White Paper

GPS Fleet Management: A Buyer's Guide

Introduction

Not more than a decade ago there were a handful of GPS tracking companies offering a working solution. The choice was limited.

Fast forward to today, the industry has swollen to hundreds of core suppliers, with re-labelled and franchised options extending that handful into the thousands.

Nowadays, it's easy to become overwhelmed by the myriad of options available all at varying price points. The guide below aims to help you understand the options.

What is GPS fleet management?

GPS tracking is referred to as GPS fleet management, GPS asset management, vehicle telematics and many other creative buzzwords and acronyms. You'll find a glossary of terms at the end of this guide.

In short, a GPS fleet management system is a combination of hardware, software, and telecommunications.

A GPS tracking unit is installed in the vehicle (or other fixed/mobile asset) and includes a connection to the mobile network and, in some cases, a satellite communications platform such as Inmarsat, Iridium or Globalstar. It also has a GPS receiver as a minimum. Different models allow for a range of different inputs, outputs and add-ons.

The unit records GPS location data and then at regular intervals it transmits that data, via the cellular network or alternative communications platform, back to servers where it is stored.

The fleet manager then accesses that information via a software application (either a downloaded application that accesses the stored data, or a browser-based/cloud solution) allowing them to see where the vehicles are. They can also view historical data in all but the most basic of systems.

This is the framework of a GPS fleet management system, however, not all of the many thousands of products on offer are this limited.

Basic features

So let's break down what you should expect as a minimum then look at what else is available to add value or for specific applications.

If you're looking for a system to track your personal vehicle simply for security purposes, or to keep an eye on a young driver, then these basic systems may be all you need. They'll provide a dot on a map, perhaps some speed alerts or reports, and maybe a print-out of the historical location data.

For a commercial application, even if only for a few vehicles, you need to be sure your system includes the following standard features:

- Run sheet reporting

- Tamper alerting

- Replays

- Location-based alerting

- Scheduled reporting

This is the minimum specification required to benefit from a commercial fleet management application.

Benefits

The basic features listed above will allow your business to increase productivity and efficiency while reducing operating costs, improve customer service outcomes, and reduce risk.

Productivity

The act of installing a GPS tracker into an employee-driven vehicle will often result in employees being less inclined to take advantage of the fact that they are working without supervision.

This is why GPS tracking is often compared to having a manager in the passenger seat. The transparent nature of GPS means that, invariably, mobile staff get more done.

Efficiency

From the office, staff involved with planning work for the mobile workforce are much better placed to make planning decisions that will make the workforce more efficient. This further drives productivity without increasing costs.

Operating Costs

By increasing efficiency, reducing private mileage, and ensuring accurate time sheets, adopters of GPS fleet management are able to reduce operating costs dramatically. What is an hour of saved wages worth to your business - per employee, per week? How much would a 100 kilometre reduction in travel save you each week? These two areas of operation alone can reduce costs by over $600 per vehicle per month.

Customer Service

Imagine all of your office-based staff being able to see the current location of all of your field staff live on a map, and thus responding to customer enquiries about ETAs instantly and accurately. GPS also allows businesses to quickly respond to enquiries about time on site if a customer queries an invoice.

Some systems will also allow you to set up automatic alerts that go directly to the customer when you arrive and again when you leave. Some also provide the ability to send commercial or project customers a monthly summary report of all of your site visits. It's these sort of features that enable companies to make more compelling tender responses and win and retain more business.

Reducing Risk

Being able to keep an eye on your mobile workforce to ensure they got home at the end of the day, are not speeding, and haven't been stationary too long, is a simple way to reduce risk in your business.

Having a GPS fleet management system also indicates to corporate clients and government authorities that you have a system in place to manage risks in your business. This has helped countless businesses around the world save lives, save money, and win contracts.

Additional features and benefits

In addition to the the features and benefits above, some systems include additional features that may be of benefit to some companies. Often these features come at a premium, but more and more they are included as standard. Some of the features that may provide additional value for your business could include:

1. Maintenance manager

2. Driver behaviour monitoring (incl. accident alert)

3. Driver ID

4. Inputs and Outputs (I/O)

5. Panic/Duress button

6. Roll-over alerting

7. Advanced map tools (show nearest, traffic, ETA)

8. In-Cab devices (navigation, messaging, job management)

9. Integration (API)

10. Dashboards

11. Mobile apps (i.e Android/iOS)

12. Satellite communications (such as Iridium, Globalstar, Inmarsat etc.)

13. Job and freight management

1. Maintenance manager

A quality GPS fleet management system will incorporate a fleet/asset maintenance manager. The maintenance manager allows you to calibrate the actual odometer and engine hours with the GPS and set the due date/kms/hours for the next service or inspection. When the vehicle or asset gets to within a predetermined window of the required service, it will provide an alert and email reminder.

