ENABLING THE DATA LIFECYCLE
to Flow Frictionlessly Across the Logistics Value Chain

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1. Introduction

The logistics industry has become the lifeline of global trade and commerce, ensuring the smooth movement of goods across borders, regions, and last-mile destinations. Today, it is no longer defined solely by physical assets like trucks, ports, or warehouses. Instead, logistics has transformed into a data-driven ecosystem, where real-time information enables efficiency, transparency, and resilience at every stage of the value chain.

As customer expectations for speed and visibility rise, and global networks become more complex, logistics leaders are realising that success depends on how effectively they capture, process, analyse, and act on data. Every shipment, route, warehouse operation, and delivery generates massive volumes of data. Without the right systems, this data remains fragmented and underutilised, leading to inefficiencies, blind spots, and higher costs.

The key to overcoming these challenges lies in enabling a seamless data lifecycle across the logistics value chain. By ensuring data flows reliably from planning to customer support, organisations can unlock smarter decisions, reduce risks, improve customer experience, and build resilient operations ready for the future.

2. Data Lifecycle (DLc) in logistics

The data lifecycle acts as the nervous system of logistics, connecting assets, people, and systems into one intelligent, responsive network. It refers to the journey of information as it flows across the five stages of the logistics value chain. At every stage, data is generated, captured, transmitted, stored, analysed, and acted upon. When managed effectively, this cycle transforms raw information into actionable insights that drive speed, accuracy, and visibility.

What enables this smooth flow are integrated digital solutions:

Secure connectivity and cyber backbones ensure all systems talk to each other safely.

Smart devices and sensors turn real-world events into usable information.

Data platforms and analytics process this information into clear, predictive insights.

Collaboration and communication tools ensure the right people, partners, and customers get timely updates.

Before we look at the data lifecycle stages, it's important to understand the logistics value chain stages, as these are the points where data is generated, captured, and acted upon.

Logistics value chain stages are as follows:

Stage 1: Logistics network planning

This is the strategic backbone of logistics, involving planning routes, capacity, asset utilisation, procurement, and network design. Data from predictive models, historical performance, and real-time feeds shape these decisions.

Stage 2: Multimodal transportation

Covers both Port and Terminal Operations and Inland Operations.
  a. **Port and Terminal Operations:** Focuses on loading/unloading, customs, crane automation, and documentation. These hubs generate data from IoT sensors, video analytics, and automation systems.
  b. **Inland Operations:** Handles movement of goods across road and rail, involving yard management, fleet tracking, and gate entry/exit.

Stage 3: Warehousing and inventory management

Centres around storage, cross-docking, cold chain, and smart inventory systems. Warehouses today are becoming data-driven hubs with automation and IoT-enabled operations.

