



Photo courtesy of Ordia Solutions.

Keeping track

Satellite technology has allowed businesses and individuals access to accurate information on location and tracking services for various different purposes. Satellite Evolution finds out how satellite is being used in this field.

Use of location based services, satellite navigation, tracking and telemetry have risen sharply in the past few years. Today you can find out where your nearest petrol station is, where you son or daughter or elderly relative is, how your fleet of vehicles are progressing, how long a driver takes for their lunch break – and a plethora of other bits of information that simply make life and running a business or operation so much easier. With the exponential rise in the take-up of mobile telephony there is a tremendous opportunity unfolding for location-based services using satellite and mobile technology. Assisted GPS, a combination of satellite technology and mobile networks appears to be the next-generation location based service (LBS) platform.

The lynchpin of these services, at present, is the US' GPS satellite constellation. Originally developed for use by the United States Department of Defense, new uses are constantly being found for the service. The upcoming operational launch of the Galileo constella-

tion will also usher in new and evolving requirements for location information. Satellite navigation was born around thirty years ago. It is now widely used by civilians and by the public sector. Satellite navigation basically allows anyone with a receiver to determine their position in time and space extremely accurately. The system relies upon a constellation of geostationary satellites that each emit their own personalised signals. These signals indicate the precise time they left the satellite. The receiver picks up the satellite signal, recognises the satellite it was emitted from and determines the time taken by the signal to arrive at the receiver. It then calculates the distance from the satellite. In order to determine its accurate position, the receiver must accept signals from at least four satellites.

GPS is a wonderful thing but it does have its weaknesses. The system has difficulty in providing reliable positions in poor signal conditions such as when surrounded by tall buildings and it can take several minutes to get a position fix, but there is a technology that is



making the GPS receivers much more sensitive.

Assisted GPS

Assisted GPS technology or A-GPS, represents a key turning point in terms of tracking and telemetry. This technology can enable mass-market, location-oriented applications through hybridisation between GPS satellites and GSM. A-GPS compensates for the areas where GPS and GSM fall down in terms of latency and accuracy respectively.

The principle of A-GPS consists of coupling satellite positioning and communications networks, sending assistance data to the receiver integrated into the handset to improve its performance. A wireless network sends information directly to the GPS receiver which allows the receiver to quickly locate the four satellites necessary to give a precise position and to process the data from the satellite signals. The A-GOS information includes identification of the satellites. As the receiver is only searching for specific signals the amount of time that it takes for the receiver to gain its first location is reduced from minutes to seconds. This system provides better cost effectiveness and better accuracy than network-based solutions. A-GPS is really designed for mobile devices with limited battery power. The world's first A-GPS device was introduced to the market in 2004 by the '3' network and this is a significant breakthrough for the mobile phone market that will now be able to improve further on the functionality of its products.

Vehicle tracking

One of the applications that stands out and is widely used is that of the automotive industry. We are all becoming very accustomed to seeing satellite navigation terminals in cars, vans and lorries. They have become the 'must-have' device for vehicles. However, vehicle tracking is where the money is going at the present time. In an era where roads are getting ever more busy, where fuel prices are rising and where firms involved in transportation such as haulage are facing bankruptcy, tracking their fleet is a way in which a great deal of money can be saved.

Transportation firms are turning to satellite in order to carry out effective fleet management. Vehicle tracking is often used as part of a complete fleet management system that enables the fleet operator to locate any of his vehicles at any time throughout their entire journey. The data provided will also provide information that can enable the fleet operator to make well-informed decisions. The system can show the exact distance that has been travelled in a certain time period. It can also show the speed of the vehicle at a given location and give analysis of the time taken to cover a particular distance. The system may also be used for public transport so fleet planning, scheduling and operations are made a great deal easier. Delivery drivers also benefit through the use of GPS location based services as they can plan their daily deliveries more effectively and can also help the customer with much more accurate delivery times as they have a much better idea of when their arrival time at a certain destination will be.

