



## The Unrestricted Mobile Enterprise

*Achieving Functional  
Parity between Field  
and Office Employees*

## A Vision of Field and Office Parity

Today, enterprise business is on the move; and when it comes to the topic of communications, mobility is at the center of every discussion.

The voice and data capability of today's laptops, cell phones, and handheld PDAs have accelerated field worker productivity beyond what many thought possible only ten years ago. This has created a new paradigm referred to as "*the mobile enterprise*". Armed with mobile technologies, field sales, service, and support personnel have been able to extend the capabilities of enterprise information and communications to the precise point of customer interaction, thereby growing revenues, improving accuracy, and sustaining high levels of client satisfaction in the process.

Mobile workers often have to perform additional sets of procedures and requirements, adding time and complexity that diminishes their productivity.

### Limitations

Current mobile enterprise technology is based on a single connected "*network-to-network*" model. This term refers to a situation where each mobile device uses a third party Wireless Wide Area Network (WWAN) to connect to an enterprise network and to exchange information. Even with some of the most sophisticated solutions available, mobile devices still fall short when compared to tools used by internal office workers. Mobile workers often have to perform additional sets of procedures and requirements, adding time and complexity that diminishes their productivity.

Beyond their functional limitations, most mobile solutions also don't provide an effective level of "*situational awareness*" back to the enterprise. This term refers to the ability of an enterprise to move any and all of its available information resources forward to the exact point of customer interaction allowing for the best, fastest, and most profitable decisions to be made. The faster that customer information can be received, the better the enterprise is equipped to respond and resolve problems, build loyalty, and generate new business opportunities.

### Beyond Limitations

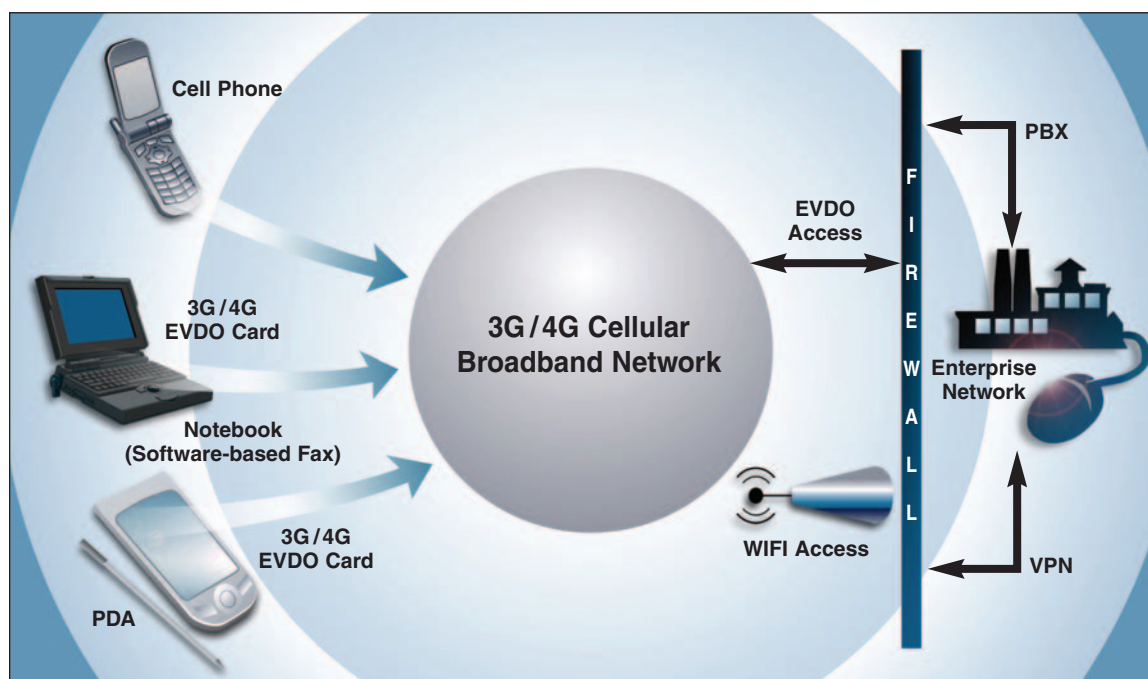
Now an innovative solution is available that allows mobile field personnel to connect to the enterprise network at an equivalent capability level of internal employees. With it, mobile workers can leverage the full capabilities of the enterprise information infrastructure while in the field, saving time and boosting productivity to a whole new level.

