

ITS ePrimer

**Module 6: Freight and
Commercial Vehicle ITS**

February 2022

**ITS Professional Capacity Building
Program**
ITS Joint Program Office
U.S. Department of Transportation

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Learning Objectives

1. Provide an overview of supply chain and motor carrier freight operations.
2. Describe recent freight automation advancements, future growth, and challenges.
3. Identify resources for increased understanding of ITS freight applications.

Module Outline

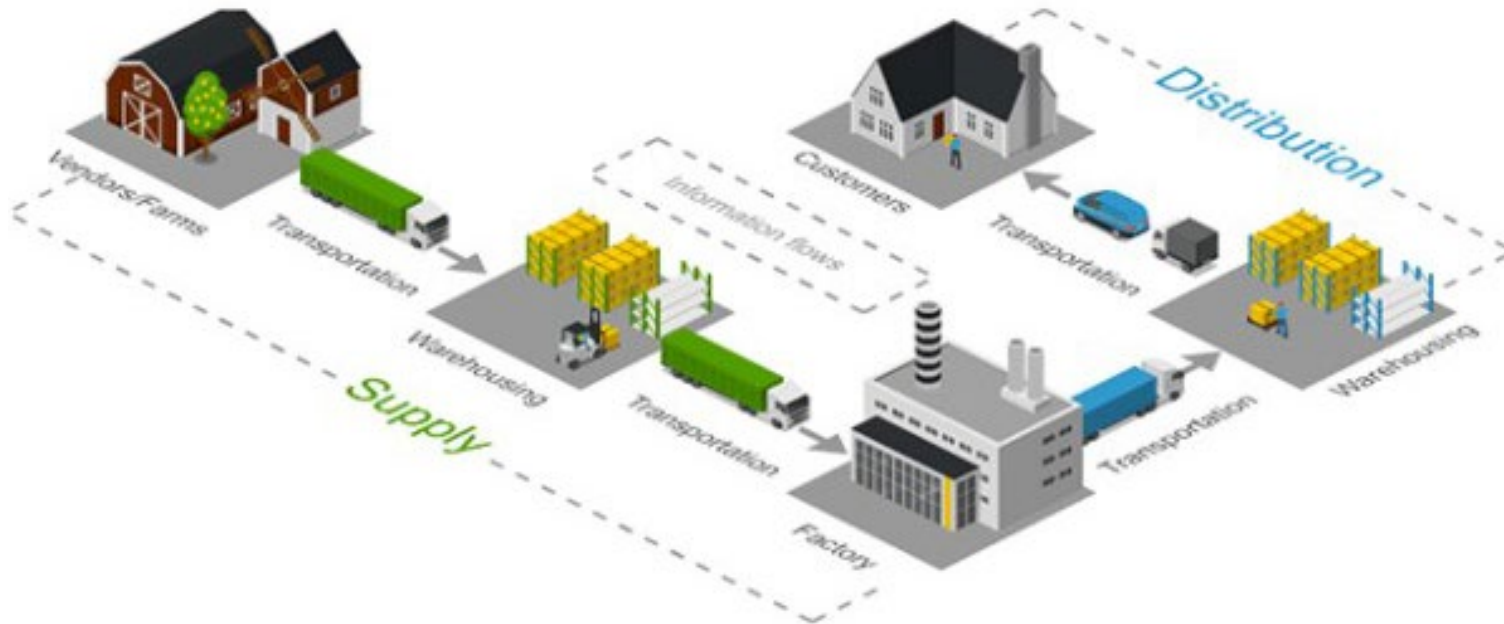
1. Supply Chain Management
2. Freight Technologies
3. Industry/government Interactions
4. USDOT Freight ITS Program
5. Benefits of Freight ITS
6. Future Freight ITS
7. Resources



Source: USDOT

All e-Primer modules accessible at <https://www.pcb.its.dot.gov/eprimer/>

Supply Chain Management



Source: Icoograms.com modified by
Kenneth Troup

Supply Chain Management

- Shippers – manufacturers, wholesalers, retailers
- Carriers – commercial fleets, independent truckers, private fleets
- Receivers/Consignees – shippers, warehouses, end customers
- Third Party Logistics (3PL) firms
- Timeliness, accuracy, completeness essential
- Technology and data help at each stage
- First and last mile are especially crucial
- Supply chain lecture at TRB 2022:
 - Anne Strauss-Wieder, Director, Freight Planning, North Jersey Transportation Planning Authority:
<https://www.youtube.com/watch?v=1bCauJWqyYA>