This allows the fleet manager to keep the vehicles properly maintained, safe, and running economically. Some systems will allow for storing a complete maintenance history, including one-off repairs and maintenance.

This forms an essential component of a complete WH&S plan for your mobile workforce. For more information on this, see Managing Fleet Safety - Your Obligations, Options and Opportunities

2. Driver behaviour monitoring

It's one thing to provide a safe, well maintained vehicle, but quite another to ensure it is being used in a safe and sustainable way.

Quality GPS Systems will always include driver behaviour monitoring as an option. Sometimes called 'driver scorecard', it means that the GPS unit has a built-in (or add-on) G-Force sensor that can report or alert when excessive forces are placed on the vehicle. These include:

- Harsh Acceleration

- Harsh Braking

- Harsh Cornering

The advantage of having a system that can provide this data is that you can rank drivers, reward safe drivers, and re-educate poor performers for a safer and more economical fleet.

3. Driver identification

Driver ID (DID) can be achieved in a few different ways: some systems use a PIN pad, others use RFID or 1-Wire/Dallas Tags (Driver ID Tags), and some use a logon number on an in-cab screen.

In many businesses, the driver of a vehicle is set. It's the same driver in the same vehicle every day. However, a lot of businesses have a pool of vehicles and the drivers of these regularly change.

In the latter scenario, it is important to keep track and a record of who is in what vehicle. The main reason for this is reporting: if you can't identify who did the work, then there isn't much point producing a run sheet report. If you don't know who caused the breach, there isn't much point in a speeding alert. There is also a financial reason: if you receive traffic infringements (such as speeding or parking tickets) and can't prove who the driver was, then the company is liable to pay the fine, rather than the actual culprit. Often these fines are higher when they are for an organisation rather than an individual. This costs some companies many thousands of dollars each year.

4. Inputs and Outputs

In addition to picking up ignition on and off, most decent tracking units will also have a number of inputs and outputs. This greatly increases the potential of GPS fleet management from just a dot on a map to a powerful tool.

Examples of use cases include:

- Seat-belt sensor

- Handbrake/4WD sensor

- Engine overtemp sensor

- Door open/close

- Temperature monitoring

- PTO engage (pump on/off, sweeper in use, mower engaged etc.)

- Remote engine shut-off

There are a wide range of applications for using the inputs and outputs. So long as there is a wire or a switch to connect to that has an on or off (or high/low) state, you can record that information and use it to create alerts and reports.

5. Panic/Duress button

An essential part of a complete IVMS (In Vehicle Monitoring System - typically required for vehicles in the mining and resources sectors), the Panic button is a button or switch on the dashboard connected to one of the tracker's inputs and set to create an alert/email when used.

This feature is a great option to ensure you get the maximum WH&S benefits from your GPS fleet management system.

6. Roll-over alerts

In addition to driver behaviour monitoring, the g-force sensor can often be used to trigger rollover alerts. In a serious incident, if a vehicle goes on its roof or rolls, the sensor (a separate device attached to the tracker via an input in some cases) will trigger an alert.

7. Advanced map tools

In addition to seeing the vehicle and sites/locations/geofences on the map, some systems include additional functionality, including features such as:

- Street-view (Google or similar)

- Live Traffic overlay

- ETA functionality

- Show nearest vehicle function

- Topographic maps

- Advanced search (fuzzy logic)

8. In-cab devices

A range of different in-cab devices are available, from very basic data terminals through to ruggedised tablet-type computers. Since the advent of the smartphone and other connected devices such as tablets, many businesses have switched from the in-cab data terminal-type devices to providing drivers with a single smart device. However, there is still a place for in-cab devices, and some of the new devices coming out may see this trend reverse. The latest Fleet products from Garmin, for example (Fleet 660/670), are ruggedised, Android-based, large-format smart devices that operate as a fit-for-purpose in-cab navigation unit, but provide a platform for running specialised applications for job management, freight management, driver ID and work diaries, email/messaging, field payments, and sign-on-glass. Talk to your GPS vendor about the range of options available.

9. Integration

Most decent software applications nowadays (especially cloud software) have integration tools (called an API). This allows you to increase the value of one bit of software by integrating with another. An example is integrating a job management system (such as simPRO Service) with your accounting package (such as Xero).

