FORM 2

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COMPLETE SPECIFICATION

(Section 10; rule 13)

TITLE OF THE INVENTION:

Freight Distribution System and Trucking Distribution System for Integrated Multimodal Transportation Logistics

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PREABMBLE TO THE DESCRIPTION

The following specification particularly describes the invention and the way it is to be performed.

DESCRIPTION OF INVENTION

FIELD OF INVENTION

The present invention relates to logistics and transportation management systems, specifically to a unified Freight Distribution System (FDS) and its subsystem, the Trucking Distribution System (TDS). These systems integrate multiple modes of transportation to streamline and enhance the efficiency of logistics operations for shippers, carriers, and freight brokers.

BACKGROUND OF THE INVENTION

Logistics and transportation management are essential components of the global economy, facilitating the movement of goods from manufacturers to consumers. The complexity of logistics operations has increased significantly with the expansion of international trade and the growth of e-commerce. Despite technological advancements, the logistics industry still faces several critical challenges:

Fragmented Systems and Data Silos: Traditionally, each mode of transportation operates within its own siloed system. For example, air cargo, maritime shipping, rail freight, and trucking companies typically use separate systems for booking, tracking, and managing shipments. This fragmentation leads to inefficiencies and difficulties in coordinating multi-modal transportation.

Lack of Real-Time Visibility: The absence of real-time data integration across different transportation modes results in a lack of visibility into shipment status and location. Shippers and freight brokers often struggle to track shipments accurately, leading to delays, increased costs, and customer dissatisfaction.

Inefficient Route Optimization: Without a centralized system to optimize routes and schedules across various transportation modes, logistics providers cannot fully optimize the use of resources. This inefficiency results in higher fuel consumption, increased carbon emissions, and elevated operational costs.

Complex Booking and Management Processes: The process of booking transportation for goods often involves multiple intermediaries and complex paperwork, particularly for international shipments. This complexity adds to the time and cost of logistics operations.

Regulatory Compliance and Security Concerns: Ensuring compliance with international and domestic transportation regulations is a significant challenge. Additionally, protecting sensitive information related to shipments is crucial to prevent fraud and ensure the integrity of the supply chain.

The airline industry has addressed similar challenges by developing Global Distribution Systems (GDS), which integrate flight information, bookings, and schedules from various airlines into a single platform. These systems have significantly improved the efficiency and transparency of air travel. However, there is no equivalent system for the freight industry that consolidates all transportation modes into one platform.

Recognizing the need for a comprehensive solution, the present invention proposes a unified Freight Distribution System (FDS) and its Trucking Distribution System (TDS). The FDS aims to address the fragmentation in the logistics industry by integrating data from air cargo, maritime shipping, rail freight, and trucking companies into a centralized platform. This integration facilitates real-time data sharing, seamless booking and tracking capabilities, and optimized logistics management.

The Trucking Distribution System (TDS) is designed to support trucking companies, especially those that lack their own sophisticated management systems. By providing tools for managing profiles, truck inventories, and daily operations, TDS enhances the operational efficiency and market visibility of these companies.

OBJECT OF THE INVENTION

The primary object of the present invention is to provide a centralized platform capable of seamlessly integrating data from various transportation modes, including air cargo, trucking, railroads, and container shipping.

Further object of the present invention is to provide real-time visibility of shipment status and location across multiple transportation modes. By continuously collecting, processing, and updating transportation data, the invention enables stakeholders to monitor and track shipments in real-time, thereby improving decision-making and responsiveness in logistics operations.

Further object of the present invention is to seamlessly integrate a Trucking Distribution System (TDS) within the framework, providing specialized modules tailored for trucking companies

Further object of the present invention is to streamline the booking process for transportation services across diverse modes.

Another object of the present invention is to leverage predictive analytics to forecast trends, identify potential disruptions, and optimize logistics operations, including route and schedule optimization.

