

CONNECTING THE FORCE FROM SPACE:

The IRIS Joint Capability Technology Demonstration

MIKE FLORIO, DAVID HOTOP, STEVEN GROVES, KIRK DAVIS AND RICH FARRELL



A member of the U.S. Army's Asymmetric Warfare Group during an operations demonstration.

The U.S. Army Space and Missile Defense Command Future Warfare Center Battle Lab's quest to find quality technology for the soldier now focuses on innovative space communication capabilities that could close the digital divide. The Space and Missile Defense Battle Laboratory is assessing a commercial communications concept called IRIS for the Office of the Secretary of Defense. IRIS is an acronym for Internet Protocol Routing in Space. As the Operational Manager for the IRIS Joint Capability Technology Demonstration, U.S. Army Space and Missile Defense Battle Lab is fast approaching the culminating demonstration that will provide an assessment of this new commercial capability for the Department of Defense.

Joint Capability Technology Demonstration is an Office of the Secretary of Defense initiative to assess technologies for their usefulness to the warfighter. This initiative started almost three years ago when the Commander of the U.S. Strategic Command sought to quantify new concepts in connectivity and acquisition strategy. An industry consortium led by Cisco Systems and Intelsat General Offices proposed to General James Cartwright III, U.S. Marine Corps (the U.S. Strategic Command Commander at the time) to launch an internet router into geosynchronous orbit. The industry consortium explained that



One of two operational demonstrations was conducted on the USCG's High Endurance Cutter 270 Sherman. *Images provided by Mike Florio*

IRIS could provide cost effective connectivity to both commercial and military customers. The Office of the Secretary of Defense embraced the concept by authorizing a U.S. Strategic Command sponsored Joint Capability Technology Demonstration unlike any in the past. Rather than Department of Defense dictating requirements to industry, the consortium would design, develop and launch the capability at its own expense to meet their market forecast. Consequently, given a commercially viable capability, the Joint Capability Technology Demonstration would assess the potential of this capability for military utility.

Putting the Joint in Joint Capability Technology Demonstration, we have two sponsors, both U.S. Strategic Command and the Defense Information Systems Agency. We also have three managers contributing to this Joint Capability Technology Demonstration:

- The U.S. Air Force Space and Missile Systems Center as the Technical Manager;
- The U.S. Army Space and Missile Defense Command as the Operational Manager
- The Defense Information Systems Agency Program Executive Office, SATCOM and Teleport Services as the Transition Manager

The Operational Management team of the IRIS Joint Capability Technology Demonstration determined early on to implement a crawl-walk-run strategy for this assessment.

This strategy consisted of one Laboratory Demonstration for the crawl phase, two Operational Demonstrations for the walk phase and a final on-orbit Demonstration for the run phase. This strategy allowed the Joint Capability Technology Demonstration to mitigate risk, maximize lessons learned and minimize cost. This approach provided invaluable insights into net centric operations and tactics, techniques and procedures from the Combatant Commanders.

In the crawl phase, Operational Demonstration 1 focused on characterizing the router and the programmable satellite Internet Protocol modem performance in a controlled environment. The IRIS payload was emulated in the Massachusetts Institute of Technology–Lincoln Laboratories. This gave us the opportunity to understand the waveform, the proposed capability and its impact to net centric operations. In the walk phase, there were two Operational Demonstrations, one maritime and one cross-Atlantic. Both were very successful and provided significant technical and operational data. All three Operational Demonstrations were the foundation for the final on-orbit Operational Demonstration in the spring of 2010.

During Operational Demonstration 2, a U.S. Coast Guard high endurance cutter used the IRIS architecture to simulate the IRIS capability from a domestic teleport. This enabled the U.S. Coast Guard Cutter Sherman to become the first cutter to perform a video teleconference between ship and shore while underway. Another innovation made possible by these new concepts included a live video “interrogation” of an individual from

Artist's depiction of the IRIS satellite in orbit.



ship to shore. The critical lesson learned was that linguists could be based in sanctuary and conduct real-time interviews of suspects in custody anywhere in the world.

During Operational Demonstration 3, the NATO Consultation, Command and Control Agency and the U.S. Army Asymmetric Warfare Group conducted Information Operations aimed at achieving the goals of a Civil Military Cooperation operational scenario. The cross-Atlantic demonstration highlighted the value of robust communications down to the tactical edge and enabled Civil Military Cooperation and Information Operations in a Peace Keeping exercise. NATO Consultation, Command and Control Agency expressed the need for an IRIS capability with the following lessons learned from the Operational Demonstration 3 success:

- Optimized transponder access by control at Layer 3
- Improved Information Assurance due to selective multi-beam routing
- Avoidance of satellite double-hop connections between different Areas of Responsibility.

The fourth Operational Demonstration is called Operational Demonstration 4 and occurs this spring. Operational Demonstration 4 user groups include the U.S. Army Signal Center, the U.S. Southern Command, the Royal Netherlands Navy, the U.S. Coast Guard and NATO Consultation, Command and Control Agency. This on-orbit assessment will take place primarily in the Caribbean, with remote stations both in Europe and the U.S. East Coast. These user units will exercise the IRIS architecture and equipment both ashore and afloat. Based on lessons learned from the three previous Operational Demonstrations, Operational Demonstration 4 could very well provide revolutionary collaboration capabilities from the strategic corporal in the field all the way up to the Three Star in any major headquarters.

The IRIS Joint Capability Technology Demonstration is leveraging an existing, well-funded commercial effort at a very low cost to the Department of Defense. The IRIS Joint Capability Technology Demonstration will provide an excellent source of data on space-based Internet Protocol networking. Operational Demonstration 4 should provide a wealth of

Mike Florio and LTC Dennis Brozek in front of
USCG Cutter Sherman's IRIS antenna.



VIP Day during Operational Demonstration 3 with the
NATO Consultation, Command and Control Agency.



knowledge on commercial satellite IP services. If the IRIS commercial venture has utility for the Department of Defense, U.S. Army Space and Missile Defense Command will once again provide an innovative way forward in connecting the force.

As internet and networking technology continues to proliferate on a global scale, commercial efforts like IRIS hold the promise of providing affordable, commercial, Internet Protocol-enabled communication services. This technical capability could improve Department of Defense effectiveness in supporting a truly joint, interagency, and international effort and provide timely information to the edge. If the IRIS commercial venture has utility for the Department of Defense, U.S. Army Space and Missile Defense Command will once again have provided an innovative way forward in connecting the force from space. 



Intelsat 14 on the pad

Mike Florio,
NSPS-3, Internet
Routing in Space Joint
Capability Technology
Demonstration
Operational Manager,
Space and Missile
Defense Battle Lab,
Colorado Springs, Colo.

David Hotop,
Task Lead for the
IRIS JCTD, Camber
Corporation

Steven Groves,
Lead Scientist for the
IRIS JCTD, Camber
Corporation

Kirk Davis,
Senior Systems
Engineer, Camber
Corporation

Rich Farrell,
Analyst, Camber
Corporation

Camber Corporation
provides SETA support
on the IRIS JCTD for
SMDBL