Test, Evaluation & Training in a Complex TDL Environment

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Tactical Data Links Interoperability Summit
Canberra, ACT, Australia

Ultra ELECTRONICS

Overview

TEST, EVALUATION & TRAINING IN A COMPLEX TDL ENVIRONMENT

- Complex environment, getting more so as technology and warfare evolves
  - 5th Gen fighters, stealth, manned-unmanned teaming, space & cyber (CEMA), tighter integration in multi-domain operations (including ground component)
- Effective training is difficult & often does not occur
- Data Link practitioners and technology providers need integrated tools to help prepare for effective integrated battlefield effects
- Integrated Live-Virtual-Constructive environment as a solution

Evolution of Tactical Communications

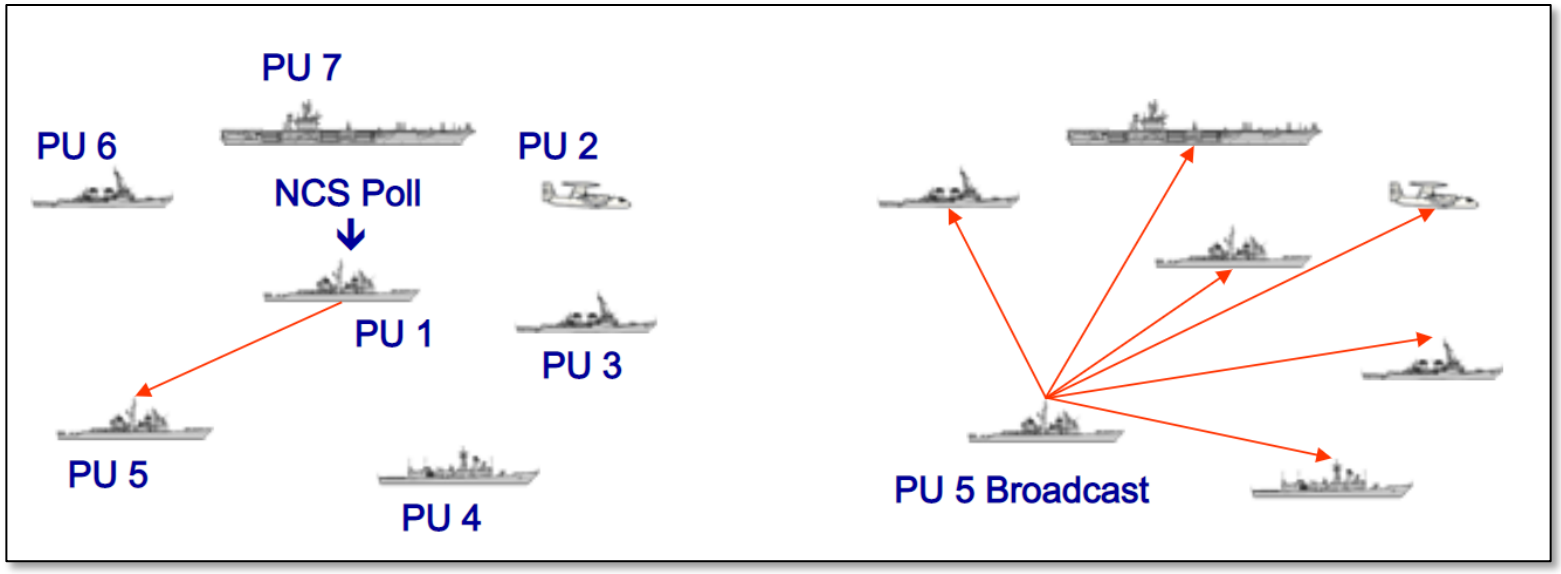
IN THE BEGINNING

- From what the eyes can see, and the ears can hear…
- Tethered hot-air balloons collecting intel and directing indirect fires
- Voice
- Semaphore – ***true*** line-of-sight
- Morse Code – Beyond-line-of-sight

