



STARFISH

(A GPRS based Automatic Vehicle Locator)

Versus

SMS based Automatic Vehicle Locator

What are GPRS and SMS?

GPRS is an acronym for Generalized Packet Radio Service. The definition below is extracted from <http://en.wikipedia.org> a public online encyclopedia.

“**General Packet Radio Service (GPRS)** is a [Mobile Data Service](#) available to users of [GSM](#) and [IS-136 mobile phones](#). GPRS data transfer is typically charged per megabyte of transferred data, while data communication via traditional circuit switching is billed per minute of connection time, independent of whether the user has actually transferred data or has been in an idle state. GPRS can be utilized for services such as [WAP](#) access, [SMS](#) and [MMS](#), but also for Internet communication services such as email and web access.”

What this means is that GPRS is a service available on the mobile phone used for transferring data. SMS uses this infrastructure also to transfer data.

However, as far as common usage is concerned, GPRS is related to MMS (Multimedia Messaging Service) and ICS (Internet Communications Service). When Starfish documents refer to GPRS it would specifically mean GPRS/ICS that is, Internet Communications Services. Starfish uses GPRS/ICS to transport its data back to the Starfish Servers. We have coined the phrase, “**Over the air, on the net**” to mean the same thing. Data is transferred over the air by radio waves and will end up on the Internet.

SMS (Short Messaging Service) is an older service that allows mobile phone users to send short messages to one another. SMS was originally part of the first GSM services, before GPRS, EDGE or 3G existed. However, when these standards came into being, SMS was implemented using these infrastructure. This fact is not commonly known and Automatic Vehicle Location System (AVLS) equipment are sometimes said to be GPRS when it is really using SMS for data transmission. Whereas they are technically correct, it confuses customers whose perception has been that GPRS is Internet and SMS is SMS.



What are the differences between GPRS/ICS and SMS?

SMS is very well known these days. Almost everyone with a mobile phone would have sent an SMS at some point in time. It is a simple and convenient way of sending information so long as they are text based. In another words, no pictures and no sounds. One can understand how SMS can be used by an AVLS to send data back from the vehicle to the central station.

SMS messages must not exceed 180 characters long. However, some mobile phones, for example Nokia, will break a message into 2 SMS messages if you key in a message longer than 180 characters and it will automatically stitch them up again when it is received with a similar branded phone.

SMS messages take time to deliver. This is because it goes through several “store and forward” stages in the system before it is finally delivered.

GPRS/ICS (Internet Communications Services) works differently. Firstly, you can send any sort of information you wish over ICS. This can be text messages, pictures and sounds.

There is also no limit on the amount of information you can send at one time. Unlike SMS that can be viewed as packets of information, ICS has no form and can be said to be a “streaming” service. Information flows in as it flows out from the other point, quite like water in a water pipe.

Furthermore, ICS can be perceived as a “Virtual Direct Circuit”. This means when a connection is made between two points, it is as if there is a piece of wire connecting the two together. When information is sent from one, it travels directly to the other almost immediately.

The charging method for these two services is also different. SMS is charged on a “packet” or message basis. In another words, it would cost just as much to send one character and 180 characters since both would fit in one packet or message.

ICS is charged on a character basis. For example, in Malaysia an SMS message could cost as cheap as 1 cent per message and ICS messages are charged at 10 cents for 10240 characters, then if 180 characters were sent by SMS, it would cost 1 cent. However if a message of 180 characters were sent via ICS, it would cost 0.175 cent. The most dramatic difference in prices will occur if only 1 character was sent. It would cost 1 cent via SMS and 0.00098 cents via ICS.

Therefore sending messages via SMS is much more expensive then sending it via GPRS/ICS.



Here is a table that summarizes the differences between SMS and GPRS/ICS.

	SMS	GPRS/ICS
1.	Can only send text messages.	Can send any sort of messages that includes text, pictures and sound.
2.	Each message is limited to 180 characters	There is no limit to the amount of data that can be sent.
3.	Messages are sent and delivered in packets.	Messages are streamed, like water in a water pipe.
4.	There is a delay between sending and receiving. This delay can be 15 seconds to several hours depending on congestion.	Data is received almost immediately when it is sent.
5.	Charges are based on per packet basis	Charges are based on a per character basis

Implications of using SMS in a ALVS

As discussed earlier, SMS is costly. To get around this problem, many SMS based ALVS systems work on a “demand” basis. This means if I wanted to know the location of a particular vehicle, I will have to send an SMS to it and wait for its response. There are two SMS messages involved, that is the request message and the response message.

The other argument for a request/response type arrangement is that you may not need to always know where the vehicle is located, so why spend the money to find out?

However, having said this, SMS based ALVS systems do send information back automatically as well and are often event triggered. For example, a message will be sent if the vehicle comes to a halt or exceeds a certain speed. There can be other events that will trigger the transmission. There are even SMS based ALVS systems that are programmed to send back information when the vehicle has traveled a certain distance, for example every 2 kilometers.