BRIEF DESCRIPTION OF DRAWINGS

The accompanying drawings constitute a part of this specification and illustrate one or more embodiments of the invention. Preferred embodiments of the invention are described in the following with reference to the drawings, which are for the purpose of illustrating the present preferred embodiments of the invention and not for the purpose of limiting the same.

For simplicity and clarity of illustration, the drawing figures illustrate the general manner of construction, and descriptions and details of well-known features and techniques may be omitted to avoid unnecessarily obscuring the invention. Additionally, elements in the drawing figures are not necessarily drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help improve understanding of embodiments of the present invention. The same reference numerals in different figures denotes the same elements.

In the drawings:

Figure 1 illustrates a centralized network known as the Air Cargo Global Distribution System (GDS). This network integrates logistics-related data from various air cargo companies, such as Air Cargo #1, Air Cargo #2, and Air Cargo #3. Each of these carriers maintains their flight schedules, available cargo space, and specific service details within the GDS. This centralized database allows for real-time management of cargo spaces and schedules. Customers (Customer #1, Customer #2, and Customer

#3), either directly or through agents, interact with this system to book and manage their cargo shipments. Through the GDS, customers can compare services and prices offered by different carriers and choose the option that best suits their needs. By integrating the Air Cargo GDS system into the FDS, the system can offer users a seamless interface to access, compare, and book air cargo services efficiently.

Figure 2 depicts the functioning of a Maritime Shipping Systems network. This network serves as a centralized platform that connects various container ships with their customers, optimizing the logistics and management of maritime cargo transport. Maritime Shipping Systems act as the central node in this network, facilitating the coordination and management of cargo between multiple container ships (Container Ship #1, #2, #3) and their respective customers (Customer #1, #2, #3). By incorporating this network into the FDS, the system can streamline maritime shipping logistics, providing users with comprehensive options for container ship services, real-time scheduling, and rate comparisons.

Figure 3 illustrates how customers interact with different rail freight companies via online platforms. This diagram emphasizes the role of these platforms in connecting global or local rail freight services with customers. In this setup, each customer (Customer #1, Customer #2, and Customer #3) uses the Internet to search for and interact with various rail freight companies (Rail Freight #1, Rail Freight #2, and Rail Freight #3). The integration of rail freight systems into the FDS allows users to access detailed rail service options, book freight services, and manage shipments through a unified platform, enhancing the efficiency of rail logistics management.

Figure 4 illustrates how the FDS obtains information regarding air, container ship, and rail freight through direct Internet connections or Application Programming Interface (API) integrations with other systems. For trucking companies, however, the FDS will rely entirely on a subsystem known as the Truck Distribution System (TDS). TDS will be developed within FDS to manage trucking logistics. This subsystem will connect to self-managed carriers through APIs for data exchange. For non-major carriers, there will be a provision within TDS for them to maintain their profiles, vehicle information, driver availability, service areas, pricing information, compliance certifications, insurance details, maintenance records, and booking schedules. TDS

will facilitate automated matching, dynamic pricing, route optimization, real-time tracking, compliance management, digital documentation, and enhanced analytics.

Figure 5 represents the TDS system for self-managed carriers. This system is a new component that connects self-managed carriers through APIs for data exchange, allowing these carriers to maintain their operational information within TDS. This includes vehicle details, driver availability, service areas, pricing, compliance, insurance, maintenance records, and booking schedules. The TDS system enhances the FDS by providing a comprehensive and dynamic platform for trucking logistics, enabling more efficient and optimized trucking services

Figure 6 illustrates how shippers or customers manage and maintain their profiles within the FDS. This profile includes detailed shipping preferences such as regularly ordered routes, specific timelines, and preferred services. Shippers can specify their favorite routes and trusted transport service providers, along with desired rates. The profile also documents the types of goods transported, specific handling requirements, usual origin and destination locations, financial information for streamlined billing, and logistical capabilities such as warehouse space and inventory management systems. Compliance certifications and adherence to safety standards are prominently displayed to assure partners and regulatory bodies of the shipper's commitment to legal and ethical practices. Performance history, including metrics like on-time delivery rates and feedback from past transactions, is also included to build credibility and trust with potential clients and partners