This white paper explores the various challenges inherent in the current mobile enterprise information model, and presents a new solution that allows mobile employees to act as full-fledged equivalents to internal enterprise employees. In doing so, they can maximize the organization's level of situation awareness that can be used to generate more profitable business opportunities.

## Exploring Current Limitations with Network-to-Network Mobile Connectivity

The most popular method for a mobile employee to connect to their enterprise network has been through the use of a 3G or 4G-compatible network interface card along with a mobile device such as a notebook computer, “smart” cellular phone, or Personal Digital Assistant (PDA). These cards support a protocol called Evolution Data Only, Evolution Data Optimized, or EVDO to make the connection. While other protocol standards are used such as EDGE, UTMS, and GPRS, EVDO is the most commonly used standard with most mobile devices today.

This methodology is commonly referred to as a “*network to network*” communications model, which is illustrated below:



Single User  
Network-to-Network  
Connection Model

For organizations that have hundreds or thousands of field employees armed with their own mobile device, this model becomes quite complex to manage and more costly to maintain.

The **business challenges** associated with a network to network mobile strategy include:

- 1. Higher Cost** – Each device (cellular phone, PDA, 3G / 4G-enabled notebooks) requires the purchase of a separate 3G / 4G broadband-enabled EVDO card and voice / data wireless plan. Depending on its use (peak vs. off peak minutes), the location (U.S. or outside country), and type of service (voice, data, or combination), the costs associated with managing such a system can be substantial. For example, one Denver-based financial firm paid about \$2250 to buy 30 “push-email” style devices that would allow their mobile employees to send and retrieve their corporate e-mail. In addition the company will pay approximately \$1500 per month (about \$45 dollars per device) to support them<sup>1</sup>. For a small business this may not seem like a significant expenditure, but for a large organization with a mobile workforce of several thousand employees, these costs can quickly add up.

<sup>1</sup>The Denver Post, April 2, 2006

In addition to the hardware procurement and voice/data, there are additional costs associated with training the field employee to use the device to access enterprise resources. Also, costs are incurred with configuring the enterprise network to accept the mobile devices as well as the training costs associated with an internal set of IT support and administration personnel.

**2. Limited Functionality** – Conventional and “Push-to-Talk” style cellular phones are most frequently used for mobile voice and data communications. Unfortunately, due to their small size and broadband network capabilities, they have limited functionality as compared to a comparable enterprise voice or data solution. These limitations impact usability in areas such as inferior e-mail functionality, slow network performance, small screen size, small keyboards, as well as difficult and/or confusing text messaging capabilities.

**3. Lost Productivity** – Assuming that each mobile worker has a cellular phone, notebook computer, or PDA, the time that is required to set up and configure these devices for basic connectivity to the enterprise network (voice, fax, and sharing data) can be time consuming. In addition, the length of time it takes a field employee to learn and manage these devices takes away from their productivity.

**4. Greater Security Risk** - Because these mobile devices use multiple network paths to obtain enterprise information, security cannot be assured at the same level as with an internal enterprise employee on the corporate network. Since many devices do not have access to a direct secure Virtual Private Network (VPN) connection, IT administrators cannot effectively manage the device as they would a similarly configured internal device. In the event that the mobile device becomes lost or stolen, the enterprise can be at risk of an intruder accessing the protected network, vital corporate databases, or obtaining sensitive internal information.

**5. Competing Standards** – Completing basic productivity tasks with any mobile device is always different and more complicated than performing those same tasks on a comparable desktop device. For example, performing the simple task of sending or receiving a fax on a mobile device requires learning new software tools and procedures, calls with cellular phones require separate numbers with special prefixes, and files from many mobile devices may require either visual or file-format conversions before they can be read by standard desktop software applications.

**6. Supplemental Resources** – When the limitations of a mobile device require additional manual or paper-based procedures, a host of internal personnel, procedures, and training are required to provide support to mobile workers. This reduces the productivity of both internal and field personnel.

## A New Solution – The “Site-to-Site” Communications Model

The solution to these problems is connectivity that can empower remote workers with functionality and access to resources similar to those of an internal, direct-connected enterprise employee. Such a solution would reduce a great portion of the additional costs and resources associated with the mobile worker, significantly enhancing productivity.

This solution is now available in the form of the *Wrouter WWAN Platform (“Wrouter”)*, which provides a single device that enables a direct and secure communication link to an enterprise network using a site-to-site connectivity model.



