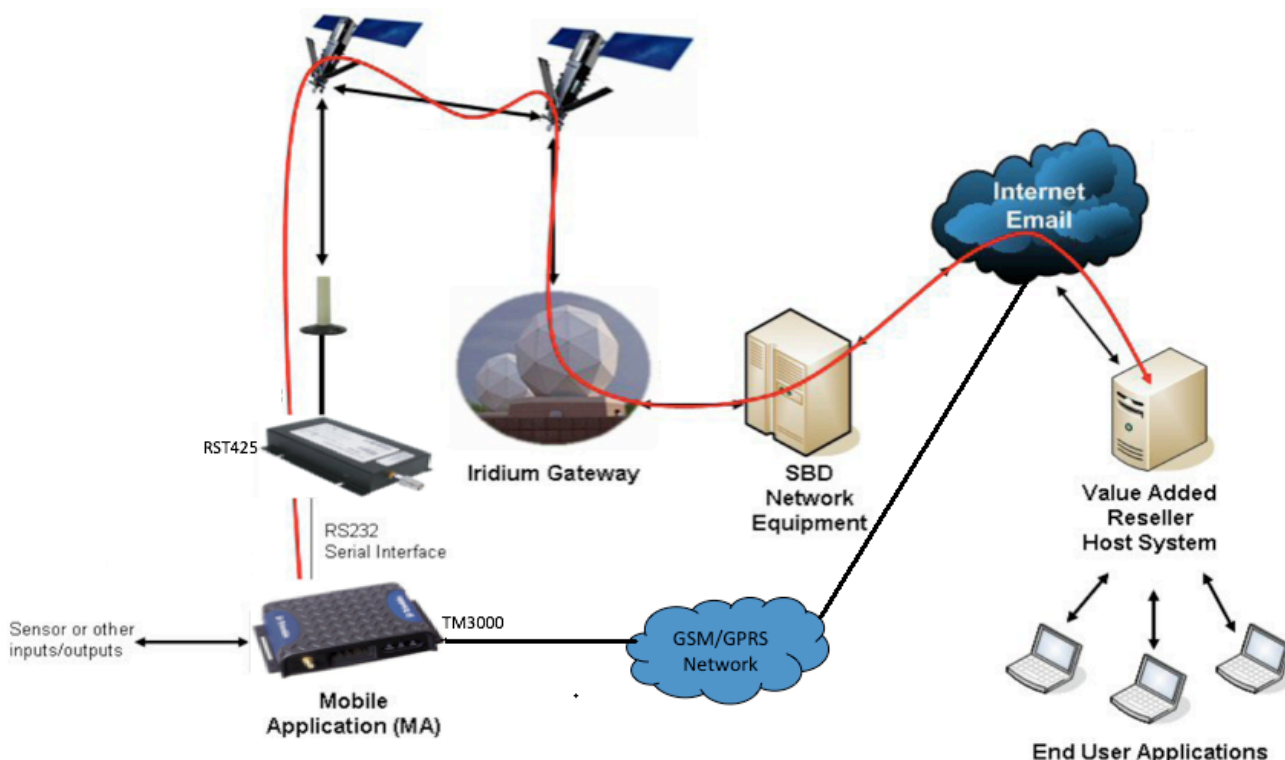


# Remote Area Tracking and Mapping

## TM3000 with Iridium Satellite Back up Communications

Step Global has developed a solution to remote area GPS tracking by interfacing the Trimble TM3000 Asset Tracking Device with an Iridium Short Burst Data Modem. When GSM (GPRS & SMS) communications is unavailable the TM3000 will switch over to the Iridium modem for transmitting its reports to an Internet based Applications Server. This solution provides for continuous tracking from anywhere, land / air / sea, in the world.



## The TM3000 Asset Tracking Device

Trimble's TM3000™ asset tracking device is an open and flexible platform that can be adapted to a broad range of vehicle/asset monitoring, management and recovery services.



The TM3000 asset-tracking device integrates a GSM/GPRS modem, a GPS receiver, 3 axis accelerometer, extensive digital and analogue Inputs & Outputs, 2 RS232 ports, battery backup, rugged automotive grade power regulator, extensive data log, Over-The-Air configuration, an independent application sub-system and an array of peripheral interfaces in a small, robust, cost-effective package.

Some of the functions that can be achieved with the TM3000 deployed in assets/vehicles are:

- Locate the position of assets/vehicles at all times
- Monitor vehicle conditions
- Warn operators on safety conditions
- Remotely operate systems on board the vehicle
- Communicate from monitoring centre to vehicle operator
- Measure fuel consumption
- Measure engine idle times
- Monitor vehicle operators driving behaviour for excessive braking, swerving & acceleration
- Remotely monitor operation of peripheral equipment attached to vehicle
- Accurate capture of FBT information
- Security alerts on out of hour's operation
- Alert on un-authorized use of vehicles
- Accurately measure driver hours and alert on excessive hours

Because of the open architecture of the TM3000, Step Global is able to offer its customers a tailor made tracking solution to exactly meet their service requirements at an affordable price.

