data centre /new CSP selected by TSRTC within a period of 3 months.

10.16 In case of disaster cloud services should provide RPO <=15 Minutes and RTO<= 2 Hours. Bidder shall develop appropriate policy, checklists for failover and failback to DR site.

10.17 **Relevant certifications and documents shall be submitted in support of the proposed CSP meeting the criteria prescribed.**

## 11. Functional Modules/Requirements of the OPRS System

The software shall have the following main features. Broad details are specified in subsequent paragraphs. The detailed scope would be finalized at SRS stage. However, it is to be noted that there will be additional requirements from time to time based on the changes in the business logic, the need for providing better facilities to the passengers and directives of the Government etc., and the same are to be incorporated from time to time at no additional cost.

The requirements given include both the immediate requirements as well as the future requirements which will have to be addressed within the contract period, as and when required by TSRTC. The design should take into account the future requirements also. All the facilities available in the existing project, even if not explicitly mentioned, shall be included.

Each module should have facilities for generating reports, the formats for which will be provided by TSRTC.

### 11.1 Online Passenger Reservation System (OPRS)

11.1.1 All the facilities related to advance and current booking/cancellation (full/partial), pre/postponement of tickets for TSRTC buses online.

11.1.2 TSRTC as part of its business development policy may offer reservation facility on mobile, TIMs, Vending machines, Kiosks. The access to the reservation will have to support wireless interface to the system through an ISP or any other relevant technology.

11.1.3 The Reservation and cancellation facility should be made available through mobile, ticketing issuing machines, SMS, ticket vending machines, Kiosks, mobile app based booking confirmation alerts etc.

11.1.4 Passengers can purchase any form of tickets available through the Self-Service Web Portal, Mobile App, B2C Portals or through the Assisted mode with RTC Operators and ATB/B2Bs agents, etc., for single journey, or return journey tickets or concession (special category) passes, multi-journey tickets etc.

11.1.5 Issue of concessional tickets for Journalist Passes, Retired Employees Passes, concessional cards, coupons etc., through OPRS application and validation of such passes during issue of tickets to the pass holders.

11.1.6 Web / any Browser, mobile app, iTIM based ticketing facility for computerized reservation, current, advance tickets with/without concessions.

11.1.7 The web browser based application (ticketing part for online users) shall be designed for both Desktop as well as mobile phones and should work with all types of popular browsers.

11.1.8 OPRS Application shall be developed for all types of buses identified by TSRTC.

11.1.9 Synchronizing and updating real time data across all ticketing interfaces viz. (e-Ticketing, RTC operator, ATB/B2B agent, B2C channels, iTIMs etc.)

11.1.10 Origin-Destination (OD) based open ticket booking system with fixed time slot-based ticket validity.

11.1.11 Tickets once purchased should be stored in such a manner that they can be presented for validation / authentication even if the user's phone is offline without a data connection.

11.1.12 Multiple passengers may ride using one ticket on one phone as long as the correct number of tickets or rides have been validated.

11.1.13 Cashless Payments: Enabling collection of payments by Drivers/Bus Station Counters/Ground Booking points through QR Code (static and dynamic) via UPI or TSRTC wallet system.

11.1.14 Facility to book tickets under concessional schemes and amenities.

11.1.15 Facility to upload the data pertaining to the different types of concessional cards/bus passes through uploading of CSV/Excel files and through APIs. Validation shall be done when tickets are booked with concessions.

11.1.16 Reservation of concession tickets with / without physical tickets.

11.1.17 Enabling Blocking, Return Journey reservation with/without concession route wise, service wise, cancellation (full/partial), pre/postponement of tickets anywhere.

11.1.18 Automatic releasing of predefined quota seats based on configurable time, place or condition.

11.1.19 Facility of payment through Credit cards/Debit cards, Net banking, NCMC payments, online payment through third party Payment Gateway services etc.

11.1.20 Centralized control of fares, concessions, discounts, cancellation slabs, reports, etc., and access based on the role defined in the system for these functionalities and provision for multiple type of concessions like seat-wise concession, Service-wise concessions, type-wise concessions, sector-wise concessions, point to point concession, group concession, seasonal concession etc.

11.1.21 Dynamic/static configuration of concessions or increase in fare i.e., implementation of flexi-fares for a few days in a week, few days in a month, for selected days, for a given period, for a part of the service etc., based on the business rules in force from time to time.

11.1.22 Provision for implementation of flexible/dynamic fares for specified service-types/ specified routes/ specified origin-destination/ specified services/ specified days or range of dates / specified days of week etc.

11.1.23 Should support different fare structures for operations in different States.

11.1.24 The commission that has to be paid to the ATB/B2B Agents shall be configurable. This shall be configurable based on the bus station they are attached to, Agent-wise, Route-wise, service type-wise, service-wise, peak/slack/ selected days based, between two selected stages of a service, number of seats sold/earnings realized by an agent etc., or a combination of two or more of these. The commission can be percentage based or fixed amount based or any other rule in force from time to time.

11.1.25 Agent wise commissions, agent wise cancellations as per rules in force, universal stock account etc., and Agents cash remittance through prepaid and postpaid in configurable methods.

11.1.26 Integration and accessibility to various service delivery points such as RTC counters, ATB agents, Sub agents, B2C/B2B Franchisees, e-Seva/Mee Seva, iTIMs, TS Online portal & other G2C portals etc., and required accountal of tickets and revenues.

11.1.27 Reconciliation of Inter Bus Station/Depot transactions based on issue date or journey date.

11.1.28 Anywhere to anywhere Bus Station-wise transaction reports daily, weekly, fortnightly, monthly, yearly or for any selected date range to be generated.

11.1.29 The system should facilitate display of departure /arrival timings as well as the facility to drill down to view the arrival /departure timings en-route.

11.1.30 Facility for wait listing and allotment against cancellations.

11.1.31 Facility for transfer of seats from one service to another service.

11.1.32 There shall be provision for implementing EQ /quota system service-wise, bus station-wise, issue point-wise etc.

11.1.33 The system should support display and printing in English and Telugu.

11.1.34 Tickets to be printed in bilingual mode English and Telugu as per the requirement and as per the design approved by TSRTC.

11.1.35 Multi-level user authorization and authentication with appropriate User Profiles, Rules & Roles, One Time Password valid for one day, etc. The One Time Passwords shall be sent to the Agents, TSRTC operators/users/officials concerned through SMS and e-mail.

11.1.36 All Operational, MIS and Revenue reports for a specified period Bus Station-wise, Service-wise, route-wise, service type-wise, sector-wise, journey date-wise, booked date-wise, Operator-wise, other agents and e-ticketing, payment gateway-wise etc shall be generated.

11.1.37 Finest granularity in data dashboards shall be facilitated for Macro and Micro analysis of data with selective drill down and cross referencing.

11.1.38 It shall provide facility for reconciliation report or tool between RTC vs agents, RTC vs Payment Gateways, similarly RTC vs other channel providers etc.

11.1.39 The system shall provide reconciliation of amounts realized and amounts for tickets sold.

11.1.40 Main unit of application is Service, it shall be extended or shrunk either side. Majority of parameters are based on the service and shall be configurable.

11.1.41 Provision to extend or shrink routes.

11.1.42 Provision to copy services/routes/layouts/users etc.

11.1.43 Ladies seats to be earmarked in PINK/different colour and facility for blocking these for ladies only. Special blocking for MLA/MPs, Senior citizens, PHC, Conductor etc., to be provided. Blocked seats release time to be configurable.

11.1.44 Dynamic configuration provision of earmarked seats like Senior Citizens, PHC, etc., quota seats in a service, as per the requirement of TSRTC.

11.1.45 Facility to capture passenger information such as name, gender, age, email, profession, GSTIN, Nationality, Passport number in case of foreigners etc., and to deduce patterns on travels related to frequency and branded services.

11.1.46 Maintenance of passenger profile to facilitate integration with CRM.

11.1.47 Integration with TSRTC's call centre for providing required data through API calls.

11.1.48 The System should have an option to provide refunds/collect additional fare to/from passengers according to the downgrading and upgrading of service/class.

11.1.49 The System should have an option to provide refunds automatically to passengers in case of service cancellation or breakdown, etc., and for online failure transactions (transactions for which amounts are received but tickets are not generated), as per the requirements of TSRTC.

11.1.50 Service cancellation information and refunds shall be triggered automatically to all online, B2C tickets, etc.

11.1.51 Multi Concession booking in single transaction should be provided.

11.1.52 The System shall have a facility for seat vacancy/booked position sector-wise, route-wise, service type-wise, between a given source and destination etc., or a combination of these.

11.1.53 The system shall have the facility of Out Depot cash remittance module. Services originate from a Depot and return back to the Depot after completion of the service/ set of services. The bus crew is supposed to remit the earnings at the parent depot after completing their spell of duty. In case the bus cash with the crew is high, for safety reasons, the crew generally remits the earnings at other than their parent Depot viz. another Depot or a Bus Station, duly collecting a receipt (on pre-printed type numbered stock or as decided by TSRTC) which will be submitted in the parent Depot. This is called out depot cash remittance.

11.1.54 Facility to provide information and alerts on timings, fare, service cancellations, payment gateway transactions, e-ticket booking and cancellation, late arrivals and departures to passengers on mobile phones through voice calls or SMS, web notification, e-mails etc., as per the requirements of TSRTC.