Source: Kenneth Troup

Supply Chain Management Technology

- Shipment status data
- Carrier management – truck location, routing, and order management
- Truck-specific navigation systems – low bridges, hazmat
- Shipment visibility



Source: USDOT

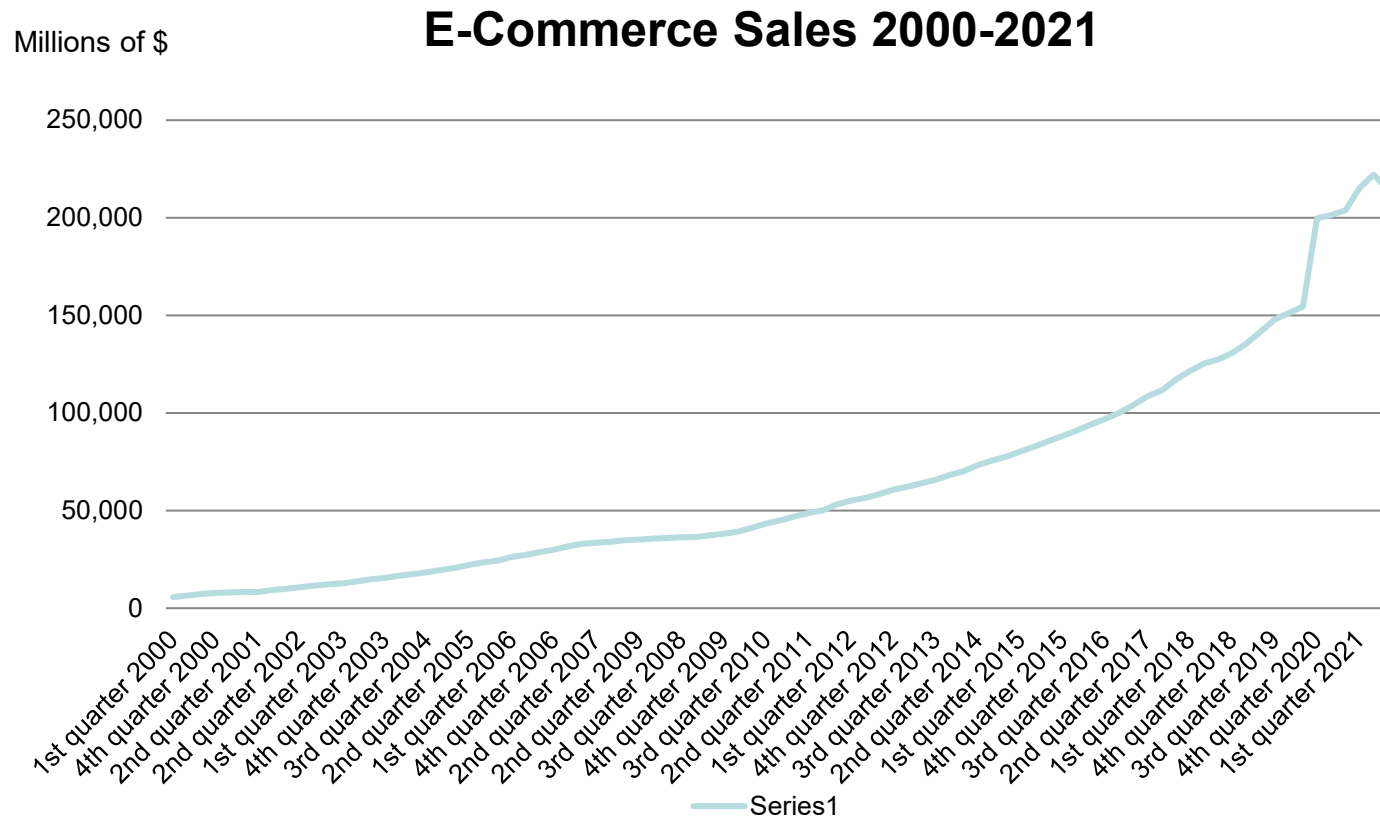
E-Commerce

- Smaller shipments directly to customers
- Increased emphasis on last mile
- Creates more complicated supply chains
- Parcel delivery by UPS, FedEx, and USPS
- Free shipping and rapid delivery



Source: Kenneth Troup – Lockers at a Retail Store

Growth of e-commerce



Source: Kenneth Troup from US Census data

Supply Chain in the Pandemic

- Consumers stayed home and ordered more
- “Supply Chain” became a household word
- Operational and coordination challenges for suppliers and carriers in United States and worldwide
- Increased demand for last mile delivery
- Accelerated interest in technology
 - Improved visibility
 - Automation of freight movements



Source: shutterstock_1943891122 – Ever Given

Supply Chain in the News

Inbound Logistics December 2021 – Readers Weigh In

“How would you summarize the supply chain in 2021 in five words?”

