"ALWAYS ON - ON DEMAND":
Supporting the Development, Test, and Training of Operational Networks & Net-Centric Systems

Information Briefing
8 April 2014
**The World of Operational Networks and Net-Centric Systems**

*Effective Operational Networks Critically Underpin Army Mission Success*

*The Network is the Army’s Number One Modernization Priority*

GAO Report on Army Networks January 2013
System of Systems Realistic and Relevant Operational Context for Network Modernization

➢ Well known truth:
  ➢ *Train the way we fight*

➢ Evolution of thinking during FCS:
  ➢ *Test the way we fight*

➢ System of Systems Engineering and Integration:
  ➢ *Develop technologies the way we fight*
  ➢ *Integrate and assess technologies the way we fight*

➢ What is needed:
  ➢ A representative, realistic and relevant, Technical and Operational Synthetic Environment for use in the research, development, test, evaluation and experimentation of Network Modernization capabilities and gaps

“Always On-On Demand” Approach

“Always On-On Demand” is the integration of existing live, virtual, and constructive systems to create a persistent realistic and relevant Technical / Operational Synthetic Environment to address technology and process issues and gaps associated with Operational Networks and Net-Centric Systems that is available on demand.

Focus is on Battlespace Integration at the Service, Joint, and Coalition Level.

“Always On-On Demand” is being developed to support Network Modernization across the life cycle by building on 15+ years of collaborative development between acquisition, testing, and combat development communities, leveraging ongoing work in and collaboration between SoSE&I, RDECOM, ATEC, TRADOC, etc.

Using distributed real-time interactive secure networks, “Always On-On Demand” will provide access to:
- Army test ranges, battle labs, training locations, and R&D Centers
- Joint and Coalition assets
- Army and OSD Cyber Ranges

Optimize RDTE, operational testing, and experimentation by incorporating economies and efficiencies:
- Cost avoidance: Integrating existing Government facilities and capabilities through distributed network technologies to form a virtual integration and testing environment rather than creating new components
- Cost offset: Using M&S to augment, supplement, and/or replace live system testing and assessment
- Cost savings: Economic investment of Acquisition PM testing dollars in existing Government owned testing environment rather than in Prime Contractor developed assets
- Investment leverage: Continual build up of additional capabilities with each use via “leave behind” integrated technologies
“Always On-On Demand” Foundation Of Capabilities

What exists today that can be integrated to produce a more comprehensive capability

- Scalable, real-time, network models with options for fidelity (conceptual, emulation, or abstract) that can be invoked depending on use cases (e.g. SRW, WNW, WIN-T, etc)
- High fidelity RF effects (e.g., urban terrain)
- System-in-the-loop (“SIL”) with live radios (e.g. GMR, HMS, etc)
- Software-in-the-loop with live battlefield applications (e.g. IBEX, FCBC2, etc)
- Interface with live network managers (e.g. JENM)
- Interface with instrumentation and data collection tools used on live networks (e.g. OASIS)
- Interface with external simulation tools (e.g. OneSAF)
- Representation of Multi-level Security
- Relevant Operational Contexts for TRL assessments

Integrated, Comprehensive Capabilities

- Operational Networks test bed environment capable of evaluating systems and system of systems effectiveness, current & future capabilities, as-is and to-be architectures
- Fast, agile, low risk integration of technology & operations for integration and test events such as NIE
- Repeatable, relevant, end-to-end test environment capable of executing larger than single thread scenarios
- Distributed Networked Live-Virtual-Constructive technologies environment reducing the need to ship equipment and relocate key personnel
- Leveraging the strengths and tool suites of each participating location, promoting collaboration and reuse of test assets across T&E, Planning, Analysis, Acquisition, Training, Cyber
"Always On-On Demand" Live-Virtual-Constructive Architecture
Baseline: Starting With Capabilities We Have Today

Providing a Network Modernization “Integration/Test Harness” Capability Which can Support Multiple Use Cases Across the Acquisition Life Cycle
“Always On-On Demand” Program
Enterprise Capabilities
Examples of “Always On-On Demand” Program Instantiations

“Always On-On Demand” Enterprise Capabilities Can be Instantiated to Meet Different Requirements
“Always On-On Demand” Integration Across Event Environments

“Always On-On Demand” Instantiations Can Be Integrated to Address Larger, More Complex Issues
“Always On-On Demand” Event Instantiation Process: Fostering Systems Engineering Discipline and Reuse

Specific Events are created using the “Always On-On Demand” Program DSEEP* Overlay Process

1. Define Simulation Environmental Objectives
2. Perform Conceptual Analysis
3. Design Simulation Environment
4. Develop Simulation Environment
5. Integrate & Test Simulation Environment
6. Execute Simulation
7. Analyze Data and Evaluate Results