Nokia attempts to combat global problem – via GPS

Nokia and University of Berkeley researchers have tested technology that could soon transform the way drivers navigate through congested highways and obtain information about road conditions. One hundred cars equipped with the GPS-enabled Nokia N95, and driven by students from the University of California, travelled a 10-mile stretch of highway near San Francisco to show how real-time traffic information can be collected from the GPS feed, while preserving the privacy of the devices' owners.

The experiment was carried out to test the traffic data collection and aggregation system, while studying the trade-offs between data accuracy, personal privacy, and data collection costs. The software aggregating the GPS feeds immediately disassociates that data from an individual device and combines it with the general stream of traf-

fic data. To protect privacy, all data is anonymous and aggregated, and protected by banking-grade encryption.

During the experiment, special software on the mobile devices periodically sent anonymous speed and location readings from the integrated GPS to servers. The feeds were then combined to create a real-time picture of traffic speeds and projected travel times. This innovation could revolutionise travel planning and is a continuation of the NokiaMaps navigation service that is available on some devices. The integration of traffic information with functions such as a calendar and online timetables set the foundations for a personal travel planner.

"There are mobile device-based systems out there that can collect data in a variety of ways, such as measuring signal strength from towers and triangulating position, but to our knowledge, this is the first demonstration of this scale using GPS-enabled mobile devices to provide traffic related data such as travel times, and with a deliberate focus on critical deployment factors like bandwidth costs and personal privacy issues," said Director Thomas West, Director, UC Berkeley's California Center for Innovative Transportation.

The researchers believe that fewer than five percent of drivers need to contribute location data for the system to be effective on any particular highway. For state transportation agencies such as The California Department of Transport, tapping into the vast network of mobile phones on the road could one day remove the need to invest in expensive infrastructure to obtain traffic information as well as greatly expanding the coverage of such services. In the USA alone congestion causes 4.2 billion hours extra travel every year and the purchase of extra 2.9 billion gallons of fuel for a congestion cost of US\$78 billion. With the number of vehicles on the road increasing rapidly around the world a cost-effective method of travel planning could help drivers make smarter decisions about which routes to take, the researchers say.

People tracking – "where are you?"

How many times have you been asked this very question when you have answered the phone? Well now the technology has been introduced so that those people calling you will know exactly where you are before they speak to you. Social mapping is fast emerging as one of the newest applications offered by GPS. So what is social mapping? Social mapping is enabled by GPS technology in mobile telephones. Social mapping enables the user to locate friends using the same service and to find out what they are doing via a detailed, interactive map on their mobile phone. Social mapping enables friends to connect and to 'navigate' their way through their social lives by identifying people, places and events on their mobile phones. If you have arranged to meet friends for dinner, for example, you can easily check whether they are stuck in traffic and whether you will need to re-schedule the reservation. It is also a tool that can be used by parents to track their children or even to track elderly relatives.

A novel way in which social mapping is being used can be found through Loopt, a social mapping and communication service. They are working in co-ordination with a leading music marketing agency to produce a new service that allows music fans to literally follow their favourite artist as they travel throughout a country. Their 'Follow The Music' feature shows which city the band is in and fans can view updates, add comments and participate in special events based on their proximity to the band's location.

Locating people in an emergency is another, more significant application. In the future, we can be fairly safe in predicting that GPS and the services it provides will play a significant role in future disaster recovery plans. We are experiencing what appears to be an increase in disasters both natural and manmade. GPS can be used in order to track the first responders and to coordinate a much more effective relief effort. Those in charge of teams of people can see the bigger picture, where their team is located and can also communicate with them and move them or direct them accordingly. But it isn't just the first responders who can benefit. The victims of disaster can



too. In 2006, Cisco demonstrated a GPS-based victim tracking and tracing system in Germany in order to help simplify the registration and identification of casualties involved in a disaster. The simulation enacted the after-effects of a bus bombing where all casualties were provided with GPS micro trackers with a GPS/GPRS transmitting unit.

