

# The Public Transportation Management System (PTMS)

## Functionality specification

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Functionality specification

< Project name >

## Version history

Version	Date	Author	Comment

## Document certification

Name	Role	Company	Date	Signature

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## Introduction

The PTMS is an integrated solutions designed for the State of Arstotzka to modernize public transport. It is a great solution between real time vehicle tracking, automated passanger registration with NFC and administrate route management. This system aims to enhance the passenger experience while providing transit operators with data-driven insights into city-wide movement

## Scope of the project

Include:

The project encompasses the design and development of a cross-platform mobile application for passengers and a high-availability web portal for transit operators. It includes the development of robust backend services for real-time data processing and the specialized firmware for IoT devices equipped with NFC readers

Not include:

This project does not include the physical procurement of transport vehicles, the manual installation of hardware (NFC readers) on buses or trams, or the maintenance of the city's cellular network infrastructure

## Concepts

NFC registration (for the register passengers)

IoT devices

Real-time tracking (for track the position of vehicles)

Develop web application and mobile application

## Role description

Passengers

The primary end-users who interact with the system via the mobile app. They rely on the system for navigation, real-time tracking, incident reporting, and seamless trip registration through NFC interaction

Transit operators

Administrative users responsible for the system's accuracy. They manage the infrastructure (routes/stops), communicate with the public via emergency notifications, and analyze traffic data to improve service efficiency

## Fences

The project strictly excludes physical hardware maintenance, offline mode operations, and the development of independent network or map infrastructures

## Assumptions and dependencies

Network stability, power continuity, hardware compatibility, data accuracy, vehicle availability

## List of requirements

### Requirements related to functionality

#### Real time vehicle tracking and schedule visualization

As a passenger, I want to track vehicles in real time and their schedules

#### NFC trip registration

As a passenger, I want to register my trip using NFC

#### Incident reporting

As a passenger, I want to be able to report unusual activities

#### Notifications

As an operator, I want to post notifications about extraordinary traffic conditions so that passengers stay informed

#### System content management

As an operator, I want to be able to provide up-to-date information to the system

#### Analytics and visualization

As an operator, I want to be able to conveniently visualize information about passenger numbers and other statistics

#### Route management

As an operator, I want to be able to add change routes and stops using a web application

#### Viewing passenger traffic statistics

As a passenger, I want to see how full buses

#### Encryption and secure data transmission

The system shall implement end-to-end encryption for all communication between the vehicle-mounted IoT NFC readers and the central server. This ensures that passenger check-in data and device ID are protected against interception or tampering. The encryption protocol must maintain data integrity even in areas with fluctuating network stability

## Multi-language localization support

The system must support dynamic localization to cater to the diverse population of Arstotzka. Mobile application: the UI must be fully localized in English, German, Italian, and French. Web application: the administration interface must support English and German. Users shall be able to switch languages within the application settings without needing to restart the session

## Requirements related to characteristics

### Response time

Both the web and mobile applications must achieve a response time of less than 500ms for all standard operations

### Localization

Mobile app: full support for English, German, Italian, French

Web app: professional localization for English and German

### Security

All communication channels between the IoT NFC readers and the central server must utilize industry-standard encryption to prevent unauthorized access to passenger data