Some GPS fleet management systems have been successfully integrated with a range of other software products including freight management system and job management systems (seeing jobs and vehicles in the same screen and having data flow between the two programmes).

Ask your GPS vendor to advise the strength of their API and to show examples of integrations they have done, particularly integrations to other software programmes you use in your business.

10. Dashboards

In addition to reporting, some systems incorporate dashboards. The better dashboards are customisable to suit the particular metrics that are of benefit to either that user or to the business as a whole.

Usually, these dashboards allow you to drill down into a particular KPI. For example, you might have a graph showing the number of speeding offences per vehicle for the week. If you click on any vehicle in the graph, it will then display a graph of the offences per day for that vehicle. If you click on a day, it will then list the offences for that vehicle on that particular day.

This is a fantastic management tool, as it means that rather than looking at text and numbers on a report, you can compare performance across the fleet in a format that is easy to understand. Some of the metrics you might find included could be:

- Fleet use

- Speeding events

- Idling time

- Time on site (known and unknown)

- Travel time

- Harsh vehicle use events (driver behaviour/driver scorecard)

- Number of gobs

Being able to see these metrics, clearly displayed and ranked, means managers can make important business decisions quickly with all the information at their fingertips.

11. Mobile applications

In most modern GPS fleet management systems, the data is stored on hosted servers. This means that most GPS vendors will also have a mobile app, allowing you to access a cut-down version of the software from your mobile phone or tablet.

These apps vary in features, almost as much as the desktop versions. Some are just a dot on a map, some allow messaging, reporting, alert notifications, basic job management, and more. Due to the limited screen size on a mobile device, be sure that whichever vendor you choose has a clear, easy-to-use app that functions well on these smaller devices.

A mobile app is a great way to give all the mobile employees easy access to locate their colleagues for support or in an emergency.

12. Satellite communications

In the early days of GPS fleet management, you had to wait for the vehicle to get back to the depot to download all of the data either manually or over radio. Then came the ability to SMS the tracker for an update. Now, the trackers are automatically sending their complete data at regular intervals via GPRS (i.e. the 2G or 3G mobile network).

The vast majority of units available now have onboard data storage, so when the unit is out of 2G/3G coverage, they simply store all of the tracking data and send it through when the vehicle enters coverage. This is fine for most business, particularly metro operations.

Some vendors will offer an additional option: satellite communications (Satcom). This is typically provided by carriers such as Iridium, GlobalStar or Inmarsat, and although this platform has been around for over 30 years, it is still an expensive option.

The reason that some businesses opt to purchase the additional hardware and pay the extra monthly charge for airtime is for situations when the vehicles are used mostly in areas with no mobile coverage. Other businesses pay the extra simply because the vehicles are in remote and/or dangerous areas often enough that they need 100% coverage for WH&S reasons. (E.g., some oil and gas contractors, particularly in lines/pipeline install and maintenance.) However, in this scenario, the employee should really have a satellite phone, making this functionality largely redundant.

Owing to the costs involved and the broad coverage of the mobile networks, satellite communications uptake has been slow, but expect it to get cheaper over time. Make sure that the trackers you purchase will be be able to integrate to Satcom modules down the track, should you ever need it.

13. Job and freight management

Often, once businesses have implemented and benefited from GPS tracking, not only do they wonder how they ever survived without it, but they start wanting to further the gains and savings.

One of the easiest ways to achieve that is with either additional fit-for-purpose business software, or looking at ways to integrate the fleet management with existing job or freight management systems.

(See Integration above)

Pricing

For a basic "dot on a map" system to track a personal vehicle, expect to pay less than $200 for the hardware and nothing for the software - and then supply your own SIM card and cover your data charges. Other suppliers will provide the hardware for "free" and supply the SIM card and data, but typically lock you into a $25-$50 per month service fee agreement of between 24-48 months.

For a basic commercial solution, add about 20% to the figures quoted above. Add 25-30% if it is a 3G solution (such as Telstra nextG connectivity) and/or the position updates more frequently than every 4-5 minutes.

For a good commercial solution that includes some of the additional features listed earlier, expect prices to start at about $600 for a 3G Plug & Play (OBDII) device that tracks at 2-minute intervals (or better) and around $35 per month (some with fixed-term contracts), and from about $700 for a hard-wired version.

In terms of add-on products such as in-cab screens, these vary wildly from less than $200 for no-brand 4" screens, to mid-tier 5" devices from reputable brands at around $300, to over $1000 for connected 6"-8" devices.