When this device is activated it transmits the exact position of the casualty to a central database in real time. This enables the rapid exchange of information and automatic processing of data collected by emergency workers at the scene of a disaster. The critical information is collected and stored in real time and can therefore be made available to emergency workers via a web-based portal which prevents loss of time and patient data. Not only do the rescue teams have access to the data but hospitals and other crisis support centres also do, allowing them to make the necessary preparations.

GPS and public service

Provider of tactical command and control systems for first responders and their chain of command, Ordia Solutions, have recently announced the successful deployment by the Richmond Police Department (RPD) of the United States of Ordia Solutions' next-generation Mobile Tactical Collaboration System (MTCS) and AdvanTraq GPS to enhance police operations. The system will be used for a variety of functions from critical incident response, major events security and critical infrastructure protection, to routine patrol operations and

weekly briefings on crime trends throughout the city.

In addition to supplying the collaborative command and control software and personnel GPS trackers, Ordia Solutions will provide the department with training, support, system customisation, and additional services to integrate MTCS with existing technologies. "Knowing the real-time location of our officers in relation to an operation, incident site, support elements, and each other is of immense benefit to the chain of command and officer safety," said David M. McCoy, Interim Chief, Richmond Police. "The Ordia Solutions technology has given the Department a force-multiplier advantage during the planning and execution of a major incident response or routine police operation."

Because the MTCS tactical command and control system is Web-based and inherently interoperable, RPD is leading an effort to bring other local, state, and federal law enforcement jurisdictions, as well as Fire and EMS services in the Richmond area, to be part of a regional mutual aid consortium using MTCS, for those public safety operations where a regional, all-hazard, coordinated, and timely response is essential. "The Richmond Police Department has had a rich history of aggressively exploiting innovative technologies and processes to enhance its community policing mission," said Joe E. Ordia, Chairman and CEO, Ordia Solutions. "This MTCS deployment demonstrates that RPD will continue to lead its peers around the nation in delivering a safer city for Richmond's residents and visitors."



Photo courtesy of U-Blox.



Introducing advanced LBS services to India

In May, Tata Teleservices, India's fastest-growing telecom service provider, announced that it will commercially deploy a new location-based service that is the first to use Qualcomm's Assisted GPS technology in the Indian market. The service leverages Qualcomm's QPoint solution and GPSOne chipset technology, with hosting services from wireless communications provider TeleCommunication Systems (TCS). The service is expected to be available on multiple handsets from Tata's catalogue.

A-GPS technology will provide Tata with a differentiated LBS service, as it improves on previously deployed cellular LBS services in India in terms of both performance and reliability. Conventional Cell-ID-based solutions rely solely on base stations for positioning, which can equate to less than optimal functionality in areas where cellular signals are compromised. Tata's A-GPS service leverages triangulation with cellular base stations and satellite-based GPS for precise position location in both rural and urban environments, including inside buildings and structures.

Tata's service will leverage Qualcomm's QPoint and gpsOne solutions, which together deliver a complete, integrated mass-market solution for enriched location-based services. Using these technologies to leverage the capabilities of A-GPS allows developers to easily create precise, reliable and compelling location-based applications. Tata plans on working with the local developer community to create both consumer and enterprise LBS applications. Consumer navigation will include friend finder and social networking applications, while enterprise customers will benefit from asset and fleet tracking applications.

TCS provides proven precise location technology for in-network deployments or via world-class hosting solutions. For Tata, TCS will be hosting its Xypoint Location Platform that includes a Position Determination Entity built upon the aforementioned QPoint technology from Qualcomm.

"Adding to our commercially proven location deployments in Asia and worldwide, TCS' solution for Tata underscores our strategic commitment to the Asia-Pacific market," said Joe Hannan, Vice President of location products for TCS. "We are proud to be an integral partner with Tata in offering differentiated services to the dynamically expanding market of India."

Strong growth in LBS forecast in Japan

Provider of instant positioning systems for GOS and Galileo, U-Blox, is predicting strong growth in the Japanese GPS market and has set up additional offices in Tokyo to deal with the expected demand. The new offices will house local marketing managers and support personnel. Situated in the popular business district of Minato-ku, the new offices bring U-Blox closer to a wide range of leading telecoms and electronics customers in the area and positions U-Blox to gain new ones.