11.1.55 Comprehensive audit trail, logging and reporting log on important events in application like waybill generation/cancellation and other reports etc., and on critical parameters. High water marks for concurrent application users, module of application, page of application etc.

11.1.56 Audit trail shall be available for tracking all the changes made and the person who has made the changes, for all changes which are identified by TSRTC like any changes in service, layout, commissions, routes, users, concessions etc.

11.1.57 After creation and implementation of a Service in the application, for every modification of critical data (like Master data) Route-wise, Service-wise, user-wise, fare changes, Kilometers changes, stage changes shall be intimated to the Chief Admin and Admin roles through mail and pop ups immediately.

11.1.58 Error pop up must be generated with correct related messages wherever required and shall be popped up.

11.1.59 Facility of dynamic fare changes across the board centrally.

11.1.60 Dynamic MIS for effective decision making.

11.1.61 Based on the data available in the system, the software shall generate various reports on daily, fortnightly, monthly and yearly basis, any selected period and individual queries as required by TSRTC from the time to time. The requirement of types of reports and their formats are liable for change from the time to time.

11.1.62 Accommodation and other value added services to be incorporated in the ticket for services where applicable with or without concession.

11.1.63 The administrative interface shall support web enabled, browser based interface and standalone interfaces. Administrative interface with full functionality shall also be made available for mobile devices.

11.1.64 The OPRS system administration shall facilitate generation of various kinds of reports - text and graphical. The reports will be of use to various stakeholders such as the Corporation, Identified Management Officials and Service Access, network, payment gateway, authentication, back office and other service providers. Such reports could be planned in advance, the system should provide for creation of additional reports online.

11.1.65 The solution must enhance the overall management of security, by providing Officials of TSRTC an easy way to manage users and their corresponding profile information; while also maintaining the ability to manage at the application level. The centralized control should allow for the web-based maintenance of organizational level controls such as user management, role management and overall administration control.

11.1.66 The solution must provide scalable access services to the System / Solution, including scalability in terms of number of users, user groups, concurrent users, resources, and access control policies. In addition, it must be scalable to legacy/current and future applications /resources that are attached to the portal. The ability to transport this solution for all future web-enabled services with minimal effort reduces future implementation costs and ensures a structured / proven security environment.

11.1.67 The System should be able to capture IP addresses of the customer/user logged in. The System should provide log reports of login and logout of various users at the specified intervals of time.

11.1.68 The solution must provide a robust and customizable security solution that meets the application requirements of Anytime Anywhere Booking. It is hard to anticipate all present and future requirements. An open, extensible architecture and well documented Application Programming Interfaces (APIs), Web services enable site developers to customize an access control system to their specific requirements. A platform that will grow with additional application deployment and scales as user traffic grows, while providing the highest level of reliability is required.

11.1.69 The solution must be capable of comprehensive logging of the traffic through the network and applications under its control. It should be capable of logging unauthorized access attempts into the network and the System internal resources, and attempts to login that fail. It should also be capable of notifying appropriate parties including the organization/department users/System Security Administrators etc., of suspicious activity.

11.1.70 The vendor has to provide security certification for security check in the application throughout the project period, as per the requirements of TSRTC, duly bearing all costs.

11.1.71 There shall be provision for issue of e-ticketing through a minimum of four payment gateway service providers identified by TSRTC.

11.1.72 System shall facilitate booking entire bus for use of group of passengers, tourist/ Corporate or any other citizens with or without concession. The information like vehicle type, hire charges and other terms and conditions shall be provided online and the system shall facilitate online booking of entire bus(es).

11.1.73 The data relating to passengers shall be held securely and inaccessible to any hacking attempts.

11.1.74 The system should provide facility to enquire about the availability of services, departure / arrival timings, booking counters, franchisees, service driver phone number etc.

11.1.75 System should facilitate payment for ticket booked through Credit Card, Debit Card, Net Banking, static/dynamic UPI QR code based payments, NCMC cards, Wallets etc.

11.1.76 Such payments received will provide appropriate interfaces for the backend accounting and financial systems to access the payment collection data.

11.1.77 The system should support printing, using any type of printer – Laser/Inkjet/Dot Matrix on pre-printed or plain paper through any browser.

11.1.78 The System shall have the facility to send the details of the generated ticket to the e-ticket user through mail, SMS and WhatsApp (SMS and WhatsApp gateways will be provided by TSRTC and relevant charges will be borne by TSRTC). SMS/WhatsApp gateway integration is in the scope of the successful bidder. The successful bidder shall integrate with SMS/WhatsApp gateways identified by TSRTC from time to time. The SMS/WhatsApp gateway providers may be changed from time to time and the successful bidder shall carry out the integration as and when required.

11.1.79 The system shall facilitate capturing feedback from users of TSRTC services and provide an option for TSRTC management to get alerts on feedback posted on the site for immediate attention and action.

11.1.80 The system shall provide user management services and service enrolment features to enable the user to register with the portal. It should also provide secured mechanism for user identification, transaction integrity, security and non-repudiation.

11.1.81 iTIMs for issue and accountal of tickets and revenue. The iTIM App should be able to get seats availability, fare matrix from the Server and should be able to issue tickets through the iTIM and update the Server in real time. The

communication with the iTIM to the Central Server will be through GPRS, GSM or other communication media.

11.1.82 The App deployed on iTIM should work in offline / online mode with zero revenue loss to the corporation by ensuring 100% data sync with the server.

11.1.83 The iTIM app should be able to board the passenger by validating and the authenticating the travel in offline/online.

11.1.84 TSRTC is contemplating the implementation of a Centralized Fare Management System. The OPRS System will have to get the relevant data from the centralized fare management system through APIs.

11.1.85 Integration with UPI, NCMC and mobile eWallets.

11.1.86 To incorporate advertisements in the home page and modification of the same whenever changes are made by TSRTC. However, the bidder shall have no rights to claim on the revenue generated through advertisements and his scope is limited to uploading the ads only. As far as possible, the content should be changeable on the fly.

11.1.87 The vendor has to maintain and change the website homepage periodically incorporating contemporary design elements from time to time to add appeal.

11.1.88 Flash messages, SMS/WhatsApp and e-mails to be generated automatically, whenever a service is cancelled or introduced, modification of schedule time and pickup point, etc., immediately in the application, as per the requirements of TSRTC.

11.1.89 All charges for email services shall be borne by the successful bidder.

11.1.90 To provide Credit card/Debit card payment facility across all the counters.

11.1.91 Facility for providing configurable bus station-wise/Agent-wise/route-wise (between given two stages)/stage-wise quota seats for services.

11.1.92 System should check valid parameters defined by TSRTC such as current booking time, cancellation timings, minimum travelling distance, and concessions, etc., for booking/cancellation of ticket in a service.

11.1.93 The vendor has to deploy manpower 24 X 7 with sufficient team of Software Engineers, Database Administrators, Network Administrator, etc., for design, development, implementation, migration with necessary equipment & tools and to attend day to day problems immediately, without any interruption.

11.1.94 Additional requirements will be finalized during the preparation of the System Requirement Specifications.

11.1.95 TSRTC is looking for an end to end solution for software design, development and deployment deploy Data Center (Cloud based) to handle 20,000 hits/sec, installation, migration, setting up and running of Cloud based Disaster Recovery Center (with minimum 50% capacity of DC) including providing of required Internet Bandwidth, leased lines between DRC and DC, and providing the required manpower for monitoring on a 24 x 7 basis.

11.1.96 The system should be able to withstand occasional spurt in traffic beyond the 7,000 concurrent users limit and continue to provide seamless and undiminished user experience.

11.1.97 Users should have a facility to Print/SMS/ email Ticket.

11.1.98 Passengers should be able to book (advance/current), cancel (full/partial), pre/postpone their journey as per the business rules of the Corporation.

11.1.99 Passengers should be able to track their refund status via ticket Number, Mobile number, booking reference number etc.

11.1.100 Dynamic searching (today, tomorrow and next 30 days seat status with fare).

11.1.101 Integration with NCMC and mobile eWallets, web enquiry for seats availability, fare, routes, en-route stops, Arrival and Departure time, etc., as per the requirement of TSRTC.

11.1.102 Integration with other departments like Tourism, TTD, other STUs, Railways etc., for providing a composite/ combined ticket.

11.1.103 To provide accurate and easy accounting system for Inter Depot Transactions and e-ticketing.

11.1.104 Solution shall be flexible and able to adopt the future needs of TSRTC such as inclusion of Non-stop services and short distance services etc. into OPRS platform.

11.1.105 Role based dashboards shall be provided.

11.1.106 Audit trail must be maintained for all data updates/amendments and deletions for security audit.

11.1.107 It is expected that as a part of development of OPRS System, the system integrator will study the existing Software used for reservation, cancellation, pre/postponement, e-ticketing and payment gateways, etc., and suggest appropriate changes and obtain sign off from various concerned departments within TSRTC.

11.1.108 Provision for generating reconciliation report based on total transactions and Payment gateway remittances shall be provided. The total transactions carried out through the system, by online users/cashless transactions through iTIMs shall be reconciled with the amounts settled transaction-wise by the payment gateways. Soft copies of the gateway settlement reports will be available with TSRTC. Provision shall be given for uploading the settlement reports to the OPRS application for reconciliation. Alternately a standalone application may be provided and maintained for the reconciliation activity. This application shall have a provision to download the OPRS online transactions data, accept the gateway settlement reports and generate the reconciliation reports.

