Joint Tactical Networks (JTN)
Joint Enterprise Network Manager (JENM)
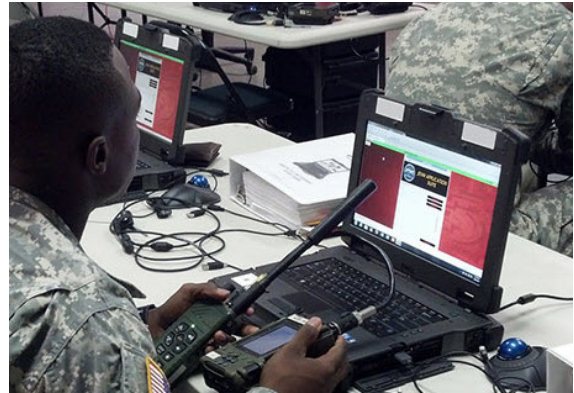
Executive Summary

- DOT&E assessed the Joint Enterprise Network Manager (JENM) during the Mid-tier Networking Vehicular Radio (MNVR) Limited User Test (LUT) during the Network Integration Evaluation (NIE) 15.2.
    - Contractors using JENM were able to plan, configure, and load MNVRs prior to the LUT. Soldiers did not demonstrate these tasks during the operational test.
    - Soldiers were trained on JENM, but they could not effectively monitor or manage MNVR networks, or characterize the health of individual MNVR nodes and Wideband Networking Waveform (WNW) links.
- The Army's development, test, and fielding strategy since moving into sustainment has been to conduct government testing of JENM with waveforms, perform operational assessments based on surveys, and field new software increments. Project Manager (PM) Warfighter Information Network – Tactical (WIN-T) is developing a Test and Evaluation Master Plan (TEMP) that describes the test and evaluation strategy of the JENM and waveforms in coordination with the host radio programs. The target timeframe for completion is 1QFY17.
- The Army collected data from the Mobile User Objective System (MUOS) Multi-Service Operational Test and Evaluation 2 (MOT&E 2), NIE 16.2, Army Warfighting Assessment 17.1, and WNW simulation testing at the program manager's San Diego, California, facility to support a fielding of JENM 3.3. Data to support the fielding consisted of developmental testing and operator interviews and surveys.

System

- JENM is the Army enterprise solution for network operations to the Joint Tactical Network (JTN). JENM is designed to support planning, loading, monitoring, and managing current and future waveforms and software-defined radios.
- Software-defined waveforms are loaded into and considered a part of a radio set. JENM is capable of supporting radios integrated with the following software-defined waveforms: Soldier Radio Waveform (SRW), WNW, Single Channel Ground and Airborne Radio System (SINCGARS), ultra-high frequency satellite communications (SATCOM), and MUOS.

- The Army intends JENM to:
    - Provide network operations to current and future waveforms and software-defined radios. Current software-defined radios include Rifleman Radio, Manpack Radio, and MNVR. JENM will support the future Airborne Maritime Fixed Station Small Airborne Networking Radio.
    - Enable configuration, loading, monitoring, and management of the tactical radio network.
    - Provide an enterprise over-the-air management (eOTAM) capability. eOTAM is a real time command/response protocol between JENM and radios, enabling over-the-air radio and network management with JENM as the controller.

Mission

- Military forces use the software-defined radios to communicate and create networks to exchange voice, video, and data during all aspects of tactical military operations.
- Signal staffs use JENM to:
    - Plan, load, monitor, configure, troubleshoot, and prioritize network operations involving software-defined radio sets running SRW, WNW, SINCGARS, and tactical SATCOM
    - Provision a MUOS terminal to connect to a MUOS satellite network

Major Contractor

Government-developed by Network Management Reference Implementation Laboratory – San Diego, California

Activity

- As previously reported in the FY15 Annual Report (MNVR article), DOT&E assessed JENM 3.1 as a part of the MNVR LUT during NIE 15.2. The Army conducted the test according to a DOT&E-approved test plan. Prior to the LUT, contractors planned and configured the WNW and SRW networks. Contractors loaded the network plan and communications

security (COMSEC) into the MNVR radios. During the exercise, soldiers attempted to monitor and manage the network.

