**Software Requirements Specification (SRS) for Bus Navigation App using LoRaWAN Technology**

**1. Introduction**

**1.1 Purpose of this Document**

This Software Requirements Specification (SRS) outlines the functional and non-functional requirements for the development of a Bus Navigation App that utilizes LoRaWAN (Long Range Wide Area Network) technology to track the vehicle's location in real-time. It serves as a comprehensive guide for the development team and stakeholders to understand the system's functionalities, user needs, and operational constraints.

**1.2 Scope of this Document**

This document focuses on the core functionalities of the Bus Navigation App, including real-time vehicle tracking, route planning, and user interface design. It excludes specific hardware specifications, network infrastructure details, and LoRaWAN technology implementation details, which will be documented separately.

**1.3 Overview**

The Bus Navigation App aims to provide users with real-time information about bus locations, routes, and schedules. By leveraging LoRaWAN technology, the app offers accurate and reliable tracking of buses, ensuring efficient navigation for passengers.

**1.4 Business Context**

The Bus Navigation App will cater to commuters using public transportation, offering them a convenient way to track buses and plan their journeys. It will be implemented by transportation authorities and service providers seeking to enhance the overall passenger experience.

**2. General Description**

**2.1 Product Functions**

* Real-time bus tracking using LoRaWAN technology
* Route planning and optimization
* Bus stop information display
* Schedule updates and notifications
* User-friendly interface for easy navigation

**2.2 Similar System Information**

Existing navigation apps and public transportation tracking systems can be referenced for understanding functionalities and user experience best practices.

**2.3 User Characteristics**

The Bus Navigation App is intended for commuters using public transportation, including regular passengers and occasional travelers.

**2.4 User Problem Statement**

Commuters face challenges in tracking bus locations and planning their journeys efficiently due to limited real-time information and unpredictable schedules.

**2.5 User Objectives**

Users expect the Bus Navigation App to provide:

* Accurate real-time bus tracking information
* Easy-to-use interface for route planning and navigation
* Timely updates and notifications about bus schedules and delays

**2.6 General Constraints**

* Compliance with data privacy regulations and standards
* Integration with existing transportation systems and databases
* Scalability to accommodate increasing user and bus volumes

**3. Functional Requirements**

**3.1 Real-time Bus Tracking:**

* Integration with LoRaWAN technology for accurate bus location tracking
* Display of real-time bus locations on the app's map interface
* Refresh mechanism to update bus locations at regular intervals

**3.2 Route Planning:**

* Input mechanism for users to enter their origin and destination
* Calculation of optimal routes based on bus schedules and current traffic conditions
* Display of route options with estimated travel times

**3.3 Bus Stop Information:**

* Display of nearby bus stops based on user's current location
* Information about bus routes serving each bus stop
* Real-time bus arrival predictions for each stop

**3.4 Schedule Updates and Notifications:**

* Notification system for users about bus schedule changes and delays
* Option for users to subscribe to specific bus routes or stops for updates

**4. Interface Requirements**

**4.1 User Interfaces**

* Mobile application interface accessible on smartphones and tablets
* Intuitive and user-friendly design with map-based navigation and search functionality

**4.2 Software Interfaces**

* Integration with LoRaWAN network servers for receiving real-time bus location data
* Integration with transportation authority databases for bus route and schedule information

**5. Performance Requirements**

* Fast response times for loading bus tracking information and route calculations
* Reliability of real-time bus tracking data with minimal latency
* Scalability to handle concurrent user requests during peak hours

**6. Other Non-Functional Attributes**

**6.1 Security**

* Secure authentication and authorization mechanisms for user accounts
* Encryption of user data and communication channels to protect privacy

**6.2 Reliability**

* High system availability with minimal downtime for uninterrupted service
* Regular monitoring and maintenance to ensure system reliability

**6.3 Maintainability**

* Modular code architecture for easy maintenance and updates
* Version control and documentation practices for efficient code management

**6.4 Usability**

* Accessibility features for users with disabilities
* Multilingual support and clear instructions for users of diverse backgrounds