Stage 4: Logistics and fulfilment management

Encompasses pick, pack, sort, and deliver for B2B and B2C operations. Also includes emerging use cases like drone delivery and autonomous last mile.
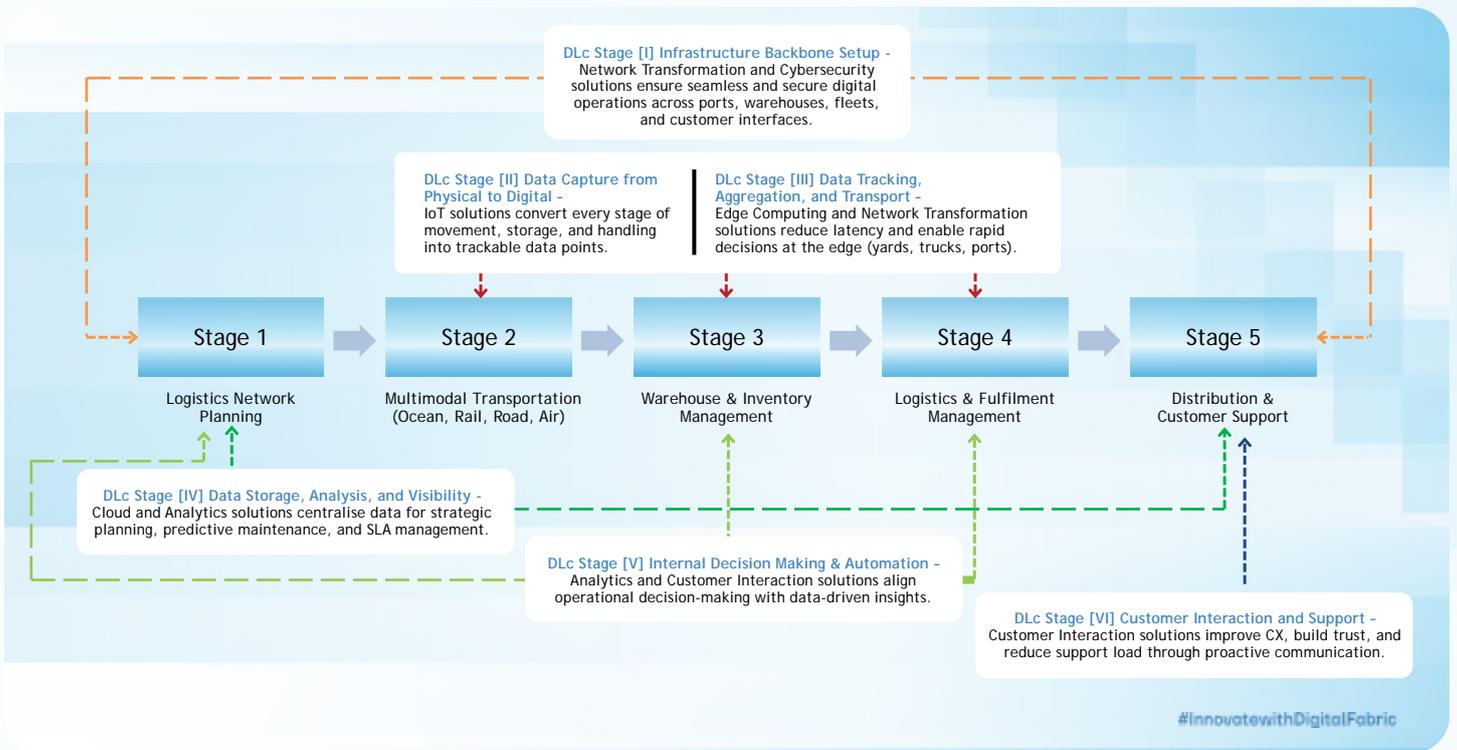
Stage 5: Distribution and customer support

This stage focuses on customer-facing visibility, issue resolution, and continuous performance tracking through dashboards and help centres.

Once the value chain context is clear, the data lifecycle stages describe how information flows and is managed across these logistics stages.

The logistics data lifecycle typically involves six key stages:

1. Infrastructure backbone setup

2. Data capture (physical to digital)

3. Tracking, aggregation and transport

4. Data storage, analysis and visibility

5. Internal decision-making and automation

6. Customer interaction and support

Enabling the Data Lifecycle (DLc) to flow frictionlessly across the logistics value chain

DLc Stage [I] Infrastructure Backbone Setup - Network Transformation and Cybersecurity solutions ensure seamless and secure digital operations across ports, warehouses, fleets, and customer interfaces.

DLc Stage [II] Data Capture from Physical to Digital – IoT solutions convert every stage of movement, storage, and handling into trackable data points.

DLc Stage [III] Data Tracking, Aggregation, and Transport - Edge Computing and Network Transformation solutions reduce latency and enable rapid decisions at the edge (yards, trucks, ports).

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Logistics Network Planning	Multimodal Transportation (Ocean, Rail, Road, Air)	Warehouse & Inventory Management	Logistics & Fulfilment Management	Distribution & Customer Support

DLc Stage [IV] Data Storage, Analysis, and Visibility - Cloud and Analytics solutions centralise data for strategic planning, predictive maintenance, and SLA management.

DLc Stage [V] Internal Decision Making & Automation – Analytics and Customer Interaction solutions align operational decision-making with data-driven insights.

DLc Stage [VI] Customer Interaction and Support – Customer Interaction solutions improve CX, build trust, and reduce support load through proactive communication.

