Wireless for a Hostile World™

Technologies International 3e

Automated Maintenance Environment

United States Navy

The Challenge

The operation of Navy vessels is complex, with hundreds of sailors performing thousands of tasks related to the maintenance and logistics associated with keeping systems running properly. A ship is a dynamic environment, requiring the ability to access critical data regarding ship operations while moving about the ship, or in harsh environments, such as an engine room.

Historically, sailors would move about the ship recording data manually into notebooks and then returning to the chief engineering office to enter the data into the official Ship Engineering Log or, if available, into the Integrated Condition Assessment System (ICAS). This process engages a large number of staff in manual and routine monitoring. There was also a significant time lapse that would occur between the time data was recorded into the system and when the data was acted upon, should maintenance be required.

The Solution

3eTI designed a secure wireless local area network (WLAN) that allowed for communication in the engineering spaces of the ship while in port or when sailing. The network included the installation of sensors on critical systems to allow for the transmission of data over a wireless network to ICAS in real time. The chief engineering officer could immediately identify equipment problems and communicate with maintenance personnel to implement corrective action quickly.

The solution called for pre-wiring sensors into local data acquisition devices, which communicated wirelessly to a WLAN to send the sensor data to ICAS. The local data acquisition boxes have the ability to support a range of sensor types, including vibration, RTD, thermocouple, IEEE 1451 smart sensors, and legacy analog sensors. For equipment that could not be sensorized, 3eTI developed a wireless client for Pocket PC that could be carried by a sailor and used to record local gauge readings and send the information back to ICAS over the WLAN while he or she was moving about the ship.

This solution has been deployed on several U.S. Navy ships — including the USS Elrod, ex-USS Paul F. Foster and USS Sea Fighter — to support the test and evaluation of the concept. This solution is highly flexible and scalable to a wide variety of seagoing vessels, both military and non-military.

Products Used

- Wireless LAN-Enabled Data Acquisition System (3e-565)
- Access Point / Bridge with USB for Sensor Networks (3e-525N)
- FIPS 140-2 Outdoor Dual Radio Wireless Mesh Node (3e-525A-3)
- FIPS 140-2 Outdoor Wireless Interface
- FIPS 140-2 Security Server
- FIPS 140-2 / 802.11i Cryptographic Client Software (3e-010F-A-2)

3eTI's secure WLAN solution has been deployed on several United States Navy ships, including the USS Elrod (shown here). The solution — which meets government security standards — helps streamline ship maintenance activities.

The Benefits

A secure wireless network helps the U.S. Navy utilize its personnel more effectively, while improving shipboard maintenance and damage control. The solution saves valuable sailor time, results in a lighter workload, requires fewer personnel to perform routine monitoring of equipment for maintenance purposes, and allows for more time to focus on war fighting. Since the data is transmitted in real time, personnel are able to respond to maintenance situations faster, potentially preventing more intensive equipment repairs and reducing the overall maintenance and logistics burden. The 3eTI solution keeps critical and sensitive information secure, as the equipment meets government security standards. The U.S. Navy also benefits because no disruptive and costly wired construction is required on board the ship.

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