Evolution

LINK 11 – 1950'S

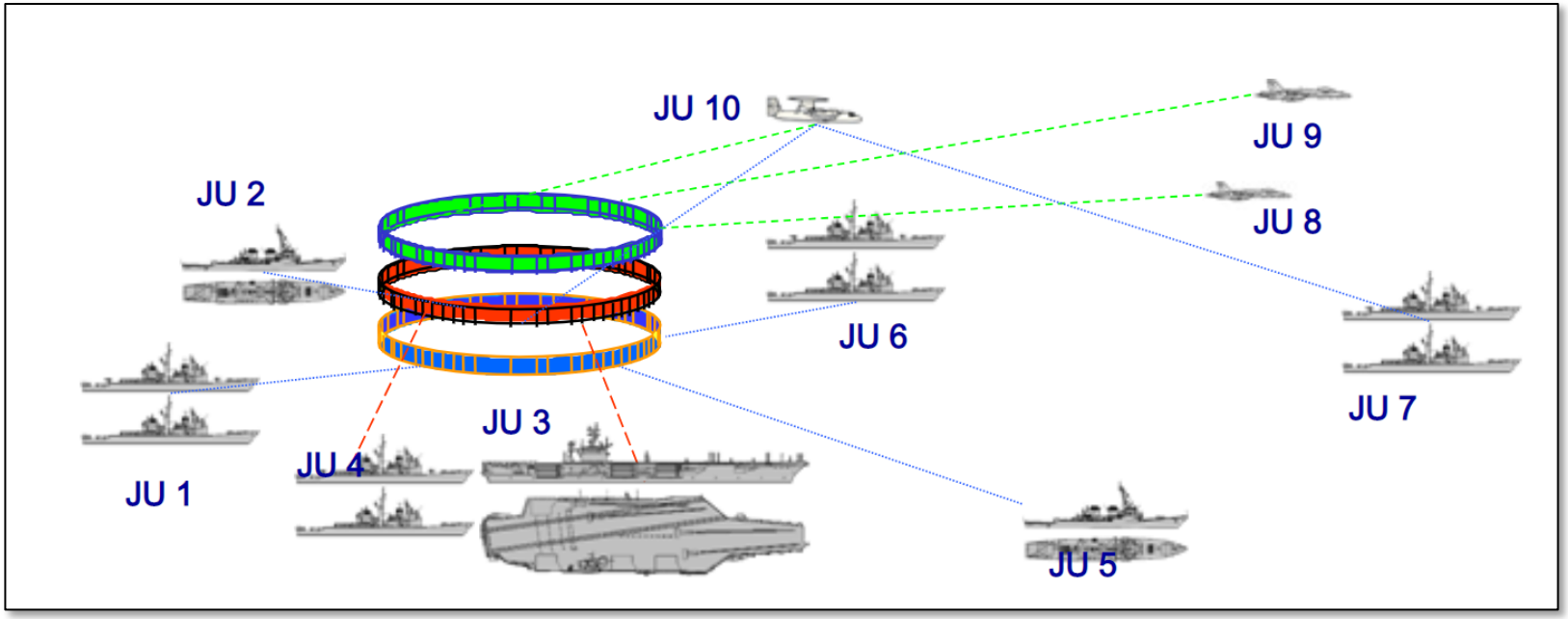
- Netted communications, using M-Series messages
- HF 300 nm omnidirectional range
- UHF – 25 nm surface, 150 nm surface to air range
- "Dial up your PU and load the correct crypto"



