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# WHITE PAPER

# WHY CHOOSE DUAL-MODE SATELLITE/CELLULAR SERVICE FOR MOBILE RESOURCE MANAGEMENT APPLICATIONS

*Dual-mode terminals merge cost-effective, high data cellular messaging with reliable and uniform satellite service to enable the best of both worlds.*

## **Abstract**

This paper is for fleet managers looking to install GPS enabled equipment on vehicles to reduce operating costs, optimize fleet resources, ensure cargo security, enhance driver safety and monitor vehicle information. It discusses the merits of selecting tracking solutions that communicate over both cellular and satellite networks for highly reliable and cost-effective tracking and remote control of mobile assets.

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## INTRODUCTION

Reducing operating costs and increasing productivity is a necessity for fleet owners looking to survive tough economic times. There are many cost-savings options available, one of which is installing Mobile Resource Management (MRM) equipment on fleets to track and monitor vehicles, reduce fuel costs, optimize travel routes, minimize idle times and ensure cargo and driver security.

Figure 1 illustrates the wide array of equipment choices with varying capabilities available in the market:

1. GPS-enabled vehicle navigation systems
2. Terrestrial-based Automatic Vehicle Location (AVL) systems
3. Satellite-based AVL systems
4. Dual-mode satellite/cellular AVL systems

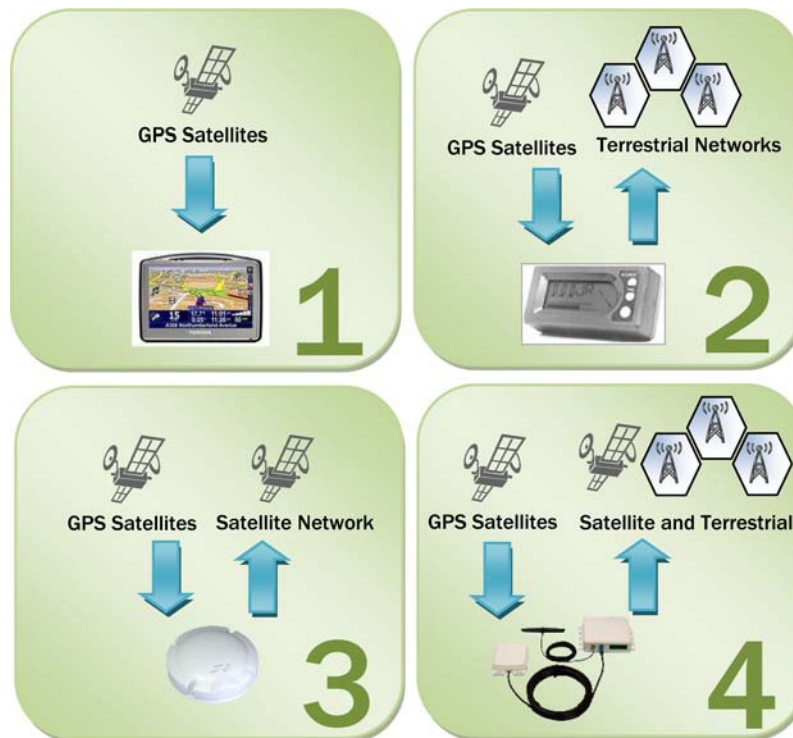


Figure 1. Vehicle Tracking Equipment

Choosing the right equipment with the right services is imperative to maximize capital investments. The right equipment depends on the user's application, budget and needs. This paper reviews the characteristics and application for each category of equipment shown above. It also discusses the merits of selecting a dual-mode AVL system that supports both cellular and satellite-based communication for fleet tracking applications.



## VEHICLE TRACKING EQUIPMENT

Organizations everywhere are turning to GPS technology to help reduce vehicle related costs. With increased fuel prices, the return on investment can be months. The key to maximizing potential savings is to select the right product and technology for the right application.