“ON DEMAND” Enterprise Repository

M&S Resources (e.g., OneSAF)
Scenario (e.g., entity/jaydown)
Plans (e.g., Integration Plan)
Simulation Object Models (e.g., MATREX FOM)

* DSEEP = Distributed Simulation Engineering and Execution Process - IEEE Std 1730-2010
“Always On-On Demand”: Support for Army Process Improvements

- Supports The Army T&E Enterprise Strategic Plan 2013 initiative to leverage modeling and simulation (M&S) to augment / replace tests and shorten testing
- Supports The Army Agile Capabilities Life Cycle Process by optimizing assessment of new technologies
- Supports recommendations from the Army T&E Efficiencies Study 2013 to increase the use of M&S to create efficiencies
Areas of Support for Army T&E Efficiencies Task Force

Primary

• *Test Efficiencies Through Distributed T&E*
• *Enduring Unified Measure of Performance (MOP) Framework*
• *Maximize Use of M&S*
• *Leverage existing M&S tools to support T&E*

Secondary

• Cost Benefit Analysis (CBA) of Number of Test Articles Available
• Integrate or Bundle Tests
• Collaboration Between S&T and T&E
• Test Efficiencies through Reliability Engineering M&S
• Capitalize on Potential M&S Offsets for Early Identification of Meeting Critical Data
• Better Use of Analysis to Identify Data that Matters to Acquisition Decision Making

(*Implementation and Assessments occurring during Bold Quest 14.2*)
Optimize Testing, Training, and Experimentation by Incorporating Economies and Efficiencies

- **Cost avoidance:** Integrating existing Government facilities and capabilities through distributed network technologies to form a virtual integration and testing environment rather than creating new components.

- **Cost offset:** Using M&S to augment, supplement, and/or replace live system testing and assessment.

- **Cost savings:** Economic investment of Acquisition PM testing dollars in existing Government owned testing environment rather than in Prime Contractor developed assets.

- **Investment leverage:** Continual build up of additional capabilities with each use via “leave behind” integrated technologies.
“Always On-On Demand” Program Structure

- Defense Acquisition Model #3 (formerly BCL)
- Well defined process for development and management
- Parallel “Swim Lanes” of activity
- Management Activities and Process Architecture
- Distributed LVC Development and Execution Activities
“Always On-On Demand” Program
On Demand Environment for Networks and Net-Centric Systems (ODENN)
Event 14 (E14)
ODENN E14 Event Overview

**ODENN E14 Scenario**

**ODENN E14 Distributed Sites**

### ODENN E14 Timeline

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<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
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<tr>
<td><strong>Kickoff</strong></td>
<td><strong>Design Review</strong></td>
<td><strong>BQ CWG#2</strong></td>
<td><strong>IRR 2</strong></td>
<td><strong>IRR 3</strong></td>
<td><strong>ERR</strong></td>
<td><strong>ODENN E14</strong></td>
<td><strong>Quick Look Report</strong></td>
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<td>20-22 Nov 13</td>
<td>13-16 Jan 14</td>
<td>25-28 Feb 14</td>
<td>17 Mar 14</td>
<td>03 Apr 14</td>
<td>24 Apr 14</td>
<td>05-23 May 14</td>
<td>Aug 14</td>
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**IRR** – Integration Readiness Review
**CWG** – Consolidated Working Group
**ERR** – Event Readiness Review
**AAR** – After Action Review
ODENN Support to NIE BQ 14.2
- current as of 31 March 2014 -

ODENN E14/BQ Online Support:

- Emulated US Army and USMC firing batteries for Joint Fires Support Joint Mission Threads
- Simulated Red aviation, ground maneuver and ballistic/cruise missiles for IAMD
- Emulated 3 tier wireless BCT Network with Comms effects (CS 13 with MNVR Mid-Tier)
- Simulated Blue air tracks for Airspace Management/Integration and Clearance of Fires
- Emulated UAS data link including Comms effects for MUM-T and MHFA
- Emulated BETSS-C video data distribution with Comms effects for targeting vignettes

ODENN JTE Online Support:

- Blue aviation
- Simulated Patriot
- Red aviation & UAS
- Red ballistic missiles
- Red cruise missiles
- Red ground maneuver
**Integration Spiral Progression**

- **Integration Spiral 1**
  - Network Connectivity
  - Experiment Infrastructure Integration

- **Integration Spiral 2**
  - Sites Operational Applications
  - Data Transfer Across Federation

- **Integration Spiral 3**
  - Concurrent Execution of Key Ops Tasks
  - Focus of IS-2 Accomplishments

Progress of Integration
ODENN E14 Distributed Architecture

Architecture Components

- Net-Centric Systems (NCS)
  - GCCS
  - JCR
  - TAIS
  - AFATDS
  - JADOCS
  - BETSS-C SGS
  - OSRVT
  - MHFA
  - TBMCS
  - PATRIOT ECS

