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Unmanned Surface Logistics Concept of Support

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Tactical Wireless Mesh Networks (WMN) Concept for Unmanned Logistics Surface Vehicle (ULSV) Employment in Communication-Challenged Environments

Wargame Formulation

- Wargame analyzed the feasibility of using unmanned surface vehicles (USVs) by Blue forces in maritime logistics operations.

- Wargame was executed using Lightweight Interstitials Toolkit for Mission Engineering Using Simulation (LITMUS) and Unity game engine.

- Simulated ULSV control was through the thesis' proposed additional/alternative communication architecture, which encompassed directional antennas, ultrawideband (UWB) sensor networks, tactical airborne networks (TANs), and Defense Advanced Research Project Agency's (DARPA) Towed Airborne Lift of Naval Systems (TALONS).
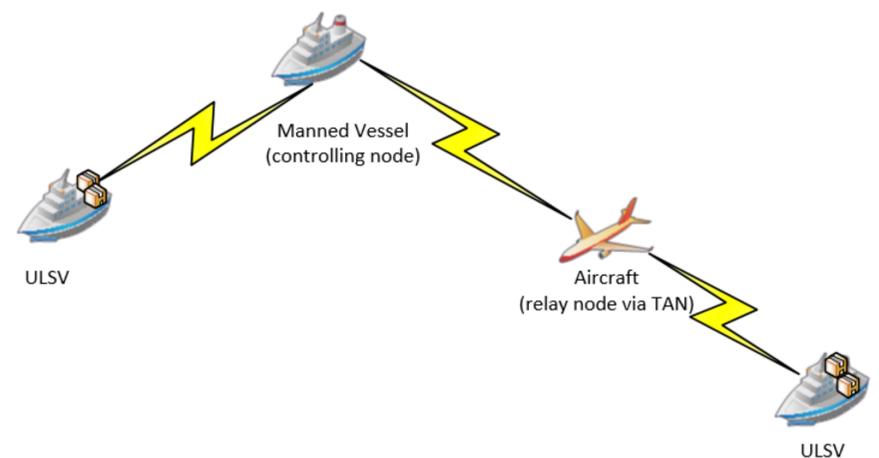
Concept of Communications Between WMN Nodes
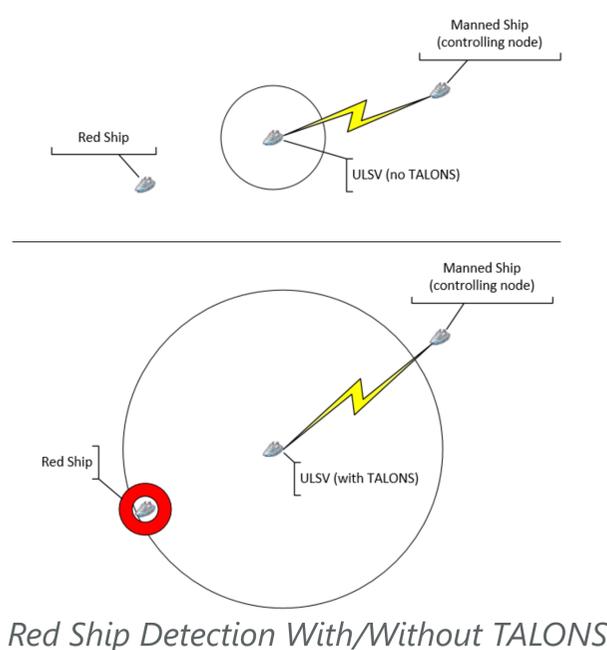
Red Ship Detection With/Without TALONS

Wargame Scenarios

- Wargame was split into six different games with different logistics concept to be utilized by Blue.

- Blue and Red teams were given designated order of battles (OOBs), with each game spanning approximately 30 to 40 minutes.

- After the completion of each scenario, five to ten minutes of seminar style discussion and data gather took place so as to compile gameplay results and player inputs.

- Teams comprised of subject matter experts (SMEs) spanning different organizations across the DoD, and included Naval Postgraduate School (NPS) students and faculty.

Findings

- Given the range of the Space and Naval Warfare System's Command (SPAWAR) Directional Ad Hoc Networking Technology (DANTE) antennas, Blue was able to control the ULSVs at a large distance.

- Having TALONS onboard ULSVs allowed Red ships to be detected at a large distance.

- Loss of controlling nodes (manned vessels) could compromise ULSV operations and communication/data flow.

- Increasing the number of forward deployed assets could increase survivability of ULSV convoys, and in turn increase ULSV availability time.

Conclusion

- The prescribed additional or alternative communication architecture to the current medium unmanned surface vehicle (MDUSV) request for information (RFI) N00024-19-R-6302 (issued Dec 18 2018) appeared to give Blue great tactical advantage in a communication-challenged environment.

- The wargame demonstrated potential use of ULSVs as early threat detection vessels through the use of TALONS.

- Cybersecurity vulnerabilities and field experimentation are areas of potential further research to ensure that the deployment of ULSVs is feasible across the fleet.

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