### 1. GPS-Enabled Vehicle Navigation Systems

GPS-enabled vehicle navigation systems use GPS satellites to acquire the vehicle's position and display it on a digital map. Typically inexpensive to purchase and no cost to operate, this type of equipment is ideal for the consumer market and route planning. This type of system does not, however, allow fleet managers to track and monitor vehicles since it does not have a communication modem to enable transmission of location information. This type of equipment also does not have the capability to monitor vehicle telemetry information that can help reduce operating costs – such as idle time and fuel economy. GPS enabled equipment is not suited for cargo security and driver safety applications since there is no means to communicate to authorities when a security breach has occurred.

### 2. Terrestrial-Based AVL Systems

Like vehicle navigation systems, terrestrial or cellular-based AVL systems use GPS satellites to acquire the vehicle's position. However, since this type of product includes a communication modem, it is able to send real-time location information via radio frequency (RF) or cellular networks. This allows dispatchers and fleet managers to instantaneously pinpoint the location of the vehicle and make more effective use of fleet resources.

#### AVL Systems Provide Savings

*When Time Warner Cable of Central Texas implemented a terrestrial-based AVL system, they found that they not only reduced travel times and technician stress, they also reduced fuel costs. "Our new GPS solution has allowed us to reduce companywide engine-idle times by more than 25%," according to Doug Bender, workforce management supervisor. "With gasoline hitting \$4 a gallon, this decrease in fuel consumption saves us tens of thousands of dollars each month."*

Unlike GPS-enabled navigation systems, some cellular products enable vehicle telemetry monitoring features, such as fuel-economy and vehicle-fault monitoring, for reduced operating costs.

One drawback of using cellular-based equipment is the loss of communication when the vehicle travels through an area without cellular coverage or during periods of network congestion. In either of these cases, reconnection to the network does occur once the asset re-enters areas with coverage or the network recovers, but during the "black-out" period, critical information is delayed or lost. For this reason, terrestrial-based AVL systems are not suitable for cargo security applications where a constant communication link is required.

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Quality of network coverage and the frequency of lost connectivity depend on the region and service provider. Figure 2 shows that even inside a well-served area of the United States (San Francisco, CA), AT&T customers still have areas of “shadow” where the cellular signal is unavailable or weak.

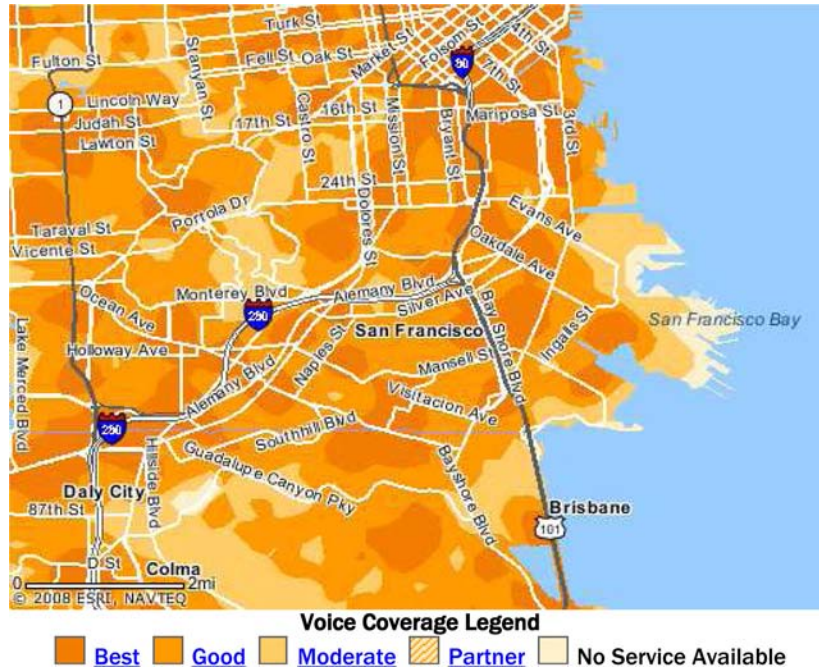


Figure 2. Cellular Service in San Francisco, CA for AT&T customers

When looking at cellular coverage from a country or continental point of view, cellular service is typically only available in highly populated areas. Even in those areas, there are pocket areas spanning several hundred kilometers with spotty or no service. For long-haul transport and security companies, gaps in cellular coverage are detrimental to business.

