

## PINGz™ – The unique Global GSM Tracking service from TariffMan Ltd

### Introduction

Mobile phones have become part of daily life for billions of subscribers worldwide. The mobile phone companies construct networks so that subscribers are provided with the best reception and most complete cellular coverage possible. The most obvious evidence of this is the increasing number of masts (BTS, Base Station Transceivers) appearing alongside our road and rail networks and anywhere the mobile service is required.



This ever increasing 'Network' is now so entrenched in our society that it is now vital for the world economy and security to function properly. Whether we like it or not, just try and imagine life without a mobile device of some kind? Even if you do personally hold one, almost 98% of the adults that you know will have one.

So it stands to reason therefore, that as almost the entire adult population of the developed world owns a mobile device of some kind, developing these devices to provide us with more features and benefits will only improve our lives and make us more efficient as a society.

### Background

The world is changing, and like it or not, we must adapt with it. Our lives are becoming ever more demanding and the pressures of work and family lives are reducing our free time dramatically. Ironically, the very technology designed to enable us to free up more time for ourselves, has also enabled our employees to expect more and demand more productivity from us.

25 years ago, when you left work even for a few minutes break or to have lunch, you were completely unreachable; you left the office...at the office! Yet nowadays, even if you go outside for some fresh air, you are almost expected to take your mobile device with you "just in case!"

Yet this apparent negative impact upon our lives has also brought with it many advantages and has saved many lives. And it is on the positive aspects of the GSM world that we believe that we should focus our attention.



The ability to communicate almost anywhere in the world with family, friends and colleagues is an obvious advantage, but we believe that the ability to physically **locate** someone who is miles away simply by sending them a text message has an enormous potential also.

**PINGz™** is a service from TariffMan that is setting the standard in GSM location. Unlike its competitors such as LBS (location based services), PINGZ is constantly evolving. Its accuracy is almost 6 x that of Standard LBS and it is getting more accurate every day.

### The Basics

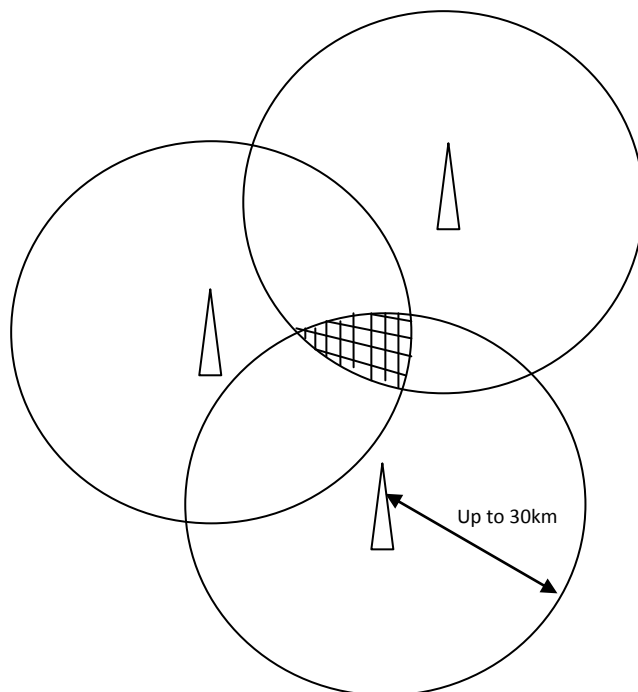
PINGZ can be a web-based service or a client only service depending upon the customer's requirement. It requires a simple software applet to be downloaded into the clients mobile device (currently 90% of all mobile devices are supported) which enables the device to receive position requests from our servers.

When a request (PING) is received, the device sends its GSM positional data back to our server for evaluation. This is then displayed on a mapping panel for the owner to view. Simple.

