

TRANSITIONS

SCALABLE Network Technologies SPOTLIGHT



Airborne Networking Live-Virtual-Constructive Environment

Source: Jeff Hoyle, Vice President, Federal Programs, SCALABLE Network Technologies

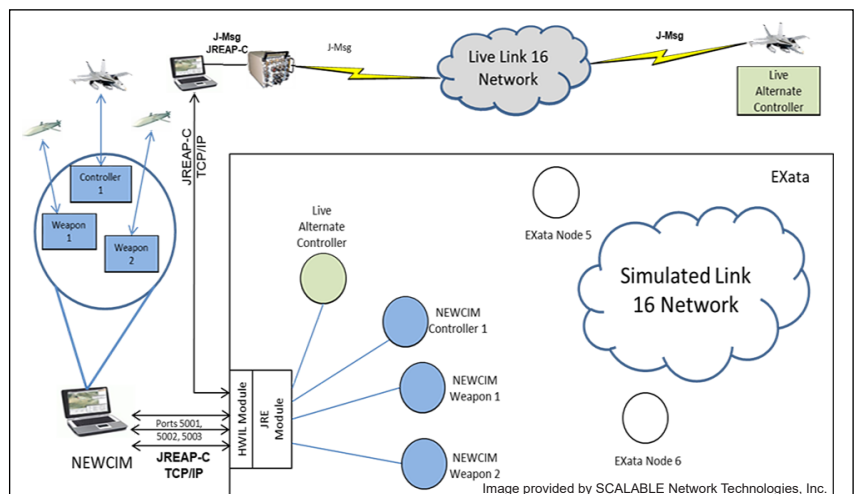
As an active participant in the Navy SBIR/STTR Transition Program (Navy STP), [SCALABLE Network Technologies](#) (SCALABLE) worked with the Multifunction Information Distribution Systems (MIDS) Program Manager and Naval Air Warfare Center Weapons Division China Lake to develop and optimize an Airborne Networking Live-Virtual-Constructive (LVC) Environment to support rapid and comprehensive assessment of network performance in support of future airborne networks mission concepts of operation (ConOps).

SCALABLE's Airborne Networking LVC Environment enables both government and defense prime organizations to realistically model airborne network communications in environments of interest for future warfighting, including highly contested environments with near-peer adversaries. Use of a common LVC environment by both government and defense prime organizations significantly enhances information sharing and collaborative development of future capabilities.

SCALABLE's [modeling and simulation tools](#) can perform both pure simulation, which is completely computer-generated, and emulation, which communicates with real radio hardware and network components in real time. Simulation allows engineers to run through many "what if" scenario analyses with large scale airborne networks for different warfighting concepts as quickly as possible.

The tools also can connect live equipment up to that environment and do more hardcore testing to determine how well whatever new hardware or software that will deploy on Navy or Marine Corps aircraft is going to work, particularly scaled up to large numbers of equipment. "A lot of times when you are testing new hardware and software you don't necessarily want to buy lots of components right away so the Live-Virtual-Constructive environment helps you test small numbers and still represent how it's going to work when you scale up to larger networks," said Jeff Hoyle, a vice president at SCALABLE.

Understanding the end-to-end performance of mission command applications executing on airborne networks under realistic operational conditions is critical for development of future



A simulated Link 16 network models how well the network will work live.

TRANSITIONS SPOTLIGHT

Airborne Networking Live-Virtual-Constructive Environment (continued)

capabilities and evaluation of new warfighting concepts. Identifying and mitigating any shortfalls in application performance can provide significant value to warfighters and directly save lives by ensuring communication and targeting data shared among command and control, weapon launching, and electronic warfare platforms all will work as expected and as required to be operationally successful.

“By testing systems as they are developed, when warfighters go into battle they are going to have systems that will work for them at the speed and the scale that they need. So if it’s a large force-on-force event, they need to be able to scale up these airborne networks in order to handle all the targeting information that is required for whatever the particular mission is. You’ve got to make sure that equipment is going to work in the harshest environment you can imagine,” Hoyle said.

This project enables predictable communications in all physical and cyber warfighting domains, enhancing future integrated fires and cooperative engagement capabilities for all Link-16 network capable platforms, including tactical aircraft, ships and submarines.

Specific capabilities provided by the Airborne Networking LVC Environment include:

- Link-16 Network System-in-the-Loop Capability
- Tactical Targeting Network Technology (TTNT) Waveform Compatibility
- Joint Range Extension Applications Protocol Version C (JREAP-C) Application Layer Model
- J-Series Message Generation and Consumption
- Standards Compliant External Interfaces (e.g., Distributed Interaction Simulation (DIS) Interface)
- Net-Enabled Weapon Control Interface Module (NEWCIM) Interoperability
- External Simulation System Integration (e.g., Advanced Framework for Simulation, Integration and Modeling (AFSIM))

The Airborne Networking LVC Environment has successfully transitioned to the Naval Air Warfare

Center Weapons Division China Lake for use in their Tactical Network Model Development Branch. It has also transitioned to Naval Air platform providers responsible for the E-2D Hawkeye (Northrop Grumman Aeronautics Systems), F/A-18 Super Hornet (Boeing Defense) and MQ-25 Stingray (Boeing Defense). Government and defense prime organizations are using the Airborne Networking LVC Environment to evaluate future airborne networking capabilities and warfighting concepts. Each organization continues to add additional capabilities to their LVC environments through new commercial licensing and additional development services provided by SCALABLE.

The primes building these platforms and integrating all the equipment can test the same way that China Lake is testing at the government laboratory’s facility. “It enables the sharing of models as well as hardware and software that can be tested in the loop and so, for example, as Boeing is developing the MQ-25, they need to make sure it’s going to be able to network. It’s even more challenging for an MQ-25 because it’s an unmanned aircraft that doesn’t have the benefit of an operator who can make decisions; it has to do that on its own as it’s performing its mission. As Boeing is developing those systems to be able to do that they need to test that in situ with other aircraft and that starts in the modeling and simulation world before moving to actual flights, identifying and fixing potential issues in a simulation environment while you are still on the ground,” Hoyle explained.

According to Hoyle, the biggest benefit of participating in Navy STP was the events, particularly the Navy Forum for SBIR/STTR Transition (Navy FST). “At Sea-Air Space we got lots of exposure to government personnel as well as potential prime personnel and got to talk to them about what we are doing and show them the capabilities we are providing.”

Thanks to SCALABLE’s SBIR-supported technology, current and future government and defense industry customers can plan and deploy reliable Link-16 networks, enabling predictable communication in all warfighting domains, using less time and fewer resources.

