

Application Note: Broadband Wireless in Military Applications

Broadband wireless networking solutions are becoming a major element in military applications. The demand for increased security and ongoing communications is absolutely critical. There is also the ongoing need to maintain these communications under extremely adverse conditions, or in remote areas where links are non-existent or have been destroyed.

While satellite and mobile services can provide these functions to some extent, they do not provide the levels of security or reliability required for the military. Deployment is costly, interference is high, bandwidth is extremely limited, and signal integrity is easily compromised.

Broadband wireless links are becoming increasingly important to the military as a cost-effective, highly flexible, secure and reliable means to deliver high-speed links to transmit voice, data and video. They can be:

- Quickly and inexpensively deployed
- Easily moved for nomadic applications
- Counted on to deliver the bandwidth, speed and reliability necessary to function in the most challenging conditions

Redline Communications and the Military

Redline has worked extensively with branches of the U.S. Military among others to test the capabilities of OFDM (orthogonal frequency division multiplex) broadband wireless radio technology. These tests were designed to gauge the performance of broadband wireless equipment in a variety of applications, including fixed and mobile communications links supporting voice, video and data. The equipment was tested in various RF environments including point-to-point, point-to-multi-point, radio, optical and non-line-of-sight conditions.

Deployment Examples:

US ARMY (REFERENCE: *US ARMY FT. HUACHUCA – PEO EIS, PMDCATS – CAISI PROJECT*)

Overview:

Redline extended the range of a wireless LAN from 1000 feet to 68 miles (109 kilometers) for laptop users who were linked to a satellite-based WAN. Deploying 802.16-based equipment increased the speed of point-to-point links to distant locations, many of which were located in mountainous terrain and in a climate that reached desert-like conditions.

Results:

This deployment minimized the high monthly recurring costs associated with satellite terminals with a fixed capital expense. It also increased transmission speeds over long distances (up to 54 Mbps over 2 miles or 3.2 kilometers), and extended the network to more users (furthest link was 68 miles or 109 kilometers). Plans are to replace existing 802.11 access points with next-generation 802.16 radios within two years.

The Marine Corps (Reference: *US Marine Corps – 1st MEF – Camp Pendleton, CA*)

Overview:

Redline's broadband wireless solutions were deployed to support voice, video and data transfer for supply convoys currently using mobile radio and GPS tracking systems, and to quickly establish communications networks in forward theatre environments. The intent was to install video surveillance equipment on the convoys to transmit information back to field base. The landscape presented a number of non-line-of-sight (NLOS) challenges, including mountains and forests.

Results:

Redline successfully deployed a WAN that entailed a double hop satellite uplink with encryption while providing the speed and performance necessary to deliver real-time video streaming and VoIP, as well as data traffic.

The Redline Advantage

Redline's suite of broadband products are particularly well suited for supporting military security applications, because they offer:

- Non-line-of-sight (NLOS) capability
- Secure connectivity
- High data throughput
- Rapid deployment
- Long-range reliability over distances of up to 50 km (30 miles)
- Interference resistance
- Extremely low latency to support real-time voice, data and video applications

Performance, portability and ease of implementation make Redline's broadband wireless solutions ideal for a variety of security-intensive applications, such as:

Emergencies and Natural Disasters:

- Rapid deployment allows military personnel to create or re-establish communications anytime, anywhere
- Equipment can be set up within hours to provide the links to field command stations to allow for the simultaneous transmission of voice, video and data

Technology can be used in concert with satellite WANs to extend the reach to remote locations without incurring additional space segment charges

Remote Access:

- High-speed access allows users to share information, access resources, and maintain a clear chain of command in real-time from virtually any location in the world
- Field tools can deliver broadband data links quickly, easily and inexpensively from remote locations

Temporary/Portable Deployments:

- Field military operations can rapidly deploy broadband data transmission to and from strategic field locations, regardless of environmental conditions
- Redline's unique OFDM technology provides communications links in challenging or complete non-line-of-sight radio conditions where other broadband wireless products fail

Defense:

- Broadband wireless can strengthen video surveillance and other security defenses of key infrastructures such as communication systems, power grids, airport, rail and highway transportation systems

Disaster Recovery:

- Rapid deployment and low cost allows for alternate disaster recovery links in the event of disruption to military installations and industrial facilities, such as power generating stations, chemical plants, oil processing facilities, and water systems

The Wireless Advantage

Broadband wireless offers a number of advantages, including:

Rapid Deployment

With Redline equipment, users can perform fast, low-cost set-up and tear down in a matter of hours to allow for easy relocation when required. Antennas can be mounted on relatively low rooftops or poles to allow for transmission in any environmental conditions, even when line-of-sight is obstructed.

Remote Access

Wireless broadband is the most cost-effective method to provide links for security applications in remote areas. Redline products can transmit beyond 50 miles (80 km) in a single link. In addition, multiple hop links can be set up to connect locations 125 to 185 miles (200 to 300 km) away.

Backup/Redundant Communication Links

Critical facilities may require a redundant communication link to protect against the possible loss of primary communication links. A Redline system can provide a redundant communication link at a very reasonable cost.

Low Cost

A broadband wireless infrastructure is less costly and much more robust than most satellite or radio services.

Critical Features for Redline's Broadband Wireless Solution

High Data Rates

A Redline system can carry IP (Ethernet) data at rates as high as 48 Mbps or carry a combination of high speed IP traffic and up to 4 E1/T1 circuits concurrently. That means a single link can simultaneously carry voice, data, and video. Even though high-resolution video cameras generate large amounts of data traffic, a single Redline system can easily carry the output of several high-resolution cameras.

Voice, Data, and Video Support

The combination of 10/100BaseT IP ports and TDM E1/T1 native interfaces allows standard computer equipment, PBX equipment, or VoIP equipment to be connected. Any or all of these interfaces can be used at the same time. Redline products also feature the extremely low latency necessary to support real-time applications including voice and video.

High Tolerance

Redline's unique combination of performance features provides reliable links where many other broadband systems cannot. These include: protection from multipath interference, frequency specific fading tolerance, and dynamically adjusted modulation and coding techniques to provide an error free link under many challenging field conditions.

License Exempt Frequencies

Redline's products operate in both licensed and license-exempt frequencies. In most countries, no special permission is required to set up radio links in the license-exempt bands in an urgent situation. Redline's license-exempt products operate in the 5.47-5.725 and 5.725-5.825 GHz bands.

Wireless Security

Redline equipment offers security features that guard against unauthorized access leading to theft of data or privacy violations, and protect against radio jamming and denial of service attacks. Proprietary features include over-the-air encryption to prevent signal interception. Redline also partners with leading providers of external Firewall and VPN security devices that have FIPS 140-2 certification and CCEVS Common Criteria certified validation.

Product Migration and Road Map

Redline's two-year road map is focused on continuous improvement in size, weight and ease of use through initiatives that include reducing form factors and enhancing security features.

Why Redline Communications

Redline Communications is a technology leader in the design, manufacture, and marketing of standards-based broadband wireless access solutions. Using industry leading OFDM technologies, Redline's award-winning products provide an unmatched, high capacity, non-line of sight solution with proven performance, reliability and security. Ideal for a variety of access, backhaul and private network applications, Redline products are meeting the needs of carriers, service providers and enterprises worldwide.

Redline is a principal member of the WiMAX Forum™, and was first in the world to market an 802.16 compliant product. Over 5,000 installations of Redline products have been deployed in 60 countries on 6 continents including military and civilian sites in the U.S.

For more information: www.redlinecommunications.com