RAJANT

CASE STUDY

Enhancing Situational Awareness

Naval Demonstration Using the Rajant Wireless Mesh BreadCrumb® - Case Study

"Improvements to Situational Awareness are Directly Proportional to the Mission Success Probability. Leveraging Technology is the Smartest and Fastest Way to Achieve This."

Cape Fear Situational Awareness Demonstration

As the port security boat made its routine patrols along the blackwater Cape Fear river, the sound of its engine was suddenly disrupted by a loud alarm sound.

An unidentified, potentially hostile water craft had been identified within five kilometers. In an instant, an Army security boat on patrol was alerted. Precise information about the unidentified craft, GPS coordinates, digitized maps, water speed, type of craft, and other important data was immediately shared with the port and Army boats, and the Mission Operation Center (MOC) located on shore with mobile communications and security personnel on foot. Hundreds of miles away, the Fleet Area Control and Surveillance Facility (FACSFAC) received the real-time detailed information via a satellite link and coordinated a response to the invading craft with the port and Army security boats.

This situational awareness demonstration showcased the technology that is available today and currently being used in hundreds of mission critical deployments. At the core of this technology is the portable Rajant 'BreadCrumb', a wireless device capable of securely transporting critical sensor and radar information in real time. Located on the port and Army security boats, military vehicle on shore, a moored inflatable aerostat balloon, the harbor pier and wearable by security personnel, the BreadCrumb is able to transmit and receive large amounts of video, sensor, voice or other data, while each maintaining multiple connections through a meshing architecture. This resiliency and mobility is critical for enhancing situational awareness.

Improvements to situational awareness are directly proportional to the mission success probability. Leveraging technology is the smartest and fastest way to achieve this. This case study will outline the details of this situational awareness demonstration done in partnership with Solipsys.

Situation Awareness

Military commanders need to know where their troops are, where their enemies are, and other various vital information about the battle area. Situation Awareness (SA) involves being aware of what is happening around you to understand how information, events, and your own actions will impact both your immediate and long term goals and objectives. In many situations, there are technological and situational complexities that the decision-maker needs to filter in order to make an informed decision.

In these situations, having complete, accurate and up-to-the-minute SA is essential. For this reason, SA has been recognized as a critical, though often elusive, foundation for successful decision-making across a broad range of complex and dynamic systems.

A commander's headquarters is typically responsible for ensuring that the appropriate information is presented to the commander, so that he can make the best command decisions. An important SA information tool

is the Common Operational Picture (COP), a single identical display of relevant operational information (e.g. position of own troops and enemy troops, position and status of important infrastructure such as bridges, roads, etc.) shared by more than one command.

Exercise Purpose

The Rajant BreadCrumb wireless mesh devices were utilized to extend the reach, coverage and functionality of the Raytheon Expeditionary C3 Solution. In addition, the BreadCrumbs were used to create a resilient wireless mesh network among security boats, Mission Operations Centers (MOC), mobile vehicle and convoy operations, multiple sensors and security personnel. The exercise also successfully conducted an ad hoc field integration of EC3 and Rajant BreadCrumb capability to several Navy aerostat assets demonstrating their utility to provide extended Situational Awareness via a flexible WAN capability.

Location of Exercise

Military Ocean Terminal Sunny Point (MOTSU), Cape Fear River, North Carolina. The Sunny Point facility, opened in 1955, is operated by the 597th Transportation Terminal Group. The facility is on a 16,000-acre, Army-owned site near the Cape Fear River with 212,000 square feet of building space.

Background

Navy Expeditionary Combat Command

Navy Expeditionary Combat Command (NECC) was established in January 2006 as one of the Navy's lead commanders. NECC centrally manages the current and future readiness, resources, manning, training and equipping of approximately 40,000 expeditionary sailors who are currently serving in every theater of operation.

NECC is a global force provider of expeditionary capabilities to joint war fighting commanders.

Expeditionary sailors are deployed around the globe in support of the new "Cooperative Strategy for 21st Century Seapower," a joint maritime strategy signed by the Chief of Naval Operations, Commandant of the Marine Corps and Commandant of the Coast Guard that applies maritime power to the responsibility of protecting the U.S. in an increasingly interconnected and multi-polar world.