## Iridium Short Burst Data Modem



The RST425 Data Modem is a robust data terminal providing simple Short Burst Data communications from all types of devices with serial communications to the global Iridium satellite network from or to anywhere on earth.

The Iridium network of Low Earth Orbit satellites provides truly global voice and data communications from any location, land, air or sea. Iridium delivers essential communications services to and from remote areas where no other form of communication is available.

The Iridium Short Burst Data (data only) service allows users to simply and conveniently gain access to data packet data services anywhere on earth.

## **The TM3000 to Iridium Modem Interface**

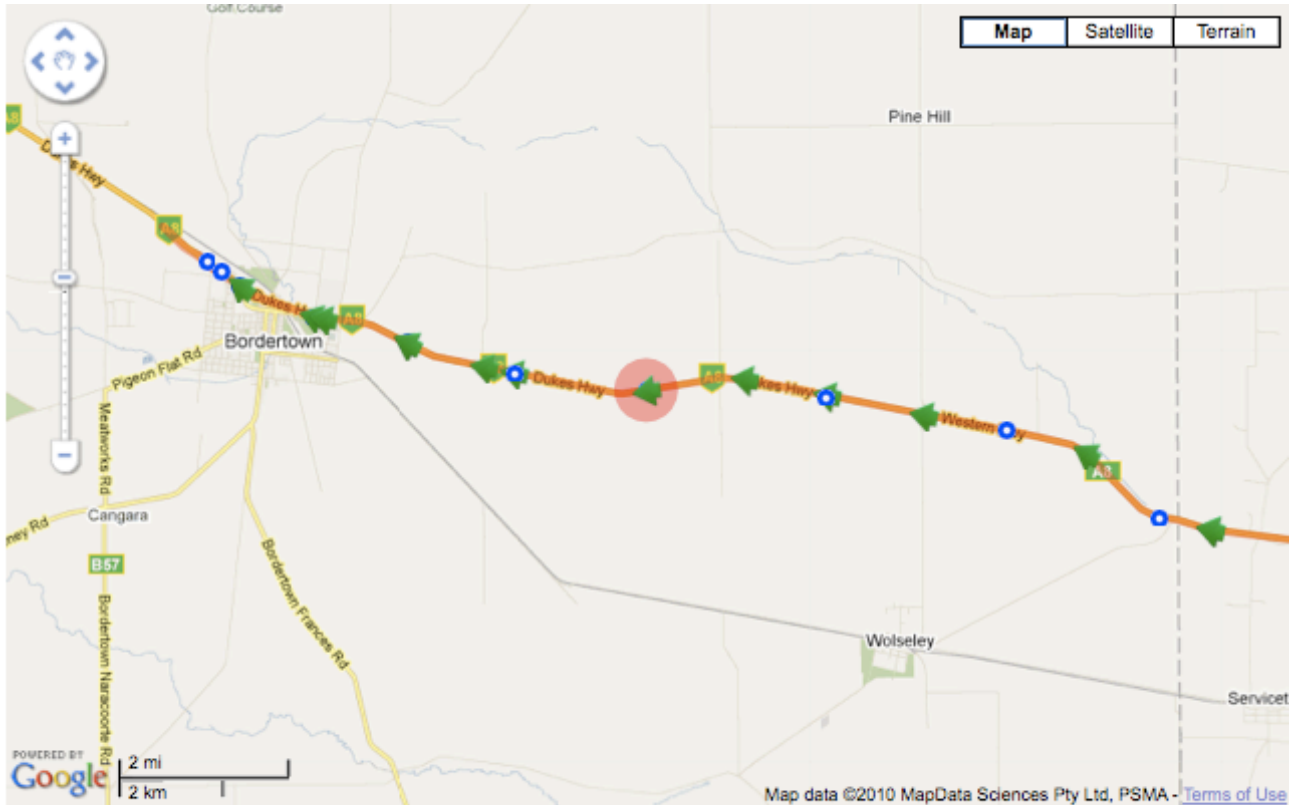
The RST425 houses an Iridium SBD (Short Burst Data) 9601 modem with a regulated power supply. It has external connections for power, an Iridium antenna and a DB9 connector for its RS-232 communications.

The Iridium communications infrastructure is very similar to standard GSM infrastructure in the way that data is communicated to external equipment; a mobile phone number for SMS, an email address or an IP address. For tracking applications the data is sent to an IP address of the Server service that provides the back-end monitoring.

The Iridium SBD modem is preferred over the Iridium Voice modem primarily due to Airtime costs but also for reliability of service. SBD does not require the same extensive bandwidth as voice and it only uses one of the control channels within the Iridium protocol.

