GPS and IFTA/IRP

Diana Kay (FL)
Jeff Hood (IN)
Robert Weber (CT)
Hoa Quach (AB)
Agenda

- GPS Basics
- Controls in an IT Environment
- IFTA/IRP Requirements

- GPS Specific Topics
  - GPS Survey Questionnaire
  - Definition of a “Trip”
  - Real Life Examples
How does GPS work?

- 24 + satellites orbit the earth searching for GPS receivers
- When a receiver is in contact with three or more satellites, the location of the receiver is determined
- This location is expressed in Latitude and Longitude and is stored along with the precise time of its calculation
How does GPS work?

• The GPS receiver is attached to a micro computer which takes the information, interprets it, then stores it or passes it on to a communication device.

• The GPS data is sent to a computer (perhaps a server) and is available for calculating distance reports for use in Tax and Licensing.
How does GPS work?

• These GPS points can be calculated as frequently as once per second which allows a precise calculation of speed and direction of travel.

• In most systems, not all of these points are stored. The recording interval could be from two minutes up to an hour.

• The shorter the interval, the larger the number of points and the greater the accuracy.
Accuracy of GPS

• Generally accuracy should be within 15 meters (50 feet)
• Accuracy can be improved through the use of Differential GPS (DGPS) and Wide Area Augmentations System (WAAS), these can increase accuracy to within 1-3 meters (3 – 10 feet)
• Filters and algorithms have been developed to minimize distortions in the data
• Accuracy in measuring routes of travel increases with the frequency of recording
• For example, if points are recorded every 5 minutes it is more accurate than every 30 minutes
Methods of Calculating Distance

- Use the continuous distance calculation (every second) and accumulate distance which can be added to recorded points.
- Calculate straight-line distances between recorded points.
- Get distances from an external source such as an odometer or a “Miler” program.
Distance Calculation

- If straight-line calculations are used with infrequent data records, the distance may be under reported.
- If continuous calculations are used (every second), then the frequency of recording is less important.
Assigning Distances to Jurisdictions
Assigning distance to Jurisdictions

• Data could be run through a Miler program which assigns the distance to each jurisdiction.

• Distribution of distances can be done by the use of “Geofencing”.
What is a Geo-Fence and How Does it Work?

• Geo-fence is a virtual perimeter for a real-world geographic area.

• Allows users of the system to draw zones around places of work (i.e. jurisdiction borders).

• Using GPS, Geo-fencing may be used to monitor whether a tracked vehicle stays within certain boundaries, or compare the vehicle’s tracked position to predefined virtual boundaries.

• Notification of such occurrences usually include date, time, and location that the virtual boundary was crossed.
Use of Geo-Fencing

• Describe a polygon using Lat and Long
• Use an algorithm to determine when a truck enters or leaves a polygon
• Set up all states and provinces as contiguous polygons
• Calculate the distance traveled in each jurisdiction (polygon)
IT Controls

• Subset of enterprise’s internal controls.
• Objective is confidentiality, integrity, availability of the data.

a) General Controls
b) Application Controls
General Controls:
1. Change management procedures
2. Security Policies, Standards and Processes
3. Disaster Recover

Application Controls:
1. Completeness Checks.
2. Validity Checks
3. Authorization
4. Input Controls
IRP 502 & IFTA P620
(Printed Reports)

• Printed reports must be produced which replace handwritten trip reports.

• Retained for audit

• Vehicle and fleet summaries.
IRP 504 & IFTA P660
(Minimum Device Requirements)

• Manufacturer certification.
• Security – tamperproof and prevent altering of information.
• Functionality – warnings if devices quits.
• Date and time stamping.
• Automatic update a life-to-date odometer or operator enters odometer.
IRP 505 & IFTA P640
(Data Collection Requirements)

• Distance (IFTA and IRP)

• Fuel (IFTA)
IRP 506 & IFTA P650
(Reporting Requirements)

- Trip Reports
- Individual Vehicle Reports
- Summary Reports (Monthly, Quarterly, Annual)
- Exception Reports
- Calibration Reports
GPS Survey Questionnaire

• Purpose is to help the auditor gain an understanding of the carrier’s system.
• Seek information on the system from the carrier’s personnel to provide sufficient knowledge to conduct the audit.
What Information Should be Obtained?

- General System Information
- Internal Controls
- System Reporting capabilities
- Data Retention
General System Information

• Type of GPS System
• How often are pings transmitted?
  – Are all pings recorded?
• What data is recorded by the system?
• Does the system record odometer readings?
  – If it does at what points are they captured?
General System Information (cont’d)

• Are other software programs used in addition to the GPS to calculate fuel/distance?
  – If yes, what is the other software and its function?
Internal Controls

• Can exception reports be generated & printed?
• Is GPS data being edited?
  – Why?
  – What is being edited?
• Can the driver defeat or tamper with the GPS?
• Does the GPS rely on the truck’s battery for power?
• How would you know if a truck was being towed? (moving but not accruing distance)
Internal Controls (cont’d)

• Are you alerted when the GPS is not receiving a signal from a unit or there is a problem with the signal?
• What procedures or policies are in place for recording distance information if GPS were to malfunction?
• Are there units not equipped with GPS?
  – Request a listing of those units by unit #.
Internal Controls (cont’d)

• If units are operating without GPS what records are kept for those units?
• Are there any other functions/Internal Controls that would help in understanding the system?
Can the following reports be produced?

- Fleet Distance (Total & Jurisdictional distance per unit and the fleet)
- Unit Distance Summaries (Total & Jurisdictional distances)
- Total & Jurisdictional distance per trip
- Routes of travel (detail of GPS location points) by trip
System Reporting Capabilities (cont’d)

• What other reports are available that are useful for a distance/fuel audit?
• What reports are used to prepare IFTA returns?
• What reports are used to prepare IRP renewals?
Data Retention

- How long are printed GPS reports retained?
- How long does the system store and allow retrieval of prior period printed/non-printed reports?
Required Trip Data

P640 – Data Collection Requirements

- Date of Trip (starting and ending);
- Trip origin and destination (location code is acceptable);
- Routes of travel or latitude/longitude positions used in lieu thereof (may be waived by base jurisdiction).
- Beginning and ending odometer or hubodometer reading of the trip (may be waived by base jurisdiction);
- Total trip distance;
- Distance by jurisdiction;
- Power unit number or vehicle identification number;
- Vehicle fleet number; and
- Registrant's name.
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GPS CSI