Figure 7 presents a high-level process flow illustrating multi-modal transport coordination within the FDS. This process flow integrates air cargo, maritime shipping, rail freight, and trucking logistics into a cohesive system. The FDS facilitates seamless transitions between different transport modes, ensuring optimal route efficiency, real-time tracking, and comprehensive management of shipments. This integration enables users to select preferred transportation modes based on efficiency, cost, and schedule, while optimizing resource usage such as fuel and space, tailored to specific cargo requirements

SUMMARY OF THE INVENTION

Embodiments of the present disclosure present technological improvements as solution to one or more of the above-mentioned technical problems recognized by the inventor in conventional practices and existing state of the art.

The present disclosure seeks to provide a freight distribution system and trucking distribution system for integrated multimodal transportation logistics.

In accordance with an aspect of the present invention, the Freight Distribution System (FDS) is an advanced logistics management platform that offers a comprehensive solution for optimizing freight transportation operations across multiple modes. Central to the FDS is its centralized platform, which seamlessly integrates data from diverse transportation modes, including air cargo, trucking, railroads, and container shipping, using robust Application Programming Interfaces (APIs) and internet protocols. This integration facilitates real-time data processing, enabling continuous collection, processing, and updating of transportation data to provide stakeholders with comprehensive visibility of shipment status and location.

A key feature of the FDS is its booking engine, which allows for instantaneous booking of transportation services across various modes, streamlining the booking process and enhancing operational efficiency. Additionally, the system incorporates a predictive analytics module that leverages historical and real-time data to forecast trends, identify potential disruptions, and optimize logistics operations, including route and schedule optimization.

To ensure data security and regulatory compliance, the FDS integrates a security and compliance module, which employs advanced encryption protocols, secure access controls, and compliance checks. This module safeguards data integrity and ensures adherence to international and domestic transportation regulations. Furthermore, the system includes an eco-friendly routing module that calculates and suggests optimal routes to minimize fuel consumption and carbon emissions, promoting environmental sustainability in freight transportation.

Within the framework of the FDS, the Trucking Distribution System (TDS) is seamlessly integrated, offering specialized modules tailored for trucking companies.

These modules include profile management, operational efficiency tools, and market visibility features. The TDS enables trucking companies to efficiently manage vehicle information, automate shipment matching, optimize routes, and enhance visibility to potential shippers, thereby improving overall operational efficiency and market competitiveness.

Together, the FDS and TDS revolutionize freight distribution by offering a holistic approach to logistics management, encompassing integration, optimization, security, compliance, sustainability, and market visibility. This comprehensive solution empowers stakeholders to streamline operations, enhance efficiency, and drive sustainable growth in the freight transportation industry.

While the invention has been described with reference to specific embodiments, various modifications and alterations can be made without departing from the scope of the invention, as defined by the appended claims.

The objects and the advantages of the invention are achieved by the process elaborated in the present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

The following detailed description illustrates embodiments of the present disclosure and ways in which the disclosed embodiments can be implemented. Although some modes of carrying out the present disclosure have been disclosed, those skilled in the art would recognize that other embodiments for carrying out or practicing the present disclosure are also possible.

The present invention describes a freight distribution system and trucking distribution system for integrated multimodal transportation logistics.

The present invention is a comprehensive and centralized logistics management platform designed to integrate and streamline the operations of multiple transportation modes, including air cargo, trucking, railroads, and container shipping. This integration is facilitated through the use of Application Programming Interfaces (APIs) and internet protocols, which enable real-time data sharing and coordination among various transportation systems. The present invention comprises several interlinked modules that enhance efficiency, transparency, and sustainability in

logistics operations, catering to the needs of shippers, carriers, and freight brokers alike.