## How it Cellular tracking works:

Traditional cellular tracking technology works using the same principle as PINGZ which is 'Triangulation'. (In other words, directional signal strength data taken from at least 3 points to give a general location)

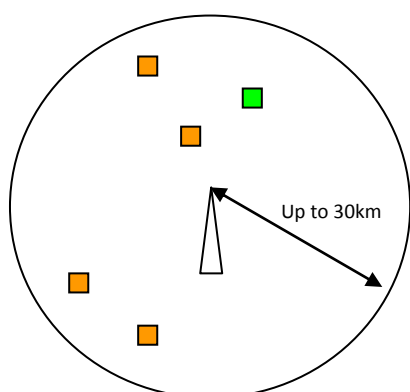
Fig1:



Here the *shaded* area gives us the approximate location of the signal (target). But as cellular towers can cover up to 60km in diameter - you can begin to see the problem. The search area could still be in excess of 10's of Km.

**LBS** (Location Based Services), is a predominantly UK system designed for general location data in order to promote other services such as local businesses near to your location, such as taxi companies or restaurants etc. But often this service is GSM network based so the data you receive is often only from one network and in most cases simply from the single cell tower that is 'servicing' or 'hosting' the particular mobile device.

Fig 2:



■ Taxi rank

■ Mobile device (actual) Position

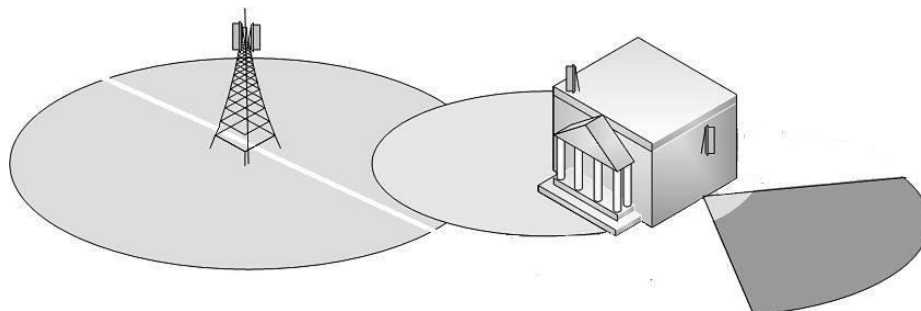
So here we have an example of LBS. A single cell tower is 'servicing' the mobile device. All that it can confidently predict is that the mobile device is somewhere within its footprint. So it can only provide 'General' service data. (In this case local taxi ranks)

*"But in terms of trying to locate the mobile device, it is obviously very inaccurate"*

## LBS (cont)

Of course not all Cell towers work the same or indeed service the same geographical area. Some are very small and perhaps only serve a shopping centre for instance, whilst others may have to only point in a particular direction for geographical or even political reasons. But even with these improvements, LBS is still a highly inaccurate system if you are using it to try and locate someone or something.

Fig 3:



Another, key factor in LBS technology is the fact that the mobile device positional data is provided by the mobile network and NOT from the device. Ie it is the servicing cell tower that provides the data. This means that in order to access this service, you will need an agreement with the gsm network. This costs you money and is only as accurate as the data that the networks choose to provide you. In our experience, and for reasons unknown, the exact location of the relevant cell towers is not always accurate.

*Note: This is one of the key factors behind LBS being a predominantly UK based service. Other developing GSM networks outside of the UK are not as amenable to providing such data and so LBS is almost impossible to operate.*

## So how does PINGz™ work?

PINGZ does not rely on the data from the local GSM network for its positional data. Indeed, we have avoided working with most GSM networks as the accuracy of their data is actually so bad it often simply hinders the location process.

Instead, a small piece of software (applet) is downloaded into the target mobile device either via SMS or vis GPRS. Currently we can support over 90% of all mobile devices and modems sold globally, including all Symbian and Blackberry systems. (FYI, in the UK we need permission from the target in order to track it, but this is not always a legal requirement in most other countries)

This software quietly sits in the background of the mobile device and simply waits and listens for our server request, otherwise known as a 'Ping'. When this PING is received, the mobile device itself records the nearest Cell tower signal strengths and individual ID codes, known as LAC codes and sends this data back to our servers via SMS or GPRS. (cost chargeable to the mobile device as per its standard tariff)

The advantage of this service is that the device records ALL GSM network cell towers, not just one. The results are obvious (fig 4).