11.1.109 Enabling bulk blocking/releasing of seats in a given service, for a particular/ a group of agents, to enable only those Agents to issue tickets for these blocked seats, and also facilitate commissions accordingly.

11.1.110 Blocking/releasing seats by operators (by name). These seats will be visible only to the respective operator for booking.

11.1.111 Stock management – For preprinted ticket stock.

11.1.112 The system shall have a facility for carrying out cash based and cashless (payment through credit/debit cards) transactions at the counters for issue of tickets. The facility shall be provided at all counters including ATB agents.

11.1.113 The system shall also provide an option for delivery of tickets through courier at an extra charge which should be configurable.

11.1.114 The System shall send the details of the generated ticket to the e-ticket user through mail and SMS/WhatsApp. The system shall also send SMS/WhatsApp and e-mail to the passengers for ticket booked at the Agents counters. Provision should also be available for sending SMS/WhatsApp message in case of tickets booked at TSRTC counters. This should be configurable dynamically. Event based SMSs/WhatsApp messages also need to be fired for example when a service is cancelled, when waitlisted ticket is not confirmed, details of service driver once waybill is generated etc.

11.1.115 Event based SMS/WhatsAPP messages shall be sent to the identified officials/group of officials for events like more number of cancellations/bookings by an agent, high value top-up by the Agents, Service cancellations etc.

## 11.2 **Open Ticket Booking Module**

11.2.1 System should allow booking of tickets for bus services based on the origin-destination, time slot and bus type.

11.2.2 System should have business configurable parameters where in the number of bookings per bus type, role-wise and per slot shall be configured. Based on the services already created in the system, the system should allow booking only to the extent of the cap set per role, bus type and per time slot. This capping may vary based on route, bus time and slot time.

11.2.3 Tickets should be issued online, iTIMs, Bus Station Counter, Ground Booking Points, Agents etc.

11.2.4 All tickets booked should be recorded in the system.

11.2.5 Passengers will bring these tickets for boarding the buses.

11.2.6 All tickets should be carrying QR code and/or unique PNR number.

11.2.7 Tickets brought to the buses should be validated both online/offline.

11.2.8 Offline validation of tickets should be carried out in case of non-availability of internet connectivity.

11.2.9 Once ticket is validated the same ticket should not be allowed for boarding in other buses.

11.2.10 Tickets might be booked for roundtrip or one way. Both tickets should be issued through all modes and validation of each ticket is mandatory before boarding the bus.

11.2.11 System should be able to restrict booking based on the number of passengers defined per slot.

11.2.12 MIS reports should be generated against the bookings made, number of passengers booked for a journey date, number of passengers boarded, etc.

11.2.13 Dashboards needs to be created as per TSRTC requirements

## 11.3 **Payment Gateway Integration**

11.3.1 TSRTC will identify Payment Gateway service providers.

11.3.2 Successful bidder shall integrate all the Payment Gateways identified to web portal, Apps, iTMs etc., to accept digital payments.

11.3.3 Integration shall be carried out whenever TSRTC changes the Payment Gateways.

11.3.4 Successful bidder shall integrate with payment gateways up to payment method.

11.3.5 The successful bidder shall provide dynamic switching of Payment Gateway.

11.3.6 The user shall not be provided with selection of payment gateway (Like ICICI, Ingenico, HDFC, Razorpay, PayU etc.).

11.3.7 The user shall be provided with selection of payment method only (CC, DC, Net banking, UPI, Wallets etc.).

11.3.8 After the selection of payment method, the user shall be directed to a single payment gateway based on the success ratio/response received / as per priority decided by TSRTC from time to time.

11.3.9 If multiple gateways are available for same payment method, randomization shall be used to direct the user for making payment or it should be as per the priority decided by TSRTC from time to time.

11.3.10 This feature helps the load on Payment Gateway service provider and improves the user experience.

11.3.11 Dynamic switching reduces the rate of failure transactions.

11.3.12 In case, the user failed to make payment successfully using a selected payment gateway, the user transaction state shall be saved and provide necessary

facility to make payment using another payment gateway after the stipulated period, subject to availability of the same seats in the service.

11.3.13 In case, poor success ratio is observed from a specific payment method, the respective payment method may be disabled to the live users for a stipulated period of time, till the payment gateway resolves such issues.

11.3.14 Under any circumstances, turnaround time for response from Payment Gateway shall be configurable and shall not be more than 5 minutes.

## 11.4 System Administration (ADMN)

a) Vehicle type-wise seat layout creation/management/modification.

b) Route creation/management/modification.

c) Service creation/management/modification

d) User creation/management/modification

e) Ticket/Booking management/modification.

f) Fare change or update.

g) Vehicle master creation/management/modification

h) Places/boarding & alighting points creation/management/modification

i) Bus Station, Bus Depot, Region, Zone etc. creation/ management/ modification

j) Different types of concessions creation/management/modification

k) Dynamic fares creation/management/modification

l) All other admin related activities required from time to time.

## 11.5 System Maintenance

a) Delay time and cancellation entry.

b) Bulk message (SMS & mail) transmittal.

## 11.6 Central Monitoring System

a) Bus Station-wise operation monitoring.

b) Real time monitoring.

c) Pre-emptive operational alerts.

d) Anywhere to Anywhere transaction details.

e) Log reports for critical and non-critical item modifications.

f) Monitoring ticketing (real-time status on booking, cancellations etc., at all bus stations).

## 11.7 Internet Booking and Information System

a) Web based information system and E-mail.
b) Reservation rules.
c) Web inquiry.
d) e-Booking.
e) Ticket delivery through print and mail.
f) SMS to passenger
g) Site map of the whole system.
h) Cancellation of e-ticket.
i) Refund of amount for cancelled ticket(s).
j) E-ticketing sales reports payment gateway-wise.
k) E-wallet based ticketing.

## 11.8 iTIMs (Issuing tickets in buses)

11.8.1 The Android Apps required for the iTIMs shall be developed by the successful bidder and shall be maintained during the entire contract period. Modifications shall be carried out in the Apps from time to time, as per the requirements of TSRTC.

11.8.2 Integration can be carried out with the payment and other applications.

11.8.3 The iTIMs will be used for issuing tickets in the buses and at ground booking points.

11.8.4 TSRTC reserves the right to procure iTIMs from different sources, with multiple makes/models being in operation at any given point of time. The successful bidder shall carry out the required integration to make these devices to function as per TSRTC's expectations.

11.8.5 Conductor/Driver login based on Employee ID and password, OTP etc.

11.8.6 Facility to enter the service number, trip number and vehicle registration number.

11.8.7 The crew should be able to select only the services pertaining to their respective Depots and the product (based on vehicle registration number) to which the service is attached.

11.8.8 Once a service is selected and started by any driver/conductor, no other driver/conductor should be able to select that service until it is closed/ended.

11.8.9 The system should cater to the need of services with multiple trips and starting trips in chronological order.

11.8.10 Fetch fare details of the selected service from OPRS.

11.8.11 Any fare changes made after the service starts shall be updated in real time.

11.8.12 Fetch all the Advanced reserved passengers' information in waybill and display boarding point-wise.

11.8.13 Provision to display details of passengers alighting point-wise.

11.8.14 Display the number of passengers on board at any given point of time.

11.8.15 Provide a facility to the driver to mark boarded passengers using, ticket number/seat number/scanning QR Code etc.

11.8.16 Display boarding point-wise available/ boarded / not boarded summary, real time seat availability, revenue summary, current available seats in the bus.

11.8.17 Provision for issuing tickets with/without seat numbers.

11.8.18 Provision to issue tickets from any point to any point, irrespective of distance and even between points within the same city.

11.8.19 Display seats availability with or without Bus Layout. There should be a provision in the system to enable/disable this feature at service level.

11.8.20 Issue tickets in the bus with seat selection from layout or without Bus Layout. There should be a provision in the system to enable/disable this feature at service level.

11.8.21 In case of seats blocked through OPRS, there should be a facility to issue tickets for such seats in case the passenger does not board at the intended stage.

11.8.22 Enable issuing tickets to standees.

11.8.23 Marking stage left. Once a stage is marked as left, all other booking modes should be disabled for that stage. The driver should still be able to issue tickets from that stage.

11.8.24 Marking stage close. Once a stage is closed, the driver shall no more be able to issue tickets from that stage. Online booking for that stage shall however be stopped 15 minutes before the scheduled departure from that stage. This time should be configurable.

11.8.25 Acceptance of Digital Payments such as QR Code (UPI), Credit/Debit cards, NCMC card enabled payments. There should be a provision to enable/disable these payment modes by route, bus type, service number, service type and/or user type.

11.8.26 Issue tickets to General Public, Concession Tickets, Police Warrants and Luggage tickets.

11.8.27 Issue child only ticket.

11.8.28 Update seat availability in real-time.

11.8.29 Zero value tickets (police warrants, pushpak bus pass, MLA/MPs etc.) should not be printed but accounted.

11.8.30 Driver number SMS shall be sent to all the passengers who have already booked tickets, when driver starts/opens the service.

11.8.31 Driver number SMS should be sent to all the passengers who book tickets after the service is opened by the driver.