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2.1 DLc Stage I - Infrastructure backbone setup

Builds the secure, high-performance foundation that links ports, warehouses, fleets, and customer systems. This backbone ensures data moves quickly, reliably, and safely across the value chain.

Logistics value chain impacted - Stage 1 to 5 (Logistics Network Planning to Distribution and Customer Support)

Tata Communications solutions

Network Fabric

IZO™+

Delivers secure, high-performance global connectivity across logistics hubs, warehouses, ports, and DCs, with scalable bandwidth for seasonal peaks and IoT surges. It ensures always-on, low-latency access for WMS, shipment tracking, and cloud control tower dashboards.

IZO™ MPLS ((Multi-Protocol Label Switching)

Provides private, low-latency connectivity between logistics sites and data centres, with QoS to prioritise mission-critical apps like TMS, ERP, and WMS. It ensures predictable performance for voice, video, and data while enhancing security via a fully managed private backbone.

IZO™+

Delivers centralised, policy-based routing that dynamically selects the best path (MPLS, broadband, LTE) for logistics workloads, ensuring high uptime and reduced MPLS costs. It provides deep application visibility, optimises TMS/IoT/automation traffic, and integrates seamlessly with cloud SaaS and AI analytics platforms.

IZO™ Hybrid WAN

Unifies MPLS, Internet, and Cloud interconnect into a single backbone, ensuring continuity with automatic failover. It supports hybrid logistics models, accelerates new site onboarding, and seamlessly connects last-mile partners.

IZO™ Private connect

Delivers direct, secure, high-throughput links to major cloud providers, cutting latency for logistics planning, AI route optimisation, and supply chain analytics. It bypasses the public internet for sensitive data and enables bulk transfers between global hubs and central analytics systems.

IZO™+ Multi Cloud Connect

secure, SLA-backed, low-latency links between data centers and leading clouds (AWS, Azure, Google Cloud, Oracle)—uniting ports, warehouses, fleets, and customer systems. It provides on-demand bandwidth, traffic segmentation/QoS for IoT, WMS/OMS and customer apps, policy-based routing with deep visibility, and resilient active-active paths—so data moves fast, reliably, and safely end-to-end across site-to-cloud and cloud-to-cloud.

Global VPN and Secure Remote Access

Provides encrypted, identity-based connectivity for logistics planners, partners, and field operators to TMS, WMS, and analytics dashboards. It also enables secure remote troubleshooting of warehouse systems and fleet telematics devices.

Ethernet Private Line / Global Ethernet

Enables high-speed, point-to-point connectivity with dedicated bandwidth for mission-critical logistics data. It supports bulk transfers of video analytics, drone imagery, and IoT datasets from ports and warehouses to analytics centres.

Managed Wi-Fi

Offers secure, high-performance wireless connectivity across warehouses, ports, and distribution centres. It supports handhelds, scanners, and WMS, while connecting IoT devices for tracking, monitoring, and maintenance. With centralised visibility, it segments networks for employees, contractors, and visitors to strengthen security.

Cybersecurity solutions

Managed Security Services (MSS) and Global SOC

Offers 24×7 threat monitoring across logistics IT and OT environments. Powers incident detection, correlation, and rapid response for WMS, TMS, and fleet control systems. Integrated with SIEM, SOAR, and global threat intelligence, it ensures real-time insights and consistent protection across distributed logistics networks worldwide.

SIEM (Security Information and Event Management)

Centralises collection and analysis of security logs from logistics endpoints, applications, and IoT devices. Issues real-time alerts for unauthorised access, malware, or anomalies in shipment tracking systems, while supporting compliance-ready reporting for regional and industry regulations.

Zero Trust Network Access (ZTNA)

Secures logistics platforms with identity-based access controls, ensuring only verified staff, contractors, or 3PL partners connect. Enforces least-privilege policies and supports secure remote access to logistics control centres, even for mobile or hybrid teams.

Cloud security (Cloud workload protection + CASB)

Safeguards logistics applications hosted in public, private, or hybrid cloud. Uses CASB to monitor and secure data flows between warehouses, fleets, and cloud apps. Protects sensitive supply chain documents with data encryption and loss prevention policies.