NECC forces and capabilities are integral to executing the new maritime strategy which is based on expanded core capabilities of maritime power: forward presence, deterrence, sea control, power projection, maritime security and humanitarian assistance and disaster relief. To enable these, NECC provides a full spectrum of operations, including effective waterborne and ashore anti-terrorism force protection; theater security cooperation and engagement; and humanitarian assistance and disaster relief.

Maritime Expeditionary Security Force

The Maritime Expeditionary Security Force (MESF) is a capability consisting of Adaptive Force Packages (AFPs) tailored to the specific requirements of the deployment. MESF fills current warfighting gaps by providing highly trained scalable and sustainable Expeditionary Security Forces capable of defending mission critical assets in the near-coast environment. MESF units provide Ground Defense, Afloat Defense, Airfield/Aircraft Security and a wide range of secondary tasks from Detention Operations to Law Enforcement.

Anti-Terrorism and Force Protection missions include harbor and homeland defense, coastal surveillance, and special missions. Specialized units work together with MESF squadron staffs providing intelligence and communications. MESF units deploy worldwide to detect, deter, and defend an area, unit, or High Value

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Asset. Recent locations include the United States, Korea, Saudi Arabia, Kuwait, Bahrain, United Arab Emirates, and Egypt.

Raytheon Solipsys
Solutions for Information Processing Systems

SOLIPSYS

Solipsys, a wholly-owned subsidiary of the Raytheon Company, is an industry leader in the development of integrated Command and Control (C2) Network-Centric solutions for the Domestic and International DoD and Homeland Security. Solipsys delivers the C2 infrastructure necessary to effectively control security/ military forces in any environment. The provided solutions assure information superiority, increased shared awareness, deep sensor reach, aircraft control, air defense, disaster management, and time-critical decision making. Some of the Solipsys customers include the United States Air Force, United States Navy, United States Marine Corps, United States Army, Missile Defense Agency, Royal Australian Air Force, Iceland Defense Force and the Italian Navy.

Solipsys has received industry-wide recognition in the diverse areas of sensor automation, information synthesis, networking and communications, and visualization. They have introduced a suite of software applications that solve the vexing problem of creating an extensible network solution for sharing sensor information among distributed Joint and Coalition forces.

RAJANT

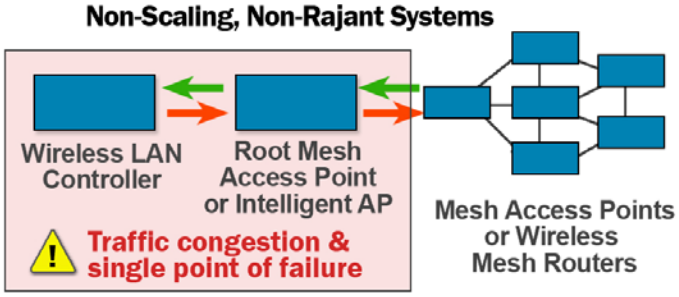
For nearly 7 years, Rajant has been creating rugged and portable wireless access points for the military and first responders. Rajant's devices, called BreadCrumbs, create wireless mesh networks forming a highly-resilient multi-hop network. They can be operated by a battery and can support IEEE 802.11 a/b/g protocols.
In addition to single switch operation, the BreadCrumb can use stringent security including Harris SecNet® 11, SecNet® 54 levels (external) and AES-CCMP & TKIP.

The Rajant BreadCrumb wireless mesh device is an intelligent layer–2 device that can quickly adjust to a changing network environment making it ideal for Situational Awareness applications. Because of the built-in computer and InstaMesh® software, each BreadCrumb can quickly configure itself at startup as well as instantly reconfigure when existing connections break or change due to a moving boat, aerostat, vehicle or other asset.

BreadCrumb ME2
- FIPS 140-2 in Process
- IEEE 802.11b/g Radio
- 11Mbps & 54 Mbps Bandwidth
- 100Mbps Ethernet Port & Portable (2 lbs.)

