

Components Needed:

GPS Trackers: GPS trackers are essential for accurately monitoring the real-time location of public transport vehicles. They provide precise geospatial data, making them suitable for tracking buses, trams, and other public transport modes.

Onboard Computer Systems: We will use onboard computer systems with GPS capabilities to collect and process real-time data from GPS trackers. These computers will run on specialized hardware designed for public transport vehicles.

Reason for Choosing: Onboard computer systems are optimized for vehicle data processing and communication with GPS trackers, ensuring real-time data accuracy and reliability.

Communication Modules: We will employ 4G/5G cellular communication modules for real-time data transmission. These modules will enable seamless data transfer between public transport vehicles and the central optimization platform.

Reason for Choosing: 4G/5G cellular communication offers high-speed and reliable connectivity, ensuring real-time data updates for efficient public transport optimization.

Sensors for Passenger Counting: To optimize public transport capacity and passenger load, we will use sensors for passenger counting. These sensors may include infrared or ultrasonic sensors installed at vehicle entrances and exits.

Reason for Choosing: Passenger counting sensors help determine the occupancy of public transport vehicles, allowing for real-time capacity adjustments and improved passenger experience.

Protocols:

RESTful APIs (Representational State Transfer): RESTful APIs will be used for communication between onboard computer systems and the central optimization platform. They provide a simple and standardized way to exchange data over the internet.

WebSocket: WebSocket will be employed for real-time data updates from public transport vehicles to the optimization platform. WebSocket allows for bidirectional, low-latency communication, which is crucial for real-time monitoring and control.

Cloud Platform:

Azure IoT Hub: Azure IoT Hub will serve as the primary cloud platform for data storage, processing, and analysis. It offers robust IoT capabilities, including device management, data ingestion, and advanced analytics.

Reason for Choosing: Azure IoT Hub provides a comprehensive IoT solution with support for real-time data processing, device management, and scalability, making it well-suited for public transport optimization.

Google Cloud Platform (GCP): GCP will be used for machine learning and predictive analytics to optimize public transport routes and schedules. GCP's machine learning tools enable data-driven decision-making for route planning and passenger management.

Reason for Choosing: GCP offers powerful machine learning and analytics capabilities, allowing for data-driven route optimization and improved public transport efficiency.