- Technical Control, Collaboration, & Monitoring (TC2M)
  - Test Talk (TOEL Server)
  - VoIP
  - Chat
  - VTC
  - Confluence (Wiki)
  - LVC Arch Status
  - Nagios sys monitor
  - SIMDIS

- Data Collection, Reduction, and Analysis (DCRA)
  - Nagios Network Performance Monitor
  - Tactical Message Logger
  - TENA Logger
  - DIS Logger
  - WireShark

- Infrastructure Integration Aids (IIA)
  - SSE Gateway
  - MC Adapter
  - JREAP-C Publisher
  - SIMDIS

- Simulations, Stimulators, and Emulations (SSE)
  - OneSAF
  - ExCIS
  - AME
  - JASPER
  - RTOS
  - JSTEN
  - MUSE
  - NVIG
  - OH-58 Simulator

Distributed Architecture Configuration

- BOLD QUEST (WSMR)
  - NCS
  - TC2M
  - DCRA
  - IIA
  - NCS
  - PATRIOT
  - RAMPART
  - TBMCS (USAF)
    - Eglin, AFB
  - MAOC (USMC)
    - 901 Complex

- DTCC
  - NCS
  - TC2M
  - DCRA
  - IIA
  - SSE

- JOIN
  - TC2M
  - DCRA
  - IIA
  - SSE

- NVESD
  - NCS
  - TC2M
  - DCRA
  - IIA
  - SSE

Encrypted Links over DREN
ODENN E14 Distributed Sites Systems View

Site Key:
- Green: Army
- Blue: Air Force
- Red: Marines
- Purple: Joint

System Key:
- Live
- Simulation
- Data Collection
- Test Control

- TAIS/EASI
- JCR
- GCCS-A
- OSRVT
- DDS
- JSTEN
- OneSAF
- MC Adaptor
- NVIG
- ExCIS (x2)
- AME
- RTOS
- JASPER
- OH-58 Sim
- MUSE
- MARK XIIA Sim
- ADS-B Sim
- JREAP-C Pub
- JSTEN CDL
- TBMCS
- Test Talk
- Confluence
- Chat
- VOIP
- eMail

- TAIS DACT
- Nagios
- VLC
- SIMDIS
- Test Talk
- Confluence
- Chat
- VOIP
- eMail

- NSITE
- WireShark
- Nagios
- DIS Logger
- SIMDIS
- Test Talk
- Confluence
- Chat
- VOIP
- eMail
- NTP

- GCCS-J
- Confluence
- Chat
- VOIP

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- BETSS-C SGS
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- OneSAF
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- Joint Staff Facility, Suffolk, VA
- JOIN, APG, MD
- 46TS, Eglin AFB, FL
- DTCC, RTC, AL
- JFS JMY Lab
- WSMR, NM
- BQ Air Ops Cell
- Holloman AFB, NM
Mission Contributions of “Always On-On Demand”
ODENN E14

Realistic and Relevant Operational Environment

• Provide high fidelity simulations that replicates a Battlespace well beyond what can be afforded with only live assets
• Replicate all of the live air assets and provide this scenario prior to live flying occurring
  – This will significantly reduce risk for event execution by creating the ability to troubleshoot the live and simulated mission threads prior to live aircraft arriving for missions

IAMD

• Build a scenario for IAMD that will be utilized by the MAOC for TTP evaluation, weapons and surveillance training
• Support injection of simulated Red and Blue aviation and Theater Ballistic Missiles (TBMs) into live Patriot system at the RAMPART facility near Orogrande Range Camp on WSMR
• Provide simulated Patriot at Biggs AAF to support detection, tracking and engagement of Red ABTs and TBMs
  – This capability will be used during the JTE portion

Joint Fires Support

• Emulated US Army and USMC Field Artillery batteries for complete Joint mission thread testing
• Reconnaissance, Surveillance and Target Acquisition (RSTA) missions using a Manned-Unmanned Team (MUM-T)

Airspace Integration

• Fully stimulate the US Army TAIS system by creating an environment that will force dynamic coordination across the Battlefield as well as test the TAIS Enhanced Airspace Interface (EASI) correlator
  – Simulated Link 16 air tracks and Mode 5 Level II IFF for Blue aviation
  – BFT from simulated US Army aviation platforms
  – Simulated Sentinel radar plot data

BCT Network

• Network performance impact assessments of using brigade communications architecture for the Base Expeditionary Target Surveillance System - Combined (BETSS-C) Standard Ground Station (SGS) full motion video
**Innovative LVC Features in “Always On-On Demand”**