BreadCrumb LX
- IEEE 802.11a/b/g Radio
- 11Mbps & 54 Mbps Bandwidth
- 100Mbps Ethernet Port
- 700MHz, 900MHz, 2.4GHz, 4.9GHz & 5.8GHz

Because it operates at layer-2, it is not burdened with overhead routing. Other mesh technologies that use root node or LAN Controller architectures add unnecessary routing, latency and overhead. These devices are inadequate for mission-critical applications.



Raytheon Surface Search Radar

The Raytheon Surface Search Radar (SSR) is an advanced navigation and surveillance system that can be configured for ship or land-based applications. Its radar, processors and displays combine commercial, off-the-shelf products and specialized technologies to create powerful navigational awareness. Integrated data from its own ship sensors provides SSR operators with a comprehensive view of the maritime environment. The SSR system meets or exceeds International Maritime Organization requirements and Radar Technical Commission for Maritime Services requirements for an automatic radar plotting aid.

Designed for both small and large ship applications, the SSR's shipboard configurations have been tested in operational use by the U.S. Coast Guard. These configurations are being installed to replace the current

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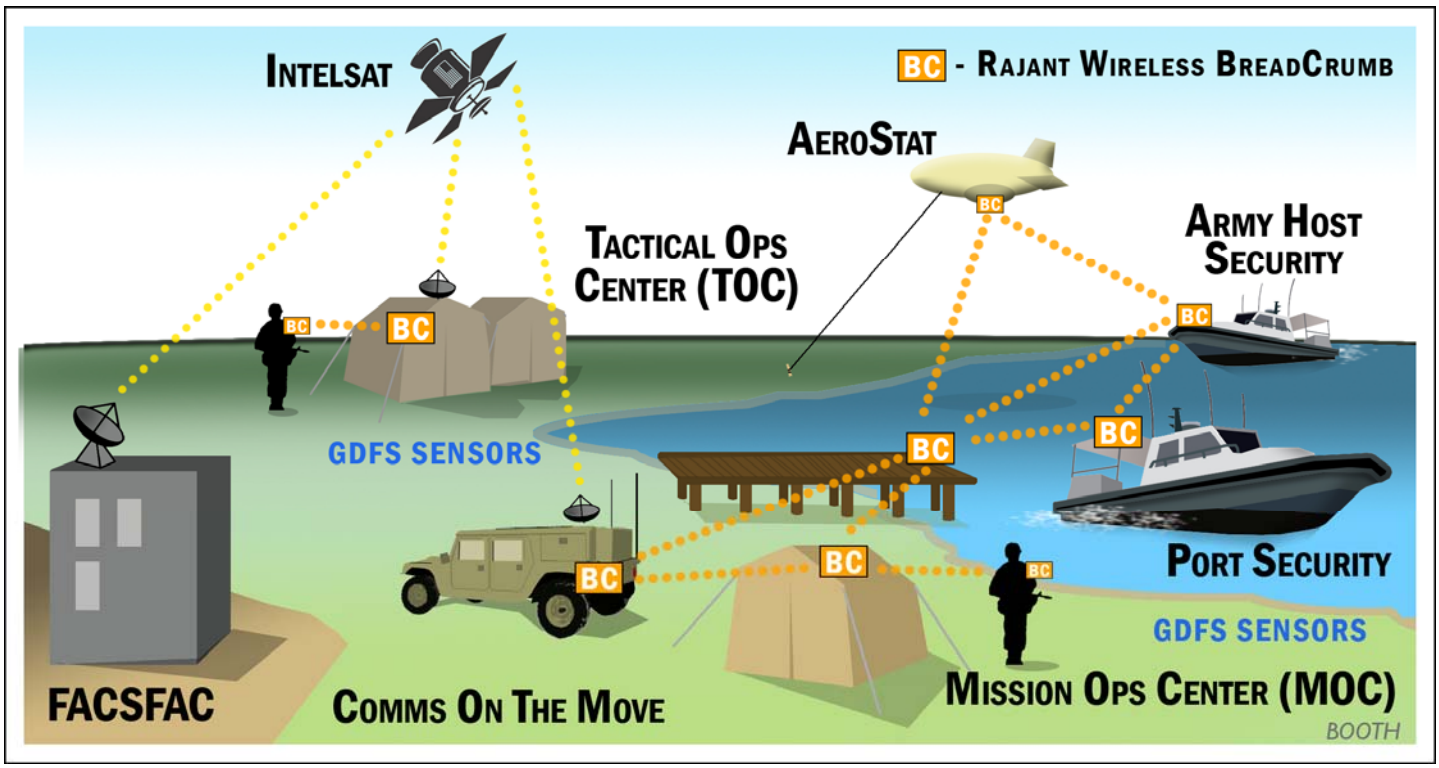