### *Advantages of Site-to-Site Connectivity*

There are several features and benefits associated with using Wrouter as part of a mobile enterprise strategy. They include:

**1. Simplicity** - Rather than having a series of devices using external broadband WWANs to make a connection to the corporate network, the site-to-site model uses one device to connect all of the mobile devices within its immediate area. This model is similar to the way that a standard network router works inside the enterprise to provide connections for an entire department.

**2. Lower Costs** – Instead of requiring the purchase or lease of a series of 3G / 4G-supported network interface cards for each mobile device, the Wrouter WWAN Platform (“Wrouter”) uses only one 3G / 4G card that can be shared by any mobile device within 100 yards of its location. Depending on the number of mobile locations, one Wrouter can support multiple field employees, allowing a typical enterprise to substantially lower their cellular data service charges. Additionally, Voice over Internet Protocol (VoIP) telephones can be used at each location, saving additional costs in hardware and calling minutes.

**3. Greater Productivity** – Instead of waiting for power or phone lines to be installed at a remote location, mobile workers can be up and running immediately. With Wrouter, an organization is able to use a high-speed wireless data link instead of a slower dial-up or DSL connection for their communications and transactions. Wrouter allows field employees to use all the capabilities of their notebook computers including the full suite of personal and enterprise applications with full access to the enterprise network infrastructure.

**4. Functional Parity** – Working in conjunction with an enterprise VoIP phone system, Wrouter equips remote field employees with a full range of voice and data services, without the need to install additional phone lines or cabling. Mobile employees using standard SIP-compatible telephones have full voice functionality equivalent to that of an internal office employee. Since the remote phones are directly connected to an enterprise PBX system, they are able to use standard 10 digit dialing for outbound or inbound calls, access voice mail, and use extension forwarding, conference calling, and other shared enterprise phone properties. Administrators can use a standard web interface to establish calling preferences for the Wrouter that specify how internal or external calls are received at the remote location. Fax capability is easily added by plugging in a fax machine to a Wrouter hub and using the administration software to assign an extension number to that location.

**5. Standards Support** – Wrouter supports any standard computer or mobile device with either a direct Ethernet or 802.11 B/G wireless connection capability. With an Ethernet hub, Wrouter can support and share a variety of Ethernet devices such as printers and computer peripherals, supports WEP or WPA standards for wireless network security, and comes with a built-in firewall allowing users to tunnel into an enterprise VPN using the IP-SEC, PPTP/L2TP, or SSL VPN security protocols.

**6. Extensive Power Support** – Wrouter supports three power options that allow mobile employees to obtain power in almost any situation. These include a 12 volt vehicle cigarette/utility port, 110-240 global AC power, or hard wired to an existing power source. This hard-wired option can be used for a more permanent connection for other uses such as fixed mount vehicles, boats, RVs, or for emergency applications with mobile field units.

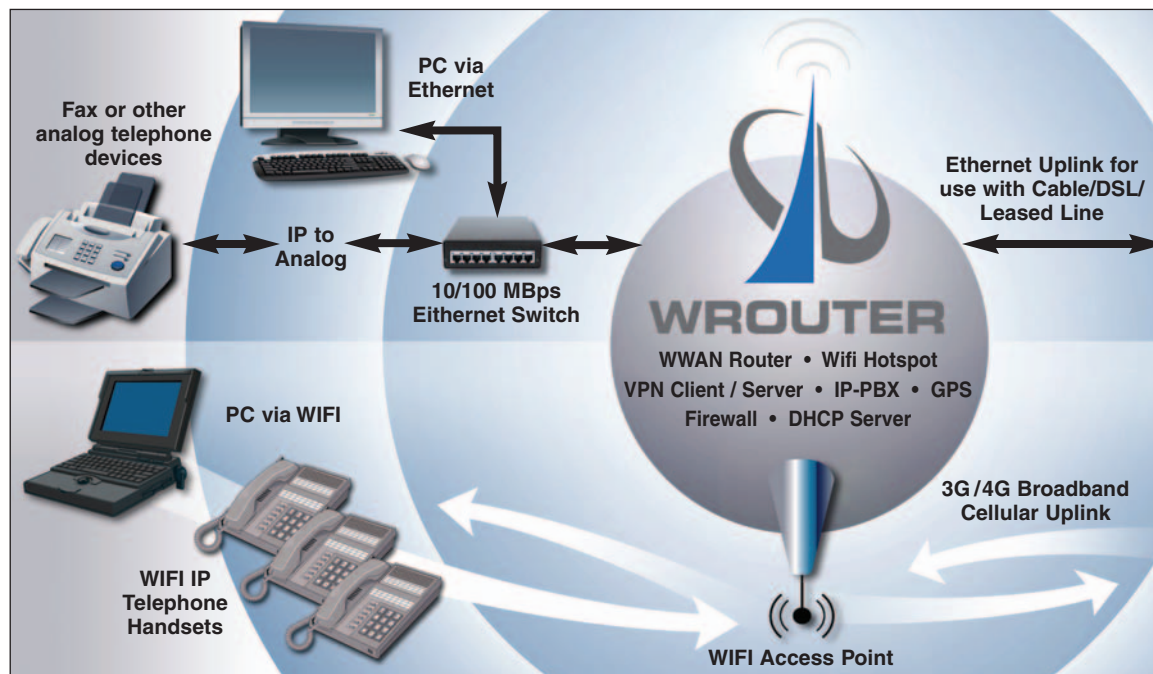
**7. Remote Video Monitoring or Conferencing** – Wrouter can also be deployed for situations that require remote monitoring such as construction sites or secure locations. Multiple surveillance cameras can be wired to Wrouter's optional rack-mounted configuration. Once installed and operational, live video images can be broadcast over the network for surveillance monitoring, network communications, or video conferencing on a real-time basis.

