Trailer Tracking: Background Issues

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January 8, 2008

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RAC:
- Freight Carriers
- Federal/State Government
- Labor
- Suppliers/vendors
- Academia
Board of Directors

Key Realities

- Trucking
  - Profit Margins of 3.6%
  - Highly Competitive
    - 640K Carriers with U.S. DOT; 100K in last 3 years
    - Competitive edges are needed
  - Cargo Claims up/costly
    - Insurance costs have increased substantially since 2000
  - Asset Costs up/costly
    - Truck Tractors = $100K +
    - Trailers = $20K - $40K
Why Track?

- Operational Issues
  - Cargo Management / Shipper Requirements
  - Congestion
- Asset Management
  - Trailers = JIT Storage
  - Lost trailers = Lost revenue
  - Replacement costs = Lost profit
- Safety/ Security
  - Pre-9/11 Security = Cargo Theft
  - Post-9/11 Security = National Security
  - Blended Confusion Examples: Fuel and Cyanide

The Cost of Congestion

- Idled trucks cost industry $7.8 billion/ 243 million hours in 2004
- In 2006 industry spent $103.3B on diesel fuel; 2007 estimate: $110.9B
  - 2nd highest operating expense
  - As much as 25% of total operating costs
- No “congestion credit” in HOS
Top Industry Issues: 2005 vs 2006

Top Industry Issues - 2005
1. Fuel Costs
2. Driver Shortage
3. Insurance Costs
4. Hours-of-Service
5. Tolls/Highway Funding
6. Tort Reform/Legal Issues
7. Overlapping/Burdensome Regulations
8. Congestion
9. Environmental Issues
10. Truck Security

Top Industry Issues - 2006
1. Driver Shortage
2. Fuel Issues
3. Driver Retention
4. Hours-of-Service
5. Congestion
6. Government Regulations
7. Highway Infrastructure
8. Tort Reform
9. Tolls/Highway Funding
10. Environmental Issues

2007: Drum Roll Please...

Top Industry Issues - 2007
1. Hours-of-Service
2. Driver Shortage
3. Fuel Issues
4. Congestion
5. Government Regulation
6. Tolls/Highway Funding
7. Tort Reform
8. Truck Driver Training
9. Environmental Issues
10. On-Board Truck Technology
American Transportation Research Institute

www.atri-online.org

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FMCSA’s Security Role

- DOT has a supporting role with DHS to improve the secure transportation of hazardous materials
- FMCSA Technology Initiatives
  - Hazardous Materials Field Operational Test
  - Untethered Trailer Tracking System Pilot Test
  - Expanded Satellite Communications Pilot Test
  - Truck Disabling Technology Study
Trailer Vulnerabilities to Theft

- **Unattended Trailers**
  - Trailer Stockpiling
  - Lengthy yard checks
  - Erroneous pickups
  - Increased opportunities for theft

- **Lack of in-transit visibility**
  - Subcontracting to trucking companies to haul certain loads, losing trailer visibility at the switch
  - Delays at shippers when trailers are empty

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Untethered Trailer Tracking System

**Project Purpose**

“...leverage existing technology and develop an untethered trailer tracking and control system that will provide real-time trailer identification, location, geo-fencing, unscheduled movement notification, door sensors, and alarms.”

– Department of Transportation and Related Agencies Appropriations Bill, 2003
Project Partners

- **Industry Expert Panel**
  - Landstar
  - JB Hunt
  - Geologic Solutions
  - Skybitz

- **Federal Agency Review Team**
  - TSA
  - DOD
  - MARAD
  - FHWA
  - PHMSA

Pilot Test Overview

- **3-month pilot test**
- **3 Scenarios:**
  - Truckload Dry Van
  - High Value
  - Truckload Explosives