11.8.32 Alerts to driver when Ground booking user issues tickets for the selected Service/Trip No. and when tickets are booked online.

11.8.33 The device should work offline in case of any network issues. Once a device goes offline, the service should not be available for booking from any other mode (online, counters, ground booking etc.). Once the devices gets back online, the data should be synced to the server and other booking modes should be enabled.

11.8.34 All the required data should be pushed to CIS at the end of the trip/service in the format(s) prescribed or through API calls.

11.8.35 Provision for entering details of toll charges paid.

11.8.36 Option to view on board passengers / duplicate waybill details.

11.8.37 Cancel Trip.

11.8.38 Facility to stop/restart other booking modes to enable the driver to issue tickets to the passengers who have already boarded the bus. In case the driver does not restart other booking modes, it should automatically get started once the driver closes the stage.

11.8.39 Break Down functionality.

11.8.40 Provision for refunds of cash and cashless payments in case of breakdown as per the business rules prescribed.

11.8.41 Provision for enabling the checking officials to generate reports for conducting checks.

11.8.42 Provision for the checking officials to issue tickets to the passengers (with separate credentials) in case of over travelling, ticketless travel etc.

11.8.43 Report for enabling the driver to remit cash in the depot after his spell of duty. The report shall have full details of the tickets, cash based and cashless transactions, toll charges paid if any, police warrants, etc., and the actual amount to be remitted in physical cash. In case the service is configured as multi-trip, the final report shall be for all the trips. Facility should also be available for trip-wise report.

11.8.44 Facility to give advance reservation tickets for other services for which advance reservation facility is available.

## 11.9 iTIMs (Issuing tickets at ground booking points/counters)

11.9.1 Booking Staff login/Travelling Ticket Inspector login based on Employee ID and password, OTP etc.

11.9.2 An option should be available for issuing tickets for iTIM Services already started (of any selected Depot) and / or for any service available in OPRS.

11.9.3 Facility for issuing current/advanced tickets from any point to any point, for any service, irrespective of the Depot (similar to booking at counters).

11.9.4 Display seats availability with or without Bus Layout. There should be a provision in the system to enable/disable this feature at service level.

11.9.5 Provision for issuing tickets for standees i.e., over and above the seating capacity, if the passengers are willing.

11.9.6 Acceptance of Digital Payments such as QR Code (UPI), Credit/Debit Cards, NCMC card enabled payments. These payments modes are to be enabled / disabled by route, bus type and / or user type etc.

11.9.7 Alerts to driver (if iTIM service is already started) when Ground booking user issues tickets for the selected Service.

11.9.8 Option to make a device as primary to issue tickets in rapid speed.

11.9.9 Booking Revenue Summary Report with different options viz. total, service-wise, Depot-wise etc.

11.9.10 Remittance reports for enabling the booking staff to remit cash in the depot after their spell of duty. The report shall have full details of the tickets, cash based and cashless transactions, police warrants, etc., and the actual amount to be remitted in physical cash.

11.9.11 Report for generating tickets report for any service and date.

## 11.10 Vehicle Tracking & Passenger Information System (VTPIS)

11.10.1 TSRTC is implementing VTPIS for 4,170 special type buses.

11.10.2 All the OPRS services will be covered under VTPIS.

11.10.3 The system shall be integrated with Vehicle Tracking & Passenger Information System module to enable the users to see ETA & location of buses. The details shall be available on the OPRS portal as well as the Mobile Apps. The integration shall be carried out with the existing vendor and with all future vendors, as and when required.

11.10.4 The service details (Service number, Vehicle No. and other required details) shall be pushed to the VTPIS system through FTP / API calls once the first way bill is issued. In case of service operating with iTIMs, the data shall be pushed once the driver starts/opens the service.

11.10.5 Link to vehicle tracking application/App shall be available in the Website and mobile Apps, to track the service after it is started i.e., after the required data is pushed to VTPIS. The link should be dynamic and should contain the vehicle number/service number. The link format will be provided by the VTPIS System Integrator.

11.10.6 The option of displaying the tracking in separate pop up window may also be required.

11.10.7 After generation of the waybill/opening of the iTIM service, the link for tracking the bus has to be sent through SMS, to the passengers who have booked/book tickets for that service.

### 11.11 Bus on Contract Module

11.11.1 Bus on Contract facility is used to provide online inventory for passengers to book a whole bus(es) for occasions like marriages, picnics, functions etc.

11.11.2 Module should have an option to configure depot-wise bus inventory available for full bus booking.

11.11.3 Google Maps (or any other maps as decided by TSRTC from time to time) integration shall be carried out by the successful bidder. TSRTC will bear the Map license charges.

11.11.4 Passengers will have an option to search for buses available from a nearest depot(s) from their origin point. The search will be based on the place searched on maps and based on the nearest depot(s) from origin point and the bus type inventory available in that depot(s).

11.11.5 The maximum distance of a Depot, from the origin point, for display to the customer should be configurable.

11.11.6 Customer should be able to select via places, if they require so.

11.11.7 Customer should be able to choose different via places for up and down journeys.

11.11.8 System should have the capability to configure bus type based per kilometer/KM slab-wise fare, waiting charges, levies, interstate taxes, other charges etc., which will be used for calculating the charges.

11.11.9 Provision should be available for customers to book a bus for one way journey. Provision should be available for configuring the fare structure for one way journey.

11.11.10 Provision shall be available for the depots to enter the bus type-wise inventory for enabling bookings, period of availability, increasing/decreasing inventory.

11.11.11 Provision shall be available for bookings at the Depot. In this case there should be option to book buses either from the available inventory or without any inventory restrictions.

11.11.12 In the case of depot bookings, there should be a provision to send the payment link to the customer to make online payment. The booking shall be confirmed only after the payment is successfully done within the prescribed time.

11.11.13 The fare will be based on the KMs travelled, travel time slabs, interstate route taken, etc. All these calculations should be done by the system automatically as per the requirements of TSRTC.

11.11.14 The system should allow to collect security deposit from the passenger.

11.11.15 System should be able to accept payment from passenger through payment gateway and generate invoice online.

11.11.16 There should be a provision to upload the passenger manifest before the journey.

11.11.17 System should allow cancellation based on the rules defined and process refunds automatically.

11.11.18 On acceptance of the payment, system should be able to map the booking to depot inventory and able to send the necessary alerts to respective depot managers, depot personnel, etc.

11.11.19 On completion of the trip and on bus reaching the depot, the system should be able to calculate the final invoice based on the actual number of passengers/distance/time and automatically process refund of security deposit to passenger post any applicable deductions. Provision shall be available for collecting additional amount if required.

11.11.20 Provision should be available for configuring discounts based on bus type, booking date, journey start date, advance booking time etc.

11.12 **MIS**

OPRS shall provide a system for generating and viewing online, real-time project and MIS reports Route-wise, Service-wise, Sector-wise, counter-wise, centre-wise and e-ticketing transactions payment gateway-wise etc., handled daily, weekly, fortnightly, monthly and yearly and transaction density trends during any specified periodicity. The online MIS reporting system shall be an integrated system which shall provide web-based reporting for TSRTC and various stakeholders.

OPRS being a multi-location, multi-user initiative, it is imperative to provide online MIS reporting capabilities tailor-made to the requirements of the various participating departments. The successful bidder should gather the requirements for online MIS reporting from the individual participating users and design the application accordingly.

**The successful bidder shall provide transactional data, to TSRTC, at prescribed intervals and as and when required by TSRTC.**

a) Data Warehousing and data mining facility for dynamic and effective decision making.

b) Facility to print various Operational, Revenue, Commission, and MIS reports for a specific period (for any given range of dates, daily, weekly, fortnightly, monthly, quarterly, half yearly, and annually) and option to generate the reports based on various criteria like Bus Station-wise, Service-wise, Operator-wise, Franchisee-wise, Depot-wise, Region-wise, Zone-wise, Route-wise, Sector-wise etc.

c) Statistical Reports

d) Ticket Sales Reports (Daily, Weekly, Monthly, given period, Sales counter or shift-wise, route-wise, sector-wise, origin to destination-wise, service type-wise, destination-wise, journey date-wise, booked date-wise, service-wise etc., and a combination of the same)

e) Occupancy/vacancy data reports

f) Powerful Inquiry Tools

g) Real-time statistical output

h) Agent/operator-wise reports

i) Exception reports

j) Trend Analysis Reports

k) Reconciliation reports for Gateway/online/cashless payments.

l) Inter-depot transaction reports etc.

m) Any other reports as per the requirements of TSRTC from time to time.

## 11.13 **Reports**

The various reports required from the modules as existing in the current system shall be provided. The formats and details of actual reports shall be worked out jointly by the successful bidder and TSRTC during System design stage.

Apart from regular reports like waybills, reservation charts, window scroll reports, etc., generation of various reports for monitoring and planning is a major activity which is done on a regular basis. The system resources required for this activity will be quite high at times. Proper care shall be taken to generate the reports depicting the correct information (real time or near real time) and to ensure that this activity does not have any adverse impact on the ticketing activity.

The distribution of data into three databases namely transaction, search and reporting may also be examined for better performance of the whole system.

Reports generated shall be interactive i.e., drilled down from macro (Corporation) level to micro (trip/service) level. Reports shall always be generated and updated on real time basis. Frequency of generation is real time, daily, weekly, fortnightly and monthly reports.

