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Modeling Time to Derive PLI Information From Open Sources

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NPS NRP Executive Summary

Title: Modeling Time to Derive PLI Information From Open Sources
Report Date: 10 March 2017 Project Number (IREF ID): NPS-N16-M343-E
Naval Postgraduate School / School: GSOIS



NAVAL RESEARCH PROGRAM

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Modeling Time to Derive PLI Information From Open Sources (NPS-N16-M343-E)
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EXECUTIVE SUMMARY

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The expeditionary nature of USMC operations requires highly maneuverable forces. A highly fluid battle space, typifying maneuver operations, results in rapidly changing unit locations. The exchange of unit position location information (PLI) between force elements on the battlefield, regardless of service organization, is critical to joint operations. However, current policy regarding the classification of PLI data may not reflect the transient nature of tactical forces or the ability to derive the location of force elements through open sources. This study examined the operational impacts of policy and technology on the implementation of PLI systems, of which there is considerable variety. This was done within the current construct of the Marine Corps Operating Concept (MOC).

Background

There is theoretical background in the concepts of network-centric warfare, networks, organizational design and systems dynamics. Specific references are included in Major Greg Lizak's thesis (graduation date is in September 2017). The core of the problem revolves around the variation between multiple systems including the PLI technology, transmission paths, organizational level at which information is collected then refined for use, the presentation of the information and the classification of the information. There is a further technical difficulty in presentation of the information within the current constructs of a common operating picture and feedback between units in the field and headquarters. Policy issues with regard to the classification of the information create fissures within the system, and interruptive seams between services. There is a continuing question as to whether classification policy produces a more or less contextually complete picture for use in individual/small dismounted unit or mobile unit situational awareness of the battlespace.

The first step in the research was to collect and collate the various systems and system characteristics. Characteristics such as the encryption used, range or extension of the information (reach), network latencies introduced through the technology and network, bandwidth requirements, organizational level, intended use, situational awareness impact in the field and feedback within the system are included.

With system characteristics identified, it is possible to simulate the different configurations of the PLI systems in the context of a scenario. This is done in EXTEND. The first step was to build the model, then define the parameters of each of the characteristics. After this was done, a scenario is selected to test for outcomes of each

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system, sensitivity to specific configurations and finally compare the results of the simulation runs and each PLI system. This work is still in progress, and the subject of Major Lizak's thesis.

Findings and Conclusions (to include Process)

The simulation is currently being developed, parameters are being defined through discussion with system owners and a suitable scenario is being created that is consistent with the MOC. Findings and conclusions are not yet available, but are expected in the next couple of months as simulation experiments are conducted.

Questions that will be answered through the research include:

1. How does current DoD policy affect the utility of PLI information, and how do Combatant Commanders and the USMC/Services apply the systems within policy? Related to this, and the subject of the simulation method is whether there is a tactical advantage to classifying the PLI information.
2. A further refinement of the model approach is to define a similar model for open-source information networks that might be used by adversaries, and comparison with specific PLI systems.

Recommendations for Further Research

Identifying and implementing improvements to situational awareness by forces in the field.

Creating and maintaining a persistent and resilient network that includes individuals at the edge of combat operations with the organizational and C2 needs of higher headquarters.

References

Joint Staff (2014) CJCSI 3910.01B: Friendly force tracking operations guidance.
Department of Defense

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Jones, D., Sadowski, C., & Urch, Ralph. (2012) Combat identification technology analysis report. (No. SURVIAC-TR-12-2599). Wright-Patterson AFB, OH.

Northrop Grumman. (2014) . Understanding voice and data link networking. San Diego, CA: Northrop Grumman.

Porche, I.R., Paul, C., York, M., Serena, C.C., Held, B.J. (2013). Redefining information warfare boundaries for an army in a wireless world. Santa Monica, CA: RAND Corporation.

Senft, M.S. (2015). Vulnerability analysis of the beyond line of sight command and control (BLOS C2) architecture (Masters Thesis). Available through DTIC. (ADB408314)