### Cellular Coverage is Not Uniform

*“Today more than 2,400 Brazilian municipalities (43% of the total) have no local cellular telephone service (there are no cellular network radio base stations in these municipalities). This disparity particularly affects the poorer regions in the country (North-East and North), but exists in all Brazilian states. For example, 29% of municipalities in Rio Grande do Sul, one of the most economically advanced states in the country, do not have the service.”*

Global Information Society Watch 2007 Report



Even though cellular-based equipment offers the advantages of being able to transfer large amounts of data inexpensively, for customers whose assets frequently operate out of cellular service ranges or who require uninterrupted communication for security reasons, cellular-only communication equipment does not provide the mandatory constant and reliable connectivity.

### **Cellular Coverage Not Ideal for Cargo Security Applications**

*For transport companies concerned about security, operating in large urban areas (with extensive cellular coverage) does not guarantee cargo security. "Statistics from the State Office of Public Security, in cooperation with the union of Transport Companies (Setcesp), show that robberies are concentrated in the Metropolitan Region of São Paulo - with 78.8% of the occurrences." "They (thieves) know the most fragile moment and attack", affirms the owner of a transport company in the north zone of São Paulo."*

Translated from de O Estado de S. Paulo

### **3. Satellite-based AVL systems**

Satellite-based equipment offers all of the functional benefits of cellular-based equipment, with the advantage of uniform and reliable coverage even in remote areas. This type of system is ideal for fleets that operate outside of cellular areas and where cargo and driver safety are of concern. In some parts of the world, satellite service is a must for cargo security and vehicle retrieval applications. Some satellite products offer vehicle telemetry functionality that provide the opportunity to optimize operating budgets by reducing idle time and fuel usage. This use of vehicle telemetry also allows for driver monitoring for conditions such as hard breaking and acceleration, and speeding as well as vehicle maintenance optimization.

*Satellite service provides the critical communication link for long-haul transport and security companies that operate between regional cellular areas.*

Satellite service is no longer only afforded by large companies and government agencies. Driven by competition and increased service availability over the last few years, satellite airtime costs have become very competitive. Operating costs for satellite-based AVL systems are highly dependent on the type of service, satellite constellation and usage patterns.

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**Cargo Security - An Expensive Problem**  
*Worldwide, cargo losses have been estimated at US\$30 billion a year, and the incidence is probably increasing (Salkin 1999). Organised crime is responsible for nearly half of these losses (RICCS 2000, p. 46). Annual cargo loss estimates for the United States alone range between US\$3 billion and \$10 billion (Gooley 1999; Salzano & Hartman 1997, p. 40). Indirect costs—such as investigation and insurance payments— can cost between two and five times the direct losses; that is, US\$20–60 billion (US General Accounting Office 1980). Road transport is associated with about 87 per cent of the total direct-cost value of lost cargo. Maritime cargo accounts for eight per cent, rail cargo for four per cent and air cargo for one per cent (based on figures cited in DeGeneste & Sullivan 1994, pp. 40–43). In other words, the overwhelming majority of cargo theft occurs in trucking (ICCS 2000, p. 46; Salzano & Hartman 1997).*

Australian Institute of Criminology, September 2001

#### 4. Dual-Mode Satellite/Cellular AVL Systems

Fleet managers looking to capitalize on the operational and cost-benefits of cellular service with the reliability of satellite service have the option of using dual-mode solutions. Users who adopt dual-mode satellite/cellular communication technologies are able to take advantage of the best of worlds:

1. High-bandwidth, lower cost data transmission in cellular areas.
2. Secure and uninterrupted satellite communication in areas with no cellular coverage.