So allow for an investment of about $800 per vehicle on average and $35 per month with no fixed term (some providers will offer a finance or "all-in" fee, where you pay nothing upfront and then a monthly payment of $40-$100+ per month, depending on the term, complexity, and quality of the solution).

The future

The future for GPS fleet management is very exciting. Here at simTRAC, we are working on a range of very interesting projects that will extend the capacity of the "little black box" even further.

As mapping data improves and data costs come down, the possibilities for GPS tracking and telematics are endless. To ensure you make the most of these future developments, it is important that you partner with a cloud-based provider that issues regular updates (at no additional charge) and ensure your hardware is capable of taking on add-on products (by ensuring it has inputs and outputs, battery back-up and on-board memory). Also make sure you select a device that uses an appropriate network (i.e., avoid 2G units in Australia as the network is being shut down in 2016 so the units will then be useless).

Glossary

1-Wire™

1-Wire is a device communications system that provides low-speed data, signaling, and power over a single signal. It is typically used to communicate with small, inexpensive devices such as driver ID tags (DID) and digital thermometers (temperature monitoring).

The iButton (also known as the Dallas Key) is a mechanical packaging standard that places a 1-Wire component inside a small stainless steel "button" similar to a disk-shaped watch battery. iButtons are connected to 1-Wire bus systems by touching the key onto a reader, or the connection can be semi-permanent with a socket the iButton clips into (but can be easily removed from).

Each 1-Wire chip has a unique ID code. This feature makes the chips, especially in an iButton package, suitable for use as a Driver ID solution.

2G

Sometimes referred to as GSM, 2G is an abbreviation for "Second Generation" and is the digital telecommunications platform first used in 1991. It is now nearing end of life in many regions. Millions of GPS tracking units are still running on this network, but it has been surpassed by the faster and more stable Third

Generation standard (3G). In some countries, the 2G network has broader coverage than subsequent networks and is still the network of choice for GPS tracking. This is the case in the UK, but the opposite is true in the USA and Australia, where 3G is far superior and 2G is unlikely to still be operational by 2017.

3G

Sometimes referred to as HSPA or W-CDMA, 3G is a mobile telecommunications standard for voice and data services. It is faster than the original cellular networks and Second Generation (2G) networks and is more stable and secure. It typically has the broadest coverage and is the ideal network for GPS tracking units. In Australia, the best 3G network is Telstra's nextG network. In the UK, some industry experts are suggesting that 3G may be shut-down before the 2G network, however, there are no set plans to close any UK networks in the foreseeable future.

4G (and beyond)

Although these new generation platforms such as 4G and LTE are substantially faster in terms of data transfer, the data requirement for GPS tracking is very low, so these networks offer no real advantage. Also, the modems are typically more expensive, so it is more cost for no real advantage. The other issue is coverage, with 4G networks only having limited coverage in most countries.

Android

A mobile software operating system (OS) used on millions of tablets and mobile phones. It is the main alternative to Apple's iOS and is used by manufacturers such as Samsung, HTC and Huawei. It is also the platform for the new Garmin Fleet 660/670 in-cab devices.

API

Application Programming Interface - a set of functions and procedures that allow the creation of applications which access the features or data of an operating system, application, or other service. Basically, it is the tool by which a software application can be integrated with another application.

AVL

Automatic Vehicle Location - the location of a vehicle that is tracked transmitting data from the vehicle to a monitoring system. Another term for the GPS tracking software.

Black Box

Another name for a GPS tracking unit - the hardware that is at the core of a GPS fleet management system. Another name for a DCU, Tracker, IVU, etc.

CAN bus

A Controller Area Network bus is a vehicle "bus" standard, designed to allow devices to communicate with each other without a host computer. It is a specialised internal communications network that interconnects various components inside a vehicle, such as the braking system and Engine Control Unit (ECU - the engine computer).

It is a message-based protocol, designed originally for automotive applications. CAN bus is one of five protocols used in the OBD-II vehicle diagnostics standard (see below). Some GPS trackers can interface to the CAN bus (via the OBD-II diagnostics port) to capture and import vehicle use data back to the software, such as whether 4WD is engaged, the seatbelts are in use or the engine speed is acceptable (Revs/RPM), for example.

Cloud

A network of remote servers hosted on the Internet and used to store, manage, and process data in place of local servers or personal computers. Simply put, cloud computing means that users can access their data

remotely via either an app or their browser (such as Google Chrome or MS Internet Explorer), rather than having to have whole programmes loaded onto their computer and access the data via that computer or a local server. It is a far more flexible, reliable, and future-proof IT concept.

DCU

Data Collection Unit - another name for a GPS tracker.