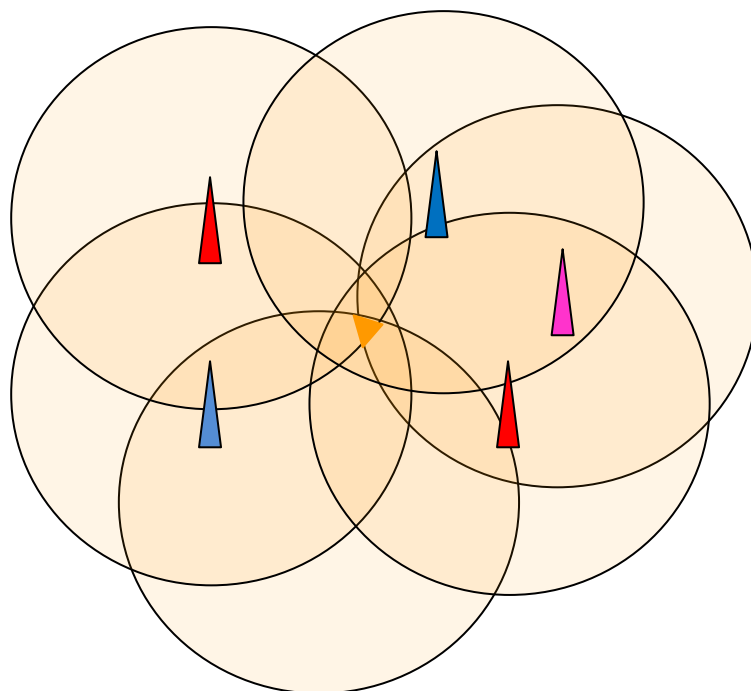
## PINGz™ (cont)

Fig 4.

Here we can see all the available cell towers and they are obviously closer together. This creates a much smaller (accurate) area of overlap. Bringing the target search area down from 10's of Km to 50m (in some built up areas where cell towers are densely packed).

So, when compared directly with LBS systems, the PINGZ service is far more accurate.

Coupled with the fact that it is a global service and not dependent upon the agreement and cooperation with the local GSM networks, you can see the advantages straight away.



## Other features - Intelligence

The other unique feature of PINGZ, is the fact that it is an **intelligent** service. That means that it **learns** from all of the data that is stored and returned. Each positional request made by a client, is stored and logged into the mapping system. As more and more data is logged, so the accuracy of the positioning reports increase. This means that the more customers that use the service, the more the service will improve. *(unlike LBS, whose accuracy is driven simply by the locations of the fixed Cell towers and will only improve if more cell towers are built)*

## GPS enhancement

As part of our commitment to creating the most accurate GSM tracking system available globally, we utilise data from every source available to us. This includes our range of GPS tracking products and systems.

As well as data from our GSM clients, we also log data received from our GPS/GSM clients. This means that we can correlate GPS positional data (accurate to within 3m) with GSM signal strength and LAC data. Thus creating millions and millions of GPS points globally that enhance and improve the GSM LAC data accuracy.