- **75 Trailers**
Baseline Typical Operations

- **Lengthy time of unknown status**
  - Untethered: 2-7 days where its status was unknown to all carriers
  - Cargo In transit: 1-2 days where the visibility into cargo status was limited or non-existent
  - Not at company locations: Trailer locations or status related to cargo unknown to one carrier

- **Site operations**
  - 5-6 hours spent searching for one particular trailer
  - 3-10 days before trailers were picked up
  - Up to 25 trailers sitting idle and unavailable to the carrier

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Trailer Mobile Communications and Sensors

- **Terrestrial UTT System**
  - GPS and cellular communications antennas
  - Rechargeable battery

- **Ultrasonic Cargo Sensor**
  - Detects cargo status change from empty to full and full to empty

- **Magnetic Door Sensor**
  - Monitors when a trailer door is opened or closed
Geo-fencing and Trailer Connection Status

- Geo-fencing
  - Notification of a trailer moving outside of its geo-fence
  - Capability to increase the position-polling rate after geofence violation

- Trailer connection and disconnection status

Security Benefits

- Theft reduction
  - Notifications of door opening and cargo status changes
  - Ability to track and recover stolen trailers

- Improved unauthorized trailer movement detection
  - Information about unauthorized disconnections or connections
  - Visibility into trailer locations
Operational Efficiency Benefits

- Improved asset management
  - Ability to find trailers and expedite deliveries through knowledge of trailer arrivals, unloading, and loading
  - Collection of detention charges with system data
  - Enhanced visibility of trailers and their cargo
  - Less time needed to rotate trailers for deliveries, which prevents the use of trailers as storage
  - Reduction of trailer to tractor ratios

New Systems Today

- Improved mapping (Google)
- Custom polygonal landmarks
- New trailer applications (flatbed, tanker, reefer, container)
- Solar charging system
- Smart sensor departure and arrival data
- Idle time reports
- Custom reporting
Thank you for your attention!

Contact Information:

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About Celadon

- Trucking Operations:
  - 2,900 tractors (including 350 Canadian, 250 Mexican)
  - 8,100 trailers
- 950 Miles Average Length of Haul
- 52% Domestic/U.S.
- 48% Crosses Mexican or Canadian border
- Strong Driver Base
- Safety Focus
- Technology Focus
- Non-Asset Based Businesses

Trailer Tracking Objectives

- Decrease in Trailer Idle Time Costs
- Decrease in Fuel Costs Searching for Trailers
- Increase in Trailer Detention Billing
- Improve Truck Productivity
- Increase Trailer and Cargo Security
Current Deployment

- Installed on 3,000+ units
- All units deployed with cargo sensor
- Full integration with operational system

Exception Based Integration

- Trailer Connect
- Trailer Disconnect
- Cargo Loaded
- Cargo Empty
- Geo-Fence
- Status Report (Pings)
- Low Battery
- Battery Replacement
Exception Based Alerts

- **Connect**
  - Tractor not assigned to trailer that it is being connected to

- **Disconnect**
  - Tractor disconnecting at an unauthorized location
  - Trailer disconnected at a customer location not identified as a drop location

Exception Based Alerts

- **Loaded**
  - Trailer loaded detected but order is not generated in system

- **Empty**
  - Tractor attached to trailer specified as a drop location

- **Geofence**
  - Trailer being pulled by non-Celadon equipment
  - Trailer departing geo-fence is not assigned on an order
Trailer Tracking Benefits

- Improved business operations and customer service
- Reduced wasted fuel
- Improved driver and tractor productivity
- Enhanced detention billing
- Increased trailer and cargo security
- Increased visibility of freight during third-party moves
- Optimized trailer inventory pools and reduced yard checks
- Provides mechanism for auto arrive and depart

Implementation Hurdles

- In order to recognize a connect or disconnect, the tractor must have a special in-line fuse.
- Coordination of equipment installations
- Quality control and diagnostic checks prior to trailer being released to the fleet
- Training of maintenance staff to troubleshoot potential hardware issues
- Systems integration
- Training of Operations staff in handling alert events
LANDSTAR