***Dual-Mode terminals offer intelligent message routing capabilities for seamless switching between cellular and satellite networks.***

There are two types of dual-mode satellite/cellular products; a *hybrid solution* and an *integrated dual-mode terminal*. A hybrid solution is one where a standalone satellite terminal is integrated with a standalone cellular product, to create a unified satellite/cellular solution (see Figure 4 – Products A and B). Installation of a hybrid solution is more complex, requiring the services of a knowledgeable integrator to create the cellular-satellite switching intelligence.

An integrated dual-mode terminal is one where the satellite and cellular modems are all housed in a single enclosure (see Figure 4 – Product C), thereby eliminating the costs and complexities of installing and integrating a cellular product with a satellite product. With an integrated dual-mode terminal, the user is able to take advantage of features such as intelligent message routing to automatically send messages via land networks when in cellular range, seamlessly switching to satellite service when the asset is out of cellular range.

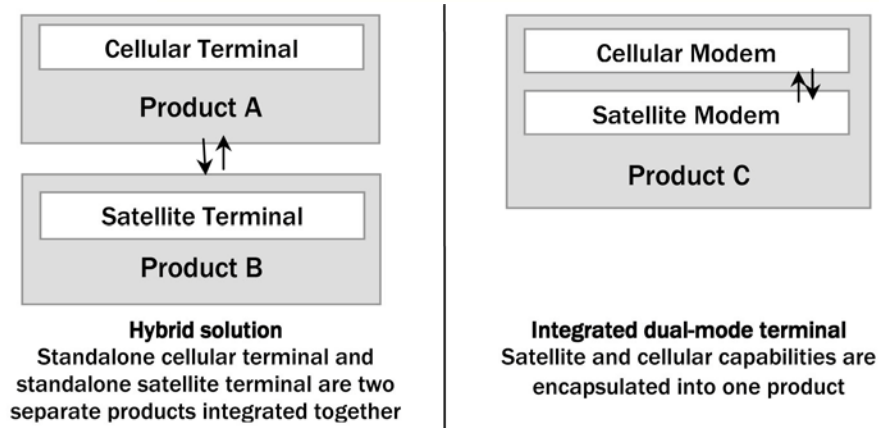


Figure 3. Dual-Mode Satellite/Cellular Terminals

Compared to a cellular or satellite-only terminal, initial costs (including equipment, integration and installation) and reliability concerns associated with implementing a satellite/cellular solution can be reduced by choosing an integrated dual-mode terminal solution. Costs for operating a satellite/cellular solution are dependent on the service provider and the data transmission profile. The more data that is sent, the higher the cost and the incremental monthly costs will depend on the cellular and satellite service provider and number of units being installed.

### Beyond Location Information

*For fleet management, look for products that offer more than location information, such as:*

- *Geofencing capabilities*
- *Sensor information*
- *Vehicle diagnostic monitoring including speed, odometer, status of malfunction indication lights (MIL) and fuel levels.*
- *Data logging for historical views of trips.*

## SELECTING DUAL-MODE SOLUTIONS

When selecting a dual-mode satellite/cellular product, consider the following:

- **Price:** What are the costs to purchase and install the equipment? Are there any integration costs?
- **Features:** What needs to be monitored for effective vehicle operation? Driver information? Speeding, Idling?
- **Advanced Applications:** Does the device offer an advanced computing environment that allows customized application development as needs change?
- **Installation:** Does the form-factor of the device meet my application requirements? Is the installation easy and do-able in a reasonable time?
- **Ease of Use:** Is the software easy to use and requires little training?

### THE DUO-900 INTEGRATED SATELLITE/CELLULAR TERMINAL

GlobalTrack offers a fully-featured, integrated satellite/cellular terminal – the Duo-900. The Duo-900 communicates location and other information to asset managers using cellular frequencies when in range of cellular networks, and seamlessly switches to the Inmarsat IsatM2M global satellite service in remote or noncellular coverage areas.

