

# Comprehensive Wireless M2M Solutions

Broadband Networks on a Single Platform  
for Wireless M2M Communications



Modern communications technology enables large quantities of information to be rapidly and readily available. This high-volume type of accessibility is now an essential need for many industries that rely on Machine-to-Machine (M2M) networking for a wide range of applications.



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Organizations expect to receive more and more data and they not only want it instantly, but also want to reduce their operating budgets. Industries such as utilities, oil and gas, government and defense, education, municipalities, and public safety need high-speed connectivity, but they also want to maintain top security standards and protocols.

In many of these industries, assets are increasingly geographically dispersed, requiring coverage of multiple locations and remote connectivity for the field personnel who need to access data. Many organizations want to bring the corporate office to their remotely located assets or incorporate IP video into their network infrastructure.

And some organizations want it all – security, video, reliability, flexibility, speed, volume, and connectivity – while simultaneously cutting back on operating costs. Wireless broadband communication platforms, designed with the security and versatility requirements of the modern M2M network in mind, have made all of these capabilities possible within a single, flexible platform.

## Trends Behind the Demands

There are several key trends that explain today's intensive wireless networking requirements. First, more data is being collected and utilized which requires a network that has high speed and bandwidth. Additionally, most communication vendors will agree that the decision makers have changed. Many organizations have specific IT security requirements, and every single networking element must comply with those specifications to receive approval for use on the corporate network. Because of these security requirements, the IT person or team is now the point decision maker about communications programs in the field. A significant benefit of this shift is that more organizations can now integrate/connect their core IT network infrastructure with all of their geographically-dispersed assets for greater manageability, network visibility, and control.

Organizations also want to build or expand core network infrastructures and remote networks while protecting their existing investments in serial communications technology. Many organizations are no longer limiting communications networks to a single vendor, technology, or service provider. In order to leverage the most cost-effective solutions for specific network deployments, there may be substantial benefits in leveraging multiple technologies for a hybrid networking approach. These communications trends are seen without barriers across industries – from industrial plant to government buildings to public safety and even education – and wireless vendors have been paying attention.

## Why Wireless Broadband?

Mobile broadband, remote broadband, security over wireless, and the mix of M2M and human machine interface (HMI) have all played significant roles in the evolution of broadband networking solutions into their current state. The ability to securely extend high-

speed wireless networks into remote locations while maintaining mobility and end user device choices is an attractive offering to many industries.

The increasing bandwidth in broadband communication technologies is driven by the demand for video and other bandwidth intensive applications to remote devices in remote locations. For example, certain industrial applications tend to be either very remote, very mobile, or both. For example, there is increasing demand in oil and gas for video on the wellpad and Wi-Fi access for field service personnel. In the defense industry, there is a desire to add video on strategic defense platforms to use with communication products for command and control applications.

The idea of being able to connect all organizational networking needs into a single wireless broadband solution may sound ideal to some, but wireless is not without its critics who have placed more trust in wired solutions over the years. It's important to note that wireless has come a long way. Today, many industries accept it as readily as traditional wired/cable communication solutions. With the increasing use of wireless, organizations have begun to reap the benefits including:

- Determining how resources can be leveraged in the most valuable way
- Mitigating or responding to issues via enhanced monitoring capabilities
- Achieving greater operational efficiencies and increasing productivity
- Increasing data consumption to more thoroughly analyze the key operational factors that drive success
- Diminishing the impact on the environment via monitoring/control across large geographic regions
- Aiding the development of increased safety and security measures
- Securing greater adherence to regulatory and compliance factors
- Improving product quality and innovation within an organization

As wireless has grown in popularity, the M2M industry has also evolved. In its early days of implementation, an M2M network was likely limited to a singular location – such as a plant with production lines where devices or machinery needed to communicate in one location. But over time, organizations began to realize the value of the data that the communications technology provided and their needs began to shift. Speeds and throughputs began to increase, and the M2M networks became much more versatile. Wireless broadband networks can now be deployed for one or a combination of the following typologies:

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NETWORKING TYPE	POTENTIAL FEATURES, BENEFITS AND APPLICATIONS WITH WIRELESS BROADBAND SOLUTIONS	
Cellular Backhaul	<p>For network redundancy and/or enabling drop-in networks wherever cellular is available.</p>	<p><b>Key Features:</b></p> <ul style="list-style-type: none"> <li>• Connectivity for mobile devices – phones, tablets, and laptops/PC</li> <li>• Flexibility</li> <li>• Accelerate Network Deployments</li> </ul> <p><b>Application:</b> In the event of a disaster when wired solutions are down, a wireless broadband solution can use its drop-in network capabilities to serve as temporary communications until the damaged systems are up and running again.</p>
Point-to-Point Networking	<p>For transmitting high volumes of data becoming the backbone infrastructure.</p>	<p><b>Key Features:</b></p> <ul style="list-style-type: none"> <li>• Back-to-Back Repeater</li> <li>• Link Range</li> <li>• High Data Throughput – multiple in, multiple out (MIMO) 2X2</li> </ul> <p><b>Application:</b> A school district with three separate buildings and the need for 50 Mbps of data. This would typically require a DS3 connection per building – which is an expensive investment and requires on-going monthly fees for each circuit. Wireless broadband solutions can provide the same high throughput in data with only the initial cost of the broadband device and deployment and the on-going fees of a single circuit cutting operational costs by more than 50 percent.</p>
Point-to-Multipoint	<p>Networking for providing fixed point mesh capabilities and allowing multiple systems across multiple client points and sites to be connected back to a central point.</p>	<p><b>Key Features:</b></p> <ul style="list-style-type: none"> <li>• Sectorized Communications</li> <li>• Fixed Point Mesh</li> <li>• Frequency Diversity</li> </ul> <p><b>Application:</b> A Rural community that has been dominated by one communications provider for years, but now has competing carriers. New broadband solutions can offer public domain Wi-Fi for small to mid-size businesses by setting up a communications base and several key data points consisting of broadband communication devices and Wi-Fi hotspots throughout the community.</p>
Wi-Fi	<p>Networking to easily connect people, sensors, and other systems in the field to the back office.</p>	<p><b>Key Features:</b></p> <ul style="list-style-type: none"> <li>• Compatible with smartphones, tablets, PC</li> <li>• Easy Wireless Connection</li> </ul> <p><b>Application:</b> A field technician at a remote oil and gas site needs to connect to the corporate network. Broadband wireless can securely enable this through the technician’s smart phone, tablet or laptop/PC.</p>
Mobile Mesh	<p>Networking to provide high speed communications links for multiple access point network and self-configuring ad-hoc networking capability.</p>	<p><b>Key Features:</b></p> <ul style="list-style-type: none"> <li>• Multiple Access Point Network</li> <li>• Network Range and Size</li> <li>• Self-Healing Networks for Resiliency against single points of failure</li> </ul> <p><b>Application:</b> In agriculture mobile grain carts can operate and associate with each other, knowing they are securely on the same network with the support of RADIUS authentication technology.</p>

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Ideally, organizations should have the choice to select a network topology or combination of networks that best suit their applications with a mix of high speed Ethernet and Serial data ports for easily interconnecting with existing system technologies. The latest wireless broadband networking solutions can meet these requirements, integrate with existing technologies, preserve existing investments, and replace obsolete communications technologies without a hitch.

Any industry that uses M2M communications can benefit from a flexible and secure broadband wireless network platform solution that offers the flexibility to use wireless as a strategic business tool. For example, an organization that wants to cut back on telecommunication expenses can deploy these solutions without the monthly T1/E1 or DS3 charges that cost organizations hundreds (and sometimes thousands) of dollars per month – because a single broadband networking solution is able to offer the same connection, but without monthly charges. Just a few months after the investment into the technology the organization can receive its return on investment and save what they would have otherwise spent on the T1 connection, while continuing to meet security and reliability standards.

## It Starts and Ends with Security

Security is central to any M2M communications network. Many pieces of corporate communications networks, such as voice and video, are moving onto the Local Area Network (LAN). VoIP, for example, is commonplace and video conferencing, teaching, and training are all key parts of IT strategies in most corporations today. Trade Secrets and business practices that give companies a competitive edge are all discussed on the phone (VoIP) and between remote offices (video conferencing and training). These critical and sensitive business communications must be protected from those with curious or malicious interests.

New wireless broadband network platforms offer end-to-end security, which is an advantage especially with an IT decision maker. When considering communication devices for field or remote deployment an end-to-end solution offers a more streamlined approach than trying to tie in a system whose field communications include disparate providers for backhaul, Wi-Fi and cellular. A single platform not only offers ease of use for training and installation – but ensures that the entire corporate network is secure under a single end-to-end network that can utilize RADIUS technology.