navigational radars on U.S. Navy and Coast Guard ships and patrol craft.
Commercial customers, as well as U.S. and foreign government organizations, use land-based SSR configurations for Vessel Traffic Service applications. For increased safety and efficiency, the U.S. Coast Guard uses SSR to monitor commercial shipping in U.S. ports and waterways. SSR is also a key sensor for Coastal Surveillance System applications, such as monitoring territorial coastlines and Economic Exclusion Zones in support of law enforcement operations.

Equipment and Setup

- 34 ft. IBU (Inshore Boat Unit) Surface Craft – simulated unidentified-hostile craft
- Port Security Boat with sensors, laptop and dual-radio Rajant BreadCrumb LX
- Army Host Security Boat with sensors, laptop and dual-radio Rajant BreadCrumb LX
- Mission Operations Center (MOC)
- Aerostat moored balloon with portable lightweight battery-operated Rajant BreadCrumb ME2
- Comms on the Move (COTM) with man-wearable BreadCrumb ME2s for security personnel and portable SatCom
- Intelsat Satellite
- Tactical Operations Center (TOC) with portable SATCOM hub with wireless perimeter and man-wearable BreadCrumb ME2s for security personnel
- Data/Activity monitored at Fleet Area Control and Surveillance Facility (FACSFAC) through SatCom link
- Rajant BC Commander wireless mesh management software for configuration, control and monitoring

The Rajant BreadCrumbs provide extension of the SSR network across the Port Security Boat and the Army Host Security Boat and are integrated to a third BreadCrumb located on the pier. The network is then extended to the Mission Operation Center, which is a mobile Comms on the Move (COTM) unit. With this unit, a man-wearable BreadCrumb provides the security personnel a high bandwidth mobile 'pipe' back to the MOC for transmission of video, sensor, voice or other data.

From the MOC, the data is sent to an Intelsat satellite for linkage to the Tactical Operations Center (TOC) and to the Fleet Area Control and Surveillance Facility (FACSFAC). The TOC is also configured with security personnel that have man-wearable BreadCrumbs. Information from all of the sensors is displayed via the Graphical Data Fusion System (GDFS). The GDFS is a software program which correlates all sensor information and overlays it onto a digitized map. On a display, operators can see the geographic picture, their own location, the location of the sensors, and target tracks.

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Summary

Through the use of the Rajant BreadCrumb wireless mesh, the Surface Search Radar network was successfully extended over the water to the port security and Army host security boats. The secure wireless links that provided network connectivity to the patrol boats were consistently maintained while the boats conducted extensive patrols of the harbor and shipping lane areas out to a range of 5 nautical miles.

The Rajant BreadCrumbs were installed and operational on the watercraft in less than 10 minutes and immediately joined the pier-side network, where the units maintained connection throughout the course of the entire exercise.

The sensor and boat GPS data was successfully and seamlessly transmitted back to the MOC, TOC and FACSFAC for incorporation into the overall SA picture, allowing the commanders to make real-time decisions with up to date information.

Throughout the demonstration, sensor and location information provided both tracking and early warning information to the command headquarters. This aided in identification of friend or foe watercraft, as well as provided real-time communication capabilities to the forward deployed security assets. The Solipsys SA system, in conjunction with the mesh network mobile capabilities of the Rajant's BreadCrumb units, ensured this demonstration was a complete success.

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