



Radio IP Software Inc.

White Paper

Wireless Connectionware Helps Utilities Optimize Customer Service

Radio IP Software Improves Mobile Work Force Connections

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Introduction

Today, deregulated utilities compete on price and quality of service, and whether it is power, gas or water, those companies who make the most of their IT resources are best positioned for success. Avoiding high-impact events like power outages, unsafe water quality and natural gas service interruptions and creating rapid-response capabilities when such events do occur is no small order for utilities serving perhaps hundreds of millions of customers.

The successful operation of utility companies depends on applications like meter reading and billing, inventory, distribution management, outage and network management, mobile workforce management and plant-control systems. Utilities must depend on private and public wireless technologies to communicate with their field workers but they run into several obstacles. With private networks, utilities incur large capital costs, they are unable to run IP applications and network speed is an issue. Public networks pose security problems and recurring costs.

Without secure, reliable and fast wireless communications, it can be difficult for a utility to manage its mobile workforce and customer service issues efficiently. Outages caused by poor resource management are not only costly for utilities, but can also have ripple effects into regional economies. This paper will show how software from Radio IP Software, Inc. called Radio IP MTG™ provides power, gas and water utilities with secure, reliable and fast wireless connectivity over any wireless network. The software enables utilities' field workers to send and retrieve mission-critical information and reports from the field, and to work with applications located at headquarters in real-time.

Common Applications

Consider the task at hand for large natural gas utilities who distribute gas to millions of metered consumers in many communities through underground storage and a network of interconnected pipelines. A large gas utility's field service organization handles millions of service calls each year.

A typical water utility services many thousands of people in numerous towns from groundwater sources and reservoirs through water distribution systems. It also provides water-related services, including wastewater treatment plants, conservation, water quality, and in some areas, crop irrigation, as well as customer service. Customer service for a water utility involves servicing consumers and businesses with safe and high-quality water and then facilitating metered billing.

A large electric utility services hundreds of thousands of customers within an entire city, with thousands of miles of both aboveground and underground power lines, plus substations. To better isolate the causes of outages and to assign work crews to make repairs, such a utility leverages outage and network management applications that help field service centers dispatch crews for outage restoration, equipment replacement and repair, distribution, construction and network and underground work.

Such applications can identify devices or areas affected by outages or problems on the distribution network and can provide an intelligent grouping of calls and incident data. A mobile workforce management dispatch module can then help a utility match the skills of field crews to evolving situations in real-time, as well as match resources to different job types such as repair, emergencies and meter reading.

Seamless Contact

Imagine a situation at a utility's headquarters whereby the outage and network management module reports multiple outages within a given geography. Management takes a look at the mobile workforce management dispatch module to identify two field workers within the vicinity of the outage and one just outside the coverage zone but whose skill set is an absolute must for the job. Let's also assume that the utility has invested in a public network to augment its private RF network to communicate with its mobile workforce.

Using Radio IP MTG, management seamlessly, securely and automatically communicates with the three workers roaming across multiple wireless networks. The field workers download the pertinent information about the customer and the problem to their Pocket PC or laptop. Using a global positioning system (GPS), management pinpoints the exact location of each field worker, one of which is in a parking lot. Management quickly sends directions to each field worker.

When the work orders are complete, each field worker sends status reports back to headquarters.

What's more, all of the data sent in either direction was encrypted for security purposes, ensuring that the utility company's customer information is kept confidential, and that the overall security of the city is protected.

IP Applications on Private and Public Networks

Many utilities have invested in the reliable nature of private RF networks for wireless communication in lieu of public cellular networks. Spotty wireless access is simply unacceptable for mission-critical applications, such as when utilities management requires real-time contact with field service personnel during service outages.

While private RF networks alone can perform basic communication functions, these networks don't typically allow TCP/IP-based applications (such as those typically deployed on the Internet and on corporate networks) to extend to mobile workers. Consequently, significant amounts of custom programming would be required to allow the meaningful information contained in TCP/IP-based applications to be exchanged between mobile workers and utilities management in real-time over private RF networks.

To avoid the time and expense required for such custom programming, many utilities have adopted Radio IP MTG, *connectionware* that forms a functional connection between the TCP/IP-based applications that are of value to utilities companies and their non-TCP/IP radio network transports. To utilities applications running on Microsoft® Windows® operating systems (XP, 2000, 98 and Pocket PC), Radio IP MTG looks and operates like a virtual network interface card (NIC) with the standard Windows Socket Services (winsock.dll), forming a seamless interface to the radio communications network. Radio IP MTG eliminates the need for utilities IT managers to engage in custom application programming interfaces (APIs) or complex integration programming. Any application that runs on a utility's internal corporate LAN, WAN, Intranet, or Extranet is easily extended over private RF to mobile workers via Radio IP MTG, the only difference being the speed of the network used.

Public Networks

- 802.11
- MotoMesh
- EV-DO
- EDGE
- 1xRTT
- GPRS
- iDEN
- Switched Networks

Private Networks

- Motorola DataTAC
- Motorola ASTRO
- M/A-COM EDACS
- M/A-COM Opensky
- Dataradio
- ESTeem
- IPMobileNet
- Mobitex
- Tait
- Satellite

Improved Performance

Radio IP MTG actually improves wireless network performance for utilities that use both private and public networks. Here's why: Because the TCP/IP protocol was originally designed for use in high-bandwidth connections and broadband networks, the protocol is inherently limited by narrowband wireless networks. But Radio IP MTG uses an optimized version of the TCP/IP protocol with a patented technique that reduces TCP/IP header size by an order of magnitude, and uses a utility's standard RF network systems acknowledgements instead of the more cumbersome TCP/IP handshake. Radio IP MTG also eliminates the duplicate packets generated by the TCP/IP protocol, and includes an algorithm that provides 90 percent compression on text files, dramatically improving the speed with which data travels between a central office and a mobile field service location.