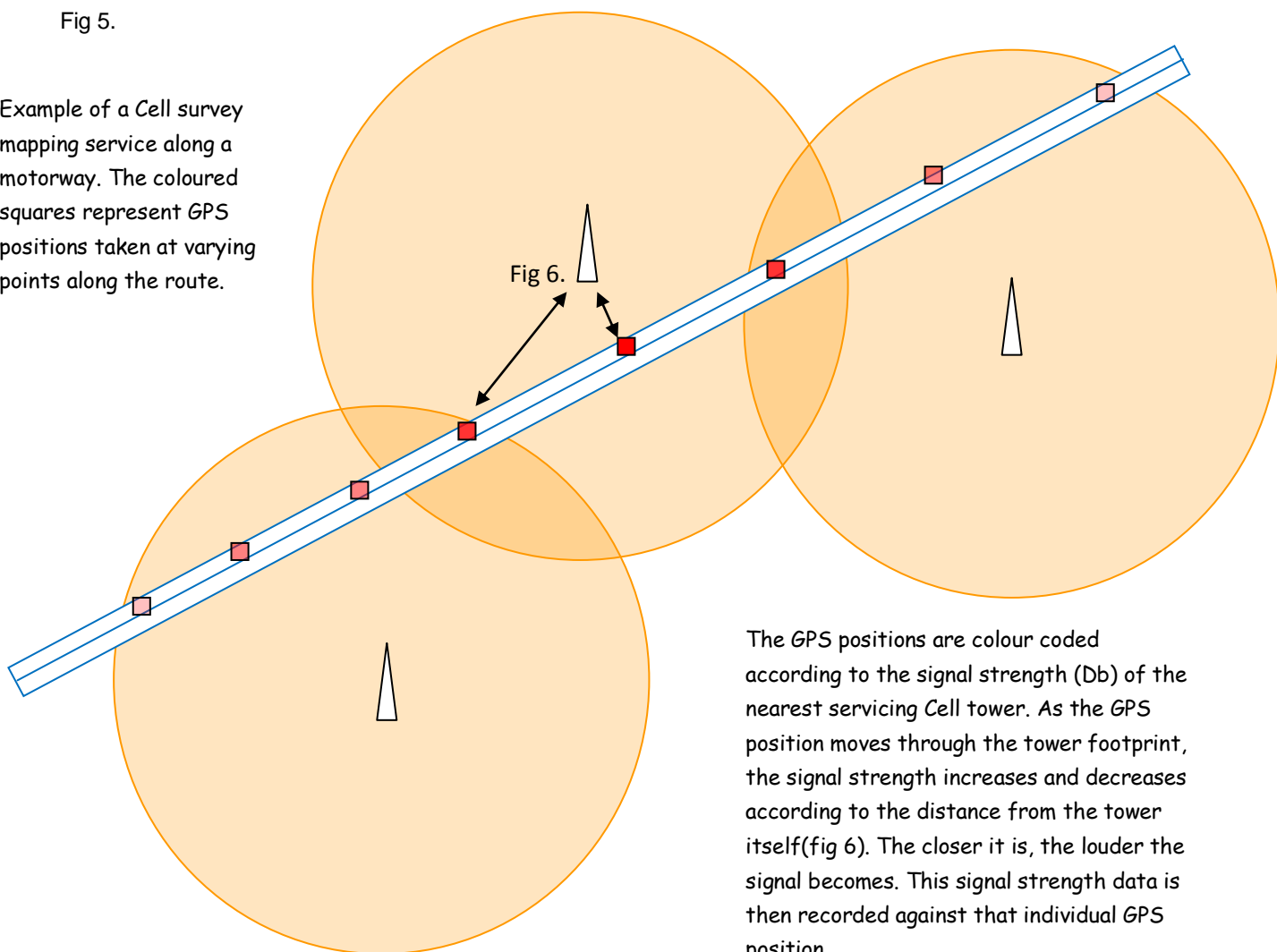
We also provide this service for our clients in targeted areas such as motorways and towns and cities. We do this using our Cell Seeker™ service. This is effectively a mobile vehicle that can record both GPS and GSM positions very quickly as it passes through areas. It usually takes a few hours to completely map an average city.

## GPS enhancement (cont)

Example of how GPS enhancement improves GSM positioning.

Fig 5.

Example of a Cell survey mapping service along a motorway. The coloured squares represent GPS positions taken at varying points along the route.



The GPS positions are colour coded according to the signal strength (Db) of the nearest servicing Cell tower. As the GPS position moves through the tower footprint, the signal strength increases and decreases according to the distance from the tower itself (fig 6). The closer it is, the louder the signal becomes. This signal strength data is then recorded against that individual GPS position.

Once the Cell Survey has been done, the data is instantly available for all PINGZ clients. This means that a GSM client travelling up this motorway would generate the same signal strengths as the ones stored against the GPS positions and a far more accurate GSM position can be predicted.

