



RFID: Extension of the

Radio Frequency Identification (RFID) is a new frontier, vendors and users need to become aware of the potential implications on the enterprise network. This article will discuss the mobility and wireless challenges and present a solution with applications. There has been significant progress with regard to tags and identification (i.e. EPCglobal UHF GEN 2). There has also been progress in middleware development to bridge to applications. The weak point is clearly the network infrastructure. RFID has evolved from the bar code reader to practical application in the retail industry. It has even been adopted by the U.S. Department of Defense for tracking within the supply chain. The connectivity requirements to track individual items will eventually drive the need to connect large numbers of RFID readers. There is a limited range to read the tags. This requires extension of the enterprise network which will drive deployment of new wired Ethernet links, or Wireless LAN.

Wireless Challenges

The use of a wired infrastructure can be used to link large numbers of RFID readers, but it has limitations of distance, unless fiber optic cable is used. The use of cable or fiber is practical in applications where the end devices remain in place for sometime. However, this introduces constraints for mobility, in particular, temporary installations, or where the assets may be in motion or will be moved requiring relocation of the RFID reader. Wireless LANs can address this, but once again there is constraint related to distance which in this case is related to the particular frequency spectrum that is used. Mesh

networks is a type of Wireless LAN that provides the ability to relay data over multiple hops.

RFID Wireless Concerns and Solutions

Mesh networks have typically had scalability constraints due to the nature of the protocol used. Not all mesh network products are the same, but they do rely upon the use of routing protocols that seek the shortest path. This may not represent an optimal path and is one of the reasons limiting the scalability of broadband wireless networks. Many mesh networks do not provide security. They range from use of proprietary hardware or rely on encryption algorithms that are obsolete or have been compromised. The need to provide device level authentication is very important for RFID applications. It is necessary to validate the data is from the correct device, especially when wireless is used for asset tracking. It is also necessary to address network management. This is often overlooked and represents a substantial cost to the enterprise.

Typically wireless LANs have exposed the enterprise to unacceptable risks and administration of the IT network has called for additional security measures. This has led many enterprises to ban the use of wireless. It is interesting to note that the typical security approach does not exclude entry into the network by adversaries, only to identify that they have entered and if they attempt to alter the environment. This problem can be addressed by provisioning secure channels extending to the end devices through the use of a Public Key Infrastructure (PKI).

Wireless LANs make use of the air as a medium. Consequently, the air interface is flooded with packets between intermediate nodes that occupy the available time needed to exchange data. This facilitates the routing table updates within the intermediate nodes. However, it can limit wireless networks. It is necessary to increase the efficiency of this process. There is also a need to provide standardization to eliminate incompatibilities between RFID applications, readers, and tags. The



(1) RFID tag (left), (2) RFID reader (middle), and (3) Wave Relay™ (right)

Enterprise Network

By William J. Miller, President, MaCT

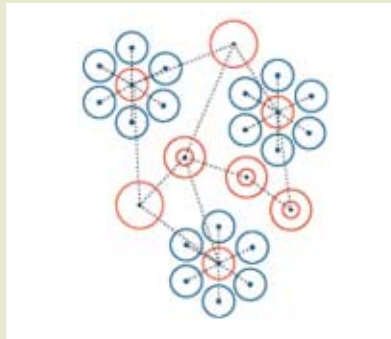
network infrastructure, wired or wireless should support IP protocols which are standard. "RFID controllers" could be developed to offload server functions. A "WLAN switch" can handle all of the functions to route and secure the packets from network devices.

Today it is possible to make use of a WLAN switch fabric from a number of suppliers, but it will be necessary for the end-user to evaluate their capabilities. RFID is a new frontier of which many vendors have yet to address many of the concerns previously discussed in this article. It's time to consider the impact of these technologies on your enterprise network.

Secure Broadband Wireless Solution for RFID Mobility Applications

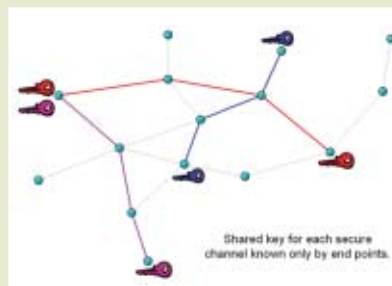
Wave Relay™ is a new WLAN switch that provides secure mobile broadband wireless connection to multiple RFID readers via Ethernet. The resulting infrastructure has the added benefit that includes device-level authentication and uses the 2.4 GHz band for unlicensed operation.

Typical application is wireless connectivity in a shipping dock, warehouse, or terminal area. For example the end points can extend from shipping containers to any device on the network. The RFID user can utilize RFID reader to identify the items with RFID tags and relay the data securely using the Wave Relay™. The following diagram indicates the RFID devices in blue and Wave Relay™ devices in red:



Wave Relay™ uses a network wide symmetric key that is changed over time for each secure channel which is known only by the end points. Wave Relay™ uses a modified version of the Pulse Protocol to ensure that packets are securely routed and to protect the protocol against adversarial attacks. The key is used to provide authenticity and integrity of the routing packets and is established and maintained using a key management scheme.

The following diagram indicates the use of secure channels:



Wave Relay™ uses Broadcast Encryption which allows a broadcaster to broadcast an encrypted message so that only a dynamically changing designated group of devices can decrypt the message. RFID or other devices can be consequently excluded from participation in the network and are easily managed by an administrator.

Broadband Wireless technology is empowering mobility and security of RFID applications. With the built-in security capability of Wave Relay™, RFID users will have the benefit of both mobility and data security. This is the next generation for shipper's warehouse and terminal area connections to the enterprise network.

Additional information can be obtained at:

<http://www.mact-usa.com/waverelay.html>

About the Author



William Miller is President of MaCT and a graduate of Pennsylvania State University

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