Radio IP MTG provides an even higher compression ratio through the optimization of the HTTP socket itself. By keeping an internal socket open, the server sends out fewer packets, improving data

compression and transmission time for commonly used http-compliant applications such as browsers for an Intranet connection. These efficiencies are absolutely crucial for the usability of mission-critical utility applications, boosting network performance without costly upgrades.

Reliable Connectivity

While private radio networks are often good solutions for connecting utilities offices with the field, there are various reasons why utilities may take advantage of existing public communications networks as a complement to their existing system. For one, they may wish to leverage the faster speeds of public systems all while alleviating the network load on the private system. Or they may simply wish to have a back-up system in place should a coverage failure occur. One particular feature of Radio IP MTG, called RadioRoam®, facilitates this by enabling mobile utility workers to automatically roam seamlessly and efficiently between an unlimited number of disparate wireless networks without losing their connection to the main office. User-defined roam criteria enable a utility's IT administrator or communications manager to load one remote network more heavily than another based on application need, time of day, and the cost of access.

RadioRoam's application and session persistence techniques ensure that field workers maintain a consistent connection with the head office by making applications less sensitive to high-latency networks. During coverage gaps, applications stay alive on both the client (field) and server (home office) ends of the connection, and security remains open making re-authentication unnecessary. RadioRoam also provides automatic network reconnect, re-establishing connections to an available network without field worker intervention; a failed transmission continues from where it left off. The software also provides data buffering, meaning that when a utility vehicle wanders into an area of poor network coverage, application data will be accumulated until the vehicle returns to a viable network connection where data transmission can seamlessly resume.

All of these features add up to greater and more efficient wireless coverage for mobile workers, guaranteed data delivery for headquarters, and better service for utilities consumer customers.

Secure Data Transmission

Radio IP® Mobile VPN, another feature of Radio IP MTG, provides the security of a virtual private network for a utility's entire mobile fleet through user authentication, and data encryption and encapsulation. It is a unique security solution for a utility's wireless communication network.

Radio IP Mobile VPN ensures positive identification of field workers accessing the network through multiple levels of advanced authentication. In addition to standard username-password authentication, Radio IP MTG also provides secure, two-factor authentication using token keys or smart cards for a double layer of security.

Since a utility's wireless network signals are broadcast and can be easily intercepted, Radio IP MTG offers the highest encryption standards to assure that all data is transferred securely between the field and the home office. In fact, the entire TCP/IP data payload can be encrypted with Triple DES (168-bit) or AES (256-bit) encryption, using FIPS 140-2 certified technology.

Radio IP MTG's Mobile VPN tunnel has been optimized and is more efficient than standard VPNs which are typically designed for wired environments. A potentially disruptive intruder would first need to decrypt the utility's data, then would need access to the compression library to understand the data and, finally, would require a thorough understanding of Radio IP Software's unpublished protocol in order to hack into the data.

Upon receipt, data transmitted to and from the field is validated, de-capsulated, decrypted, and decompressed, completing the secure data transmission process. Radio IP MTG lowers support costs by adding significant levels of security while ensuring there is no technology burden on field personnel and IT-managers.

Network Management

Radio IP MTG provides management and statistical tools that place IT personnel in the driver's seat when it comes to managing a utility's wireless network assets. Radio IP MTG includes tools like Mobile Dynamic Host Configuration Protocol (Mobile DHCP) for wireless networks, Forward and Filtering and server high availability, to name only a few, all designed to assist utility network administrators.

Mobile DHCP simplifies network administration of a utility's fleet of IP addresses by automatically issuing static IP addresses. Without Mobile DHCP, all IP addresses in the field equipment (e.g. laptops) would need to be set manually, which is not only a labor-intensive process for utility network administrators but can also cause major network issues.

The Forward and Filtering feature of Radio IP MTG allows network administrators to tailor their wireless routing within a utility's network. Administrators can determine over which networks and under which conditions an application may transmit data for unprecedented control. For example, software updates for specific applications could be restricted from transmitting over a utility's narrowband network to prevent overloading.

Radio IP MTG also uses Microsoft® Cluster Service to provide a hot standby redundancy solution for mission-critical utility applications. Should Radio IP MTG stop working on a utility's particular server, or if the server is intentionally brought offline, the communications workload is shifted automatically to another server for continuous service to and from the field.

Conclusion

Deregulation has splintered the utility industry into one that comprises many public and privately owned companies competing on price and customer service. Often servicing hundreds of millions of customers, communication with a large customer service organization can be daunting. Managing IT resources and optimizing application use is the best way for utilities to stay ahead of the competition and manage costs.

For reasons of security and guaranteed access, many utilities have invested in private RF and/or public networks for wireless coverage. Now many want to integrate corporate applications with field data in real-time to respond to outages more quickly and to prepare field reps more efficiently. For a utility, keeping a mobile fleet out in the field without having to come back to headquarters saves time and money. Automatically receiving work orders, locating lines and remotely managing workers allows a utility to stay ahead of the competition but most importantly provides better service to clients.

Radio IP MTG provides *connectionware* that glues together corporate IP applications with private RF and public networks. The software also improves network performance, ensures security and provides continuous wireless connectivity between field workers and home offices. Radio IP MTG is a cost-effective solution that helps utilities stay ahead of the competition by optimally leveraging their wireless assets, and mobilizing their field workforce for the best possible customer service.