SE 6387 Advance Software Engineering Project, 2025
University of Texas at Dallas

Cargo Connect: Improving Airport Freight Flow

Group 2

Authors

FNU Anuja

Smit Soneshbhai Patel

Bradley Evan Stover

Chijioke Elisha-Wigwe

Table of Contents

Introduction

Purpose

The purpose is to identify the challenges associated with freight transportation to and from airports, to

1. Optimize vehicle movements.
2. Reduce congestion around major air cargo terminals.
3. Increase efficiency in global cargo movements.

Scope

1) Modes of transportation
2) Key Operational Challenges
    - Narrow access roads to the airport
    - Limited truck unloading bays at cargo terminals.
    - Manual customs check at airport entry points.
    - Limited parking for freight vehicles
3) Impacts analysis
4) Propose solutions.
5) Documentation
6) Access point management
7) Terminal operations efficiency

Positioning

Business opportunity:

- Logistics carriers need maximal efficiency, especially when it comes to the routing of airport traffic.
- There is a razor-thin margin of error when it comes to obeying the parameters of time in the logistics industry.
- We are proposing a solution that will allow as much freight traffic as possible to flow in each timeframe via optimizing airport traffic routing for major carriers.

Problem Statement:

- The problem of traffic management when transporting goods to and from airports affects logistics carriers and their respective customers.
- The impact of the problem is that the lack of a comprehensive solution for traffic routing slows down the overall speed of key logistics processes.
- A successful solution would include real-time freight traffic insights, dynamic adjustment of routes, and general itinerary optimization.

Product Position Statement:

- For the logistics industry company, which needs to operate at maximal capacity 24/7 with zero unsubstantiated delays:
- Our proposed system is a freight traffic optimization solution which ensures profits are not lost due to excess traffic inefficiencies.
- Unlike currently existing alternatives, our product intelligently chooses routes which make sense in terms of maximal expediency given current airport traffic conditions and states.

Constraints

Time

- Flight Schedules & Narrow Windows
- Peak Commuter Hours
- Delivery Deadlines

Infrastructure

- Airport Access & Road Capacity
- Terminal Loading Bay Capacity
- Parking Space Limitations

Regulations

- Local & Federal Regulations
- Customs & Border Protection

Operations

- Equipment & Fleet Management
- Coordination Gaps

Data

- Cargo Screening & Handling
- Real-time Traffic Information
- Vehicle Tracking & Monitoring

Requirements

1. The system should dynamically modify truck departure times depending on real-time traffic data to cut down on airport wait times.

2. The system must assign the closest parking spaces for trucks that arrive early.

3. Traffic signal integration should provide trucks who are running late with real-time fastest route updates and green-light priority like emergency vehicle routing.

4. A large amount of real-time data from many sources, such as GPS, traffic sensors, and logistics hubs, should be handled without delays by the platform's scalability.

5. The system must guarantee secure data transmission and adhere to airport security and logistical rules to avoid unwanted. access to cargo movement details.

Proposed Solution

1. Smart Parking

- Early Arrival
    - Drivers arriving before their scheduled loading/unloading get instant directions to the nearest parking spot.
- Traffic Delay
    - If real-time data shows significant congestion and sufficient delivery buffer, the app suggests waiting in a parking area until traffic conditions improve.

2. Smart Scheduling

- To Airport
    - If cargo is running late, DALI updates the truck's departure time to avoid unnecessary waiting at the Airport.
- From Airport
    - If there is heavy congestion but enough time to deliver, the system allocates a parking spot and issues a new departure time to bypass peak traffic.

3. Priority

- Late Trucks
    - Vehicles behind schedule receive green-light priority and real-time fastest route updates, like emergency vehicle routing in DALI.
- Batch Processing
    - Vehicles are grouped based on delivery times, enabling orderly scheduling and efficient resource use.