



Ronald Reagan Ballistic Missile Defense Test Site Distributed Operations

U.S. Army Kwajalein Atoll

A transformational program that fundamentally changes mission execution and operations at the Reagan Test Site to fully support distributed viewing and control

The Ronald Reagan Ballistic Missile Defense Test Site is a world-class range and test facility located 2,300 miles west-southwest of Hawaii in the U.S. Army Kwajalein Atoll, Republic of the Marshall Islands.

Its unique instrumentation sensors, including high-fidelity metric and signature radars, as well as optical sensors and telemetry, play a vital role in the research, development, test, and evaluation required to support America's defense and space programs.

While RTS's distance from customer launch facilities and its isolation from populated areas make it ideal for missile testing, the remote location increases transportation time and cost for customers to receive data products and be present to view their missions. Satellite communication is inherently unreliable and lacks the latency and bandwidth characteristics required to support live data streaming and control of RTS sensors from the continental United States.

Program Goals

The RTS Distributed Operations program is transforming RTS from a locally operated range to a globally op-

erated national asset. Started in 2006, the RDO program has been creating an enhanced distributed operations control capability that leverages high-speed networks, advanced algorithms and sensor control technology to enable RTS operation from distributed continental United States enclaves. The RDO project focuses on:

- Increasing information availability with reliable, high-bandwidth communications
- Distributing RTS mission tasks among various locations
- Seamless remote operation of range sensors
- Improving range accessibility for customers
- Enhancing interoperability with customers, other ranges, sensors, and elements.

A new command and control facility has been established at the U.S. Army Space and Missile Command/Army Forces Strategic Command in Huntsville, Ala. The RTS Operation Center Huntsville will become the primary command-and-control facility in 2012 when the RDO program completes, instead of its current location on Kwajalein Island.

- At RTS, a customer can test and evaluate research and development for all phases of space and missile programs using an unmatched telemetry, optics and radar instrumentation suite to collect high fidelity metric and signature data

- Remote Pacific location is ideal for permissive safety and environmental constraints, but increases transportation cost and customer footprint requirements

- An undersea fiber optic cable connectivity was established between Kwajalein and the U.S. to improve reliability, latency (< 300 ms round-trip-time) and bandwidth (622 Mbps)

- New mission control hardware and software systems to support net-centric distributed operations was developed

- RTS Operation Center was established in Huntsville to be the primary RTS command and control node

- Distributed operation planned for the range control center, radars, optics, telemetry, and range safety

- The RDO will improve RTS accessibility for customers, increase customer data availability, and enable customers to reduce their on-island requirement

- Will enable cradle-to-grave customer mission support from initial cost estimating, to mission planning, through mission execution and post-mission data analysis

Customer Benefits

The RDO program will benefit RTS customers in several key ways. RTS system engineers and mission planners will be available centrally in Huntsville, which is co-located with several major RTS customers. Customers will benefit from the range being closer through reduced flight times and lesser time zone differences for training, demonstrations, mission planning and mission execution than experienced with Kwajalein-based RTS support.

Availability of data, both real-time and post-mission will be greatly improved.

Customers will be able to view their mission in real-time as it unfolds from the control center facility in the U.S. The reduced cost and convenience will enable customers to allow more of their personnel to view the mission.

Given the affordability of U.S. terrestrial networks, the ability for customers to view the mission from their own facility is even possible. Quick-look data products and post-mission analysis will both experience reduced timelines due to improved data transfer speeds.

Customers can also refine the set of personnel they deploy to Kwajalein. Given the ability to view the mission in real-time from the control center, only those mission support functions requiring access to physical assets will need to deploy to Kwajalein. Custom-



Missile takes off during a test at the U.S. Army Kwajalein Atoll.

ers will realize cost savings by deploying less personnel to Kwajalein.

High Speed Reliable Network

The RDO communications upgrade focuses on the core networking and communications infrastructure linking Kwajalein to the United States. Building a reliable, high bandwidth, low latency network is crucial to a distributed range in which the sensors are operated from 7,300 miles away.

A high bandwidth fiber-optic cable was installed between Kwajalein and the United States to complete the ter-

restrial fiber path.

Reliability is improved through a fault-tolerant design with diverse physical paths. The initial networking capability to the U.S. supports 620 megabits per second bandwidth and < 300 ms round-trip latency, a significant improvement over the previous 45 megabits per second and 600 ms latency of the unreliable satellite link.

Advanced Algorithm and Sensor Control

Distributing RTS operational control center activities is achieved by developing software that enables the system to be controlled by multiple operators at various locations. A key advantage of a distributed center is a common environment which will allow better utilization of personnel by streamlining mission operations. Primary operations will be conducted from Huntsville while a backup mission capability will be retained at Kwajalein.

The range's sensors are being 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 diagnostic tools. Remote control of the transmitters and antenna is accomplished through the use of programmable logic controllers.



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