Provision shall be available for generating and viewing online, real-time project and MIS reports for Route wise, Service-wise, counter-wise, centre-wise and e-ticketing/iTIM transactions payment gateway-wise, handled during a day, week, fortnight, month and year and transaction density trends during any specified periodicity. The online MIS reporting system shall be an integrated system which shall provide web-based reporting for points of access.

The system shall provide MIS reporting with multiple "Slice & Dice" options to generate reports in flexible formats based on user specific needs. The online MIS reporting requirements can be stated from the following perspectives:

11.13.1 The reports should present real time, historical, statistical and predictive views in addition to the daily/weekly/monthly/yearly views.

11.13.2 Portal usage statistics related to registered users, business entities, online transactions etc., payment gateway-wise for reconciliation.

11.13.3 Trend analysis reports detailing the user behaviour patterns providing forward-looking predictions of business user interests.

11.13.4 A few indicative reports which the successful bidder should consider are:

a. Date Wise Transactions.
b. Transactions since inception.
c. User-wise, counter-wise, Bus Station-wise, bus type-wise, service-wise transactions.
d. For online events: peak simultaneous users, total users logged in, (average stay per user), Gateway wise reports etc.
e. The online MIS reporting requirements include providing graphical views for information such as: collections for each center, statistical/trend view (rate of growth of transactions for particular department and predictive growth of transactions), historical view (sales/collections till date).
f. The following are indicative reporting requirements that the successful bidder should take into account while designing an appropriate solution:
    i. Hourly / Daily / Weekly / Monthly / Yearly transactions / sales/collections by center/bus station etc.
    ii. Day-wise and Shift-wise sales/collection summary reports.
    iii. User-wise summary for the day reports.

iv. Transaction based alerts.
v. All Users and all centers revenue reports.
vi. Service cancellation and tickets cancellation reports.
vii. Bus Station-wise Anywhere to Anywhere transaction reports.
viii. Gateway wise Reconciliation statement for e-ticketing.
ix. Generation of service wise MTD 141.
x. Inter Depot, Inter Region Transaction reports.
xi. Corporation summary report daily/fortnightly/monthly/yearly.
xii. All the reports to be generated in HTML, PDF, Text/CSV and Excel formats.
xiii. All the reports to be generated in "from date" to "to date" option facility.
xiv. Any other reports required from time to time.
xv. Any report in any format subjected to availability of data in the Database.

11.13.5 General reports:

i. Agent Daily Commission
ii. Agent Daily TDS Collection
iii. Agent Remittance Report
iv. Agent Revenue Report
v. Agent CR Note Report
vi. Agents Payments Report
vii. Anywhere to anywhere report
viii. Boarding Point Services
ix. Booked Seats Summary
x. Bus Station-wise Summary
xi. Product-wise performance reports
xii. Cancelled Services Report
xiii. Cancelled Tickets
xiv. Cancelled POS Tickets
xv. Date wise transaction summary
xvi. Day/Monthly Summary

xvii. IDT(Issue) Depot wise details

xviii. IDT(Receive) Depot wise details

xix. Invalid Tickets

xx. Link Tickets' Reports

xxi. Concession Ticket Sales Report

xxii. POS Tickets report

xxiii. POS Tickets Summary Report

xxiv. Seat Block & Release Log

xxv. Special Service Report

xxvi. Special Services Summary Report

xxvii. Stock Consumption Report

xxviii. Services and Agents Report

xxix. Service Types Report

xxx. Unreported Services Report

xxxi. Users OTP Report

xxxii. Vacancy Seats Summary

xxxiii. Waiting List Seats Summary

xxxiv. Waybill Cancel Report

xxxv. Waybill not Generated Report

xxxvi. Window Scroll Report

xxxvii. 141 Service Report

xxxviii. Stage-wise Alighting and Boarding Report

xxxix. Seats sold through iTIMs (Depot-wise/service-wise with breakup of cash and cashless transactions)

11.13.6 Online reports:

a) Bus Station wise Booked e-Tickets
b) Online Pending/failed/success Transactions
c) Online Reconciliation Report (for both online transactions as well as cashless transaction through iTIMs)
d) Online Transactions Report (for both online transactions as well as cashless transaction through iTIMs)

e) Online Users List

f) Online Reconciliation Summary (for both online transactions as well as cashless transaction through iTIMs)

g) Tickets Pending Refund Status

h) Failure Tickets Pending Refund Status.

11.13.7 Accounts reports:

a) ATB Agent Register

b) Accounts Head Summary Report

c) Auxiliary Waybill Summary

d) Cancellation of Tickets

e) Commission Issued Report

f) Day/Monthly Summary Settlement Report

g) e-Ticketing Summary

h) Depot wise Levy Received.

i) Depot wise Received retained Amount.

j) IDT (Issue) Bus Station-wise Summary

k) IDT(Receive) Bus Station-wise Summary

l) RTC Operator Ticket Issues

m) SRT Report

n) GST collected report

11.13.8 Other reports:

i. Active Agent wise Booked details

ii. Agents Daily Balances

iii. Agents Reconciliation Report

iv. Auto Top up Payment Gateway Response Report

v. Booked Seats (Depot-Wise/service-wise)

vi. Transferred Seats Report

vii. Booked Seats Summary (Depot-wise/service-sie)

viii. Bus Station wise ATB Summary

ix. Bus Station wise Summary Report

x. Cancellation Alert Report

xi. Cancellation Summary (Slab-wise)
xii. Day wise Auxiliary Waybill Summary
xiii. Destination-wise Booked Seats
xiv. Depot/service-wise Booked Seats
xv. IDT(Issue) Grand Summary Report
xvi. IDT(Receive) Grand Summary Report
xvii. Month-wise TDS Summary
xviii. Passenger Cess Report
xix. GST collected report
xx. Product-wise Summary
xxi. Route-wise Product-wise Summary
xxii. Sector-wise Booked Seats
xxiii. Service type-wise reports
xxiv. Service Cancel Refund Tickets
xxv. Service Cancellation After Journey Date
xxvi. Service Cancelled Tickets
xxvii. Ticket Sales (Advance/current Booking)
xxviii. Target Commission Report
xxix. TTD Darshan Passenger Info Report
xxx. Date-wise TTD Darshan Availability Report
xxxi. Depot-wise TTD tickets issued Report
xxxii. Window Scroll (Journey date based)
xxxiii. Mobile Ticket Booking
xxxiv. Ticket Block/Unblock Report
xxxv. Sector wise Booked Seats Summary
xxxvi. 141 Stage wise Seats
xxxvii. Reservation Chart with Cancelled Tickets
xxxviii. Region-wise Service Count Report

11.14 **Vendor Responsibility:**

The bidder is expected to provide detailed documentation covering various views of the application software such as use case, design, process, implementation, migration and deployment views with detailed descriptions of use cases, business

modeling, and analysis. Details of various international Standards used shall be referred to and copies submitted along with the bid.

The vendor will be responsible for carrying out the following major activities: (The list is only indicative and the vendor shall carry out all other activities, which will be required to achieve the objectives described).

a) Carry out business process study and information need analysis of TSRTC's processes to achieve the mission-critical objectives defined earlier. Shall study and analyze the system requirements and business process for the functional modules required.

b) Prepare and submit a project plan with detailed activity schedules and time-bound action plan for project and change management, as required, to implement the system and help the bidder to monitor and execute the plans. All milestones are to be broken down into sub activities. This plan is to be reviewed every fortnight and at other periodicities as mutually agreed to.

c) The reservation application and underlying components should support both horizontal and vertical scalability.

d) Migration of the existing data into the new system. The data migration should be 100% accurate. Data migration should be done before Go-Live. All data from February, 2012 should be migrated. All data from 02.06.2014 should be available in the Live System.

e) Supply the SRS document in soft and 3 hard copies before starting the design of the system.

f) Supply design documents in soft and 3 hard copies as part of system design phase.

g) Deliver the specified number of copies of all Legal Licenses, Registration documents, user manuals, technical manuals, system manual and training manuals in hard copies and on three sets of CDs.

h) Conduct training programs at project site and at any other designated venues for all levels of users so as to make them conversant with the system and enable them to run the system independently. Vendor should also submit written training schedule, training manual and courseware. A core group of TSRTC shall be given full scale all level training in all the modules.

i) Design and preparation of test data and arranging for the acceptance test of the entire system in a manner mutually agreed.

j) Maintenance of the total project during the entire contract period.

k) The look and feel of the application should be as similar as possible to the existing application to minimize the learning curve.

11.15 **TSRTC's Responsibility.**

TSRTC will be responsible for providing information, all relevant documents and data related to the functional and other procedures as may be relevant for the design and development of the OPRS and can be made available as required in accordance with the project plan. The vendor must maintain necessary secrecy and confidentiality of the data provided by TSRTC during the process of execution of the project.