**8. ISDT Terminal / Thin Client (Optional)** – Wrouter is available with an optional thin client, Integrated Services Data Terminal (ISDT) module along with an LCD touch screen and keyboard. This module works in conjunction with thin client software that is embedded within the device. This combination allows a mobile worker to display a remote Windows XP, Citrix thin client, or X Windows desktop session on the screen, bringing all available enterprise resources forward to the field level. In remote operations such as a support or maintenance function, inventory management, or order fulfillment, these locations have access to designated enterprise servers over a secure VPN connection. This saves a considerable amount of time, human capital, and money by managing one server for all remote devices, versus hundreds of stand-alone notebooks or PDAs.

**9. Ease of Set-Up** - The Wrouter Mobile Network Device is extremely easy to set up and configure. The process is as follows:

- **Step 1: Setup** – Plug Wrouter in either its stand alone (notebook-size) or Rack-Centric configuration into any available standard 110 or 220 volt outlet, or a vehicle's utility port using an optional cigarette/utility power connector.
- **Step 2: Activation** – Insert an activated 3G / 4G wireless broadband card from a supported cellular carrier into the standard PCMCIA slot of the Wrouter device. Supported cellular networks include Verizon, Sprint, Cingular/ATT or T-Mobile.
- **Step 3: Establish Connection** – Power up the device. Wrouter's web-based interface prompts the user to answer some basic configuration questions about the enterprise network. Once the configuration is completed, a connection is established. After this takes place, standard SIP- supported VoIP telephones can be used for voice communications back to the enterprise PBX telephone system.

- **Step 4: Establish a Wi-Fi Access Point** – Once the broadband connection has been established with the installed 3G / 4G wireless broadband card in the Wrouter, that location is established as a Wi-Fi hotspot. All Wi-Fi enabled mobile devices within a 100-yard radius from Wrouter's location now have a direct site-to-site VPN connection to the enterprise network (see illustration of this configuration below):



### The Wrouter Remote Network Configuration

## Examples of Wrouter in the Mobile Workplace

The following are two examples where Wrouter can be used in the mobile workplace:

### *Real Time Freight Delivery with Full Network Functionality*

With the highly competitive nature of package and freight delivery, the use of information technology is a critical competitive advantage; and the ability to track shipment status is an absolute requirement. With conventional solutions, the status of a package is recorded when it is checked into specific distribution points along a particular route. In between those points, shippers and customers have little information about the status and/or location of that package.

With the combination of a Radio Frequency Identification (RFID) tracking solution along with Wrouter's built-in GPS tracking capability, a shipping manager would be able to know the exact location of both truck and package on a real-time basis. As product palettes pass along the RFID readers, the enterprise is notified immediately that the product is on the truck and when it leaves the dock. When the truck is in motion, the shipping manager knows at any time exactly where the truck is on its designated route. This enables the shipper to track the status of the package at any point in the delivery process, providing customers with real-time information about their delivery. When the truck arrives at its final destination, the RFID tag readers confirm the delivery as the package is being unloaded. That information is also transmitted over the VPN

to the corporate headquarters and can be disseminated to an enterprise extranet, where it will be shared with the customer from a corporate website. The enterprise has full control over the information and can determine how much they want to share with their customers.