Model Definition

Landstar is a non-asset based provider of transportation capacity delivering safe, specialized transportation services to a broad range of customers utilizing a network of agents, third party capacity owners and employees.
Business Model
Network Connection
Information Flow

- Capacity
- Landstar
- Agents
- Customers

Business Model
Third Party Capacity Network

- Business Capacity Owners (BCOs)
- Broker carrier capacity
- Railroads
- Air cargo carriers
- Ocean cargo carriers
- Warehouse Capacity Owners (WCOs)
Business Model
Third Party Capacity Network
BCOs

<table>
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<tr>
<th>Year</th>
<th>Number of BCOs</th>
<th>Number of Trucks Supplied by BCOs</th>
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<td>2004</td>
<td>7,800</td>
<td>8,677</td>
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<tr>
<td>2005</td>
<td>8,011</td>
<td>8,728</td>
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<tr>
<td>2006</td>
<td>8,516</td>
<td>9,205</td>
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Business Model
Third Party Capacity Network
Turnover Rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Turnover Rate - Trucks Supplied by BCOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>34.9%</td>
</tr>
<tr>
<td>2005</td>
<td>31.5%</td>
</tr>
<tr>
<td>2006</td>
<td>27.5%</td>
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</table>
Landstar’s Search for a Tracking System

- Landstar started looking at tracking systems in 1997:
  - Landstar’s purpose of finding a tracking system was to better track and control our assets
  - Landstar researched the advantages and disadvantages of a tethered and an untethered system
  - Landstar weighed the advantages and disadvantages of GPS versus Cellular
  - Landstar leased 300 Xtra-leases trailers equipped with a tethered Terrion tracking system as a test subject

Landstar’s Search for a Tracking System

- Results of Landstar’s Research:
  - In 2002, Landstar decided at that time that an untethered tracking system would fit our needs best. There were several reasons:
    - Make up truck fleet
      - Most model year tractors built around 1997 or before did not have constant power to the center pin on the seven way, which is necessary to recharge a tethered units battery.
    - At least half the fleet was to be retrofitted and we needed an application the could be installed easily on a loaded trailer.
    - Ease of install
    - Small and Covert
    - Preferred a device that limited warranty issues by manufactures such as penetrating the skin of the trailer with a tethered systems antenna.
    - Data from device must be able to be integrated into Landstar’s system.
    - Landstar needed an upgradeable system which can change with our business environment
Benefits of Utilizing a Tracking System

- Increased revenue and loads per trailer due to improved utilization of equipment
- Allows Landstar to service their customers in an efficient manner
- Helps improve safety and compliance
- Assists in retention efforts with Business Capacity Owners
- Able to manage maintenance schedules of equipment
- Assists in theft prevention and recovery of lost or stolen equipment
- Skybitz System allows Landstar agents to utilize Brokerage Carrier Partners

Skybitz: Future Benefits

- Track and Trace; shows the tractor id when it is hooked and when it unhooks from a trailer
- Smart sensor tracking
- Door sensors; it allows Landstar to see when the trailer doors are opened or closed
- The use of cargo sensors
- Skybitz is able to be upgraded to help meet our changing business environment
- Customers will have the ability to track their shipments on their schedule
Presentation Summary

- Helps improve safety and compliance
- Helps service our customers more efficiently
- Improves utilization of Landstar equipment
- Assists in the recovery of missing or stolen trailers
- Has allowed Landstar to utilize our Brokerage Capacity Partners
- Skybitz is a covert system
- Skybitz is an upgradeable system
- Has allowed Landstar to increase the loads per trailer, which has increased revenue through better utilization
- Manage maintenance repairs and inspection schedules more efficiently
UNTETHERED TRAILER TRACKING SYSTEMS

FMCSA Office of Analysis, Research and Technology

Tuesday, January 8, 2008

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