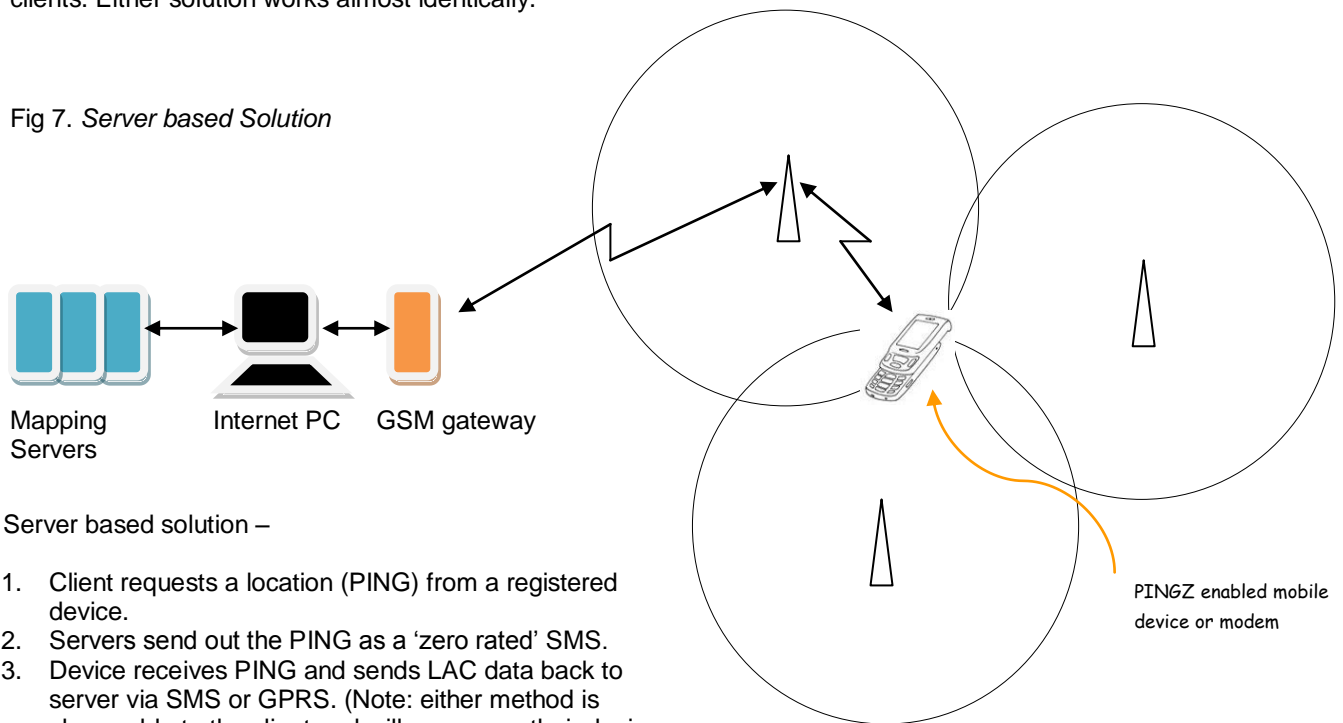
Obviously, we can only perform limited Cell surveys, but with every GPS device we sell to our clients globally able to update our systems data constantly, the network as a whole will be improving continually.

There is no other Global GSM tracking solution as accurate or as intelligent as PINGz. And with our customers support it will continue to improve itself.

## The PINGz™ System

The PINGz system can be server based and housed on the clients own servers for increased security and peace of mind. Or it can be a web-based solution for convenience and cost control. The choice is the clients. Either solution works almost identically.