But beyond the real-time tracking capability, Wrouter offers a full set of communications services with the optional ISDT module. With this add-on, shippers would be able to establish a direct link between the truck and the distribution location, ensuring a secure communications session over the VPN on both a data and voice level. In addition to the real-time GPS capability, the delivery truck would also have e-mail capability, access to all authorized network servers, fax send and receive, as well as other approved network resources all from a single mobile device. For example, if there are changes in the delivery requirements, or if the shipping manager needs to broadcast critical information to the entire shipping fleet, he can have that information automatically sent from one location using a single Terminal Server. Each delivery truck would receive that information via the Wrouter's ISDT terminal within seconds after it was sent.

Wrouter saves enterprises a considerable amount of money compared to the costs associated with a third-party solution to track assets in the field. Factoring in the monthly maintenance costs associated with deploying third-party RFID and GPS solutions, plus the related internet charges and airtime charges for maintaining a fleet of cellular or "push-to-talk" style phones, the Wrouter solution is a fraction of the cost of the conventional approach.

**With Wrouter's built-in ISDT feature and an onboard video camera connected to a secure VPN, a first responder can link up with their headquarters and provide a live video feed of the emergency scene.**

#### **First Responder Field Emergency Services**

In any emergency situation such as a fire, natural disaster, terror incident or crime scene, the ability to effectively gather all available information at the remote location is of utmost importance in determining a successful response. Being able to rapidly and accurately analyze on-site information in real-time is what allows command resources to determine and marshal appropriate emergency services, and often critically affects results.

While field emergency services have had access to voice and data communication capabilities for some time, current approaches do not form a single, unified and cohesive communication system that seamlessly integrates both. For example, while each remote vehicle has voice communications to other vehicles, they must use a central dispatcher for their connection rather than communicating directly with one another. Data communications usually involve either a one-way link using a central server at the headquarters office, or basic e-mail capabilities where the user must wait for a response after a message has been sent. In critical situations where time is of the essence, these solutions often do not provide an adequate level of responsiveness.

From a financial perspective, existing emergency communications often require expensive add-on modules that must be purchased separately, and usually require significant time to learn and master their complex processes. Also, with existing systems, it is quite difficult to add additional capabilities such as live video, database access, three-way conference calling or instant messaging. In cases where these systems can be added, remote vehicles cannot usually use the systems to communicate directly among themselves.



With Wrouter's built-in ISDT feature and an onboard video camera connected to a secure VPN, a first responder can link up with their headquarters and provide a live video feed of the emergency scene. By transmitting events as they happen, this would provide commanders at the headquarters location with an up-to-the-minute view of the situation as it unfolds. If appropriate, additional field vehicles can also be equipped with Wrouter and the ISDT terminal module, and could also connect to the VPN, thus being able to also see the live video feed. This would allow both headquarters' commanders and field support teams to cohesively communicate with each other in real time and more accurately respond to the crisis with the appropriate level of resources.

For crime-related incidents, having access to networked crime data is an important tool that can aid law enforcement officers. With Wrouter's ISDT *Thin Client* component, any officer would be able to replicate in their mobile environment the same desktop configuration used at their office location. This would allow them to access local criminal records, regional and national crime databases, and key application files. It would also allow officers to send and receive e-mail over their secure VPN network, integrating voice, data and network connections that can assist in field investigations. For example, a suspect's likeness could be immediately transmitted to mobile vehicles and be simultaneously combined with any related local or national information, which could aid in the rapid apprehension of a suspect.

## Actual Case Study: Wrouter Deployed at a Construction Worksite

<b>Customer Profile:</b>	Hub Construction Specialties, Malcolm J. Carter, IT Director
<b>Customer Environment:</b>	Retail construction worksites
<b>Customer Challenge:</b>	Lack of electrical power and voice/data lines at new construction sites limit the ability of the sales force to process material work orders and facilitate communications in support of customer needs.

Hub Construction Specialties is a medium-sized company that specializes in the supply of concrete accessories, tools, and equipment to subcontractors involved in the construction of commercial buildings, shopping malls and large retail stores. Based in Southern California, Hub Construction employs 180 people, many of whom are sales personnel remotely deployed throughout the region in support of approximately 1500 active commercial construction accounts.

To succeed in the subcontracting business, ongoing customer communications are essential. Construction firms want to know the exact moment when their concrete materials are scheduled to be delivered to the project site so they can schedule their construction personnel, maximize their productivity, and save costs. Since construction companies are contractually held to very specific project bids, it is essential that they keep tabs on all their material and labor costs so they can be tracked against the contract. A subcontractor that can supply real-time information on the exact amount of material being delivered and deployed at any point during the life of a construction project is of high value to any construction firm.