### 11.16 List of Deliverables

Vendor shall provide the following deliverables for the software system. They may specify any alternative list of milestones and corresponding deliverables with appropriate justifications for changes:

| Milestones | Deliverables |
|---|---|
| Acceptance of SRS document by TSRTC. | Approved copy of SRS document. |
| Project planning. | Project plan |
| Acceptance of system design by TSRTC. | Bidder will submit Design document and the acceptance of the same by TSRTC will mark the culmination of this milestone. |
| Acceptance of user interface prototype | Bidder will submit the prototype for approval and the acceptance of the same by TSRTC will mark the culmination of this milestone. |
| User and administrative manual | User and administrative manuals in consultation with TSRTC, including installation manuals and any other manual(s) relevant for the operational utility of the system. The receipt of adequate number of approved documents would mark culmination of this stage. |
| Training | Training plan and training schedule. |
| Quality Assurance Plan, Acceptance Test Plan, Acceptance test Schedule | Module-wise test document as approved by TSRTC. |
| Testing of all installed modules. | Test data design methods, test data and test reports, error and correction reports at the time of testing for the entire application including the various modules of the system. |
| Backup plan | Backup plan document as approved by TSRTC. |
| Live run | Live run report including migration of existing data to the new system. |
| Malicious Code Certificate | To be furnished by the successful bidder before final acceptance of the system. |

| | |
|---|---|
| Source Code for the developed application | Source code of the developed application in its entirety, on CDs/DVDs with additional information as deemed relevant by the bidder for the same. |
| Application Delivery | 3 Copies of Developed Application CDs/DVDs in the format approved by TSRTC. |

In addition to the above, provisioning the required hardware, software and other required cloud resources for Data Center and Disaster Recovery Center, integration, migration, deployment of the application software, tuning and configuration of software and the application software, will be part of the deliverables, as well as maintaining and operating the total system, carrying out required software modifications from time to time during the entire contract period.

11.17 **The system will be essentially characterized by the following features**

a) Flexibility: The system should be adaptable to changing commercial practices and reduce the total cost of ownership.

b) Open Architecture: The system should be open to allow interoperability with general purpose software and have facility to Export/Import data files from other applications and interact with other applications as mentioned earlier.

c) Object Oriented: The system design should be based on object-oriented approach.

d) Integrated: The system should be fully integrated across departments and functional areas and also across geographical location of sites.

e) Workflow integration approach: The system should adapt workflow management techniques.

f) Distributed application: The system should support functionally distributed computing, allowing distributed applications across different locations.

g) Simplicity: The overall application should be developed keeping in mind simplicity as the key, so as to enable easy maintenance and operation of the application by the end user.

h) Manageability: The OPRS application should cater for easy manageability by the system administrator.

i) Scalability: OPRS will be deployed across all the Bus Stations of the Corporation. As the Bus Stations vary in size and functionality it is a mandate requirement that the OPRS should be scalable at modular level.

11.18 The bidder should provide the list of cloud resources (Hardware, software, storage etc.) proposed for the Data Center and Disaster Recovery Center. They

should give in detail the provision for redundancy at all levels. Similarly, they should also detail the system Software, Application Software, Database proposed and merits of the same. The details of utilization of Hardware resources should also be specified such as for Database, Application, HTTP Servers, Edge Servers, mail servers, load balancers, LDAP server etc.

11.19 The Infrastructure shall be sized so as to support a minimum of 8 B2C franchisees and 3 B2B Corporate Agents apart from Mobile Apps and iTIMs. Necessary assistance to the B2C franchisees/B2B Corporate Agents shall be provided by the successful bidder for carrying out the required integration with OPRS and testing of the integration.

11.20 SSL and other security authentications have to be provided by the successful bidder, during the entire contract period, duly bearing all the costs.

11.21 The vendor has to maintain and change the website home page periodically to make it more attractive with animation, as and when required by TSRTC.

11.22 Additional and final requirements will be finalized during the preparation of the System Requirement Specifications.

11.23 TSRTC is looking for an end to end solution for software design, development and deployment for OPRS; providing required hardware/software resources bandwidth for Data Centre and Disaster Recovery Centre, and hosting the equipment in a Tier 3 plus Cloud Service Provider; installation, migration etc.

11.24 The successful bidder shall provide documentary evidence of having provided the hardware and software resources, as indicated in the bid.

11.25 At the end of the contract period, the successful bidder shall provide all the required assistance for migrating the data to the subsequent new application.

## 12. Operational Requirements for OPRS

This section sets out the operational requirements of the OPRS Project including project management requirements, acceptance testing & certification, OPRS application, maintenance & support including Data Centre and Disaster Recovery Center requirements, man power deployment and MIS reporting requirements etc. Service Level Metrics are provided in this document which shall be used for measuring and monitoring the quality of the services provided by the successful bidder.

Following is the summary of operational requirements for OPRS which are elaborated in the following sections.

### 12.1 Summary of Operational Requirements of OPRS Solution

Successful bidder shall implement, operate and manage the OPRS solution in accordance with the service level metrics defined for the project. Successful bidder shall coordinate and provide complete support to the OPRS Project

Manager of TSRTC in conducting the solution acceptance testing and certification.

The successful bidder shall provide operational support and maintenance services during the entire contract period, from the date of commencement of commercial operations, for overall system stabilization, software and IT infrastructure maintenance, system administration, security administration, database administration, network administration and end-user problem resolution. The operational support will have to ensure that the OPRS solution is functioning as intended and all problems associated in operation of the application system are attended promptly.

The successful bidder is required to train the OPRS staff nominated by OPRS Project Manager, designated Department's technical and end-user staff, franchisees of TSRTC and other identified partner organizations of TSRTC to enable them to effectively operate the OPRS system. The successful bidder shall also be responsible for re-training the OPRS and department staff whenever changes are made in the software.

Preparation of documents including User Manuals, Operational Manuals, Technical and Maintenance Manuals etc., as per acceptable standards will be part of the requirements.

**Following outlines detailed specifications for OPRS operational requirements:**

### 12.1.1 Requirement to comply with Service Level Metrics

To ensure that all the stakeholders discharge their roles and responsibilities in an agreed manner to achieve the common goals, a set of Service Level Metrics are defined for OPRS project. These technical, functional and operational requirements are specified in the RFP to enable all the bidders to understand the dimensions of the OPRS project on a level playing field and propose appropriate solutions and proposals. In case of an ambiguity or conflict, the relevant component of the Service Level Metrics will be used as the touchstone and will prevail. Refer to Section 16 for the Service Level Metrics expected to be maintained and achieved by the successful bidder for OPRS project.

### 12.1.2 Project Management

The OPRS project is a multi-user, multi-location initiative. Its implementation is complex involving a number of stake holders; especially the successful bidder is required to design and implement a comprehensive and effective project management methodology. To have an effective project management methodology in place, it is necessary for the successful bidder to use a Project Management Information System (PMIS). The successful bidder shall address the following at the minimum using PMIS:

- Create an organized set of activities for the project.
- Establish and measure resource assignments and responsibilities.
- Construct a project plan schedule including milestones.
- Measure project deadlines, budget figures, and performance objectives.
- Help communicate the project plan to stakeholders with meaningful reports.
- Help to detect problems and inconsistencies in the plan.

During the project implementation the successful bidder shall submit to the Project Manager, OPRS the following reports:

a) Results accomplished during the period.
b) Cumulative deviations to date from schedule of progress on milestones as specified in the RFP read with the agreed and finalized Project Plan;
c) Corrective actions to be taken to return to planned schedule of progress;
d) Proposed revision to planned schedule provided such revision is necessitated by reasons beyond the control of the bidder;
e) Other issues and outstanding problems, and actions proposed to be taken;
f) Progress reports on a weekly/fortnightly basis.

Interventions which the successful bidder expects to be made by the Project Manager, OPRS Project and actions to be taken by the Project Manager, OPRS before the next reporting period, Project quality assurance reports etc.

### 12.1.3 Acceptance Testing & Certification

Project Manager of OPRS will undertake an exercise of Testing, Acceptance and Certification of OPRS project either through his team or through a third party with the assistance of the team from the successful bidder, as soon as the successful bidder declares the OPRS system to be ready for deployment. The testing shall be carried out at the cost of the successful bidder.

The primary goal of Acceptance Testing & Certification is to ensure that the project meets requirements, standards, specifications and performance prescribed by the RFP and the SLA, and shall include the following acceptance tests.

**Performance**

Performance is a key requirement for the Project. The deployed solution is supposed to be a highly scalable solution, which is designed in a scale up/out

model at each layer. This will provide the model for future growth. This test process will include the following activities.

a) Determination of performance.
b) Designing performance tests.
c) Development of workload.
d) Performance testing and sizing study.
e) Identification of bottlenecks and providing solutions.
f) Determining final performance figures.
g) Communication of final results to all stakeholders.
h) Final output of this process would be a sizing guide for the solution tested. The sizing guide will document the details of the performance tests, test data, bottlenecks identified, alternate solutions provided, and the final performance data. This document will provide the scalability data of the solution for various loads. This will become the authentic guide for future scale up/out plans of the Project.

**Availability**

The OPRS solution should be designed to remove all single points of failure. The solution should provide the ability to recover from failures, thus protecting against many multiple component failures. This test process will include the following activities.

a) Designing tests for high availability testing.
b) Execution of high-availability tests.
c) Assessment of transaction/data losses in relation to Disaster Recovery system.
d) Communication of final results to all stakeholders.
e) High Available clustering at all Web, Application and DB server level will be targeted at 99.5 % availability.
f) Security.

**Security certification process will include**

a) Audit of Network, Server and Application security mechanisms.
b) Assessment of authentication mechanism provided in the application/ components/ modules.
c) Assessment of data encryption mechanism.
d) Assessment of data access privileges, retention periods and archival mechanisms.

e) Final output of this process would be a comprehensive audit report including all the Network, Server and Application security features incorporated in OPRS 3-Tier Project.

