

Joint Tactical Radio System (JTRS) Network Enterprise Domain (NED) Network Managers

Executive Summary

- Joint Tactical Radio System (JTRS) Enterprise Network Manger (JENM) runs both the JTRS Wideband Networking Waveform (WNW) Network Manager (JWNM) and the Soldier Radio Waveform (SRW) Network Manager (SRWNM). JENM allows signal personnel to manage the networks of JTRS software-defined radio sets.
- Of the JENM management functions (planning, loading, monitoring, controlling, and reporting) SRWNM and JENM/SRWNM testing examined the planning, loading, and monitoring functions.

SRWNM

- The Navy's Commander, Operational Test and Evaluation Force (COTF) conducted operational testing from October through November 2011. Based on results from testing, DOT&E issued an Operational Assessment report in August 2012 assessing SRWNM as not capable of supporting the unit's mission and unreliable in supporting JTRS Rifleman Radio. The SRWNM lacks the capability needed for Soldiers to use it quickly and effectively to configure a network. The Army had not developed the tactics, techniques, and procedures needed for Soldiers to employ the SRWNM in support of units using Rifleman Radios during combat operations.

JENM/SRWNM

- In a July 2012 Operational Assessment report, DOT&E assessed JENM/SRWNM as effective and suitable in support of JTRS Manpack radios operating the SRW in part due to applying the lessons learned from the SRWNM IOT&E. Soldiers also used JENM/SRWNM to successfully load Rifleman Radios as part of the Army's Network Integration Evaluation (NIE) activities. Lessons learned from the SRWNM IOT&E applied during the JENM/SRWNM IOT&E included improvements to Soldier training, development and validation of the network plan, and concept of operations for loading and configuring the Manpack radios for the MOT&E.
- The test unit successfully used JENM/SRWNM to import a network plan, load the radios, and monitor the SRW network. However, Soldiers reported the monitoring capability had limited utility.

System

- JTRS Network Enterprise Domain (NED) software applications allow the JTRS software-defined radio sets to provide communications to tactical forces. The software applications include waveforms, enterprise networking services (route and retransmission among waveforms), and enterprise network management.



- The waveforms and enterprise networking services software are integrated into and are considered part of a JTRS radio set, and their performance is part of that reported for the JTRS Handheld, Manpack, and Small Form Fit (HMS); and Airborne, Maritime, and Fixed Station (AMF) radio products.
- The enterprise network management software is separate from the JTRS radio sets and is deployed on designated commercial off-the-shelf laptop computers.
 - The current network manager products are: JWNM for managing WNW networks; and SRWNM for managing SRW networks of JTRS software-defined radio sets.
 - In FY12, the JTRS NED Program Office integrated SRWNM onto the JENM. In the near future, the Program Office intends to integrate both JWNM and SRWNM onto a single JENM laptop computer.
 - Enterprise network management functions include planning, loading, monitoring, controlling, and reporting.
 - The planning function develops the network parameters and creates a Radio Mission Data Set file.
 - The loading function transfers the Radio Mission Data Set file into the HMS or AMF radio sets to configure them.
 - The monitoring function provides a near real-time display of the WNW or SRW network status and the conditions of the radios.
 - The controlling function allows the signal Soldier to make changes to the network, to include sending commands to the radio operator, changing the configuration parameters

of the radio sets, or conducting cryptographic functions (rekey, zeroize, and transfer).

- The reporting function records all network management events and makes the data available for analysis.

Mission

- Forward-deployed military forces use JTRS radios to communicate and create networks to exchange voice, video, and data during all aspects of tactical military operations.
- Signal staffs use the JENM to plan, load, monitor, control, and report on network operations involving JTRS HMS and AMF

software-defined radio sets, as well as non-developmental item radios, running WNW and SRW.

Major Contractors

- The Boeing Company, Phantom Works Division – Huntington Beach, California (the JWNM and JENM developer)
- ITT Electronics Systems Division – Clifton, New Jersey (the SRWNM developer)

Activity

- DOT&E approved the JTRS NED Test and Evaluation Master Plan in July 2011.

SRWNM

- DOT&E approved the SRWNM IOT&E plan on October 7, 2011.
- COTF conducted the SRWNM IOT&E in support of the Rifleman Radio IOT&E from October through November 2011. Problems with the network plan and use of SRWNM began to affect the start date for the Rifleman Radio IOT&E. Contractor support was used to correct the plan and reload the radios to ensure the Rifleman Radio test would start on time. As a result, the SRWNM test was not conducted in accordance with the DOT&E-approved test plan.