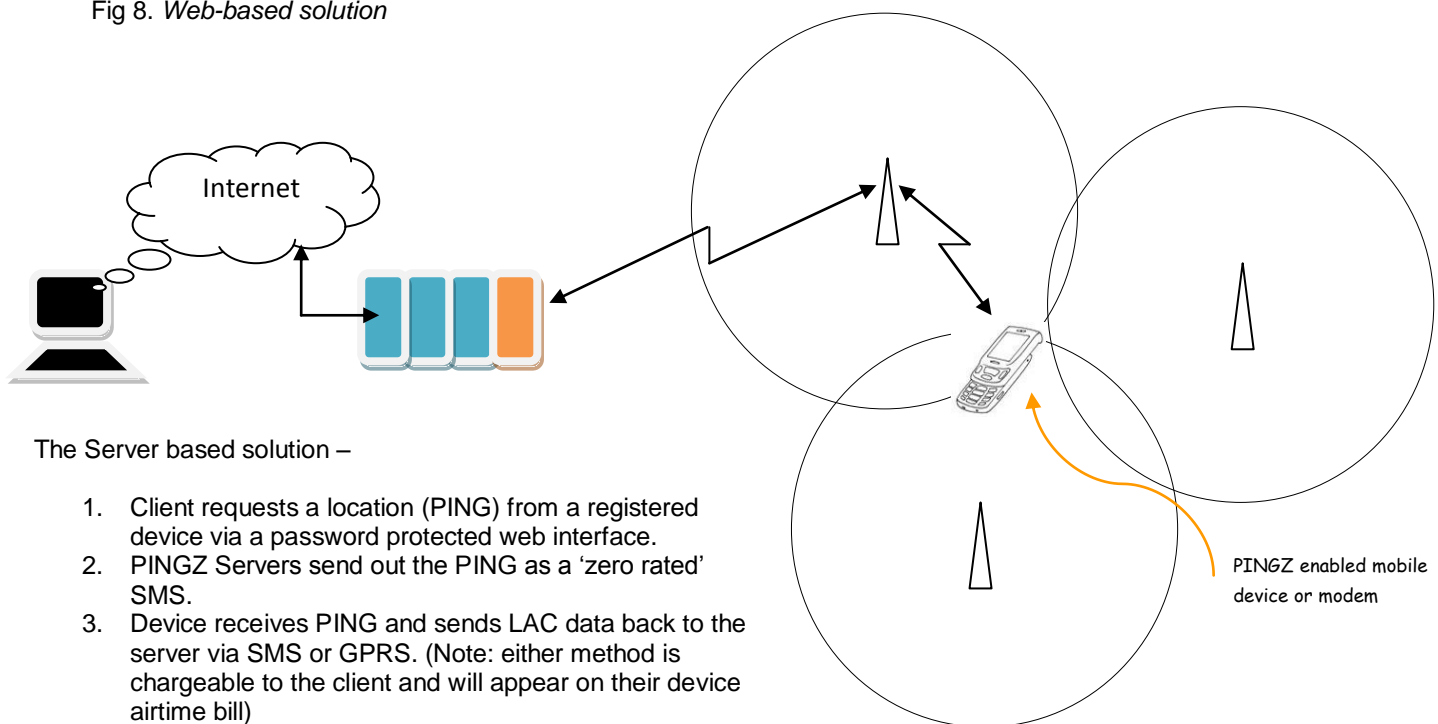
Fig 7. Server based Solution



The Server based solution –

1. Client requests a location (PING) from a registered device.
2. Servers send out the PING as a 'zero rated' SMS.
3. Device receives PING and sends LAC data back to server via SMS or GPRS. (Note: either method is chargeable to the client and will appear on their device airtime bill)
4. LAC data is displayed on the PC

Fig 8. Web-based solution



The Server based solution –

1. Client requests a location (PING) from a registered device via a password protected web interface.
2. PINGZ Servers send out the PING as a 'zero rated' SMS.
3. Device receives PING and sends LAC data back to the server via SMS or GPRS. (Note: either method is chargeable to the client and will appear on their device airtime bill)
4. LAC data is displayed on the server and viewable via the web interface from the clients PC.

## Costs

Costs will fall into 3 categories

- Hardware (client server only)
- Monthly license fee (per mobile device)
- PING charge (outbound only as inbound costs will be down to owner of mobile devices)

### Server based option:

- 1 x DT-TWR tower server for the platform and server/gateway software : £5,500.00
- 1 x DT-PC pc based tracking, admin and mapping application: £750.00
- 1 x DT-INST 1 days installation : £750.00
- 1 x Additional GSM/GPRS gateways: (optional) (£600.00)
- 1 x Tracking applet to be downloaded to each mobile device £15.00 *each*
- Monthly licence fee per mobile device £1.00 *each*
- *PING commands will be down to clients own GSM tariff. Sim cards £n/a*  
*For GSM gateway will be provided by client (or TariffMan if required)*

### Web-based option:

- 1 x Tracking applet to be downloaded to each mobile device £15.00 *each*
- Monthly licence fee per mobile device £1.00 *each*
- PING commands from server to mobile devices £0.10 *each*

### Points to consider:

- Above prices may be subject to change (outside of contract) without notice depending upon TariffMan costs of implementation.
- Above prices may vary depending upon volume of Mobile devices and upon each opportunity on its own merits.
- TariffMan Ltd can provide GPS/GSM tracking devices for use in conjunction with this system if required.

**Please contact us with any questions or for further information on these devices.**