Endpoint Detection and Response (EDR)

Monitors laptops, handheld scanners, and IoT devices in real time for malware and ransomware. Automatically isolates infected endpoints to contain threats and applies behavioural analytics to detect suspicious or compromised device activity.

Threat intelligence services

Draws on global threat feeds to detect and block known attacks targeting logistics, such as ransomware. Assigns risk scores to vendors, carriers, and partners before integration. Strengthens resilience with proactive defenses during seasonal surges when systems face heightened risk.

Network security (Next-gen firewalls, IPS, Secure SD-WAN)

Protects inter-hub and cross-border logistics data flows with firewalls and intrusion prevention. Uses Secure SD-WAN to segment operational networks (e.g., warehouse control systems) from corporate IT. Shields freight booking portals and tracking systems with advanced DDoS protection.

Data Protection and Compliance (DLP, GDPR, ISO, BRSR)

Safeguards shipment data, invoices, and customer addresses with Data Loss Prevention. Maintains compliance with global data protection laws (GDPR, DPDP, ISO, BRSR). Builds secure audit trails that help resolve disputes in cases of shipment fraud or theft.

Vulnerability management and VAPT

Conducts regular vulnerability scans of logistics applications and IoT gateways. Performs penetration testing for internal and external logistics systems, then guides remediation to close exploitable gaps before attackers exploit them.

2.2. DLc Stage II - Data capture (physical to digital)

Converts physical events—like a truck entering a yard, a pallet scan, or container temperature—into digital records. Real-time sensors and devices ensure that goods and conditions are always trackable.

Logistics value chain impacted - Stages 2, 3, and 4 (Multimodal Transportation, Warehousing and Inventory Management and Logistics and Fulfilment Management)

Tata Communications solutions

IoT solutions

MOVE™ IoT connect

Offers secure, global cellular connectivity for IoT devices across transport, warehouse, and fulfilment environments. Supports seamless SIM provisioning, activation, and lifecycle management, with dynamic policy control to prioritise mission-critical logistics data.

eSIM / SIM connect

Simplifies cross-border IoT connectivity by removing the need for physical SIM swaps. Maintains uninterrupted asset tracking across multimodal transport and streamlines large-scale IoT rollouts in warehouses and fleets.

Connected fleet solutions

Supports real-time GPS tracking of vehicles, containers, and cargo across road, rail, air, and sea. Tracks driver behaviour, fuel usage, and route adherence for cost and safety optimisation while integrating with dispatch systems for dynamic routing.

Sensor network integration

Unifies heterogeneous sensors (BLE, RFID, LoRaWAN, NB-IoT, LTE-M, 5G) into one network. Enhances high-accuracy location, movement, and environmental monitoring across logistics stages, with interoperability for existing WMS and transport systems.

Video IoT solutions

Streams live video for cargo security, warehouse surveillance, and remote inspections. Integrates analytics for intrusion alerts, object detection, and compliance monitoring to improve safety and loss prevention in sensitive areas.

IoT platform and device management

Centralises provisioning, firmware updates, and health monitoring for IoT devices. Ensures secure authentication and data transmission, supporting scale across fleets and warehouses.

Asset monitoring

Tracks real-time location, status, and condition of goods, containers, and assets across storage and transit. Supports geofencing for unauthorised movement, monitors environmental thresholds for perishables, and flags anomalies in critical equipment for preventive maintenance.

2.3. DLc Stage III - Tracking, aggregation and transport

Aggregates and transmits data from multiple sources—fleets, terminals, and warehouses—into unified systems for monitoring and coordination. Enables real-time responses and faster decision-making.

Logistics value chain impacted - Stages 2, 3, and 4 (Multimodal Transportation, Warehousing and Inventory Management and Logistics and Fulfilment Management)

Tata Communications solutions

Edge computing

- Processes IoT and telematics data locally to cut latency in logistics.
- Aggregates real-time data from fleets, ports, and warehouses for instant insights.
- Supports live tracking, route alerts, and automated inventory updates.
- Powers AI-driven anomaly detection for assets, shipments, and routes.
- Secures local storage/processing to maintain operations during outages.
- Integrates with WMS, TMS, and control towers for unified visibility.
- Optimises bandwidth by sending only relevant, processed data.
- Triggers real-time alerts for geofencing, temperature, or unauthorised handling.
- Scales across ports, warehouses, and hubs for wider visibility.
- Strengthens compliance with on-the-spot data capture and reporting.