- Biggest Dumpster Fire Ever
- Global, Volatile, Long, Expensive, Recovering
- A Slow Moving Goat Rodeo
- Opportunity to Improve Business Strategies
- Drinking From a Fire Hose
- We Need Operational Resilience Now
- Crisis Exposed Need for Visibility
- Much Ado About Nothing Delivered
- Adapt and Innovate to Survive
- Ripe for Digital Disruption

Truck Parking

- Number one problem to truckers
- Closely related to hours-of-service rules and ELDs
- Public and private parking areas used
- Industry-government work together on technology assistance in finding existing spaces
- Numerous state and regional parking initiatives
- Three-part article in *FleetOwner*



Source: FHWA Truck Parking

Truck Parking Availability Technology Projects - 2018

Project	Caltrans	Minnesota DOT	Colorado DOT	Florida DOT	Michigan DOT	I-95 Corridor Coalition	MAASTO	Wisconsin DOT	Tennessee
Funding Agency	FHWA and Caltrans	MNDOT and FHWA	Federal Funding and Colorado DOT	FHWA and FDOT	FHWA and MDOT	FHWA, MDOT, and VDOT	USDOT through TIGER grants.	Initially funded by FHWA. It is now part of the MAASTO TIGER grant.	FMCSA and TDOT
Partners	California DOT, UC Berkeley Transportation Sustainability Research Center, ParkingCarma, and NAVTEQ.	Minnesota DOT, University of Minnesota's Center for Transportation Studies, ATRI.	Colorado DOT	Florida DOT	Michigan DOT	I-95 Corridor Coalition is a partnership of transportation agencies, toll authorities, public safety, and related organizations from Maine to Florida.	Eight MAASTO states: Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Ohio, and Wisconsin.	Wisconsin DOT and TAPCO.	FMCSA and the State of Tennessee.
Location	One privately owned site on I-5.	Three public rest areas along I-94. It will also integrate with the Wisconsin I-94 system.	Six locations during the first phase, with a final goal of deploying across the state on I-25, I-70 and I-76.	Seven rest areas and weigh stations along I-4 and I-95 are scheduled for phase 1. A total of 68 locations will be active by April 2019.	Seven private truck stops and five public rest areas.	Testing was done at rest areas on I-95. Currently, the system is active at two rest areas in I-95 and two more on I-64 Virginia.	The system will be deployed in major corridors in member states.	Four rest areas along the I-94 corridor. It will integrate with the Minnesota I-94 system.	Two rest areas.

Truck Technologies

- ADAS
- ADS Level 4
- Electric trucks
- Logging devices and virtual weigh stations



Source: FMCSA virtual weigh station



Source: USDOT V2V communications

Truck Automation - ADAS

- ADAS – Advanced Driver Assist System
 - Adaptive cruise control
 - Lane keeping assist
 - Automated emergency braking
 - Active warning systems
- Tech-Celerate NOW – USDOT/Industry effort



Source: FMCSA

Truck Automation - ADS

- Level 4 ADS – Automated Truck with a safety driver who can take over driving when needed.
- Demonstrations move the technology forward.
Examples:
 - Uber/Otto – 2016 Beer trailer
 - Kodiak – Start up and trucking company -2020 “fully disengage-free day”
 - Waymo and UPS – Houston – Fort Worth corridor
 - Aurora with PACCAR and FedEx – I-45 in Texas
 - TuSimple - 80-mile nighttime run on I-10 in Arizona without the driver touching the steering wheel

Electric Trucks

- Truck manufacturers/tech firm efforts - examples
 - Volvo, Nikola, Tesla, Lion
- UPS and other electric delivery trucks
- *Run for Less* demonstration
- Lower ownership costs
- Reduced pollution
- Need for charging stations

USDOT Safety Compliance Technology

- FMCSA – Safety Compliance
 - Virtual weigh stations
 - Truck size and weight
 - ELDs and hours of service



Source: FMCSA

Past USDOT Freight Research

- Connected Vehicle Technology (V2V, V2I)
- Truck V2V Research
- Truck V2I/Smart Roadside
- Dynamic Mobility Applications and Demonstrations (FRATIS, RESCUME)
- CVISN Core and Advanced Deployment Program, now ITD state initiatives