**ODENN E14**

**IAMD**
- Simulated TBM flight path data for the Patriot Mobile Flight Mission Simulator (FMS)
  - Simulated TBM flight data will be injected over live air tracks from the Patriot AN/MPQ-65 Radar
- Simulated Patriot batteries to engage simulated ABTs, cruise missiles and TBMs
  - Engagement of simulated ABTs and cruise missile will be directed/coordinated by USMC Modular Air Operations Center (MAOC)
- Emulated AN/TPS-59 Phased Array Radar data for the USMC MAOC
  - Simulated Aircraft and TBM flight data will be injected over live air tracks from the MAOC AN/TPS-59 Radar
- Simulated AN/TPS-75 Radar data for TBM alert messages (JVMF J3.6) and air surveillance tracks (J3.2) for GCCS-A/J

**Joint Fires Support**
- Emulated US Army Field Artillery Fires Support systems for TAIS Airspace Integration testing
- Simulated USMC Field Artillery batteries for AFATDS interoperability testing
- Simulated Joint STARS Radar data for Ground Moving Target Indicator message (JVMF J3.5) for GCCS-J
- Simulated UAS Full Motion Video with Comms-Effects for Mobile Hand-held Fires Application (MHFA) testing
  - Emulated UAS video data to the MHFA will include Comms-Effects

**Airspace Integration**
- Emulated sensor data that includes Comms-Effects for the TAIS Airspace Correlator
  - Sensor emulations include Mode 5 IFF, BFT (AVN) and Sentinel Radar
- Create a simulation test environment to severely stress the EASI correlator

**BCT Network**
- Emulated UAS Full Motion Video for OH-58D MUM-T testing
  - OH-58D will be flown from a manned cockpit simulator
  - Emulated UAS video data to the OH-58D will include Comms-Effects
- Distributed Comms-Effects Modeling of brigade network architecture including BETSS-C SGS FMV testing
“Always On-On Demand” Distributed LVC Technologies
Development and Execution:

On-Demand Environment for Networks and Net-Centric
Systems (ODENN) E14 Projected Benefits and Cost Savings
Across Use Cases
# Always On – On Demand ODENN E14 Bold Quest 14.2 IAMD Support

## ODENN E14 support to BQ 14.2 IAMD Objectives
- Provide representation of a realistic IAMD model for BQ 14.2 participants integrated with ODENN E-14 objectives
- Enhance BQ 14.2 live threat Air with simulated threat Air Tracks to fully exercise IAMD shooters and the Mission Control processes
  - Lays the groundwork for future Always On-On Demand support to other services such as the new Air Force Simulation Pods
- Integrate IAMD with realistic Airspace Management

## Implementation Approach
- Use AME to provide simulated threats
- Enable the creation of a LVC environment to stimulate PATRIOT and MAOC participants
- Simulate approximately 150 threat Air and Ground Tracks to drive IAMD processes and meet all IAMD BQ 14.2 objectives
- Incorporate new technologies such as Mode 5 into the operational scenarios to test and evaluate weapon systems and mission command processes

## Products
- Operational concept for IAMD for Army integration into a joint battlefield
- Technical approach to support IAMD requirements
- Mission threads to integrate live air and simulated air tracks into the same operational scenario
- Analysis of combined use of live and simulation air and ground tracks which identifies;
  - Resource savings
  - Efficiencies gained in exercise and testing
  - Impact on warfighter training opportunities

## Cost Savings and Efficiencies
- Integrate simulated air and ground tracks safely with live tracks in support of the IAMD mission area.
  - Significant cost savings of fixed wing aircraft ($20K/hour/plane). Warfighters will meet all assessment criteria with a small number of live air. AO-OD will inject and control over 50 simulated aircraft in the scenario that will appear real to the warfighter and systems
  - Simulated tracks will stimulate weapon and surveillance systems, fully supporting data exchange at the “bit/byte” level of realism
## ODENN E14 support to BQ 14.2 JFS Objectives

- Provide simulated gun support for BQ 14.2 mission threads—this will be the first time that BQ has had end-to-end for Joint Fires Support Joint Mission Thread interoperability assessments
- Integrate Fire Support with airspace clearance objectives
- Provide Fire support from the tactical level to the operational level (JFLCC and JFMCC)
- Always On-On Demand support will lay the foundation for Fires objectives for BQ 2015

## Implementation Approach

- Use ExCIS and OneSAF to represent guns and associated messaging
- Provide Blue and Red Air, Blue and Red Maneuver as well as replicate a realistic airspace environment that will support airspace clearance request, and IAMD
- Integrate simulation with live air to provide shooters an enhanced airspace and mission command problem
- Provide multiple simulations injects from various labs to reduce cost while increasing realism for the warfighter

## Products

- Integrated mission threads coordinated with the Joint Staff, BQ, and NIE
- Force lay down, operational scenario, integrated battle management products (ATO, ACO, etc.)
- End-to-end interoperability assessment of the Joint Fires mission thread
- Integrated plans with the Analysis and Technical Working Groups