The TM3000 interfaces to the RST425 via its secondary RS232 port. The TM3000 manages the communications over the RST425. The process steps that the TM3000 takes to ensure robust communication are:

- The TM3000 is constantly monitoring GSM connectivity
- If the TM3000 does not have a good GSM connection when a report is due to be transmitted to the Tracking Server, then the TM3000 will mark that report as being unsent by GSM
- The TM3000 will then check that it has a good Iridium connection. If it does then it will send the unsent GSM report as an Iridium condensed report over Iridium SBD service to the Tracking Server
- If the TM3000 does not have a good GSM or Iridium connection then it will store all unsent reports in a buffer, until it has a reliable communication path. When it does have a reliable communication path it will send all unsent messages.
- If the TM3000 has been sending reports over Iridium SBD service, these reports will remain marked as unsent GSM. When the TM3000 has a reliable GSM connection it will then send all reports marked as unsent GSM reports to the Server over GSM. The reason that it does this is because the reports sent over Iridium have been condensed.
- All reports sent over the Iridium SBD service are marked as Iridium reports. The Application Server is then able to recognise these reports and decode the compressed message and then store it in the database as a standard report. The Application Server can display as part of its report that this message was transmitted over Iridium.



	Position	Time	Ignition	Action	Speed	Heading	Network Type	Dead Reckoning	Address
<a href="#">Show</a>	371	2010-09-21 17:50:37			105	282	Iridium		
<a href="#">Show</a>	372	2010-09-21 17:52:38			103	279	Iridium		Dukes Hwy, Pine Hill SA 5269, Australia
<a href="#">Show</a>	<b>373</b>	<b>2010-09-21 17:54:38</b>			<b>103</b>	<b>259</b>	<b>Iridium</b>		
<a href="#">Show</a>	374	2010-09-21 17:56:08			105	281	GPRS		

The cost for Iridium airtime is significantly higher compared to that of GPRS or SMS data costs. Iridium messages are charged at a rate of approximately \$0.002/byte. The standard TM3000 message length is 138 bytes long. Sending reports every 10 minutes over Iridium would quickly run up a large cost (approximately \$20 for a 12 hour day), therefore the TM3000 condenses the standard message to a more cost effective length of 25 bytes per report. All essential data is still transmitted in the condensed format, only data that is not required by the Server is stripped out. After removing the unnecessary data the remaining message is then compressed to meet the 25-byte requirement.

The TM3000 can also be configured to have a different report frequency for Iridium versus GSM. Typically, areas that do not have GSM coverage are wide-open spaces without any major roads or buildings. Unlike in an urban environment where there would be many alternative routes to be taken by a vehicle, in the remote areas it is expected that vehicles will be taking direct point to point paths. This means that the position report frequency can be reduced in order that the airtime cost for Iridium are kept to reasonable levels. A typical report frequency, within metropolitan areas with good GSM coverage, is every 10 minutes, in wide-open rural areas with only Iridium coverage this frequency could be stretched to every 30 minutes without losing any tracking detail. The report frequencies can be modified Over-The-Air from the Server.

## About Step Global

Step Global is a private Australian business headquartered in Melbourne. It is a products based Value Add Solutions provider whose services include:

- Sales and Marketing
- Technical Support
- Design Assistance
- Custom Applications Development
- Systems Integration
- Product Development
- Web based tracking solutions

Step Global's focus is on the provision of GPS solutions for a full range of applications from Telematics, Personal Tracking, Centimetre Accurate Positioning, Asset Tracking, IT Networks, Precision Network Timing, Emergency Services Infrastructure through to Geo Tagged Video Security systems.

Step Global distributes products from the world's leading GPS components companies; **Trimble Navigation Embedded Technologies, PCTel, San Jose Technologies, Pacific Crest, Antenna, GPS Source, Time Tools & Tallysman Wireless**

Step Global provides solutions from the component level, complete modules, through to full tracking solutions including Web based monitoring (thru 3<sup>rd</sup> party partners).

Solutions for OEM's / ODM's / ECM's:

▪GPS Receiver Modules	▪GPS Precision Timing Modules
▪GNSS Precision (RTK) Positioning Modules	▪Housed GPS Receivers
▪Antennas (Mobile & Infrastructure)	▪RF Splitters, Amplifiers, Bias Tees
▪Cables	▪GNSS Re-radiators

Solutions for System's Integrators:

▪GPS/SMS/GPRS Tracking Units	▪GPS/GPRS/IRIDIUM Tacking Units
▪GPS Data Loggers	▪Personal Tracking Units
▪GPS enabled Security Systems	▪GPS/3G/Video

Full Tracking Systems Solutions:

Thru partnerships with specialist 3<sup>rd</sup> parties, Step Global is able to provide fully integrated tracking/security/telematics solutions consisting of Web based monitoring and management, for simple low cost tracking, Emergency Services, or the most sophisticated Fleet Management system requirements.