**Manageability**

Manageability Requirements of OPRS will be tested and certified for the following:

a) Remote Monitoring of Status and Statistics of all high-level components.
b) Management capability to start/ stop/ restart services & systems.
c) Auto discovery of all components manageable through SNMP.
d) Auto discovery of all other system components.
e) Ability to track changes in configurations of the system components to help track Service.
f) System disruptions.

Final output of this process would be a manageability compliance document for the OPRS application deployed.

## 12.2 OPRS application Maintenance and Support

The successful bidder shall be responsible for the overall management of the OPRS application including the software and related IT Infrastructure. The successful bidder shall be responsible for the operation and maintenance of OPRS solution, which includes application solution management and IT Infrastructure management including security management, network management, server management, storage management etc. Following includes but is not limited to the various activities to be performed by the successful bidder during the maintenance of the OPRS application.

### 12.2.1 Application Management

The successful bidder shall provide warranty for the OPRS application software and all its components for the total contract period, commencing from the date of commercial deployment. The warranty should include that the solution supplied under this contract shall have no defect arising from design or workmanship or from any act or omission of the successful bidder that may develop under normal use of the supplied application.

During the warranty period, successful bidder shall be completely responsible for defect free functionality of OPRS application software and shall resolve any OPRS application related issues including bug fixing etc., within duration agreed between OPRS Project Manager and the successful bidder.

Successful bidder shall provide the latest updates, patches/ fixes, version upgrades relevant for the OPRS application components periodically.

Successful bidder shall be responsible for software version management, software documentation management reflecting current features and functionality of the application. The Successful Bidder shall also be responsible in securing appropriate number of licenses and annual maintenance contracts with software, cloud resources, vendors in case of bought out software and hardware. Training of TSRTC personnel on latest version of software as applicable in their operations is also the responsibility of the Successful Bidder.

### 12.2.2 Infrastructure Management

This includes the design of an appropriate System Administration policy with precise definition of duties and adequate segregation of responsibilities and obtaining the approval for the same from the Project Manager, OPRS. System Administration includes the following activities:

a) Overall management and administration of infrastructure solution including cloud resources, of Data Center and Disaster Recovery Center.
b) Performance tuning of the system as may be needed to comply with Service Level Metrics requirements on a continuous basis.
c) Security management including monitoring security and intrusions into the application.
d) Monitor and track server and network performance at Data Center and Disaster Recovery Center and take corrective actions to optimize the performance on a daily and hourly basis.
e) Escalation and coordination with other vendors for problem resolution wherever required.
f) System administration tasks such as managing the access control system, creating and managing users etc.
g) Data storage management activities including backup, restore and archival etc.
h) Attend to Department's user request for assistance related to usage and management of OPRS application.

The successful bidder shall undertake to ensure that daily transaction-wise back-up copies and total dump backup of OPRS and related data are created and maintained safely. Access to the backup data shall be provided to the Project Manager, OPRS and shall also be provided as and when requested.

Other important activities related to Data Center and Disaster Recovery Center shall include but not limited to:

a) Daily maintenance of system configuration.
b) Implementation of system security features.
c) Overall security of the network.
d) Day-to-day disk space management.
e) Tracking the servers performance and taking remedial and preventive actions in case of problems.
f) Proper upkeep of storage media for taking backups.

### 12.2.3 Network Management Services

Design of Network Administration Policy and getting it approved from the Project Manager, OPRS for effective and efficient management of Network resources at Data Center and Disaster Recovery Center. Network Administration, consists broadly of the following activities:

a) Network devices configuration, management and tuning for optimum performance.
b) Tracking the network status, availability and taking remedial and preventive actions in case of problems.
c) Network fault isolation and resolution.
d) Monitoring of network performance and escalation of performance deterioration to concerned authorities and take remedial actions to resolve such issues.
e) Implementation/modification of network routing policies, IP addressing policy as required.
f) Real time monitoring and deployment of network security measures 24x7x365.
g) Documentation related to network configuration, routing policies, IP addressing schema etc.
h) Bandwidth monitoring and trending for the network.

### 12.2.4 Information Security Services

The successful bidder is responsible for implementing measures to ensure the overall security of OPRS solution and maintenance of confidentiality of the OPRS data. The successful bidder shall monitor production systems for events or activities, which might compromise (fraudulently or accidentally) the confidentiality, integrity or availability of the OPRS application. This monitoring shall be through the security controls including:

a) Real-time intrusion detection tools.

b) Audit review tools.

c) Manual processes.

Successful bidder shall develop a detailed security policy for OPRS application implementation & maintenance. The security policy developed by the successful bidder shall be updated to keep the security recommendations current and the same shall be implemented for the OPRS solution.

The successful bidder, with the cooperation of appropriate, appointed representatives of TSRTC and the participating departments will manage the response process to security incidents. The incident response process will seek to limit damage and may include the investigation of the incident and notification to the appropriate authorities. A summary of all security incidents shall be made available to OPRS Project Manager on a weekly basis. Significant security incidents will be reported on a more immediate basis.

The successful bidder shall produce and maintain system audit logs on the system at which point they will be archived and stored as desired by the Project Manager, OPRS. The successful bidder will regularly review the audit logs for relevant security exceptions. The successful bidder has to purchase and integrate the security certification to the OPRS application throughout the contract period.

### 12.2.5 **Training Requirements**

Training is an important activity for the successful implementation of OPRS project. To make OPRS project a success and robust, the following training programs are to be arranged by the successful bidder from time to time depending on the requirement and understanding of the various stakeholders, Official users and end users etc. For all these training programs the successful bidder has to provide necessary course material, user manuals, troubleshooting manuals and system admin manuals etc. The following are the trainings to be imparted by the successful bidder at his own cost:

- The successful vendor has to involve Supervisors/staff of Information Technology Department, TSRTC, identified by the CE(IT) in design & development of application, deployment and implementation in all stages of the project duly imparting necessary training for not less than three months.
- The successful bidder must impart training to all the OPRS nominated staff/Supervisors, so that they gain thorough knowledge of all the operations of the OPRS application ensuring smooth running of OPRS Software implementation at all the locations.

- The Successful bidder shall also be responsible for retraining the OPRS nominated staff whenever changes are made in the software and it is the responsibility of the successful bidder to ensure that the operators are familiar with new versions of OPRS application and its allied services.

### 12.2.6 Training of the participating Users' Employees

The successful bidder must impart training to the department personnel in IT awareness and basic IT skills, usage of applicable OPRS application components and generation of their MIS reports, maintenance of user logins and operations of the backend server policies and procedures. The successful bidder shall train 10 employees of each participating department in each location and shall provide the relevant training material on a 1:1 basis which should contain the detailed procedures for operating the applicable modules in the solution.

The duration of training for department users shall be for a period of 2 weeks prior to deployment, and training shall be conducted at the respective state/district head-quarters for each department.

## 13. Common Services

### 13.1 Authentication

**Description**

OPRS will offer its administrative users a single authentication service for all transactions, as per the requirement of TSRTC. Once a user has successfully registered, they will be able to access the services using a common user ID or digital certificate.

The interface between OPRS and authentication services must provide interoperability with any such Government approved authentication service. It must also be scalable to support the requirements of continuously emerging services. The authentication interface will require secure connectivity. Bidders are required to outline how such connectivity will be offered to authentication service providers. The selected service provider will be required to work cooperatively with a wide range of 3rd party authentication service providers across the public and private sectors, in addition to any value-added ancillary service providers which may be required (such as specialist time-stamping services for example). In particular, the selected service provider will be required to co-operate in adopting common standards and procedures for connection of authentication service providers.

Bidders will be required to ensure that authentication services accessible from OPRS and available for use are available to all channels that require it. In addition to user authentication, OPRS will be required to authenticate itself to

delivery channels (and vice-versa). It will also be required to authenticate itself to back office processes and authorization service providers.

### 13.2 Operational Requirements

- The authentication mechanism deployed shall guarantee the highest degree of trustworthiness.
- Once a user is authenticated, the administrative user shall be granted access to authorized services.
- Shall Support connection to third-party authentication services.
- Scale to support an undefined number of authentication service providers.
- Secure network connectivity between OPRS and diverse authentication services.
- Establish OPRS authenticity to other delivery channels, front office service accesses, back office processes, authentication service providers, other OPRS access providers, and other services.
- Interface to authentication services will observe the relevant published standards of the Government or the standards of such authentication service providers as accepted by the Government.

### 13.3 Authorization Services

Access to services shall support multiple levels of authorization covering:

- User registration-based (User ID and Password) services for users who opt for registration based service access.
- Corporate users who may register the organization, authorized representative, who may be allowed to access the services only through PKI certification mechanism.
- Administrative users from the Corporation who shall be allowed only through authentication mechanisms.

## 14. Payment Gateway Support

**Description**

OPRS should provide necessary and appropriate connectivity to third party payment gateway services as a back end operation, to service the payment of ticket fares to the Corporation and ATB/B2B/B2C Agent Top up. It is envisaged that payment gateway providers are screened and pre-approved based on price, service and commercial specifications.

