Using GPS for Fleet Management

GPS is an important tool for fleet management. GPS has become synonymous for all sorts of mobile technologies. This white paper will explore the use of GPS in fleet technology, how it works with other technologies, and how you can make an informed decision on the correct technology for your fleet.

What exactly is GPS?

The Global Positioning System (GPS) is a satellite-based navigation system made up of a network of 24 satellites placed into orbit by the U.S. Department of Defense. GPS was originally intended for military applications; today the system is available for civilian use. GPS works in any weather condition, anywhere in the world, 24 hours a day. There are no subscription fees or setup charges to use GPS. It is a freely broadcast signal originating from this constellation of satellites.

GPS satellites circle the earth in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. A GPS receiver must be locked on to the signal of at least three satellites to calculate a 2D position (latitude and longitude) and track movement. With four or more satellites in view, the receiver can determine the user's 3D position (latitude, longitude and altitude).

The GPS receiver knows the identification of each satellite it is receiving a signal from, its position, and the distance from that satellite to the receiver. When the GPS receiver knows the exact distance from each of the satellites it can “see”, the result is known as a “fix”. This “fix” is translated to latitude and longitude readings.

GPS is not two way communications, it does not allow users to send text messages or “talk” to other users. Like an FM radio signal, it is receive only. You can “tune in” to GPS simply by buying a receiver and reading the results visually on a display, or electronically via a data stream.

How is GPS used for basic fleet management?

The Global Positioning System provides a single piece of information – but a very important piece of information. A GPS receiver on the vehicle is able to record the current position. Position update frequencies vary according to the device itself, from several times a second to once every few minutes. By determining the time between these recorded positions, the device can also determine the speed of travel.

Onboard the vehicle, the driver can determine the exact position of the vehicle if the GPS device has a display. When that recorded position is layered on top of a map, the driver can see their current position on a map – much more useful than simply knowing the latitude/longitude coordinates. When we then take the current position, display that position layered on top of a map, and add software that allows routing between two or more points – we have the GPS navigation devices that are prevalent today in the aftermarket and as OEM components. At this point, however, the information is still on the vehicle. The vehicle is not connected to anyone or anything else.

When the onboard GPS receiver is connected to some sort of communications modem, this information can be transmitted back to the office. Almost any wireless mode has been used to transmit GPS information back to the office; from free “line of sight” local area wireless to wide area terrestrial and satellite modes.
GPS is incapable of carrying two-way traffic. It is always another device that carries the communications traffic. When you use a commercial terrestrial network (such as GSM or 1xRTT) or a satellite network, there is a charge for these services by the provider or a reseller.

The term “telematics” refers to the integrated use of GPS, onboard computing, and communications. The most basic telematics device generally contains a GPS receiver, a modem, and some form of logic or memory to provide intelligent caching when GPS is blocked from view (such as overpasses, garages, tunnels, and urban canyons) and to store recorded data when the modem is out of range. Typically, these components are packaged in the same enclosure and installed inside the passenger compartment of the vehicle.

Combined with other vehicles’ information, the fleet manager can see a more complete picture of the fleet’s activities. The most recent position of each vehicle is overlaid on a map. In addition, most applications show historical “breadcrumb” trails that include position (show as an icon on a map) and vehicle speed when that breadcrumb was reported.

**How is GPS used in a complete fleet management system?**

This basic ability to know a recent position of your vehicles is helpful when you need to know where your vehicles are located. It may not be sufficient when more advanced information is needed from vehicles or drivers. When your fleet reaches a certain size, the position of your vehicles is not helpful. Knowing that the work was properly planned, tasks are being properly executed, and that your expectations are being met may require more than a simple position report. GPS makes these enhanced functions feasible – other technologies make it possible.

This starts with determining the workload for your fleet, and anticipating future work. These different tasks are identified and grouped together to make the most of drivers’ time, travel the least distance, and satisfy time requirements. These tasks are grouped together into jobs, routes, or loads. These grouped tasks are then assigned to the driver who is best qualified, geographically positioned, and has the legal ability to carry out the assignment. The proper equipment is then assigned, utilizing the fewest vehicles appropriate for the job. Routes are created based on traffic, distance, and service expectations.

As the fleet carries out these tasks, GPS positions are overlaid onto the route plan. This gives fleet managers insight into the execution of the planned work – which in many cases is considerably more valuable than simply knowing where a vehicle is located. Drivers can send two-way text messages with unusual situations or verifying tasks. The entire supply chain becomes visible, allowing consistent and timely customer service. Coordination with internal and external customers reduces variable operating costs and enhances revenue. In addition to the GPS-equipped telematics device, a driver display device is usually necessary. This allows the driver to read messages and warnings, send messages, comply with applicable Hours of Service regulations, electronically collect confirmation signatures, scan bar codes, or read RFID tags. Virtually any function drivers perform manually can be automated with the proper device in the vehicle.
Managers can view driver metrics to maximize fuel economy and encourage safe driving habits. Detailed second by second data can recreate vehicle operating conditions in the event of an accident or incident. In many cases, this requires a telematics device that records vehicle sensor or data bus activity in addition to GPS.

**What technology works for you?**

It is important to use a systematic approach to find the right system. Fleet management systems have been around for a very long time, there should be no reason to use an experimental or impractical system. Take your time and do your homework.

1. **What do you want to do?** Make a list of the things that are important to your fleet - categorizing them from mandatory, to important, to unnecessary. At what price will you give up certain features?

2. **Consider interviewing other fleets**, using trusted advisors or vendors, and working with trade associations. Who are your peers happy with? What are they dissatisfied with? Are they seeing a return on their investment and an improvement in their operations?

3. **Are you going to automate regulatory compliance?** Make certain that the vendor can prove compliance with applicable regulations.

4. **Technology is always evolving**; you can't wait for the next “big thing”. However, make sure that your vendor uses a current technology that is not obsolete.

5. **Make a short list of vendors** that can meet the criteria in steps 1-4.

6. **Meet with vendors.** Determine the feasibility of their claims, their ability to educate and implement your fleet, and their ability and willingness to provide service and support for the projected life of the system.

**Justifying your decision.**

Telematics devices have been around for a long time. The savings and enhancements are well documented. The first telematics device was tested at JB Hunt Transport in 1978 after four years of development, and became commercially available in 1981. GPS was first introduced to fleets in 1995. The internet was first used to deliver telematics information in 1997. The cost of wide-area communications has dramatically dropped, hardware is less expensive and more capable, and options have exponentially increased. Onboard vehicle telematics technology is a necessary tool for many fleets.

The savings from driving behavior modification are universal and impressive. Savings from increased vehicle utilization and enhanced customer service are specific to your operations. A 2008 study by the Aberdeen group found that surveyed commercial fleets who have adopted telematics systems:

- Reduced variable operating costs 10.4%
- Reduced vehicle maintenance downtime 15.4%
- Increased vehicle utilization 13%
- Increased regulatory compliance 25.8%

Thank you for your interest in this white paper. You can learn more about telematics, fleet management systems, and potential savings at [www.loadtrek.net](http://www.loadtrek.net). You can contact the author of this report, Joel Beal, via e-mail at joelbeal@loadtrek.net.