

Tech Notes

Reagan Test Site Distributed Operations

MIT Lincoln Laboratory is contributing to a transformational program to fundamentally change the mission execution and operations at the Reagan Test Site.

The U.S. Army's Reagan Test Site (RTS), located approximately 2300 miles west south west of Hawaii on the Kwajalein Atoll, Republic of the Marshall Islands, is a world-class range and test facility. Its unique instrumentation sensors, including high-fidelity metric and signature radars as well as optical sensors, play a vital role in the research, development, test, and evaluation required to support U.S. missile defense and space programs (Figure 1). In operation for nearly 50 years, RTS is used for space operations and Department of Defense (DoD) test and evaluation missions, but is also available to users from commercial organizations and government agencies such as NASA.

MIT Lincoln Laboratory, as the scientific advisor to RTS, supports the operations at the range and conducts the upgrades to the sensors and command-and-control infrastructure. During the late 1990s and early 2000s, the Laboratory helped modernize the radar suite at RTS, applying an open systems archi-

tecture that enabled the radar systems to be directed remotely from Roi-Namur Island to RTS headquarters on Kwajalein Island and that decreased both cost and manpower to operate the radars.

The project focuses on allowing distributed RTS operations from CONUS and improving range accessibility for users.

Currently, Lincoln Laboratory scientists and engineers are leading a program to distribute the operations of the range from Kwajalein to the continental United States (CONUS). While RTS's distance from launch facilities and its isolation from populated areas make it ideal for missile testing, the remote location increases transportation time and cost for scientists and customers to be present to view their missions. In addition, bandwidth for data and communication transfers off the atoll is limited by current satellite communications.

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Figure 1. The suite of radars on Roi-Namur Island in the Kwajalein Atoll.

Program Goals

The RTS Distributed Operations (RDO) program is transforming RTS from a locally operated range to a globally operated national asset. A fundamental aspect of the program involves the distribution of mission tasks among various locations and remote operation of the range's sensors, command-and-control center, and space operations.

The RDO project focuses on

- Allowing range operations from CONUS
- Distributing RTS activities
- Improving range accessibility for users
- Enhancing interoperability with users and other ranges, sensors, and elements
- Increasing information availability with reliable, high-bandwidth communications

When the RDO program is completed, the primary command-and-control facility will be located at the U.S. Army Space and Missile Command in Huntsville, Alabama, instead of its current location on Kwajalein Island (Figure 2). Relocating the facility closer to its customers will provide improved access for mission execution activities as well as training, demonstrations, mission planning, and data distribution.

The RDO program will achieve improvements and modernization in four key functional areas: communications and information technology, distributed systems, sensor modernization, and mission operations. The communications

upgrade focuses on the core networking and communications infrastructure linking Kwajalein, Huntsville, and the Lincoln Laboratory Lexington (Massachusetts) Space Situational Awareness Complex. Building a reliable, high-bandwidth, low-latency network is crucial to a distributed range in which the command-and-control center and the sensors are operated from 7300 miles away. A key infrastructure improvement is a high-bandwidth fiber-optic link between Kwajalein and Guam that will replace current satellite communication capabilities in fall 2010. The initial networking capability to CONUS will be approximately 600 megabits per second, with a 300-millisecond round-trip latency, a significant improvement over the current 45-megabits-per-second, 600-millisecond latency satellite link.

Distributing RTS operational control center activities is achieved by developing software that enables the system to be controlled by multiple operators at various locations. Primary operations will be conducted from Huntsville while a mission capability will be retained at Kwajalein (Figure 3). One goal is to integrate the coordination center's

operations — space, command-and-control, and radar. The primary advantages of a distributed center are expanded customer access and a common environment that will better utilize personnel since a single group of operators could manage both space and reentry missions.

The range's sensors are being

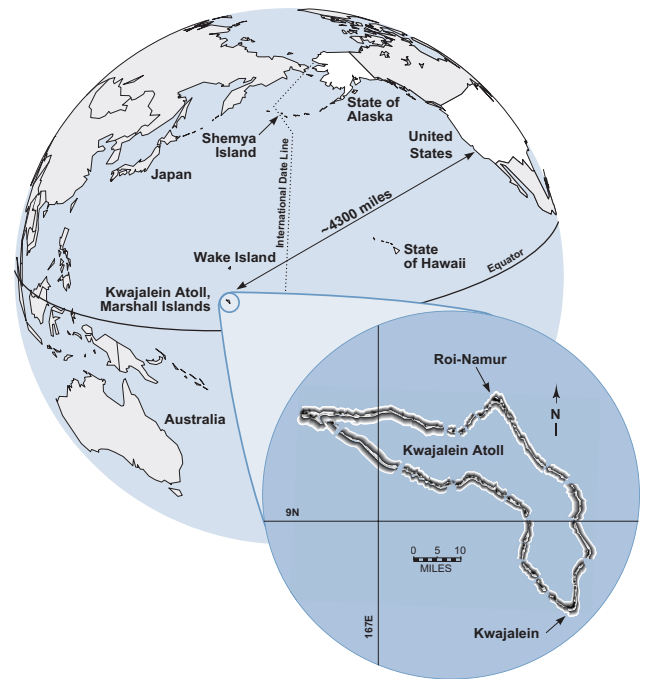


Figure 2. The map shows the isolated location of the Reagan Test Site. The inset of Kwajalein Atoll points out the site of the radars, the island of Roi-Namur, and the operations center site, the island of Kwajalein.

modified to facilitate distributed operations and to reduce operation and maintenance costs. Remote monitoring and diagnostics of the sensors are made possible with live video feeds, environmental and physical monitoring sensors, and web-based tools to display diagnostic information. Remote control of the transmitters and antenna is accomplished through the use of programmable logic controllers.

Mission operations are being enhanced by more precisely defining concepts of operation, adapting the new Huntsville command-and-control facilities, enhancing mission planning tools and data products to accommodate distributed operations, and developing a collaborative work environment.

The Lincoln Laboratory-developed command-and-control center at RTS has been certified for use as the site's mission control system. Distributed operations to control the range from sites in CONUS will be initiated in summer 2011 and augmented with additional capabilities in 2012. ■



Figure 3. Modernized mission command-and-control center at RTS; the center is already in use.

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