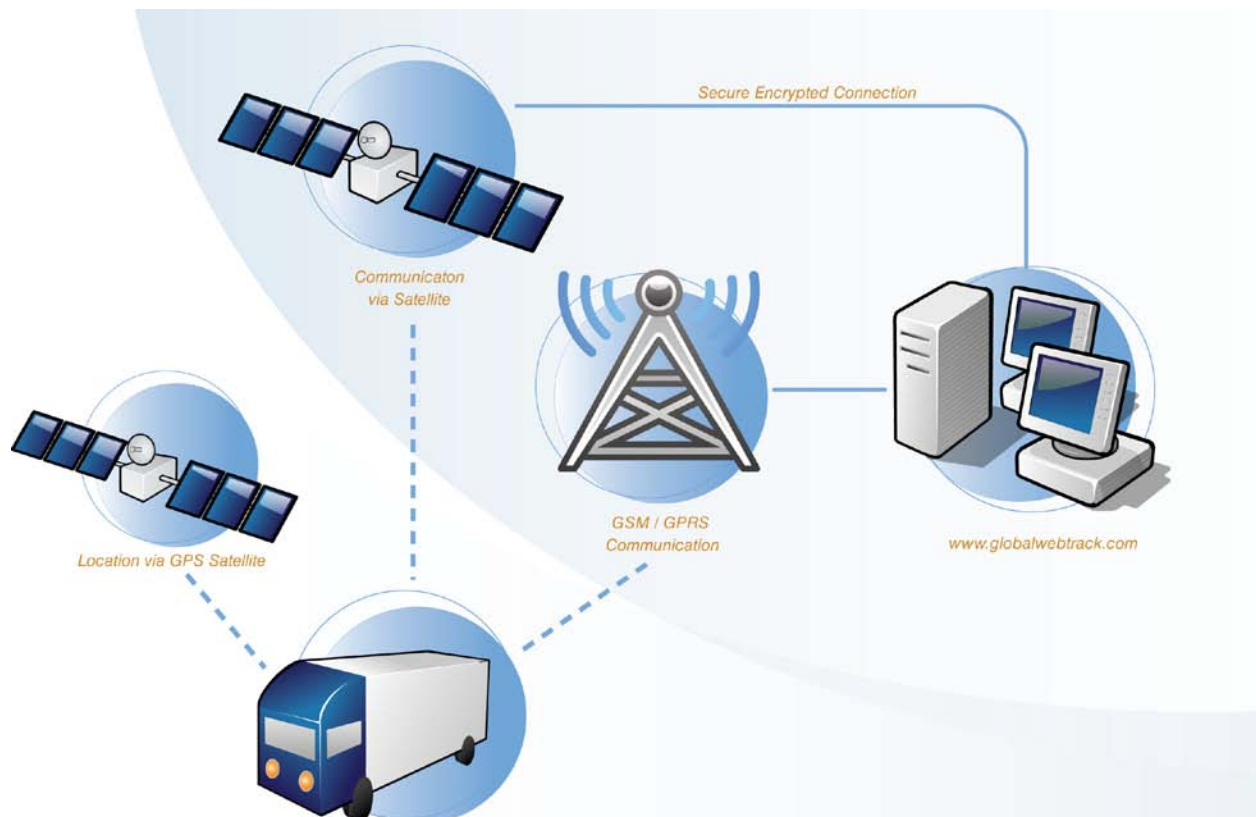


Figure 4. The GlobalTrack Duo-900 terminal

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The ability to seamlessly and intelligently switch between the two networks allows Duo-900 customers to realize uninterrupted service, equipment efficiencies and lower networking costs wherever they travel.

GlobalTrack works with a number of local partners and agents who provide everything from installation to user training.

## CONCLUSION

Cellular-based tracking equipment enables the transfer of large amounts of data but its operation is limited to urban areas. Satellite-based tracking equipment is ideal for remote tracking, cargo security and driver safety applications since it offers broader coverage and more reliability. Selecting a product with integrated dual-mode satellite/cellular capabilities affords fleet managers the ability to send and receive large amounts of data in urban areas and continuous monitoring of the location and status of their assets – no matter where their assets travel.

## ABOUT THE AUTHOR

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