An example of the benefit of end-to-end network security is in a hospital setting. If a hospital would like to obtain patient records from a nearby clinic the information cannot simply be sent via email because of the Health Insurance Privacy and Accountability Act (HIPAA). However, with a private broadband connection this data can be sent securely through a LAN without needing to go out over the public domain Internet. The data stays secure, the patient maintains privacy and the hospital receives the information fast.

When sensitive information is sent over any network, it is imperative to use highly effective security measures to prevent unauthorized access. Hackers are always a threat, but there's also concern for industrial spying and terrorism. In many industries, such as utilities,

a network breach could potentially impact operations or cause the takeover of a utility, such as an electric grid. Imagine the impact of blacking out an entire city or region. The results could be catastrophic.

Fortunately, there are broadband networks equipped for defense against unauthorized access with WPA and WPA2 protocols based on the 802.11i standard requiring the use of private, unshared keys with Counter Mode Cipher Block, Chaining Message Authentication Code Protocol (CCMP) and Advanced Encryption Standard (AES). The US Government considers AES-128 to be sufficient for securing information rated as "Secret," and AES-256 for "Top Secret."

With broadband networking solutions for M2M communications that meet these requirements, organizations can leverage and incorporate several essential network elements including wired network access, cellular network access, local area communications, high speed backbone communications, Wi-Fi Hotspot access and mobile mesh networking through a single platform. This not only provides the ability to enable data intensive applications, but organizations can extend their enterprise IT network into remote locations, empower field assets and personnel through wireless access to back office systems, streamline the integration of new devices and sensors into existing infrastructures and simplify overall networking integration and deployment, while maintaining network privacy and security.

For example, with wireless broadband networking technology, an oil or gas well pad in an extremely remote location could be easily connected to the corporate network as securely as if the two locations were connected via CAT5 Ethernet cable. The same connection could be made between school buildings, without having to trench the ground and pay monthly cellular or telecommunication fees where there may already be service issues because of the remote locations.

A rural school that chooses broadband access could stream video and distance learning just like many schools in urban locations — without the fees. Typically, rural schools have smaller budgets because of a very small population contributing/paying into the tax base. Although budgets may be tighter, with broadband capabilities the children at these schools have the opportunities to benefit from the same educational programs that urban area students receive.

## New Broadband Networking Solutions

Wireless broadband solutions with the ability to support multiple frequency bands and several industrial internet protocols can meet a vast range of networking and communication demands. These solutions can host all network communications without monthly reoccurring fees of individual telco circuits, which can significantly reduce operating expenses and improve connectivity across an enterprise. While product features vary from vendor to vendor there are key attributes to look for when selecting a technology.

Some providers offer the ability to leverage multiple radio modules per unit with high over the air data rates, high bandwidth and secure communications. Some of these technologies can operate in the 900 MHz, 2.4 GHz and 5GHz ISM bands with options for a 3G/4G modem for Wi-Fi operations. There are vendors who also offer the ability to

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leverage a wide variety of proven Ethernet and internet protocols and management services to make it easy to install, operate, and manage in both standalone and enterprise networks. There are wireless broadband solutions that allow for connectivity of a variety of different antennas, allowing the organization to best utilize their network.

Some vendors offer platforms built to support any network infrastructure, provide remote video access and power multiple Serial and Ethernet devices simultaneously with an easy integration into existing LAN and Wide Area Networks (WAN), with proven Quality of Service at the last mile. There also are broadband communications technologies that offer rugged design and versatile IP and network configuration options that make it easy to deliver advanced wireless networking and communications. What's even more incredible is that there are solutions available today that offer all of these options on a single platform in a single chassis.

An organization that wants to enable data intensive applications (such as video), reduce operating expenses, have advanced security or achieve all three of these will benefit from a broadband communications platform. It is critical for any decision maker to

properly research all of the options on the market, choose reputable vendors who support path studies and network design, and select a technology that can support all communications needs – with future considerations in mind. The right broadband network can handle all of today's communication demands no matter how varied or different the applications may be.

## FreeWave WavePoint: Enabling Comprehensive Wireless

WavePoint is the culmination of FreeWave's 20 years of experience in developing industrial grade wireless M2M communications solutions. As an organization, FreeWave understands challenging RF environments and WavePoint enables maximization of the overall networking experience because of it. WavePoint provides the secure, high speed/bandwidth data pipe of the future and can be tailored to meet the needs of any organization that require cost-effective and reliable broadband connectivity for versatile M2M networking and communication needs.

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