Data Integration and Real-Time Processing

The present invention has a robust data integration module that aggregates and processes data from various transportation modes. The system employs a sophisticated data ingestion layer that utilizes standardized data formats and protocols to collect information from disparate sources. This data is subsequently processed in real-time by a dedicated processing module, which ensures continuous updates on the status and location of shipments. This real-time processing capability provides all stakeholders with up-to-the-minute visibility into their logistics operations, allowing for proactive management and decision-making.

Unified Booking Engine

The present invention includes a powerful booking engine that interfaces with the transportation systems of air cargo carriers, trucking companies, rail operators, and maritime shippers via APIs. This engine enables users to book transportation services across all modes in real-time, thereby simplifying the traditionally complex process of coordinating multi-modal shipments. By centralizing the booking functionality, the claimed system reduces the need for multiple intermediaries and significantly streamlines logistics management.

Predictive Analytics and Optimization

The predictive analytics module of the present invention leverages both historical and real-time data to forecast logistics trends and identify potential disruptions. This module employs advanced machine learning algorithms to detect patterns in transportation data and predict future events that could impact logistics operations. Simulation models are used to evaluate various logistics scenarios, optimizing route planning, resource allocation, and scheduling. The decision support system provides actionable recommendations, enabling users to make informed and efficient decisions.

Security and Compliance

Ensuring data security and regulatory compliance is paramount within the present invention. The security and compliance module incorporates advanced encryption

protocols, such as AES-256, to protect data in transit and at rest. Role-based access control (RBAC) mechanisms are implemented to restrict system access based on user roles and permissions, ensuring that sensitive information is only accessible to authorized personnel. Additionally, a comprehensive compliance engine verifies adherence to international and domestic transportation regulations, including customs documentation, transportation permits, and environmental standards.

Eco-Friendly Routing

The present invention includes an eco-friendly routing module designed to minimize the environmental impact of logistics operations. This module features an environmental impact calculator that estimates the carbon footprint of various transportation routes and modes. Utilizing real-time traffic data, weather conditions, and transportation schedules, the route optimization algorithm selects the most fuel-efficient routes, thereby reducing carbon emissions and operational costs. Integration with third-party environmental data providers ensures that the system maintains access to the latest information on air quality, weather, and traffic conditions.

User Interface and Database Management

The user interface of the present invention provides a comprehensive dashboard displaying real-time data visualizations of shipment status, route progress, and logistics performance metrics. Interactive maps show the locations of shipments, transportation hubs, and optimal routes. Customizable reporting tools enable users to generate detailed reports on logistics operations, cost metrics, and environmental impact.

Supporting the user interface is a robust database management system characterized by a distributed architecture, ensuring high availability and scalability. Data replication and backup mechanisms provide redundancy and enable swift data recovery in case of system failures. The system's data indexing and querying capabilities support efficient search and retrieval of logistics data based on various criteria such as shipment ID, transportation mode, and route.

Integrated Trucking Management

Within the present invention, the Trucking Distribution System (TDS) module specifically addresses the needs of trucking companies. The profile management sub-

module allows these companies to create and manage profiles that include detailed information about their vehicles, drivers, service areas, pricing, compliance certifications, insurance details, and maintenance records.

The operational efficiency sub-module provides tools for automated matching of shipments to available trucks, dynamic pricing adjustments based on real-time supply and demand, and route optimization using geographic information systems (GIS). Real-time tracking of trucks is facilitated by GPS technology, while compliance management ensures adherence to regulatory requirements.

The market visibility sub-module enhances the visibility of trucking companies to potential shippers by enabling real-time updates to profile information and service offerings.

Collaboration and Blockchain Integration

The present invention includes a collaboration module that enables effective communication and coordination among supply chain stakeholders. This module provides shared workspaces for project management and task tracking, as well as messaging and video conferencing tools for real-time communication. Document sharing and version control features further enhance collaborative efforts.