The transaction engine should handle all transactions efficiently. OPRS will:

- Provide for online payment/top up function that aggregates payment for multiple passengers/Agents and/or multiple routes that can be paid online.
- Not build or manage its own Internet payment gateway or Electronic Bill Presentment and Payment (EBPP) service.
- Not operate as a proxy merchant (collect payments on behalf of the Corporation).
- As there are manual methods of effecting payment and financial institutions involved, OPRS should provide mechanism to track information relating to offline payment.

## 14.1 Operational Requirements

- The payment interface shall be easily extensible to allow for newer forms of payment and to incorporate increasing number of e-payment vendors.
- It shall be ensured that all online payments be performed in a trusted and secure manner.
- It shall be guaranteed that the online payment information shall not result in loss of money to either of the parties involved in the business transaction and any other information, which may be sensitive to the transaction will not be released to unauthorized parties.
- Liability and fraud prevention issues must be addressed (By complying with the provisions of IT Act 2000, for similar such services and its providers).
- OPRS interface may have to adopt the standards for e-Payment.
- Provide a proposal for working with other connection service providers (if any) to facilitate E-payment.
- Proposal, as to how various payment mechanisms, – manual and automated – could be handled, including links to financial institutions (for payment concerns) by OPRS, in conjunction with the E-payment vendor.
- The process for selection of payment gateway providers and the norms for their selection.
- Payment gateway integration shall be carried out by the successful bidder. Integration will be required with multiple payment gateways. The Gateway providers may be changed from time to time, by TSRTC, and the successful bidder needs to carry out integration with the new gateway provider as and when required.
- Integration with additional payment gateways with open wallet facility, like Reliance Jio, Paytm, PayU money etc., shall be carried out as and when required.
- Apart from online cancellations by the passengers in which the activity shall happen without manual intervention, there will be cases (transaction

succeeding at the gateway but ticket not issued, partial cancellation of service etc.) where in refunds have to be initiated separately. The application shall provide a facility for carrying out such refund transactions through the system.

## 15. Compliance to e-Governance and other Standards

- OPRS-Unify initiative will be required to interoperate with several other national level / state level projects envisaged under major e-government initiatives of the States and accordingly the OPRS Solution should be based on an architecture that allows for loose coupling with the information systems of all the departments involved.
- OPRS should adopt open interoperable standards so as to provide for addition of new services, agencies and delivery channels in an effortless manner in future.
- It is expected that various world-wide Standards relating to front-end interfaces, message exchange mechanisms will be part of the specifications. It is expected that the vendor clearly explains in the bid proposal various standards that are proposed to be adopted and the reasons for following a set of standards in the event that there are more than one such standard.

## 16. Service Metrics for the Online Passenger Reservation System (OPRS)

**SLA to be delivered and shown periodically.**

| | |
|---|---|
| **OPRS** | |
| OPRS Application Availability | 99.5 % |
| Functional requirements upgrade | < 7 days |
| Client access upgrades | <30 days |
| Computing accuracy | 100% |
| **Hosting Centre** | |
| Concurrent Connects to the OPRS | >7,000 |
| Availability of systems at Data Centre | 99.5 % |
| Resumption of online OPRS services in case of any issues | <1 hr |
| Update of portal contents from decision to Implementation | <2 hrs |
| Billing accuracy | 100% |
| Data availability | 100% |
| Data accuracy | 100% |
| Capacity of the Data Base Server | Handle 50,000 service transactions /hr |

| | |
|---|---|
| Capacity of the Application Server | Handle 50,000 service transactions /hr |
| Availability of the agreed services over the Internet. | 100% |
| **Network** | |
| Network availability at Data Center | 99.95 % |
| Network Latency | Average of < 75 milliseconds |
| **Client Access** | |
| Average time per transaction (Total system response time) for a reservation transaction / cancellation / pre-postponement. | < 60 seconds |
| Average OPRS page loading. | <5 sec |
| Request response time. | <5 sec |
| TSRTC Client access availability. | 99.5 % |
| **Business Development** | |
| Percentage of increase in the reservations every year(estimated) | 5% (approx.) |

**The SLA should be demonstrable as and when required by TSRTC. The SLA shall be maintained on a monthly basis.**

**The System should scale up to 5,00,000 transactions per day and be able to complete a reservation / cancellation / pre-postponement and e-ticketing transactions in less than a minute when connected on a 512 kbps broadband Internet connectivity. These service metrics are indicative and will be finalized at the time of agreement. Service metrics are demonstrable in a production system. The system should be scalable to handle additional concurrent users duly enhancing the hardware of Data center/Disaster Recovery center during peak days, without changes to application Software.**

## 17. Software Product Specifications

**The successful vendor shall provide necessary licensed software like Operating System, Database, Web application, Network software and management, Anti-virus and any other required software. The software and hardware licenses shall be valid up to end of the contract period.**

**Logical Architecture**

**N-tier:** The Proposed application will be N-tier Service oriented Architecture – with separation of business logic from application, database and presentation.

**Load Balancer**: Load balancer application will be the first component which will intercept the user request and spray it to Web Server. This ensures the load is distributed evenly across Web Server.

**Web Servers**: This component provides the front end to the solution. It allows for greater concurrency and resource offloading from the Portal Server tier, by serving static content (HTML pages, for example) and dynamic content.

**Application Services:** Main functionality of this component is to host and run the Reservation application.

**Portal Services:** Its main function is to serve the Portal Server framework to the desktops and mobile devices of portal users. This component creates an environment that provides the connectivity, administration, and presentation services that are required. Portals serve as a simple, unified access point to web applications. Portals also provide valuable functions like security, search, collaboration, and workflow. A portal delivers integrated content and applications, plus a unified, collaborative workplace. A complete portal solution provides users with convenient access to everything needed to complete their tasks virtually anytime, anywhere.

**Web Content Management:** This component empowers TSRTC team by providing an environment that allows them to create, edit, and publish Web content. This enables TSRTC Team to have less dependence on technical resources and they can publish content in a more timely and efficient way by using the Web Content Management component.

**Database Services:** This component stores data in support of Reservation systems and it needs to be deployed in Active-Active mode.

**Directory Services:** This component stores user information in LDAP standard compliant directory server.

**Business Rules:** This component provides the capability to keep Business Rules outside of the core application and enables the Business users to manage Rules on their own.

**Backup Services:** This component protects TSRTC's data from hardware failures and other errors by storing backup and archive copies of data on offline storage. This will also play a key role in Disaster Recovery.

**Reporting Services:** This layer provides reporting, analysis, score carding, dash boarding, business event management, and data integration.

**Service/Security Management:** This layer provides services such as Identification, Authentication, Authorization, and Access control, System Management, Network Management and SLA Management.

**System Environments**

TSRTC requires the successful bidder to implement three system environments.

**Test Environment:**

This would allow the successful bidder to deliver initial development releases, subsequent system updates and to enable TSRTC to carry out system and integration testing. This would be a scaled down version of the eventual production Environment. Whilst the functionality would parallel that of the Production Environment, the system throughput capacity and resilience would be significantly less. The environment shall be available throughout the contract period and should be accessible to TSRTC.

**Pre-Production Environment:**

The second system proposal is for a Pre-Production Environment. This would provide TSRTC with functionally similar to Production environment. This is used for UAT and data loading. This would be a scaled down version of the eventual production Environment. This system should be used for initial load testing and UAT. Whilst the functionality would parallel that of the Production Environment, the system throughput capacity and resilience would be less. The pre-production environment shall be refreshed once in a week and shall have all the latest one year data.

**Production Environment:**

The Third system environment is for a Production Environment. This would provide TSRTC Online Passenger Reservation System functionally. This system throughput capacity would be significantly larger than the earlier environments and shall meet all the requirements of the system.

**Disaster Recovery and Business continuity Solution**

The goal of any disaster protection planning is to protect the most business-critical processes and minimize unplanned downtime of Reservation system.

For achieving Business Continuity with highest uptime, there is a need of setting up of Disaster Recovery Site, which will be the replica of all the components of the system.

Business continuity planning and disaster recovery planning under this project are vital activities.

**Disaster recovery site**

For uninterrupted operation of Reservation application, certain fallback mechanisms and Disaster Recovery site are to be developed. The establishment of such facilities enhances the operational efficiency of the department. DR Site needs to be configured as HOT SITE.

In case of a Disaster, the users should be able to connect to DR site and work as the production site immediately.

**Business Continuity Planning (BCP)**

Successful bidder in consultation with TSRTC management team should analyze all the processes and categorize them as critical and non-critical (non-urgent) functions/ activities. Accordingly, the Recovery Point Objective (RPO) and Recovery Time Objective (RTO) for both critical and non-critical components should be considered as mentioned below:

For the critical components: RPO for each activity of solution should be designed to recover the last saved data by user and RTO for each activity of the solution be designed to restore the function within minutes.

**ANNEXURE - A**

## DATA CENTRE

Please enclose separate sheets covering the hardware, software (operating system, database, application servers, programming languages, webserver etc.), storage and all other resources/services proposed to be provisioned from the CSP, number of VMs, cores for each VM, purpose for which the resources are proposed to be utilized for, and logical architecture etc.

**ANNEXURE - B**

## DISASTER RECOVERY CENTRE

Please enclose separate sheets covering the hardware, software (operating system, database, application servers, programming languages, webserver etc.), storage and all other resources/services proposed to be provisioned from the CSP, number of VMs, cores for each VM, purpose for which the resources are proposed to be utilized for, and logical architecture etc.

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