## Cost Savings and Efficiencies

- Always On-On Demand is enabling end to end testing of systems interoperability not seen at a BQ before. Evaluators gain the ability to assess systems, procedures, and processes under a single event
- Identifies problems and solutions with interoperability earlier in the acquisition process
- Reduces requirements for multiple assessment events
- Provides assessment of the Joint Fires Mission Thread —cost and resource prohibited with live assets
## Always On – On Demand ODENN E14

**TAIS EASI Joint Interoperability Assessment**

<table>
<thead>
<tr>
<th>TAIS Interoperability Assessment Objectives</th>
<th>Implementation Approach</th>
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</thead>
<tbody>
<tr>
<td>• Support Coalition airspace integration as part of Joint Fire Support Joint Mission Threads (JFS JMT)</td>
<td>• Work with PM TAIS and Joint Interoperability Test Command (JITC) to identify requirements to support Joint Interoperability certification</td>
</tr>
<tr>
<td>• Provide a simulated environment that will severely stress the Enhanced Airtrack System Interface (EASI) application</td>
<td>• Develop the technical infrastructure, operational context and identify / develop necessary mission threads for performing the Joint Interoperability certification and Coalition Airspace Integration</td>
</tr>
<tr>
<td>• ODENN will provide air objects of various size and speed, with a high degree of maneuver and range between targets</td>
<td>• Develop requirements to support data collection, reduction and analysis</td>
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<table>
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<th>Products</th>
<th>Cost Savings and Efficiencies</th>
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<tr>
<td>• Army, joint and coalition airspace integration objectives as part of the JFS JMT requirements</td>
<td>• High fidelity of simulation will satisfy requirements for a risk reduction event prior to certification testing</td>
</tr>
<tr>
<td>• Supporting Joint Interoperability certification support and risk reduction for PM TAIS (Demonstrates capability for other systems to gain same benefit)</td>
<td>• Saves cost of personnel TDY and equipment with the benefit of being in a realistic battlefield environment that is robust enough to fully stimulate TAIS EASI capabilities</td>
</tr>
<tr>
<td>• Architecture products mapped to mission threads for Army clearance of airspace in a joint/coalition airspace environment</td>
<td>• Simulated environment will permit testing and data collection independent of real world environmental conditions and location of integrated equipment and personnel</td>
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<tr>
<td>• Analysis of live/sim air objects operating in joint airspace to determine cost savings and mission effectiveness</td>
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**Always On – On Demand ODENN E14**  
**Brigade Combat Team (BCT) Network Emulation**

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<th>BETSS-C Network Assessment Objectives</th>
<th>Implementation Approach</th>
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| • Provide a high-fidelity, full IP network stack-capable emulation with the forces simulation, in real time, for assessment of BCT-level network configurations  
  • Typical network performance measures include; network delay latency, bandwidth utilization, network throughput, routing table configuration, radios in net, next hop neighbor tabled, received signal strength | • Work with PM Joint Tactical Networks (JTN) and Communications-Electronics Research, Development and Engineering Center (CERDEC) to identify requirements to assess network performance  
  • Develop the operational context and identify / develop necessary mission threads for performing BCT network performance assessments  
  • Develop the technical infrastructure to support the BCT network performance assessments including data collection, reduction and analysis |

<table>
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<tr>
<th>Products</th>
<th>Cost Savings and Efficiencies</th>
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</thead>
</table>
| • Top-level plan for emulation of CS 13 network  
  • Objectives, requirements and MOPs  
  • Network data collection and analysis  
  • Operational scenario and mission thread injects  
  • System configuration diagrams  
  • Data flow diagrams that include data collection points  
  • Integration Spiral Plans  
  • BQ 14.2 Quick Look and Final Reports | • Saves personnel TDY and equipment costs by avoiding the need to field a complete BCT network environment to assess network characteristics  
  • Provides a realistic venue for BETSS-C network performance assessments without taxing real resources  
  • Allows evaluation without interfering with other operational activities  
  • Avoids delays and data collection impacts of adverse weather conditions during test execution |
# Always On – On Demand ODENN E14

**Base Expeditionary Targeting and Surveillance System – Combined (BETSS-C)**

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<th>BETSS-C Network Assessment Objectives</th>
<th>Implementation Approach</th>
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<tr>
<td>• Provide an environment for PM Terrestrial Sensors to assess network utilization in terms of both structure and bandwidth for the BETSS-C using WIN-T</td>
<td>• Work with PM Terrestrial Sensors and Night Vision Electronic System Directorate (NVESD) to identify requirements to assess BETSS-C network utilization</td>
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<tr>
<td>• Examine bandwidth characteristics of full motion video (FMV) for the BETSS-C in a brigade combat team (BCT) context</td>
<td>• Develop the operational context and identify / develop necessary mission threads for performing the Joint Interoperability certification</td>
</tr>
<tr>
<td>• Explore the impact of increasing use of FMV in the operational environment for BETSS-C</td>
<td>• Develop the technical infrastructure to support the Joint Interoperability certification including data collection, reduction and analysis</td>
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<tr>
<th>Products</th>
<th>Cost Savings and Efficiencies</th>
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</table>
| • Top-level plan for BETSS-C network utilization assessments  
  • Objectives, requirements and MOPs  
  • Network data collection and analysis | • Saves personnel and equipment costs by avoiding the need to field a complete BETSS-C system and BCT network to assess network characteristics |
| • Operational scenario and mission thread injects | • Provides a realistic venue for network performance assessments without interfering with other real operational resources |
| • System configuration diagrams | • Avoids delays and data collection impacts of adverse weather conditions during test execution |
| • Data flow diagrams that include data collection points | • Integration Spiral Plans |
| • BETSS-C network utilization assessment Quick Look and Final Reports | • Products Cost Savings and Efficiencies |

