

Light Fidelity (Li-Fi) advantages over Fiber/Copper in Dispersed Base Operations

TOPIC: Enabling Technologies for Mobile and Survivable Command Posts (CPs)

Problem Space: Current Army CPs are static, tent-based, cable dense, and readily detectable. These issues must be addressed in order to ensure that Army CPs are survivable in a near-peer conflict. Specifically:

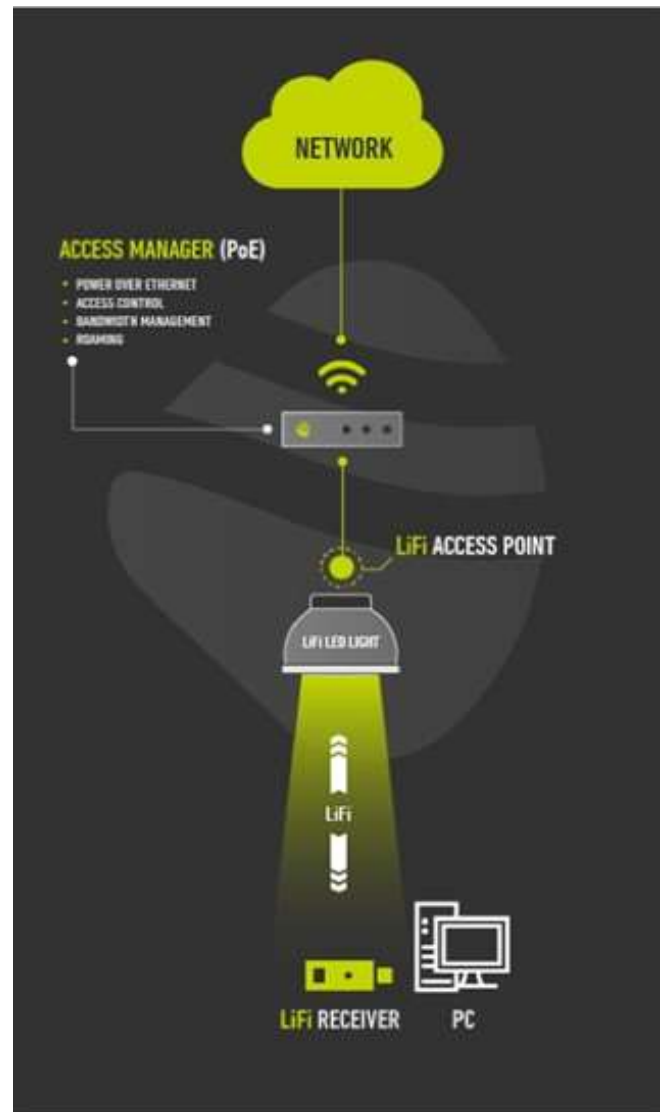
- Increased agility (i.e., SWaP-reduction/rapid stand-up/tear-down/transport) of CPs
- Increased cyber resiliency (i.e., reducing or preventing RF interference or jamming)
- Decreased signature (e.g., acoustic, RF, etc.) and greater CP signature awareness
- Elimination of single points of failure in CP infrastructure (e.g., power, hub & spoke type networks, etc.)

Proposed Solution:

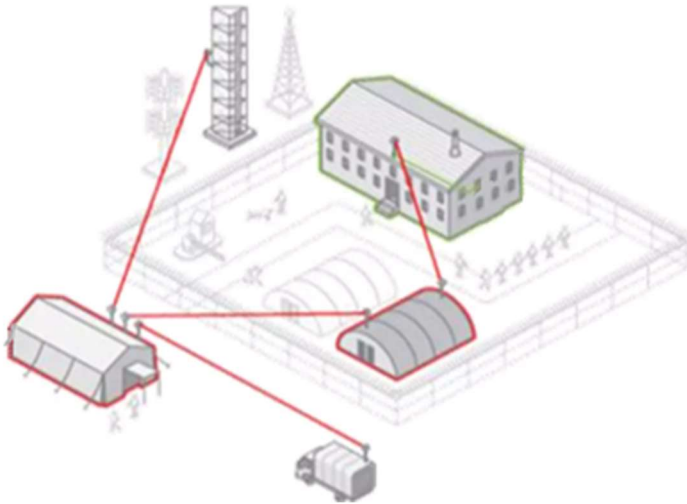
Li-Fi presents an innovative approach to solving this problem space in forward-deployed Command Posts. Li-Fi creates an extremely LPI/LPD network that delivers secure, high-data-rate communication, overcoming the limitations posed by traditional radio frequency-based or copper-based LANs.

Li-Fi Key Advantages:

- **High Data Rates (>1Gbps):**
Li-Fi's ability to modulate light at high frequencies allows for data rates that rival and often surpass traditional LAN solutions. This capability facilitates the exchange of large volumes of data like High-Availability Shared-Drives or regional lvl2 DTED map data. Additionally, this lowers network latency for mission critical applications like operation picturing, force tracking, or even unmanned surveillance video feeds.



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- No Electromagnetic Interference or Emissions:** In areas with potential radio frequency interference (e.g. contested or denied regions or densely populated urban centers) or when signal emission needs to be minimized or eliminated, Li-Fi offers a solution. Li-Fi has **zero RF** footprint. Combined with, or as part of, a Radio over IP (RoIP) solution, Forward Operating Bases can be completely hidden on the RF spectrum far removed from radiating antenna farms.

- Extreme Low Probability of Interception or Detection (LPI/LPD):** Li-Fi's inherent security advantage contributes to secure data transmission within designated zones. Impervious to RF hacking and jamming techniques, Li-Fi offers enhanced security due to its shapable and limitable range. Unlike Wi-Fi and RF, which can propagate through walls, Li-Fi signals are confined to the illuminated area or shape, reducing the risk of unauthorized access. Any accidental spillage is immediately visibly recognizable and thus easily, and quickly, correctable.

Requires capturing LiFi signal @ 1Mpps to intercept/analyze

- Energy and Logistical Efficiency:** The integration of Li-Fi into lighting infrastructure can lead to energy savings by combining illumination and communication functions into a single system. Replacing all the Ethernet cables required in Forward Operating Base's operations centers LAN eliminates 100s of pounds of equipment, reducing logistical costs. All of this leads to a faster set up and tear down, quicker initial and full operating COC times, and quickens the speeds at which commanding officials can make decisions.
- Spectral Efficiency:** The visible light spectrum is vast and mostly unregulated, offering ample bandwidth for data transmission. This can lead to reduced congestion and increased spectral efficiency.

