

Rablox – Intelligent Transport Management System – Vision & Scope

Intelligent Transport Management System (ITMS) – Vision & Scope

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Prepared by

Pulkit Arora

Business Analyst

pulkit_arora@opiant.in

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Sponsor(s)

Name	Title	Signature	Date

Signoff(s)

Name	Title	Signature	Date
Bratin Chakroborty	Supervisor		

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1 Introduction

This document is designed to provide an overview of high-level business requirements specification for the Intelligent Transport Management System, which involves the Automated fare collection system along with the CEPAS Common, mobility cards integration. This document will be prepared in a progressive manner, starting with high-level business problem statements and the business requirements.

The purpose of this document is to assimilate, analyze and define high-level requirements and features of the “Intelligent Transport Management System”. It focuses on the capabilities needed by the stakeholders, and the target users, and why these needs exist. The details of how the Intelligent Transport Management System fulfills these needs are described in the business case and supplementary specifications.

2.1. Audience

This business requirements specification document is intended for all the project stakeholders, and the target audience for this document is the client, stakeholders at Rablox, Opiant, and any other personnel directly or indirectly associated with the project.

2 Business Problem

1. Even though the state travel departments should be profitable considering the large number of people travel through them, still they are not yielding profits. Their revenue collection is at real time low even after the successful services provided to a large number of people.
2. This problem has been further analyzed and it has been identified a lot of discrepancies at different levels of the system, people with authority at different levels are applying unethical ways to conceal the revenue collected and report lesser revenue than it is usually collected by a conductor on a particular trip.
3. This behavior is not only due to corruption in the system but majorly due to manual nature of the transactions happening on a daily basis.
4. In the current scenario, conductors of the travel buses are manually providing the pre-printed tickets to the customers, collecting cash in lieu of the tickets and every single transaction is handled manually.
5. Also, the management detects a lot of discrepancies in the tracking of payments shared by the conductors, many a times the revenue collection for a single day trip for a particular route doesn't match with the number of tickets sold by a conductor.
6. There is lack of uniformity in data, everything that is recorded is manual and hence it is very difficult to analyze this data and make conceptual decisions based on that. For example, there might be some routes where the frequency is more and people travelling are low, vice-a-versa. If the data exists, proper analysis can be made and which will help to make some useful decisions which in turn increases the profits of the travel department.
7. The inventory management is very poor. Everything is tracked manually hence there are a lot of instances wherein the mis-use of the resources do happen.
8. In a realistic scenario, sometimes people don't pay for their tickets and travel freely just by showing the passes which are expired. This is another spot from where the revenue is leaked and becomes a loss for the department.
9. All the above problems have led to need of a system which should be intelligent enough to track & manage everything from electronic ticketing to fare reconciliation, inventory management to enhanced reporting which can help to eliminate the manual processes and in turn increase the effectiveness and profits of the department. This is explained further in the below section.

3 Project Vision

1. The primary vision of this project is to develop an intelligent transport management system that helps the transport departments across all states to automate the current system to electronic ticketing system.
2. It also aims at tracking all the revenue & expenditures figures, manage an inventory, manage the ETM's, user management, roaster management, generate the reporting in regards to the different parameters for example, tickets, trip wise reports, collection, status, trip details etc.
3. This system comprises of the electronic ticketing system, which is also referred to as Automatic Fare Collection System (AFC), which acts as the USP of this system.
4. The concept of Automated Fare Collection system will enable the conductors to issue the tickets based on Stages and Kilometers, a customer has to travel. Every details pertaining to a particular trip is saved in the Electronic Ticketing Machine (ETM), which is synced at the end of the day when the conductor ends the trip assigned
5. Apart from AFC, it will also support the cashless transactions (Phase 2) with the integration of the Common Mobility Cards (CMC). This will eliminate the hassles a passenger has to go through to obtain the pre-printed tickets.
6. The card will be pre-loaded with money and passengers have to swipe their cards in the ETM machine and have a hassle-free travel experience.
7. Unlike in previous scenario, conductors will now have an ETM Machine that helps them to issue the tickets based on stages (starting point & ending point) and the kilometers.
8. The system will be smart enough to track all the material required in the inventory i.e. paper rolls, pre-printed tickets etc. It will be capable of recording the payouts done along the way such as tyre puncture expense, fuel expense etc.
9. It aims to eliminate the problem of uniform data. The data will be used to generate various types of reports based on different parameters such as Trip, Shift, Bus, Conductor etc. and the analysis of data will be performed and presented on the dashboards.
10. Revenue Conciliation and revenue trend analysis are two key features of this system. The system will be capable enough to record all the transactions i.e. cash submitted by the conductors at the end of the day and based on this data, revenue trend analysis can be generated that will help to analyze and built strategies to increase the revenue share.