**Design • Develop • Deliver • Dominate**

**Soldiers As The Decisive Edge**
# Always On – On Demand ODENN E14
Manned-Unmanned Teaming (MuM-T)

## MuM-T Objectives
- Implement the Standard Common Data Link (S-CDL) network emulation (developed by CTEIP program) to support MuM-T network utilization assessments
- Investigate the bandwidth and QoS characteristics of UAS Full Motion Video (FMV) in a Brigade Combat Team (BCT) operational context
- Investigate MUM-T operations and data exchanges between manned aircraft and UAS virtual systems

## Implementation Approach
- Utilize Multi-User Simulation Environment (MUSE) for Shadow class UAS simulation
- OH-58 aircraft cockpit simulator performing Level of Interoperability (LOI) 2, 3, and 4 interface with virtual Shadow UAS
- Implement Night Vision Image Generator (NVIG) UAS sensor simulation to generate real-time FMV feeds
- All data exchanged from UAS to the Ground Control Station (GCS) and OH-58 One System Remote Video Terminal (OSRVT) will be realistically comms-effected

## Products
- Top-level plan for MuM-T FMV network utilization assessments
  - Objectives, requirements and MOPs
  - Network data collection and analysis
- Operational scenario and mission thread injects
- System configuration diagrams
- Data flow diagrams that include data collection points
- Integration Spiral Plans
- MuM-T FMV network utilization assessment Quick Look and Final Reports

## Cost Savings and Efficiencies
- Saves personnel and equipment costs by avoiding the need to field a complete MuM-T system of systems and BCT network to assess network characteristics
- Provides a realistic venue for network performance assessments without interfering with other real operational resources
- Avoids delays and data collection impacts of adverse weather conditions during test execution
# Always On – On Demand ODENN E14
## Mobile Hand-held Fires Application (MHFA)

**MHFA Objectives**

- Provide real time, high-fidelity sensor, network and fires emulations with forces simulation for assessment of MHFA interoperability
- Investigate operations, data exchanges and QoS characteristics of UAS Full Motion Video (FMV) in a operational context with a live Joint Observer using MHFA and virtual Manned Unmanned Team (MUM-T)

**Implementation Approach**

- Utilize Multi-User Simulation Environment (MUSE) for Shadow UAS simulation
- OH-58 aircraft cockpit simulator performing Level of Interoperability (LOI) 2, 3, and 4 interface with virtual Shadow UAS
- Implement Night Vision Image Generator (NVIG) UAS sensor simulation to generate real-time FMV feeds
- All sensor video exchanged from UAS to the Ground Control Station (GCS), OH-58 aircraft, and the MHFA will be realistically comms-effected

**Products**

- Top-level plan for MHFA interoperability assessments
  - Objectives, requirements and MOPs
  - Network data collection and analysis
- Operational scenario and mission thread injects
- System configuration diagrams
- Data flow diagrams that include data collection points
- Integration Spiral Plans
- MHFA interoperability assessments Quick Look and Final Reports

**Cost Savings and Efficiencies**

- Saves personnel and equipment costs by avoiding the need to field a complete MuM-T system of systems and BCT network to assess MHFA interoperability
- Provides a realistic venue for MHFA interoperability assessments without interfering with other real operational resources
- Avoids delays and data collection impacts of adverse weather conditions during test execution
# Always On – On Demand ODENN E14
## Analysis Approach and Use of the MOP Framework

<table>
<thead>
<tr>
<th>Event Analysis and MOP Framework Objectives</th>
<th>Implementation Approach</th>
</tr>
</thead>
</table>
| • Provide data collection and analysis support for ODENN E14 Users and Always On – On Demand Process and Technology activities  
• Capture the “as-is” analysis process and identify opportunities for process improvement activities  
• Implement the MOP Framework process and measures where applicable  
• Develop analysis and data collection objectives for ODENN E15 | • Work with ODENN E14 users to refine objectives and identify the analysis approach and activities  
• Develop a data collection plan and provide requirements for the technical teams to provide data collection and analysis tool support  
• Collaborate with MOP Framework development team to implement the process and identify relevant measures for use in ODENN E14 |