Source: ITS JPO – Traffic Management

Current USDOT Freight Research

Research Organizations

- FHWA Freight Management and Operations
- ITS JPO CARMA Freight – drayage operation improvements
- FMCSA Automated Commercial Motor Carrier Evaluation – facilitate ADS electronic safety inspections

Current Activities

- ADAS – Tech-Celerate NOW
- Cooperative ADS – California PATH
- ADS Grants – Ohio ADS Platooning
- ATCMTD Grants – Automated demos on state corridors

Freight Data

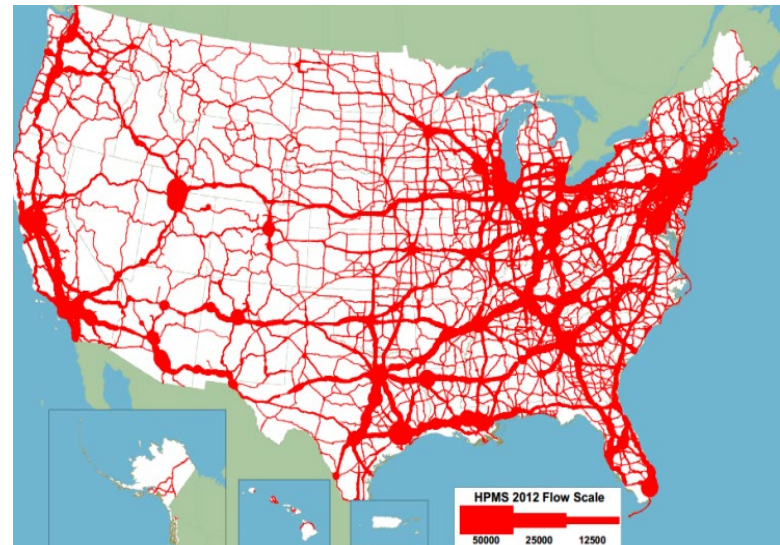
- Industry uses – tracking, fleet management, e-commerce
- Governmental uses – planning, oversight
- Freight network improvement – government reporting, network analysis, freight research



FHWA – Performance Data

USDOT Freight Data Projects

- FAF 5
- Performance Monitoring
 - Performance measures per FAST Act
- Freight Fluidity



Source: Bureau of Transportation Statistics FAF5

TRB Freight Data Efforts

- Freight Data and Urban Freight Committees
- Improvements in Freight Data workshops
- Data sharing



Source: Bill Eisele

CBP Land Border Customs Enforcement and Automated Systems

- Customs-Trade Partnership Against Terrorism (C-TPAT)
 - Voluntary program to promote adoption of security best practices among shippers, carriers, consignees, and their supply chain partners
 - Similar programs in Canada and Mexico
- Importer Security Filing – automated advanced filing
 - Importer provides 10 essential data elements of container & contents
 - Carrier provide vessel stow plan and container status messages
- Automated Commercial Environment (ACE)
 - Web-based system for filing imports across land borders for motor carriers
 - Automated Broker Interface for electronic filings

Benefits of Freight ITS

- Safety – goal to reduce crashes. ADAS, ADS help
- Productivity – Tech-Celerate NOW ROI Brochure
- Mobility – travel time savings, shipment reliability
- Energy and environmental impacts
- Efficiency – route planning
- Customer satisfaction – advanced shipment information

ITS JPO Benefits Tool and Website

<https://www.itskrs.its.dot.gov/benefits>

Future Freight Research

- L4 Automated Vehicles
- ADAS and ADS
- Cooperative ADS and increased truck platooning
- Smart corridor and similar infrastructure
- Electric trucks
- Last Mile robotic delivery vehicles
- Freight data sharing and coordination
- Workforce implications

Summary

What we've learned:

- Supply chain management is important to the United State and world economy and has been tested during the pandemic.
- All parties to the supply chain use and benefit from freight ITS and freight data
- Technology shows promise for helping address trucking industry problems including truck parking
- ADAS is being used and implemented now, with *Tech-Celerate NOW* an important advocacy program
- ADS has been demonstrated on Texas and Arizona interstates; research and demonstrations will continue
- Electric trucks are being implemented, but need charging stations for widespread implementation

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Acknowledgements

- I. Michael Wolfe, original co-author
- Niloo Parvinashtiani, ITE, and rest of ITE team
- ITS JPO's PCB program and USDOT coordinators and reviewers
- Dan Murray, ATRI
- Dan Smith, Tioga Group
- Bill Eisele, Texas A&M Transportation Institute