Additionally, blockchain technology is integrated into the claimed system to enhance transparency and security. A decentralized ledger records and verifies transactions related to logistics operations, ensuring tamper-proof records. Smart contracts automate and enforce agreements between shippers, carriers, and brokers, while audit trails provide traceability of shipments throughout the supply chain.

Integration with Third-Party Systems

The present invention is designed to integrate seamlessly with third-party systems, including Customer Relationship Management (CRM) systems, Enterprise Resource Planning (ERP) systems, and Internet of Things (IoT) devices. This integration enhances data sharing and operational visibility across the entire supply chain. IoT devices, such as temperature sensors for perishable goods, provide real-time tracking and condition monitoring, further improving logistics management.

Working Example:

Scenario 1: Sea Route with Container Shipping

Users securely log into the Freight Distribution System (FDS) and enter shipment details, such as the origin (Hyderabad, India, ZIP code 500019) and destination (New York City, USA, ZIP code 11717). This initiates the system's data integration, gathering real-time information from various transportation sources. The FDS system will check different modes of transportation required for the respective shipment, allowing customers to select their preferred mode of transport, which can be either 'system-driven' or 'customer choice'-driven.

If the customer chooses the sea route, specifically container sea shipping, the FDS system will consider several steps. From Hyderabad to the nearest port in Vizag, the FDS system requests the internal Trucking Distribution System (TDS) 1001 to pull the carrier details, shown in diagram 2a, section 701. It will also display the TDS-managed carrier 801, which might be cheaper than major carrier companies, to transport goods from the origin to the Vizag Sea Port. For the segment from Vizag Port to the Port of New York, the FDS system pulls details through an API from the Maritime Shipping System 201. Finally, from the Port of New York to the destination ZIP code 11717, another trucking carrier is needed. The FDS system relies on TDS system 1001 for carrier details (section 702) or the TDS-managed carrier 802.

Additionally, the FDS system 1000 will search for and find the best route, service, and rate from 900, providing details of air cargo (601 or 602), container ship details (401 or 402), and rail details (501 or 502). With these details, the system offers real-time booking capabilities, allowing users to select preferred transportation modes based on efficiency, cost, and schedule. The FDS facilitates seamless transitions between different modes, ensuring optimal route efficiency and optimizing resource usage, such as fuel and space, tailored to specific cargo requirements. Advanced security protocols safeguard sensitive data and transactions throughout the shipment's lifecycle, while centralized data from various transport modes is updated in real time, providing comprehensive tracking to the user.

Scenario 2: Air Cargo for Quick Delivery

Users securely log into the FDS and enter shipment details, such as the origin (Hyderabad, India, ZIP code 500019) and destination (New York City, USA, ZIP code 11717). The FDS system will check the different modes of transportation required for the respective shipment and allow customers to select their mode of transport preferences, which can be either 'system-driven' or 'customer choice'-driven.

If the customer selects air transport, the FDS system considers the nearest airport from Hyderabad (ZIP code 500019). The FDS system requests the internal TDS system 1001 to pull the carrier details, shown in diagram 2a, section 701. It will also display the TDS-managed carrier 801, which may be cheaper than major carrier companies, to transport the goods from the origin to Hyderabad airport via truck. From Hyderabad Airport to New York Airport, the FDS system retrieves details through an API from the Air Cargo GDS system 301 to transport the goods via air cargo. From New York Airport to the destination ZIP code 11717, another trucking carrier is needed. The system relies on TDS system 1001 for carrier details (section 702) or the TDS-managed carrier 802.

Additionally, the FDS system 1000 will search for and find the best route, service, and rate from service 900, providing details of air cargo (601 or 602). The system offers real-time booking capabilities, allowing users to select preferred transportation modes based on efficiency, cost, and schedule. The FDS facilitates seamless transitions between different modes, ensuring optimal route efficiency.