<table>
<thead>
<tr>
<th>Products</th>
<th>Cost Savings and Efficiencies</th>
</tr>
</thead>
</table>
| • Data collection and analysis plan targeting specific user objectives for E14  
• Architecture products relating user and event objectives to analysis activities and data collection tasks  
• System requirements to support data collection hardware and software needs  
• Quick look and final reports with results of event analysis and assessment of event objectives  
• Additional MOP capabilities to include: additional metrics for existing MOP maps, additional context considerations for each MoP map based on application, and additional MoP maps based on ODENN User defined operational needs | • Ensures event activities lead to actionable data / analysis for ODENN users through targeted data collection and analyses tied to specific user objectives  
• Utilizes existing performance frameworks (MOP Framework) to reduce the time required to develop specific measures and to provide a means to compare results with other events  
• Further matures MOP Framework for use across the Army and other communities to broaden its applicability and availability to an expanded user base |
## Always On- On Demand ODENN E14 Measures Mapped to T&E Efficiencies

### Pattern of Analysis (PoA)

<table>
<thead>
<tr>
<th>Critical Issue Under Evaluation</th>
<th>T&amp;E Efficiencies</th>
<th>Analytical Elements</th>
<th>Measurement / Data Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Operational Issue #</td>
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<tr>
<td>COI Issue</td>
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<tr>
<td>COI Question(s) and Goal</td>
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<tr>
<td>Analytic Issue</td>
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<tr>
<td>Essential Elements of Analysis (EEA)</td>
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<tr>
<td>Measures (MOEs, MO)</td>
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<tr>
<td>Data Requirements</td>
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</tbody>
</table>

### Operational Issue / Questions & Goals

1. Distributed simulation support for operational system interoperability solutions (UL, U2, U4).
2. How well is the ODENN environment able to investigate and assess mission performance using the standard common data link (CDL) environment?
3. How well does the ODENN simulation environment enable the assessment of network utilization in terms of structure, bandwidth and quality of service for systems utilizing full-motion video (FMV)?

### Analytical Approach

- **T&E Efficiencies Addressed**
  - 3.1. Assess the ability to receive mission related messages and respond appropriately with simulation activities (operational fire) and message responses. Message traffic will be collected using CDL logging capabilities.
  - 3.2. Assess the ability to receive mission related messages and understand the evaluation of CDL utilization.
  - 3.3. Assess the ability to assess the distribution of simulation and associated tools to evaluate bandwidth and link characteristics of FMV.

### MOEs, MOPs & Data Requirements Based on MoP Framework

- Success measures:
  - 2.1.1 Message Success Rate
  - 2.1.1.1 Video Session Completeness Rate
  - 2.1.1.2 Number of Successful Video Sessions
  - 2.1.1.3 Client Reachability (Sustained/Intermittent)
  - 2.2.2.1 Number of Maximum Clients in Video Group
  - 2.3.4.1 Percent Time to Maintain Continuous Connectivity During Video Session

- Performance measures:
  - 2.1.1.1 Video Session Completeness Rate
  - 2.1.1.2 Number of Successful Video Sessions
  - 2.1.1.3 Client Reachability (Sustained/Intermittent)

- Measurement / Data Requirements:
  - # of completed messages per time period
  - # of messages sent during time period
  - # of completed messages per time period by QoS
  - # of messages sent during time period by QoS
  - # of completed messages per time period by priority
  - # of messages sent during time period by priority
  - # of completed messages per time period by category
  - # of messages sent during time period by category

### Analysis provides valuable insight and feedback to T&E Efficiency initiatives
“Always On-On Demand” Program:

FY15 Planning
Always On – On Demand Program Planning
FY15 (pending funding)

• BCL Program Development:
  − Complete Phase I: Business Capability Definition:
    • “As Is” Analysis
    • Problem Statement Definition/Approval
  − Complete Phase II: Investment Management:
    • Analysis of Alternatives
    • Materiel Solution Analysis
    • Define Acquisition Approach
    • Develop Business Case
    • Risk Assessment
    • IRB/MS A Decision

• ODENN E15:
  − ODENN E15 is the Capstone Prototype Event that will support the “Always On – On Demand” program “Go – No Go” decision for the POM effort
  − Working with Joint Staff J6 to identify integration opportunities with Bold Quest 15.x
  − Working with PEO Missiles and Space/IAMD to identify program support activities
    • Battlespace Integration
    • Effects of Cyber and mitigation strategy concept development
  − Working with PEO Aviation to identify program support activities:
    • MUM-T and Airborne Aviation Network for target acquisition, prosecution and battle damage assessment in partnership with PEO AVN, PM AS and PM UAS
    • Effects of Cyber and mitigation strategy concept development
  − Working with PEO C3T to establish areas of support
  − Working with TRMC to implement JMETC 2.0 and enhanced infra-structure tools
  − Other areas to include TBD
Back Up Information
“Always On-On Demand” Program
Supporting the Development, Test, and Training of Operational Networks & Net-Centric Systems