4 Project Scope

1. The proposed system that is also known as Intelligent Transit Management System (ITMS) is an electronic ticketing and fare collection system which is designed specifically for the Bus Transit System.
2. This solution will comprise of development of an end-to-end solution that enables travel departments across states to automate their current manual system.
3. It is not only limited to the automated fare collection but it extends up to the following features/functionalities to be developed as a part of this system.
4. The high-level scope of this project is as follows which comprises of three major modules:

4.1 Business Users

This system typically supports different kind of users listed below:

- Master User – To create/update the master data.
- Depot Master – To record the daily activities like issuing ETM's.
- Administrator – To perform all administrative tasks in the system.
- Conductors – Accessing the ETM for tickets and generating reports for submission.
- Inspectors – Accessing the ETM for issuing penalty tickets.

4.2 Electronic Ticketing Machine (ETM) Application

1. The Electronic ticketing machine comes with an in-built LCD display is used for issuing the tickets for the passengers travelling in a particular bus.
2. This module will be consisting of a software application for this machine, which will interact with the backend web application and store the data into database and sync of data will happen.
3. The system is highly flexible and well efficient for issuance of paper ticket and day pass through ETM and action thereof.
4. The ETM application will be capable of successful user authentication based on the role assigned to the user. There are two types of users accessing the ETM machine mainly:
 - a. Conductors

- b. Inspectors – Can only issue the penalty ticket
5. The application will interact with the backend web application and sync the data, which mainly consists of the details of tickets/day, passes issued through ETMs in near real time through GPRS depending upon the availability of network.
6. This application will be capable of operating in two modes i.e.
 - a. Online – Sync of data happens every 5 minutes in the real time.
 - b. Offline – Sync happens when the network is up & running.
7. The front-end software application will be designed for the ETM machines and will have the following set of features included in Phase 1 & Phase 2:

4.2.1 Feature List (Phase 1)

Below are the set of features to be developed as a part of Phase 1:

- OTA Updates
- Conductor Login
- Shift Start/End
- Trip Start/End
- Transactional Menu
 - Issue Ticket For Adults
 - Issue Ticket For Child
 - Issue Group Ticket
 - Issue Repeat Ticket
 - Issue previous stage ticket
 - Issue concession ticket for Student/Senior Citizen
 - Issue Pass
 - Issue pass for single day
 - Issue monthly pass
 - Issue biweekly pass
 - Close Stage
- Cancellation of last ticket
- Record Payouts
- Re-Route Bus

- Ticket Other Menu
 - Concession
 - Paper Roll Change
 - Validate Day Pass
 - Change Direction
 - Luggage Ticket
- Generate Reports
 - Login Ticket
 - Route Table
 - Cash Summary Report
 - Trip wise Report
 - Collection Report
 - Status Report
 - Ticket Summary
 - Trip Details
 - Route List
 - Denomination
 - Actual Trip Report
 - Last Login Report
- Inspector Login
 - Issue penalty ticket
 - Generate inspection report
 - Logout
- Mid-logoff
- Shift End
- Trip End
- Logout

4.2.2 Feature List (Phase 2)

Apart from the phase 1 features, ETM will have below additional functionalities, which will be included for Phase 2:

- CEPAS cards integration
- CMC cards validation
- Recharge through ETM
- E-Wallet Integration

4.3 Backend Web Application

This application works aims to support the front-end ETM application. This module has the below features which helps to make the system functional:

4.3.1 Master Data Management

This section explains about how the master user manages the data in the system. There will a default user created with master role having super access into the system. The master user will be able to perform the below functions:

- User Management
 - User Creation
 - Role Creation
 - Role Assignment
 - Change Password
 - Forgot Password
- Create/Update Master Data
 - Depot
 - Bus Types
 - Services
 - Vehicles
 - Shifts
 - Stops
 - Routes
 - Duties
 - Targets
 - Trips

- Fares
- Concession Fare Slabs
- Concession Types
- Trip Cancellation Reasons
- Inspector Remarks
- Payout Reasons
- Denominations
- Pass Types
- Crew Details
- ETM Details
- CMC Card Management (Part of Phase 2)
 - Card Initialization
 - Card Insurance
 - Top-Up/Recharge
 - Hot-listing of Cards
 - Return Card

4.3.2 Way Bill Management

This functionality is developed from the Depot master perspective. It will be used to generate the vouchers, record entries, perform audits etc. This can be further explained as below:

4.3.2.1 Generate Vouchers

At the start of each day, conductors from the various depots are issued several ETM's based on different routes pre-decided in agreement with the driver & conductor's rosters. The depot master logged in will be able to perform the below activities:

- Issue / Return ETM's to Conductors
- Submit receipts from Main Office
- Issue to Ticket Section
- Issue to Crew
- Returned by Crew

4.3.2.2 Audit Checks

The depot master user will be able to perform audit checks with the help of this module. It helps them to perform the audit based on several factors listed below:

- Pre-Printed tickets issued
- Revenue validation check
- Issue/Return vouchers Issued
- CMC card validation
- ETM Validation
- Conductor/Driver Details
- Payouts Validation

4.3.2.3 Revenue Reconciliation / Cash Collection

1. This functionality helps the user to record details of the revenue collected by a particular bus riding on a particular route/trip.
2. Conductors end the trip at the end of day and generate the ETM report, which has the revenue data as well. This data can be recorded via this screen.
3. Cash collection is a part of this module. Cash submitted by the conductor is validated and recorded via this module.