- Although still funded as one program, the JTN program split responsibilities for JENM and Waveforms between two PMs. Responsibility for JENM transferred from PM JTN to PM WIN-T. PM Tactical Radios assumed responsibility for the waveforms.
- JENM had a draft TEMP prior to the transition from PM JTN to PM WIN-T. PM WIN-T is developing a TEMP that describes the test and evaluation strategy of the JENM and waveforms in coordination with the host radio programs. The target timeframe for completion is 1QFY17.
- Consistent with the previous test and evaluation strategy, the Army collected data to support the fielding of JENM 3.3 consisting of developmental testing and operator interviews and surveys. The Army collected data during MUOS MOT&E 2, NIE 16.2, Army Warfighting Assessment 17.1, and government-conducted WNW simulation testing.
  - In October 2015, during MUOS MOT&E 2, soldiers equipped with JENM 3.2 provisioned Manpack radios using the Simple Key Loader to load COMSEC keys and MUOS terminal profile information.
  - Prior to NIE 16.2, the Army conducted new equipment training for soldiers on how to configure a network with JENM 3.3. During the validation exercise, soldiers loaded network plans and COMSEC keys on Manpack radios running SRW, SATCOM, and SINCGARS waveforms. The Army assessed the ability of the unit equipped with JENM to execute network management and monitoring tasks.
  - During NIE 16.2, contractors demonstrated some eOTAM functionality with Manpack and MNVR over the SRW and WNW networks as a proof of concept.
  - During Army Warfighting Assessment 17.1, the Army conducted an over-the-shoulder assessment of soldiers configuring, loading, monitoring, and managing a WNW network on the MNVR with JENM 3.3.

Assessment

- During the MNVR LUT at NIE 15.2, soldiers could not effectively monitor or manage MNVR networks with JENM 3.1, and were not able to characterize the health of individual MNVR nodes or individual WNW links. Contractors using the JENM were able to plan, configure, and load MNVRs prior to the LUT.
- In October 2015 during MUOS MOT&E 2, soldiers took several days to provision the Manpacks and they relied on contractors to complete the loading and provisioning of the radios.
- During the NIE 16.2 validation exercise, soldiers loaded network plans and COMSEC on Manpack radios running SRW, SATCOM, and SINCGARS waveforms. Soldiers were comfortable with the loading process. It took between

1.5 to 2.0 hours to load all of the radios in a company. The Army observed the ability of the unit equipped with JENM to execute network management and monitoring tasks. At the company level, communications soldiers are too busy to monitor the SRW network. JENM network monitoring of SRW lacks a map display showing the location of the radios.

- During Army Warfighting Assessment 17.1, the loading of the radio-configuration files and COMSEC keys was complicated and lengthy. Soldiers used JENM to configure the WNW network over-the-air by conducting over-the-air zeroization with the support of contractors.
- The PM demonstrated JENM's capability to monitor the WNW network and conduct eOTAM at a laboratory event using WNW simulation.
- The Army's development, test, and fielding strategy since moving into sustainment has been to conduct government testing of JENM with waveform versions, perform operational assessments based on surveys, and field new software increments.
  - The JENM program in the past 18 months has coordinated its schedule with Waveforms and not Tactical Radio programs. This process has precluded the ability to discover radio-unique integration problems. The implementation of waveform protocols is unique to each vendor. In addition, waveforms are frequently updated, so the version on the tactical radio available at operational testing may not be the version the JENM product office has built to. Changing focus of coordination to the Tactical Radio programs would synchronize JENM with both the radios and the waveform resident on the radio for both testing and fielding.
  - The operational evaluation strategy, based on surveys and observations, lacks an objective assessment of the effectiveness of the system. Future evaluations require instrumented data to verify JENM capabilities.
  - To remedy this, PM WIN-T is developing a TEMP that describes an adequate test and evaluation strategy of the JENM and waveforms in coordination with the host radio programs. The target timeframe for completion is 1QFY17.
- The Army tactical network is complex for soldiers to design and plan. Network planning consists of developing the signal support architecture and radio platform preset architecture (Internet Protocol addressing and router programming). In all cases this is done by government engineers and contractors. Soldiers have executed network configuration (i.e., establishing call groups) with significant training, retraining, and contractor assistance.
- JENM has improved in usability and functionality with each software version as indicated by the ability of the soldiers to successfully perform network loading tasks without contractor assistance with JENM 3.3. Future capabilities and upgrades should be undertaken against prioritized and validated requirements.

Recommendations

- Status of Previous Recommendations. The Army still needs to evaluate the force structure requirements of adding software-defined, networking radios and network management responsibilities into company-level organizations.
- FY16 Recommendations. The Army should:
  1. Complete a JENM TEMP that describes robust testing and objective evaluations of the JENM in conjunction with the Army's software-defined radio operational tests.
  2. Prioritize and validate the requirements for JENM.
  3. Reduce the need for contractors and reduce the complexity of soldier tasks for network configuration.