The move follows new developments in the GPS industry in recent months. The introduction in April 2007 of Japanese E-110/119 emergency caller services is putting a GPS receiver in every cellular telephone so emergency response personnel can pinpoint the location of a caller anywhere in Japan. At the same time, advancements in GPS technology have enabled smaller, cheaper and more powerful GPS engines, which can now be easily incorporated into products such as PDAs, PNDs and other handheld consumer devices.

Following the E-110/119 legislation, information on a user's location is now widely available, and can also be for location-based services in mobile commerce, which presents a major new market for the telecommunications industry.

"The GPS and the location-based services industries are growing," said Teshu Naka, Country Manager, U-Blox Japan KK. "U-Blox has responded to this development by moving to bigger offices and hiring new staff to ensure U-Blox customers get the high level and quality of support we pride ourselves in, ensuring our customers' products continue to benefit from fast time-to-market."

U-Blox dead reckoning for NYC taxis

U-Blox technology has also been chosen by The Mobile Knowledge Passenger Information Monitor (PIM) which is the most widely deployed passenger facing, in-taxi information, entertainment and point-of-sale terminal in the world today. It combines GPS navigation and tracking, point-of-sale and entertainment functions in a single integrated device. The NYC Taxi & Limousine Commission has approved the Mobile Knowledge and two other systems for this purpose, and has stipulated that all 13,000 Yellow Cabs operating under its jurisdiction be equipped. To date, Mobile Knowledge and its Partners have deployed 5,000 units.

The PIM features a 10.4-inch rugged touch screen display that shows the position of the vehicle overlaid on a map, allowing passengers in the back seat to track their progress through the city. The PIM is able to accurately and reliably track a vehicle through New York's busy streets thanks to U-Blox' dead reckoning technology. Dead reckoning uses sensors in combination with GPS to provide 100 percent road coverage, even in areas with no GPS signals such as streets with high-rise buildings, tunnels, parking lots and other covert environments without GPS signals.

The New York market in particular is a challenging one due to its highly built-up nature with very tall buildings that are densely packed together. This could potentially be very problematic for GPS. However, U-Blox' LEA-4R dead reckoning GPS module proved itself to be reliable, accurate and easy to integrate. A real-time display of the status of taxicabs provides fleet managers with a clear and accurate picture of their taxi business and automates what was previously a manual and time consuming process of Driver Log Sheet collection and submission to the city authority.

Other features such as electronic shift schedules, text communication with drivers (informing them about traffic alerts or where yellow taxis are needed), as well as a panic button that drivers may use in the case of emergency, ensure managers and drivers benefit from a highly automated and integrated communication system. Moreover, the system makes previously time-consuming efforts to locate lost and forgotten articles a thing of the past. The passenger need only look at their receipt for the vehicle number of the taxi they were in, and call a central number to request assistance.

Applications galore

The benefits of using location based services are numerous and this technology does indeed appear to be on the verge of well and truly taking-off across the world. As we have seen, in Asia, the location phenomenon is already making quite an impact. Location services can encourage enhanced customer services and organisations will be able to pinpoint employee locations and report accurate information on their movements.

It also means that timely answers may be given to customer queries and can enable the operational staff to manage customers more effectively.

LBS can also increase efficiency and productivity by saving on fuel charges and cutting down on unnecessary mileage. LBS also supports lone workers such as security guards.

It can even be used to track golfballs on the fairway. In fact, the list of applications for GPS and LBS for companies and individuals alike are so numerous I cannot list them all. One thing is for sure and that is that there is a market for these services. In a world that has changed so very much over the last twenty years with new threats such as terrorism and devastating weather and day-to-day events that require the emergency services, there is much more of need to know where people are.

The financial climate also means that businesses are trying to cut costs wherever possible and these services enable them to do this. There are obviously question marks over the service – this really does mean that big brother is watching you. He will know where you are and when. Perhaps individuals will need a bit more convincing than the business will! ■