4.3.3 User Authentication and Logout

This module deals with the user authentication mechanism, which identifies any particular user login based on the role defined to the user.

4.3.4 Inventory Management

This module is designed to record the inventory data available with the department. The inventory management will record the number of materials left in stock as required in this business. The depot user can record various details listed below:

- Depot Stock
- Ticket Section Stock

- Crew Stock
- Paper Rolls
- ETM Machines
- Portable UPS

4.3.5 Roster Management

4. This module is specifically for managing the rosters created for the drivers and conductors based on their depot location and the routes.
5. The rosters will be prepared on a monthly basis by the depot master and uploaded on the system via .csv file.
6. There will be 4 shifts included i.e. General, Morning, Evening & Night shift. This will be configurable and can be customized based on the requirement.
7. Based on this roster, the depot master will align the ETM's to specific conductors planned for a specific route on the scheduled day.

4.3.6 Global Search

- This module specifically aims to provide a global search criteria are to help the users to search for any particular record. The search criterion is set up to ease the user experience.
- The search can be performed based on the set of fields that can be used independently or can be grouped together to fetch the search results.
- This module will be integrated with the database having all the information pertaining to the records created in the system.
- The global search will have two types of search i.e. Primary Search and the Secondary (Advanced) Search.
- User can select the date range to fetch the appropriate results.

4.3.7 Dynamic & Enhanced Reporting

- Reporting is a key module of this system that enables the user to generate reports based as per requirement.
- The Reporting module is dynamic as it allows the users to add a column as per the requirement.

- There are different types of reporting as listed below:

4.3.7.1 Reports based on ETM Machine

- ❖ Audit Status
- ❖ Trip Cancellation
- ❖ Penalty Ticket Details
- ❖ ETM Transactions
- ❖ ETM not synchronized
- ❖ ETM Issue Details

4.3.7.2 Reports based on Pre-Printed Tickets/Pass

- ❖ Depot Stock
- ❖ Ticket Section Stock
- ❖ Crew Stock
- ❖ Receipts from Main Office
- ❖ Issues to Ticket Section
- ❖ Issues to Crew
- ❖ Consumption of Pre-Printed Tickets
- ❖ Returned by Conductor
- ❖ Denomination based Stock Ledger

4.3.7.3 Reports based on Revenue Collection

- ❖ Revenue Statements
 - Depot wise collection
 - Route wise collection
 - Crew wise collection

- Trip wise collection
- Daily collection
- Date wise collection
- Per KM wise collection
- Vehicle wise collection
- ❖ Payout
- ❖ Pass Sold
- ❖ Passenger profiling
 - Bus stop wise
 - Route wise
 - Origin-Destination wise
- ❖ Concession Ticket Collection
- ❖ Bus wise Earning
- ❖ Conductor wise Earning
- ❖ Shift wise Earning
- ❖ Conductor Ledger
- ❖ Print Error Details
- ❖ Date wise Denomination Report
- ❖ Route wise Denomination Report
- ❖ Cash Collection Report

4.4 CEPAS CMC Cards Integration (Phase 2)

1. This system will be integrated with CEPAS (Contactless e-Purse Application), which is a Singaporean specification for an electronic money smart card.

2. This common mobility cards (CMC) aims to make all transactions cashless hence; this card will eliminate the pre-printed tickets issued by the conductors to passengers.
3. This card could be recharged online or via ETM machine that a conductor carries.
4. The working of this card will be based on below two commands:
 - a. Debit - This command shall be used primarily to deduct a certain amount from the Purse Balance. However, along with deduction it can also be used for reading back the available balance and updating the transaction log file as a single atomic operation.
 - b. Credit - This command is used to perform a credit transaction as well as modifying data in the purse EF. This is a positive command.



5 Assumptions, Dependencies & Limitations

The following assumptions, dependencies & limitations hold true for this project that can affect the functionalities/features stated in this document. Note that all these assumptions, dependencies and limitations that, if changed, will alter this SRS document and its impact on the system:

- Paper based and day pass issuance through ETM device and transaction data will be sent to the ETM backend system using the GPRS. However, ETM machine will be capable of operating in both online & offline modes.
- The system will be capable of operating in 4 different shifts i.e. General, Afternoon, Evening and Night. This will be made configurable and it can be changed later on based on the business requirement.
- When a bus break downs when en-route to a particular trip, conductor has to perform the mid-logoff and provide the pre-printed tickets to passengers and collect cash in lieu. And, at the end of day conductor has to share the ETM mid-logoff report along with details of pre-printed tickets and submit the cash collected.
- For every depot, there will be specific conductors and drivers. All the conductors of Depot A will be able to login in the ETM assigned to Depot A only. They will not be able to login in another depot's ETM machine.
- The system will be accessed through secured network and HTTPS protocol should be used for communication.
- To access the system user will require only web browser and Internet connection on their system.
- Android App will be developed for quick reporting and sending alarms (based on business rules).
- SAM (Security Access Module) to be used for Keys Management in Pre-Personalization, Personalization and ETM.