DID

Driver Identification. From PIN pads and ID tags, this system allows the software application to produce reports and alerts based on driver rather than just vehicle, by identifying who is driving which vehicle in real-time.

ETA

Estimated time of arrival.

EWD/eLB

Electronic Work Diary/Electronic Logbook - by using an in-cab screen, some systems allow drivers to complete electronic work diaries. These are not necessarily legal or compliant in all locations, but is an emerging technology in the transport industry in particular.

FDT

Fleet Data Terminal - usually a ruggedised in-cab screen with simple input buttons or a keyboard. Mostly used in transport applications.

FMI

Fleet Management Interface - refers to Garmin's hardware and software interface allowing additional fleet management features via most of their standard PNDs.

IVMS

In-Vehicle Monitoring System - another term for GPS fleet management, however, it is commonly used to refer to a more complex solution, including a range of sensors to provide richer vehicle usage data for analysis and reporting (often a compliance requirement in the oil, gas and resources sector).

Geofence

Sometimes referred to as a Geolocation, Geo-boundary, Site or Location. A Geofence is typically a multi-sided shape drawn on the map to indicate a known area to allow for clearer reporting, or to create alerts on entry or exit of a boundary. Sites or Locations are often a similar tool, but are usually imported by address or lat/long with a selected radius (i.e. 25metres-2km).

GLONASS

Global Navigation Satellite System provides an alternative to Global Positioning System (GPS) and is the second alternative navigational system in operation with global coverage and of comparable precision. Adding a GLONASS receiver to the GPS tracker makes more satellites available, meaning positions can be fixed more quickly and accurately, especially in built-up areas where the view to some GPS satellites is obscured by buildings.

GPRS

General Packet Radio Service is the mobile data service on the 2G or 3G standard mobile networks.

GPS

Global Positioning System (or Global Positioning Satellites) is a space-based system that provides location and time information in all weather conditions, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites.

The system provides location capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver (i.e. a GPS tracker).

GSM

Global System for Mobile Communications, originally Groupe Spécial Mobile, is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second-generation (2G) digital cellular networks used by mobile phones.

2G networks developed as a replacement for first generation (1G) analog cellular networks, and the GSM standard originally described a digital, circuit-switched network optimised for full duplex voice telephony. This expanded over time to include data communications, first by circuit-switched transport, then by packet data transport via GPRS (see above).

IAP

Intelligent Access Programme is a transport industry-related programme developed by the TCA (Transport Certification Authority) in Australia. Transport companies with a certified GPS tracking system can join the programme, which then allows them to carry more weight, so long as they stick to approved routes.

iButton

See "1-Wire" above

iOS

Apple's proprietary operating system (iOS) is the platform that runs the Apple iPhone, iPad and iPod. Its primary competitor is the Android system, used by most other mobile electronics manufacturers.

IVU

In Vehicle Unit is another name for a GPS Tracker (see Black Box).

nextG

Telstra Australia's proprietary brand name for their 3G network, recognised as the broadest coverage of any mobile network in Australia.

OBDII

On-Board Diagnostics is a diagnostic port found in every passenger and light-commercial vehicle since 2008 (many vehicles post-1996 will have it also). It is designed for checking the vehicle for faults as it is connected to the vehicle computer. It is used to power a number of "Plug & Play" devices including some GPS tracking units. Typically this is found under or near the steering column.

OH&S

Occupational Health and Safety, sometimes called "Osh" or referred to as WH&S, relates to the responsibility of employers to provide safe work environments for employees and provide information and training to keep staff safe and healthy at work.

Plug & Play

See **OBDII**

PTO

Power Take Off - One of many on/off state components that can trigger an input on a tracker for improved vehicle use reporting. Power Take Off is found on some vehicles/plant/equipment and allows the engine to run auxiliary devices such as a pump.

PND

Personal Navigation Device, such as a Garmin, Navman or TomTom, is a small (usually 4"-7") in-cab screen used primarily for navigation. More and more though, these devices are becoming multi-use and include features such as live traffic and life-time free map updates, two-way messaging, and some even run Android and apps.

ROI

Return On Investment - simply put, how much you will either save through efficiencies or gain in increased sales/productivity, compared to the cost of the proposed tool.

Satcom

Satellite Communications, i.e. Iridium or Globalstar, requires additional hardware (satcom modem) to function.

Telematics

The transmission of data from one place to another. A term often used in GPS vehicle fleet management referring to collecting vehicle data and viewing it in software.

TCA

Transport Certification Authority.

WH&S

Workplace Health and Safety (sometimes referred to as **OH&S** - see above).