Operational View
- Providing a cost effective, distributed and authoritative operational network representation to support net-centric capability development across the acquisition lifecycle

Program Objectives
- Define and develop a persistent, on demand environment for addressing network modernization gaps and developing net-centric warfighter capabilities
- Develop a persistent, on demand operational network representation that is authoritative, integrated and scalable
- Provide a distributed, integrated LVC environment that utilizes existing government-owned capabilities to provide net-centric support across the acquisition lifecycle
- Define the business processes necessary for efficient utilization of “Always On" technical capabilities for a broad range of acquisition lifecycle activities to include analysis, experimentation, T&E & training
- Collaborate across the Army, Joint and Coalition communities and adopt best-in-breed capabilities and processes

Program Approach
- Program Management:
  - Distributed PM ConOps
  - Risk Management Methodology
  - Cost Efficiencies Methodology
  - Distributed Collaboration Environment

Business Process Development
- Ability to develop and execute distributed LVC in an efficient, effective, and economical manner due to streamlined business processes in the following areas:
  - Test planning & coordination
  - Architecture definition
  - LVC Component selection
  - Distributed integration, testing, data collection, reduction, and analysis

Products and Deliverables
- Program Management:
  - Distributed PM ConOps
  - Risk Management Methodology
  - Cost Efficiencies Methodology
  - Distributed Collaboration Environment

Technical Capabilities
- On Demand Environment for Networks and Net-centric systems (ODENN): Distributed LVC architecture which provides:
  - Realistic, relevant operational synthetic environment(s)
  - Joint and Coalition representation(s)
  - Scalable, real-time, network models
  - High fidelity RF effects
  - System-in-the-loop (“SIL”) with live radios
  - Software-in-the-loop with live battlefield applications
  - Interface with live network managers
  - Interface with instrumentation and data collection tools used on live networks
  - Interface with external simulation tools
“ALWAYS ON – ON DEMAND”

Business Capability Lifecycle: Phase I & II (FY13-15)

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**Business Capability Definition Phase**

**Initial Problem Definition**

- Root Cause Analysis / Business Process Reengineering
  - Analysis of “as is”
  - Compare / look for patterns of behaviors
  - Quantify initial course of actions

**Initial Solution Development**

- Problem Statement for IRB

**Investment Management Phase**

**Business Case Development**

- Analysis of Alternatives
  - Summarize Alternatives
  - Assess viability
  - Estimate cost and benefits
  - Estimate risk and impact
  - Develop detailed system and business process alternatives

**Program Justification**

- Acquisition Approach
- Test Plan

**Execution**

- Prototyping - Pre-ED Review
- Engineering Development - Limited Fielding - IOC
- Full Deployment - Operations And Support

- 18 Months* MS B to IOC

---

*Design \ Develop \ Deliver \ Dominate

Soldiers as the Decisive Edge
### Always On-Off Demand Cost Savings Categories & Descriptions: “Metrics” (work in progress)

<table>
<thead>
<tr>
<th>Categories</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributed Simulation</td>
<td>Reduce TDY cost, utilize personnel and equipment at home location</td>
</tr>
<tr>
<td>Equipment</td>
<td>Utilize equipment in a normal lab environment without risk of relocation and associated cost</td>
</tr>
<tr>
<td>Testing</td>
<td>Test bed that is more easily reconfigurable, standardized, and secure—take advantage of economy of scale, and multi-tasking</td>
</tr>
<tr>
<td>Environmental</td>
<td>Simulation is not dependent on environmental conditions – live assets may be unavailable or limited due to weather</td>
</tr>
<tr>
<td>Personnel</td>
<td>Increase opportunities for training, and securing SME support required for testing and assessments</td>
</tr>
<tr>
<td>Security</td>
<td>Conduct operations on secure networks, reduces time, effort and resources to obtain certificate to operate</td>
</tr>
<tr>
<td>Technology</td>
<td>More easily integrates new technologies into a test bed on an non-interference basis</td>
</tr>
<tr>
<td>Processes</td>
<td>Capitalize on new and improved processes for conducting simulation—more available, timely, less restrictions</td>
</tr>
<tr>
<td>Availability / Flexibility</td>
<td>Integrating simulation with live maintains benefits of live assets but provides necessary enhancements to scenarios without the added burden and cost of live</td>
</tr>
</tbody>
</table>
“Always On-On Demand” ODENN LVC Prototype Events Timeline

Partners for AO-OD Prototype:
- NIE
- Bold Quest
- ARCIC:
  - JAED
  - JAMSD
- JUICE
- NET MOD
- MODESTA

AAR – After Action Review  IRR – Integration Readiness  ERR – Event Readiness Review