Network Fabric

IZO™+

Creates a secure, high-performance WAN across logistics sites, ports, warehouses, and transport hubs, ensuring real-time data flow from IoT devices, telematics, and warehouse systems.

IZO™+

Provides high-speed, reliable internet connectivity for connecting global logistics operations and enabling data aggregation across dispersed locations.

IZO™ Private connect

Establishes direct, private connections to major cloud platforms for seamless integration of tracking systems, warehouse management solutions, and analytics platforms.

IZO™+Multi Cloud Connect

Ensures low-latency and secure access to cloud-hosted logistics applications, enabling real-time aggregation of shipment and inventory data.

IZO™ Hybrid WAN

Combines MPLS and internet under a unified network for cost-effective, flexible connectivity that supports both mission-critical tracking systems and large data transfers.

Managed Wi-Fi

Delivers secure, high-speed wireless connectivity in warehouses and transport hubs, ensuring continuous data capture from scanners, handhelds, and IoT devices.

Ethernet and IPLC (International Private Leased Circuit)

Supports high-volume, point-to-point data transport between major logistics control centres and operational hubs.

MPLS VPN

Offers private, secure network segmentation for sensitive tracking and operational data across the global logistics chain.

Network security integration

Ensures secure transmission of tracking and operational data across all network layers, safeguarding against cyber risks.

2.4. DLc Stage IV - Data storage, analysis and visibility

Stores and analyses large volumes of data through cloud platforms and analytics. Provides predictive insights for route planning, inventory optimisation, and customer-facing visibility dashboards.

Logistics value chain impacted - Stage 1 and stage 5 (Logistics Network Planning and Distribution and Customer Support)

Tata Communications solutions

Cloud Fabric

Vayu Cloud provides enterprise-grade compute and storage with flexible private, hybrid, and multi-cloud options, automated orchestration, and scalability for logistics workloads. It integrates with IZO™ Cloud Connect for secure, low-latency access to hyperscalers, enabling advanced data storage, analysis, and visibility for planning and customer support.

Vayu Cloud for Enterprise unifies on-premises, private, and public clouds, ensuring seamless integration and centralised management of logistics workloads.

IZO™ Enterprise cloud storage offers secure, scalable storage for IoT data, shipment records, and analytics, ensuring reliable access to critical logistics information. It includes integrated backup and disaster recovery to safeguard operations.

Cloud security services provide built-in encryption and identity access controls, ensuring secure data handling while meeting GDPR, ISO, and logistics compliance standards.

Analytics

Analytics ingests and unifies data from IoT, ERP, telematics, and WMS to deliver real-time insights, predictive modeling, anomaly detection, and ESG tracking. Its scalable, cloud-native platform powers control towers, network optimisation, and customer experience enhancement for smarter logistics decisions.

2.5. DLc Stage V - Internal decision making and automation

Turns insights into action—optimising routes, balancing inventory, and streamlining workflows through AI, analytics, and control towers. Aligns planning with execution across operations.

Logistics value chain impacted - Stages 1, 3, and 4 (Logistics Network Planning, Warehousing and Inventory Management and Logistics and Fulfilment Management)

Tata Communications solutions

Analytics

Analytics

- AI-driven decision support for network design, warehouse placement, transport allocation, and process optimisation.

- Predictive forecasting and optimisation of demand, inventory, routes, and load planning to cut costs and improve delivery speed.

- Automated resource and exception management, dynamically allocating fleet, manpower, and space while triggering corrective workflows for disruptions.

- Real-time operational visibility through KPIs, control dashboards, and workflow insights to boost agility and reduce bottlenecks.

- Warehouse automation guidance for robotics, AS/RS, and IoT-based systems, enhancing throughput and accuracy.

- Sustainability optimisation, reducing energy use, waste, and carbon footprint across transport and warehousing.

Interaction Fabric

Contact Centre as a Service (CCaaS)

Provides a cloud-based, omnichannel contact centre for seamless coordination between logistics planners, warehouse teams, and distribution partners. Enables unified voice, chat, email, and social communications for faster, informed decision-making.