Scenario 3: Multi-Modal Transport with Truck, Rail, and Ship

Users securely log into the FDS and enter shipment details, such as the origin (Hyderabad, India, ZIP code 500019) and destination (New York City, USA, ZIP code 11717). The FDS system checks the different modes of transportation required for the shipment and considers the best mode of transport based on the route, time, rate, and various other parameters.

If the FDS recommends truck, rail, and ship, the system will consider several steps. From Hyderabad to Lingampally Railway Station, the FDS system requests the internal TDS system 1001 to pull the carrier details, shown in diagram 2a, section 701. It will also display the TDS-managed carrier 801, which might be cheaper than

major carrier companies, to transport the goods from the origin to Lingampally Railway Station. From Lingampally Railway Station to Vizag Railway Station, the FDS system retrieves rail information through an API from the Indian Railway 'Rail Freight provider 502'. From Vizag Railway Station to Vizag Sea Port, the FDS system pulls truck details from 1001. From Vizag Sea Port to the Port of New York, container ships are necessary, and the FDS system retrieves details through an API from the Maritime Shipping System 201.

From the Port of New York to the destination ZIP code 11717, another trucking carrier is needed. The FDS system relies on TDS system 1001 for carrier details (section 702) or the TDS-managed carrier 802. Alternatively, rail transport options can be retrieved through an API from Rail Freight 501, involving either Union Pacific Railroad or BNSF Railway. The truck transport dependencies from the New York seaport to the railway station and then to the final destination are managed by the TDS system of the FDS.

The system offers real-time booking capabilities, allowing users to select preferred transportation modes based on efficiency, cost, and schedule. The FDS facilitates seamless transitions between different modes, ensuring optimal route efficiency.

By integrating these scenarios, the F&TDS exemplifies a robust and versatile logistics platform, offering users unparalleled flexibility, efficiency, and real-time control over their transportation needs.

CLAIMS:

We Claim:

1. A freight distribution system and trucking distribution system for integrated multimodal transportation logistics, the said system comprising:
    - a data integration module configured to integrate data from multiple transportation modes, including air cargo, trucking, railroads, and container shipping, wherein the data integration is facilitated through Application Programming Interfaces (APIs) and internet protocols;
    - a real-time data processing module that collects, processes, and updates transportation data from said multiple transportation modes to provide real-time visibility of shipment status and location;
    - a booking engine configured to enable real-time booking of transportation services across said multiple transportation modes, wherein the booking engine interfaces with the transportation systems via APIs;
    - a predictive analytics module that utilizes historical and real-time data to forecast trends, identify potential disruptions, and optimize logistics operations, including route and schedule optimization;
    - a security and compliance module incorporating advanced encryption protocols, secure access controls, and compliance checks to ensure data security and adherence to international and domestic transportation regulations;
    - an eco-friendly routing module configured to calculate and suggest optimal routes that minimize fuel consumption and carbon emissions based on real-time traffic data, weather conditions, and transportation schedules;
    - a user interface designed to provide shippers, carriers, and freight brokers with a single access point for managing logistics operations, including booking, tracking, and managing shipments;
    - a database management system configured to store and retrieve data related to shipments, transportation schedules, pricing, and regulatory compliance requirements;

wherein, a Trucking Distribution System (TDS) is integrated within the Freight Distribution System (FDS), comprising: a profile management module allowing trucking companies to create and manage profiles that include vehicle information, driver availability, service areas, pricing, compliance certifications, insurance details, and maintenance records; an operational efficiency module that provides tools for automated matching of shipments to available trucks, dynamic pricing adjustments based on real-time supply and demand, route optimization using geographic information systems (GIS), real-time tracking of trucks using GPS, and compliance management for regulatory requirements; a market visibility module that enhances the visibility of trucking companies to potential shippers by updating profile information and service offerings in real-time.

2. The system of claim 1, wherein the real-time data processing module consists of:
   - a data ingestion layer that collects data from various transportation modes using standardized data formats and protocols;
   - a data analytics engine that processes and analyzes the ingested data to provide actionable insights and generate predictive models for logistics optimization;
   - an alert and notification system that sends real-time alerts and notifications to users regarding shipment status, potential delays, and other critical updates.