Evolution

LINK 16 – 1970'S

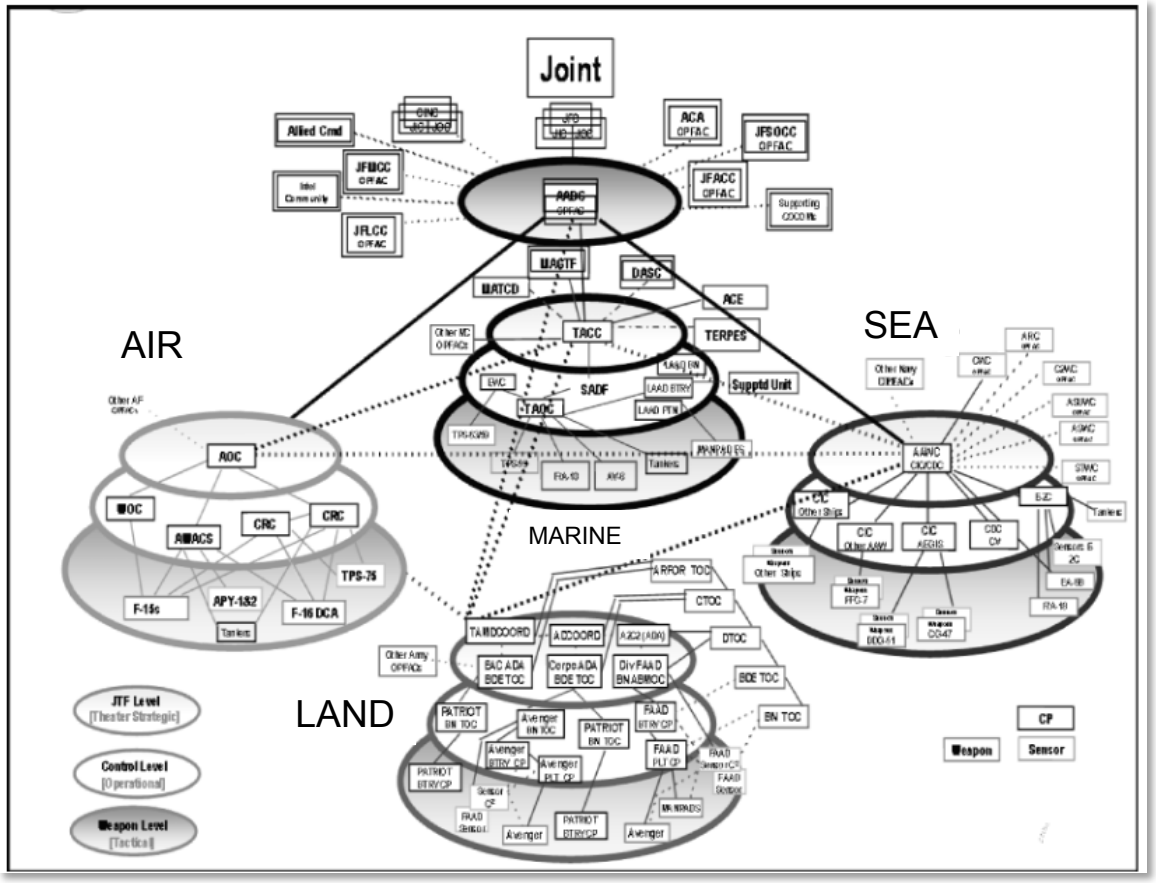
- Nodelessness, jam resistance, flexibility of communication operations, separate transmission and data security, increased numbers of participants, increased data capacity, network navigation features, and secure voice.



Evolution

TODAY

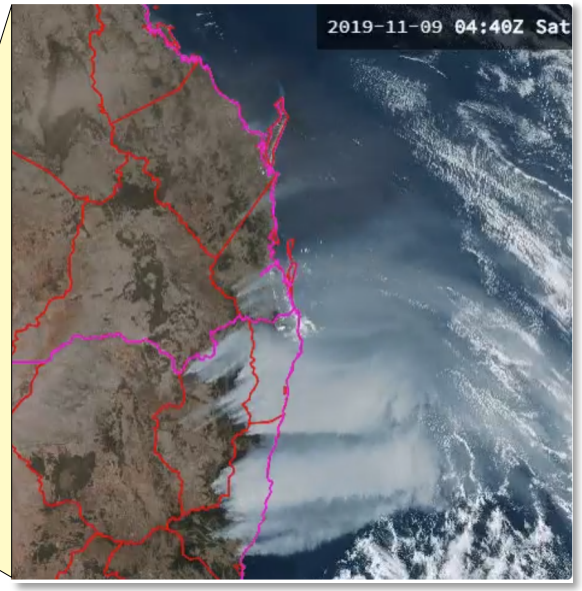
- Multi-TDL Network (NTM) consists of Links 16, 11, 22, SADL, NATO Link1, and Army TDL
- All warfighting environments from the Strategic to the Tactical: Air, Maritime, Ground, Cyber
- Warfighting capabilities:
  - Special Operations,
  - Allies & coalitions;
  - Net-enabled weapons,
  - Rotary-wing,
  - Unmanned Air Systems,
  - Integrated Air & Missile Defence



Evolution

ANOTHER LEVEL OF COMPLEXITY

- Civil Operations and Humanitarian Assistance/Disaster Relief
  - Operation PODIUM, 2010 Winter Olympics in Vancouver, Canada – leveraging Link 16 for integrated civil, air and maritime security
  - Operation CADENCE, 2018 Canadian Armed Forces civil authority security effort for the G7 Summit – leveraging TDL to monitor air, sea and land during the event
  - Tropical Cyclone Winston, Fiji, 2016 – Australian Defence Force leveraging TDL to deliver tons of aid (food, shelter, construction equipment, power, water, medical supplies, etc) to disaster area
  - 2018-2019 US Western States wildfire response – leveraging TDL to maintain SA/C2 of response activities and force protection



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making a difference

Key Roles in Contemporary Environment

WHO MAKES ALL THIS HAPPEN?