Communications Platform as a Service (CPaaS)

Offers APIs to embed voice, video, and messaging directly into logistics applications, enabling automated alerts, status updates, and workflow-triggered communications without switching platforms.

Kaleyra AI

Delivers intelligent conversational AI for automating shipment status queries, handling exceptions, and guiding team actions in real time. Supports multilingual capabilities for global logistics operations.

WhatsApp for Business API

Facilitates instant, secure, and globally scalable messaging for order tracking, change approvals, and disruption alerts between internal teams and external logistics partners.

Global SIP connect

Ensures secure, high-quality voice connectivity across regions for coordination between distributed teams, control towers, and local operations—supporting critical decision-making during time-sensitive logistics events.

2.6. DLc Stage VI - Customer interaction and support

Delivers real-time updates, proactive alerts, and omnichannel support through digital platforms. Builds trust and improves customer satisfaction with transparency.

Logistics value chain impacted - Stage 5 (Distribution and Customer Support).

Tata Communications solutions

Interaction Fabric

Communications Platform as a Service (CPaaS)

Embeds real-time voice, SMS, email, and video into customer-facing logistics applications, enabling automated delivery notifications, exception alerts, and two-way customer communication without requiring separate apps or platforms.

Contact Centre as a Service (CCaaS)

Provides a cloud-based, omnichannel customer engagement hub that integrates voice, chat, email, and social channels to handle customer inquiries, delivery changes, returns processing, and escalation management efficiently.

Kaleyra AI

Powers AI-driven conversational agents for automated customer support, delivery tracking, and proactive service updates, reducing wait times and enabling self-service resolution in multiple languages.

WhatsApp for Business API (via Kaleyra)

Offers secure, high-volume, and personalised customer engagement on the world's most widely used messaging platform—ideal for real-time delivery updates, issue resolution, and quick response to customer queries.

Customer Interaction Suite (CIS)

Centralises all customer engagement channels into a unified interface, enabling logistics providers to manage customer journeys, track service SLAs, and ensure consistent messaging across all touchpoints.

Global SIP Connect (GSIP)

Delivers secure, high-quality global voice connectivity to support customer service teams across regions, ensuring reliable inbound and outbound customer communication during peak demand or disruption events.

3. Conclusion:

Understanding the data **lifecycle (DLc) stages** within the logistics value chain is essential for organisations to turn fragmented operational information into actionable insights that drive efficiency, visibility, and resilience. Across every DLc stage, data enables smarter planning, real-time monitoring, optimised operations, and enhanced customer experiences.

Tata Communications' comprehensive capabilities ensure that the data lifecycle flows seamlessly across the **logistics value chain.** By providing secure and reliable connectivity, enabling IoT-driven data capture, supporting advanced analytics and cloud-based data processing, and facilitating intelligent automation and customer engagement, Tata Communications empowers organisations to unlock the full potential of their logistics operations.

For organisations using logistics, this approach translates into faster, better-informed decisions, reduced operational risks, improved resource utilisation, enhanced supply chain visibility, and superior customer satisfaction. **By enabling a frictionless data lifecycle, Tata Communications helps transform logistics operations into intelligent, responsive, and future-ready networks that drive efficiency, agility, and sustainable growth.**

4. Contributors

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TATA COMMUNICATIONS

About Tata Communications

Tata Communications partners with the global manufacturing industry to drive operational excellence, supply chain resilience, and intelligent automation. Our digital fabric powers secure, agile, and sustainable operations in over 240 countries. With deep expertise in Industry 4.0, IoT, network modernisation, cloud, and cybersecurity, we help manufacturers like Bosch move from legacy systems to future-ready operations.

As a trusted strategic partner to over 7,000 global businesses—including 300 of the Fortune 500—Tata Communications brings industry-specific expertise, global scalability, and a secure, cloud-native architecture to help enterprises accelerate transformation, unlock growth, and deliver superior customer experiences. Recognised as a Leader in the Gartner Magic Quadrant, Tata Communications is committed to enabling the next era of smart, scalable, and sustainable manufacturing.