Network Optional Warfare

Naval forces do not have to be engaged in constant centralized communication. Deployed Navy vessels have demonstrated independence of action in stealthy coordinated operations for hundreds of years.

Littoral operations, deployable unmanned systems, and a refactored force mix for Navy and Marine Corps forward assets pose a growing set of naval challenges and opportunities.

Operational emphasis: opportunity to restore naval covertness and potential for tactical surprise, enabling fluid operations by fleet and marine forces across NCW and NOW.

Network-Optional Warfare (NOW)

- *Major vulnerabilities are commonplace:* naval forces conducting constant communications lack stealth and become dependent on continuous data exchange.
- *Agile EMCON:* "Radio silence" emissions control with judicious use of low-probability of intercept (LPI) communication channels, such as optical.
- *Messaging maturity:* efficient compression and a coherently defined signal book, aiding remote command initiative and operational freedom of action.
- *Ethical Control of Unmanned Systems:* allow unmanned systems with potential for lethal force to operate reliably at a distance, directed by humans to follow same tasking + constraints as any other trusted participant.

Network-Centric Warfare (NCW)

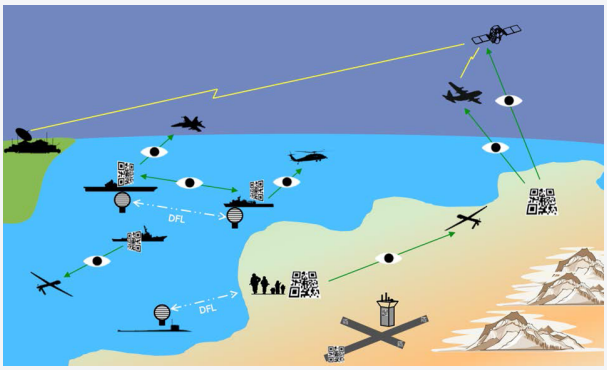
- “Seeks to translate an information advantage, enabled in part by information technology, into a competitive advantage through the robust networking of well-informed geographically dispersed forces.”
- “This networking—combined with changes in technology, organization, processes, and people—may allow new forms of organizational behavior.”
- Source: Network-Centric Warfare, Wikipedia

Precepts and Pillars

Network-Optional Warfare (NOW) precepts for deliberate, stealthy, minimalist tactical communications include multiple technical arenas for naval opportunity.

- Data Strategy for Autonomous Systems
- Efficient Messaging
- Ethical Control of Unmanned Systems
- Optical Signaling
- Rich Semantic Track (RST)
- Semantic Coherence
- References

This work includes applied efforts in Field Experimentation (FX), Modeling, Simulation, and Analysis using open standards for scalability.



Operational View (OV-1) shows line-of-sight (LOS) optical signaling via Quick Reaction (QR) codes and Digital Flashing Light (DFL). Only two radio frequency (RF) lightning bolts!

Tactical Opportunities afforded by NOW

- *Stealth:* gain deeper access into battle space, utilize inherent covertness of unmanned systems.
- *Surprise:* choose time and place to shift from passive to active use of electromagnetic spectrum.
- *Coherence:* formal mission brevity codes are actionable and precise with well-defined semantics.
- *Uncertainty:* reduced opponent confidence that threats are located and attack is unchallenged.
- *Flexibility:* tactical commanders decide use of NCW/NOW on per-platform, per-mission basis.
- *Scalability:* incremental response using low-cost assets avoids destabilizing high-cost escalation.
- *Autonomy:* loosely coordinated command via Rules of Operation (ROO) and Engagement (ROE).
- *Cyber:* smaller "surface area" exposed to attacks employing EM radiation or network connectivity.
- *Asymmetric:* increased survivability and independence of action multiplies opponent difficulties.
- *Trust*: data-centric security and ethical human supervision of intermittently connected systems.

Overview Resources for NOW

These references describe tactical techniques, operational concepts, and strategic possibilities that emerge when regaining asymmetric advantages.

- Network-Optional Warfare: Concepts Exploration and Enabling Technologies slideset.
- Network-Optional Warfare: Operational Employment Concepts lists component concepts of interest plus numerous relevant references.
- Network-Optional Warfare: Information Transfer Considerations analyzes the transition space between always-on NCW and all-off NOW operations.
- Network Optional Warfare: Overview Video (200 MB) produced for the NPS Littoral Operations Center (LOC) inaugural workshop, 24-26 March 2014.

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