- JICO is responsible for the entire interface to include all planning and execution functions. The purpose of MTN planning and execution is to satisfy the joint interface Information Exchange Requirements (IERs).
- Track Data Coordinators (TDC) are responsible to the JICO and Watch Officer for all track management issues within the MTN. This includes clarity, accuracy, currency, and quality of all tracks.
- Tactical Data Link Managers (TDLM) are responsible to the JICO and Watch Officer (WO) for all datalink planning and operations.

Problem Defined

EFFECTIVE TRAINING IS DIFFICULT & OFTEN DOES NOT OCCUR

- Effective training for the MTN team is difficult to obtain and is encumbered by evolving complexity, real-world operations, time and money
- Recurring training on perishable skills does not occur in an effective way:
  - Complexity of integrated JDN is difficult to create for training purposes
  - Regular training events (exercises) require 100% network efficiency; injecting TDL training objectives compromises the training events (training fratricide)
  - 24-hour steady-state operations deny JICC objectives-based training

From a JICO working in the European Theater: *"The expectation is that a TDC will have completed JICC Initial Qualification Training (IQT) as a minimum. Optimistically the TDC will have completed JT-101 and JT-102. What I experienced was **TDCs that may have had IQT, maybe not**. This translated to the **inability to perform simple link management**.*

*In addition to the training received as a TDC, the TDLM should have received on the job training as well as **JT-201 Planners before** being promoted to TDLM. In my experience, TDLMs may have had IQT, usually had JT-102, and went **to JT-201 sometime after becoming a TDLM**.*

*The result was TDLMs that **had no clue** when it came to planning or handling major operations/ exercises."*

Problem Defined

THE RESULTS (REAL WORLD OBSERVATIONS OF THE JICO):

- Inability to
  - Manage changes to OPTASKLINK
  - Resolve anomalies such as duplicate tracks, ID conflicts
  - Direct/assign data forwarders
  - Coordinate IU entry & exit
  - Direct/assign/monitor NTR
  - Transmit change data orders in response to environment & ID conflicts
  - Coordinate use of data filters
  - Ensure JTIDS/MIDS compliance with civil authority restrictions
  - Monitor time slot assignments
  - Evaluate network performance
  - Anticipate and mitigate Line-of-Sight connectivity issues

Proposed Solution:

INTEGRATED LIVE-VIRTUAL-CONSTRUCTIVE (LVC) ENVIRONMENT

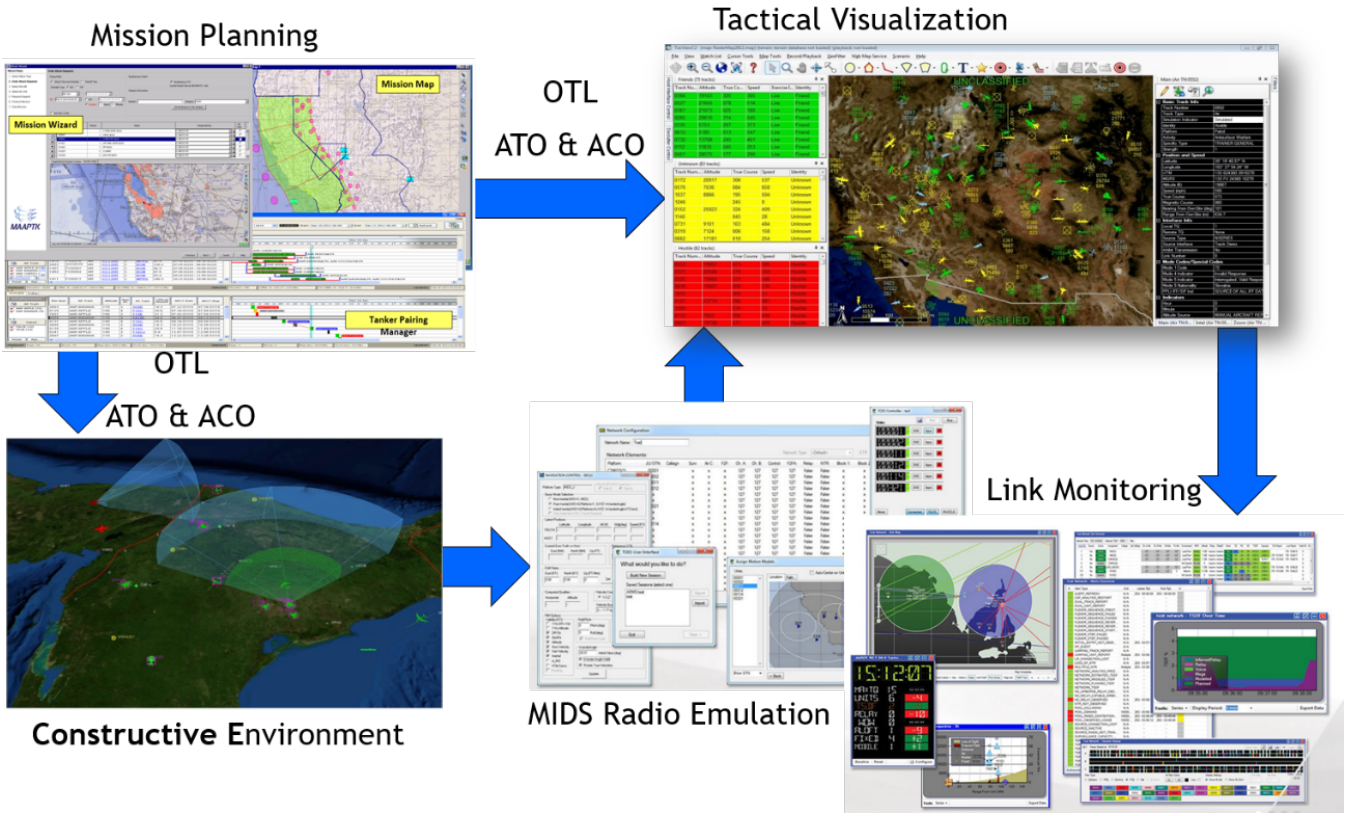
- LVC Integrating Architecture providing:
  - Planning and orders management
  - Planned friendly, enemy and neutral/unknown activity in the battlespace
  - Unplanned “fog of war” inserts
  - Communications paths as a dependency for success
  - Realtime SA and C2
  - With live actors performing live mission tasks, interacting with live and constructed actors and systems
- Simulate realistic TDL scenarios in joint/coalition/allied environments
  - Simulate h/w, s/w performances
  - Evaluate different MTN designs
- Drive volume or bandwidth variables, geography, equipment capabilities/ limitations, TTPs, security

Australian Department of Defence Science & Technology says, “synthetic environments representing the natural world and the electromagnetic spectrum **will be developed** to allow for realistic training…to adaptively train ADF personnel.”

Proposed Solution:

TRAIN AS YOU FIGHT!

- Integrated system of systems deliverable on laptops
- Use currently fielded tools for realism
- Train & exercise as much complexity as possible
- While maintaining current operations