Implications of using GPRS/ICS in a ALVS

As explained earlier, GPRS/ICS is not as restrictive nor is it as costly as SMS. As such, much more can be done since a virtual direct circuit is present between the vehicle and the server. Transmission is also much faster than SMS. Typically, a GPRS/ICS based ALVS can send more data and quicker. Starfish uses this to do complex things like keeping a history of the journey. Another reason being is that there is now no need to work on a request/response basis as with SMS based systems. As can be seen in the next paragraph, GPRS/ICS based ALVS has a far more reduced probability of “losing” a vehicle.



GPS (Global Positioning System) shortcomings and remedy

Although this document is about GPRS/ICS and SMS, the fact that GPS is used together with either SMS or GPRS/ICS in an ALVS requires us to also consider GPS and its shortcomings.

GPS signals are very weak by the time it reaches the vehicle from outer space (about 70,000km above the earth). As such, extremely heavy foliage or underground places like tunnels, underground car parks or even within warehouses would cause the signal to fade to an extent when it can no longer be heard by the GPS receivers. When this happens, the receiver will no longer know its location and in the case of an ALVS application, the vehicle is technically lost.

As such, cities would be the bane of ALVS because most of the time the vehicle is parked in the basement car park of some buildings.

SMS working on a request/response basis would most likely suffer from this “lost” vehicle syndrome as a request for location will result in the receiver reply with a negative response as it no longer knows where it is.

Whereas a GPRS/ICS based ALVS will have its history leading to the building. Although it will not know where in the car park the vehicle is now located, the history will tell you which building it is in. Technically, the vehicle is lost too but then again it is not completely lost as with a request/response type system.

Another advantage of GPRS/ICS can be seen when a vehicle has been dismantled. This is a common thing when a vehicle is stolen as they are often dismantled for parts. In this case any device on board would be destroyed. A system based on the request/response architecture would have no response to a request. However, a GPRS/ICS system would still maintain its history to show the workshop as its last known point.

Therefore, in an ALVS system, GPRS/ICS is the remedy for the shortcomings of GPS.



Other considerations of a ALVS system

When an ALVS system has to manage many vehicles, there are other considerations that have to be considered. Here we discuss the impact of an SMS and GPRS/ICS on ALVS.

Locating vehicles in an area

If you wish to locate vehicles in a particular area, you will need to know where every vehicle in the fleet is located at that moment in time. In an SMS based system, the system will have to send an SMS to every vehicle in the fleet and wait for their return response to examine if they are in the area of interest. For large fleets, this can take some time not to mention the number of request messages that must be sent the number of responses that are expected. This is twice the number of vehicles in the fleet whenever this search is required.

In a GPRS/ICS type system, this is trivial. All that is required is a search into the databases to discover the vehicles within the area. No request messages need to be sent.

Route Compliance

This requires the vehicle to adhere to a particular route. In a SMS based system, messages must be sent constantly, perhaps every kilometer traveled. The period between transmissions cannot be too quick as it takes time to transmit a SMS message. Apart from the expense of the frequent SMS messages from the vehicle, there can still be a chance that the vehicle will take an unauthorized route and yet not be detected. This can happen within the transmission interval.

With GPRS/ICS a probability that a vehicle has taken an unauthorized route is near impossible as transmission is more intelligent and does not need to be in strict intervals as with SMS based system. Furthermore transmission can be very quick.

Road Hugging

When it is absolutely necessary to know the exact route the vehicle has traveled, only a GPRS/ICS system can deliver this information. This is because transmission by SMS is not quick enough to react to sharp turns. Furthermore, the manner in which a road winds may require more than one point being sent in quick succession.

Other

As discussed above, only GPRS/ICS can give an accurate last point to locate vehicles driven into warehouses or underground car parks.



Concluding Remarks

GPRS/ICS and SMS are GSM services that are used for data transfer. However, they work differently and the services are also charged in different manner. When considered as part of an ALVS system, GPRS/ICS provides more latitude to be able to satisfy the needs of fleet managers.

Whereas SMS works reasonably well in an ALVS system, its functional characteristics will impose limitations to what fleet managers can achieve in an ALVS system.

What remains to be said now is that the request/response strategy is engineered to send as little data as possible and the reason for so doing is driven by cost. As such the data communications bills for a SMS based system is cheaper. The less request for location is sent, the cheaper the bill would be but the consequence is that there is not much information in the form of history to process.

In a GPRS/ICS system, a lot more data is sent and the reason for doing so is functionality driven. Cost takes a second place because it is already priced very much cheaper than SMS. The flexibility of GPRS/ICS begs to be exploited to achieve the objectives of fleet managers. It will not come as a surprise that the data communications bills will cost justifiably more than an SMS based system.

Ultimately, the choice of price versus functionality is the prerogative of the fleet manager.