JENM/SRWNM

- DOT&E approved the JENM/SRWNM IOT&E plan on March 29, 2012.
- COTF conducted the JENM/SRWNM IOT&E as described in the DOT&E-approved test plan in support of the Army's NIE 12.2 and Manpack radio IOT&E in April and May 2012.
- The JTRS NED Program Office integrated the SRWNM software onto the JENM platform following the Rifleman Radio IOT&E (referred to as JENM/SRWNM).

JENM

- The JTRS NED Program Office continues development of the JENM, which will integrate the JWNM and SRWNM into a single network management product in FY13.

Assessment

SRWNM

- SRWNM developmental testing in FY11 confirmed the system's capability to plan networks, create mission data sets, and then load mission data sets for the Rifleman Radios loaded with the SRW. Per the Army concept of operations, there is no requirement for SRWNM to monitor the Rifleman Radio/SRW network, so this function was not demonstrated in the SRWNM IOT&E.
- DOT&E assessed SRWNM as not capable of supporting the unit's mission and the system demonstrated poor reliability

in support of the Rifleman Radio. Soldiers could not use SRWNM to quickly and effectively configure a network. The Army had not developed adequate training or the necessary tactics, techniques, and procedures for Soldiers to employ the SRWNM in support of units using Rifleman Radios during combat operations.

- Shortfalls in the capability and use of SRWNM include the following:
 - Lack of troubleshooting procedures
 - Lack of a network plan validation event or process
 - Excessive time needed to load Rifleman Radios
 - Lack of procedures to distribute configured radios by mission
 - Lack of flexible radio configurations to support changing missions
- The single signal Soldier in the company was overwhelmed by the sheer amount of communications equipment he was responsible for operating and maintaining.

JENM/SRWNM

- DOT&E assessed JENM/SRWNM as effective and suitable in support of Manpack radios operating the SRW.
- Lessons learned from the SRWNM IOT&E were applied to the training, development, and validation of the network plan and concept of operations for loading and configuring Manpack radios. Soldiers using JENM/SRWNM also demonstrated the ability to successfully load Rifleman Radios as part of NIE activities.
 - The test unit successfully used JENM/SRWNM to import a network plan, load the radios, and monitor the SRW network. However, Soldiers reported the monitoring capability had limited utility.
 - Operational challenges with the use of JENM/SRWNM still exist. The process for planning and loading a network is cumbersome and time consuming (about 20-25 minutes per radio). This time includes several steps that include radio start up, loading the plan, loading the crypto keys, and checking the communications link. For the test, the company had 46 Manpack radios and 96 Rifleman Radios. In total, it took two Soldiers two to three days to load and check all the radios.

- Dynamic task organization remains an operational deficiency because of the length of time it takes to change radio presets to match the task organization. The brigade estimated it would take 48 hours to modify the radio presets in the plan and reload all the radios with the new plan to allow the task organization of a single platoon to a different company.
- The JENM/SRWNM had no significant reliability problems. The JENM/SRWNM IOT&E results demonstrated that the software and hardware improvements corrected the deficiencies noted in the previous SRWNM IOT&E. Training was much better than that experienced in the previous SRWNM IOT&E based on Soldier input, but Soldiers reported that they would like to see more practical exercises and documented processes in future training.
- The single signal Soldier in the company was overwhelmed by the sheer amount of communications equipment he was responsible for operating and maintaining.
- Development and verification of the JTRS networks is a significant undertaking. The Army must determine who is going to develop the SRW network architecture/communication plans and translate those into JENM files and radio configuration files for the multi-Service units to be equipped with Manpack radios. It is not clear whether the Program Office can sustain the level

of effort required to construct the needed inputs for each unit as JTRS radios are fielded across the force.

Recommendations

- Status of Previous Recommendations. The Army addressed two of the three recommendations for FY11. There is still no movement on developing an integrated test methodology for JENM developmental and operational testing. With the closing of the JTRS Joint Program Executive Office and the radio programs now all under separate program management, resolving this FY11 recommendation is critical to ensure JENM is properly tested.
- FY12 Recommendations. The Army should:
 1. Evaluate the force structure implications of adding JTRS radios and network management responsibilities into company-level organizations. The single signal Soldier in the company was overwhelmed by the sheer amount of communications equipment he was responsible for operating and maintaining.
 2. Determine who is going to develop the WNW and SRW network architecture/communications plans, and then translate those into JENM files and radio configuration files for the multi-Service units to be equipped with Manpack, Rifleman, and AMF radios.

DOD PROGRAMS