3. The system of claim 1, wherein the predictive analytics module consists of:
   - machine learning algorithms configured to analyze historical transportation data, identify patterns, and predict future logistics trends and disruptions;
   - simulation models that evaluate various logistics scenarios to optimize route planning, resource allocation, and scheduling;
   - a decision support system that provides recommendations to users based on predictive analytics outcomes.

4. The system of claim 1, wherein the security and compliance module consists of:
   - encryption mechanisms for securing data in transit and at rest using industry-standard encryption algorithms such as AES-256;
   - role-based access control (RBAC) to restrict system access based on user roles and permissions;

- a compliance engine that verifies and ensures adherence to regulatory requirements such as customs documentation, transportation permits, and environmental regulations.

5. The system of claim 1, wherein the eco-friendly routing module consists of:
   - an environmental impact calculator that estimates the carbon footprint of various transportation routes and modes;
   - a route optimization algorithm that selects routes with the lowest environmental impact based on real-time traffic conditions, fuel efficiency, and emission factors;
   - integration with third-party environmental data providers to incorporate real-time data on air quality, weather conditions, and traffic congestion.
6. The system of claim 1, wherein the user interface comprises:
   - a dashboard displaying real-time data visualizations of shipment status, route progress, and logistics performance metrics;
   - interactive maps showing the locations of shipments, transportation hubs, and optimal routes;
   - customizable reporting tools that allow users to generate detailed reports on logistics operations, cost metrics, and environmental impact.
7. The system of claim 1, further comprising integration capabilities with third-party systems, including:
   - Customer Relationship Management (CRM) systems for sharing customer and shipment data;
   - Enterprise Resource Planning (ERP) systems for integrating logistics data with enterprise-wide resource planning and management functions;
   - Internet of Things (IoT) devices for real-time tracking and condition monitoring of shipments, such as temperature sensors for perishable goods.
8. The system of claim 1, wherein the database management system consists of:
   - a distributed database architecture to ensure high availability and scalability of data storage and retrieval operations;
   - data replication and backup mechanisms to provide redundancy and data recovery capabilities in case of system failures;

- a data indexing and querying system that supports efficient search and retrieval of logistics data based on various criteria such as shipment ID, transportation mode, and route.

9. The system of claim 1, further comprising a collaboration module that enables communication and coordination among supply chain stakeholders, and consists of:
   - a shared workspace for project management and task tracking;
   - a messaging and video conferencing tool for real-time communication;
   - a document sharing and version control feature to manage logistics documentation collaboratively.

10. The system of claim 1, wherein the blockchain technology integration consists of:
    - a decentralized ledger for recording and verifying transactions related to logistics operations, ensuring tamper-proof records;
    - smart contracts to automate and enforce contractual agreements between shippers, carriers, and brokers;
    - audit trails that provide transparency and traceability of shipments throughout the supply chain.

Dated this: 4th July, 2024

Sign: 

Name of the Signatory: Mr. Paresh Ravindra Chinchole

Patent Agent Code: IN/PA-3052

ABSTRACT:

Title: Freight Distribution System and Trucking Distribution System for Integrated Multimodal Transportation Logistics

The present invention discloses freight distribution system and trucking distribution system for integrated multimodal transportation logistics. Using APIs and internet protocols, it offers real-time data processing, enabling continuous updates on shipment status and location. The booking engine facilitates instant service booking, optimizing operations. Leveraging historical and real-time data, the predictive analytics module forecasts trends and disruptions, aiding route optimization. Security and compliance are ensured through encryption protocols and compliance checks. An eco-friendly routing module minimizes environmental impact by suggesting optimal routes. With a user-friendly interface and robust database management system, stakeholders efficiently manage logistics operations. The FDS represents a comprehensive and sustainable solution for modern freight distribution.

Figure of Abstract:

Figure 7