Network-Optional Warfare (NOW) - Operational Employment Concepts

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Problem Statement

- Network-centric warfare (NCW) is a highly successful organizing principle, indeed ubiquitous
- Unintended consequences include
  - Loss of "radio silence" Emissions Control (EMCON) for communications, sensor search
  - Loss of reduced-transmission capabilities due to over-reliance on high-bandwidth links
  - Corresponding loss of coherent cross-platform tactical signal vocabulary and stealth
  - Reduced capability for flexible, independent, loosely coupled operations by naval units
- Surface naval forces (and most airborne assets) are detectable and therefore vulnerable

Technical Opportunities

- Communications: visual signaling for line-of-sight (LOS) links that are not susceptible to intercept
  - Optical: digital flashing light, digital semaphore (QR code), moderate bandwidth
  - Laser: requires tracking and power, potential safety hazard to receiver, high bandwidth
- Sensing for contacts and navigation
  - Multiple low-probability of intercept (LPI) means to provide contact detection, tracking, and identification of friend/foe/neutral (IFFN)
  - Passive electromagnetic (EM) sensing using existing radar/radio receivers
  - EO/IR visual bearing & bearing rate, depends upon on-board classification or entity SA
  - Ekelund ranging can localize (provide range, error estimate) for any detectable contact
  - Knowledge of meteorological phenomenology and local environment improves range
  - Reduce navigation dependence on GPS and EM signaling (celestial, other techniques)
- Adaptive deployment
  - Use low-bandwidth predefined signal books to relay coherent, precise reports & orders
  - Use of relay blimps and altitude changes can affect detection/counter-detection ranges
  - Local-launch UAVs reduce reliance of forward-deployed units on CVN combat air patrol
  - Additive manufacturing (aka"3D printing") can reduce/reshape logistics requirements
  - Vertical LOS provides additional relay opportunities while maintaining stealth
  - Carefully designed UAV maneuvers during transit or loiter can improve range estimates

Tactical Opportunities

- *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*: command is loosely coordinated via Rules of Engagement (ROE) and Operation (ROE)
- *Cyber*: includes both IP data + EM signals. EMCON reduces attack surface; other considerations?

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