**“This is the way that construction job sites of the future will operate.”**

*Malcom J. Carter  
Director of IT  
Hub Construction Specialists*

Prior to Wrouter, when groundbreaking took place for a new retail store or mall, Hub’s customer base would not have any electrical power or telephone lines available for voice or data communications until approximately three to four weeks from the start date. While workers at the site waited for utility poles and cables to be installed, they depended on an eclectic group of cellular or “push to talk” style phones for voice communications. As a result, critical tasks such as material orders depended on processing paper-based forms between field sales people and office administrators over wireless cell phones. Since phones lines were not installed, placing the orders via fax or forwarding calls was impossible. Under this system, customers had to wait days before their concrete orders could be processed and delivered to the site. As a result, Hub Construction’s field personnel found the process of generating and tracking orders slow and difficult.

According to Hub Construction’s IT Director, Malcolm J. Carter, *“The working environment with previous mobile solutions was a real mess. Until our customers had power and phone lines up and running our sales personnel couldn’t generate any revenues for the company. There was a lot of wasted time sitting around and waiting for things to happen.”*

Beginning in early 2006, Hub Construction was chosen by Wrouter, to field test the Wrouter WWAN Platform both within their enterprise and at several of their customers' construction sites to provide Wrouter with field experience of the product benefits applied to a real-world construction industry setting. The product was placed at three critical locations within Hub’s business model where critical information was needed:

**First Location** – Deployed with the Hub Construction Sales force for order processing.

**Second Location** – Inside Hub Construction delivery trucks providing customers with real-time status on their deliveries.

**Third Location** – Deployed at the actual construction site to provide a value-added service for the main contractor to place additional orders, obtain shipping status information, and communicate with the headquarters office.

The improvements that resulted from using the Wrouter WWAN Platform were dramatic:

- Field sales reps were able to immediately place and confirm their orders online.
- Each delivery truck had its own tablet pc and printer and was able to track pickup and delivery times by location.
- Since salespeople could place their own orders, there was no need to use additional administrative personnel to process the paper-based forms, allowing Hub Construction to re-allocate personnel to other tasks, saving the company tens of thousands of dollars.
- Finally, as soon as an order was shipped, the information was made available to Hub’s customers on a web portal, allowing customers to obtain up-to-the-minute shipping and delivery status information and to schedule construction teams accordingly. For field communications, both field sales and construction crews were able to use standard VoIP telephones to send and receive calls without exceeding wireless calling plan minutes. In addition, fax machines were connected providing inbound and outbound faxing where necessary.

Hub was extremely impressed by the test and is hoping to get 500 additional units deployed across all of their active project sites. Hub believes that providing these services in the field builds excellent customer loyalty, which will have a direct effect on creating a competitive advantage and generating additional business for their firm.

According to Director Carter, *“This is the way that construction job sites of the future will operate. They won’t have to wait for any services to be in place. With the speed of 3G / 4G network cards approaching T-1 performance, you are talking about a fully capable business operating without restriction in a field setting. Our sales force believes this is one of the most exciting products they have ever seen.”*



## Summary

It’s clear that the model of the mobile enterprise is here to stay. Its voice and data communication benefits clearly outweigh initial investment costs. But as part of a mobile strategy, enterprises must ensure that this investment will maximize situational awareness and provide the greatest return on that mobile investment.

**“Our sales force believes this is one of the most exciting products they have ever seen.”**

The Wrouter WWAN Platform provides a clear business advantage by leveraging all enterprise information assets out to remote locations where they can be used at the exact point of customer interaction. This allows for more effective decision making, and builds responsiveness, customer loyalty, and most importantly, maximizes cost effectiveness leading to greater bottom line profitability.

In summary, there are four key advantages with the Wrouter WWAN Platform:

- **Lower Operating Costs** – Wrouter saves time, resources, and personnel costs as compared to more traditional mobile solutions.
- **Productive Parity** – Wrouter levels the functionality of both internal and external personnel, providing field employees with similar functionality to their internal counterparts.
- **Situational Awareness** – Wrouter provides corporate offices with the fastest and most accurate information regarding customer needs, enabling superior responsiveness and more effective decision making.
- **Faster ROI** – The enhanced field productivity and cost savings that Wrouter provides translates into a rapid return on investment.



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For more information on the Wrouter Mobile Network Device,  
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