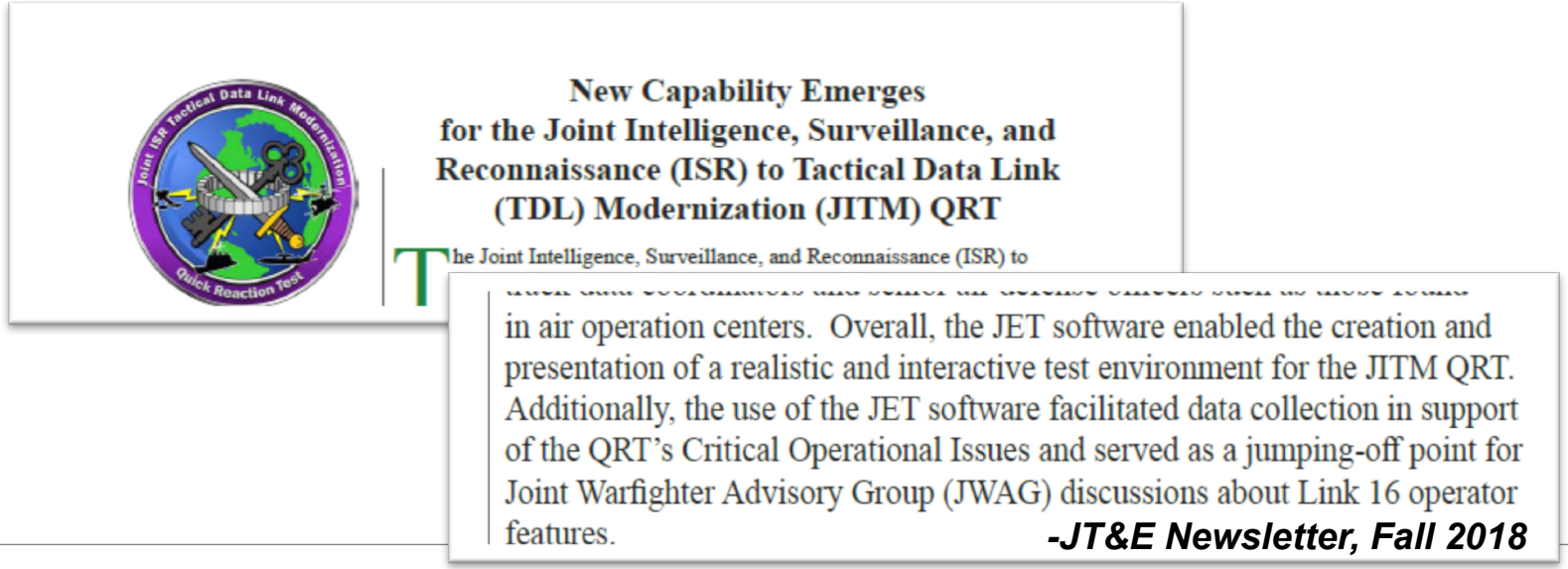
Proposed Solution:

Features	Benefits
Integrated Systems	MAAP planning, terminal emulation, environment simulation, RF monitoring, gateway processes, SA & C2, all in one system
C2 Planning	Create & exercise real-world ATO, ACO, and OTL
Training Scenarios	Recorded & manipulatable scenarios make training drills challenging & rewarding
Operational Training	Diagnose real-world issues with radar, Link 16, line-of-sight, etc, in low-risk training environment; impact of network management on the whole of the operations
Network Management Training	TDL mission planning & execution, C2, link monitoring/ management, MIDS terminal emulation and AAR
LVC Environment	Provides most realistic, least risk way to “Train as you fight because you fight as you were trained”
Automated Solution	Reduces human error and increases productivity as an alternative to view-slide and spreadsheet work-arounds

Proposed Solution:

"FRINGE BENEFITS"

- Test new plans, capabilities, TTPs
- Evaluate personnel and equipment performance
- Leverage component systems to extend training to other lanes: ISR management, Non-kinetic effects C2



New Capability Emerges for the Joint Intelligence, Surveillance, and Reconnaissance (ISR) to Tactical Data Link (TDL) Modernization (JITM) QRT

The Joint Intelligence, Surveillance, and Reconnaissance (ISR) to

in air operation centers. Overall, the JET software enabled the creation and presentation of a realistic and interactive test environment for the JITM QRT. Additionally, the use of the JET software facilitated data collection in support of the QRT's Critical Operational Issues and served as a jumping-off point for Joint Warfighter Advisory Group (JWAG) discussions about Link 16 operator features.

-JT&E Newsletter, Fall 2018

Ultra's JET

ENABLING THE TACTICAL DATA LINK WARRIOR

- Ultra's JET provides a system of systems, as one integrated suite, to deliver:
  - Mission planning capabilities for Air Tasking Orders, Airspace Control Orders and Op Task Links; the same software used in the field today
  - Complete battlefield environment simulation capability that accounts for known blue and red force order of battle, stored and recalled simulations with the ability to add real-time injects, drivers for simulated RF and radar, etc. The same software used to train C2 crews today
  - Interactive TDL radio terminal simulation, together with detailed terminal monitoring; the same software used in deployed terminals today
  - MTN gateway; the same software used in the field today
  - Tactical SA/C2 interface; the same software used in the field today.

Want to know more? Contact Ultra Electronics
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