Welcomes You to

Military Applications for LiFi (Light Fidelity Internet)
Military Applications for LiFi

1. Unlicensed Spectrum
2. Lower RF Footprint
3. SCIFs, Tactical Operation Centers (TOCs)
4. Bandwidth Intensive Resources (Virtual Reality)
5. Command and Control Centers (MARFORSYS)
6. In areas where Wifi is difficult to deploy
   - Navy vessels
   - Disaster areas
   - Aircraft, Aircraft hangers
The convenience of wireless communication also makes it easy for transmissions to be overheard and exploited by malicious users.
Accuracy Is Critical for Wi-Fi Design

The accuracy of the Sidekick allows you to identify the signal correctly the first time ensuring you get the right number of APs in the right location for your design. Relying on a Wi-Fi adapter or dongle adds high variance and risk that can significantly increase the cost and reduce the effectiveness of your network. Get the right tool for the job with Sidekick.
Ekahau – Frequency Monitor
Wi-Fi Tester

Designed for network professionals who need to validate that the WLAN is working or need to resolve problems related to connectivity and performance.

AirCheck G2 users can quickly and easily gather location-based Wi-Fi measurements and create visual heat maps of key performance metrics in the Link-Live Cloud Service or AirMagnet Survey PRO. Simple to use, the AirMapper Site Survey app is ideal for quick site surveys of new deployments, change validation, and performance verification.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Strength</td>
<td>-86 dBm</td>
</tr>
<tr>
<td>SSID</td>
<td>NSVisitor</td>
</tr>
<tr>
<td>AP Name</td>
<td>lap-cos-us-3</td>
</tr>
<tr>
<td>AP BSSID</td>
<td>Cisco:8f:0b:3e</td>
</tr>
<tr>
<td>Connection Rate</td>
<td>12 Mbps</td>
</tr>
<tr>
<td>Security</td>
<td>WPA2</td>
</tr>
<tr>
<td>802.11 Type</td>
<td>a n ac</td>
</tr>
<tr>
<td>Band</td>
<td>5 GHz</td>
</tr>
<tr>
<td>Channel</td>
<td>40</td>
</tr>
<tr>
<td>Last Seen</td>
<td>8 seconds ago</td>
</tr>
<tr>
<td>Probes For</td>
<td>AttackLab2</td>
</tr>
<tr>
<td>Locate</td>
<td></td>
</tr>
<tr>
<td>Capture</td>
<td></td>
</tr>
</tbody>
</table>
MAC Address: Fluke:c2:23:f6

Last Seen: 00:02.662

Signal Strength (dBm):

-100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0

Signal Strength: --- dBm
AURSINC WiFi Deauther Watch V3 ESP8266 Programmable Development Board | Wearable Smartwatch | OLED&Laser | Attack/Control/Test Tool|LOT for DSTIKE NodeMCU

Image of a watch-like device with buttons labeled "SCAN," "SELECT," "ATTACK," "PACKET MONITOR," and "CLOCK." The watch is transparent with a digital display screen.

Visit the AURSINC Store

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Color: Black V3

Brand: AURSINC

Connectivity: Wi-Fi

Technology: DSTIKE

Wireless: 2.4 GHz Radio Frequency

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$38.89
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- Bluetooth 5.3
- Ultra Wideband chip for spatial awareness®
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- Express Cards with power reserve
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What is Wi-Fi 7, and will it replace wired Ethernet?

The theoretical top speed of Wi-Fi 7 makes it a candidate to replace network LANs, but only in limited circumstances.

By Neal Weinberg
Contributing writer, Network World

JUL 7, 2022 11:13 PM PT
6 GHz ushers the next decade of Wi-Fi
The highest range of frequencies contains light, followed by X, gamma, and cosmic rays.

**Figure 26-20 Continuous Frequency Spectrum**
Light Fidelity (LiFi) Internet

Optical Wireless Communication (OWC) (visible & invisible light) +
Carrier Sense Multiple Access/Collision Avoidance (CDMA/CA)(Algorithms)
Different Physical Modulations
Figure 1: Coverage area

- $d = 1.20 \text{ m} / 3.9 \text{ ft (min)}$
- $r_{\text{NOM}} = 0.65 \text{ m} / 2.1 \text{ ft}$
  Area = $1.3 \text{ m}^2 / 14 \text{ ft}^2$
- $d = 1.80 \text{ m} / 5.9 \text{ ft}$
- $r_{\text{NOM}} = 1.0 \text{ m} / 3.3 \text{ ft}$
  Area = $3.1 \text{ m}^2 / 33 \text{ ft}^2$
- $d = 2.80 \text{ m} / 9.2 \text{ ft (max)}$
- $r_{\text{NOM}} = 1.5 \text{ m} / 4.9 \text{ ft}$
  Area = $7.1 \text{ m}^2 / 76 \text{ ft}^2$
<table>
<thead>
<tr>
<th>Amendment</th>
<th>2.4 GHz</th>
<th>5 GHz</th>
<th>Max Data Rate</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>802.11-1997</td>
<td>Yes</td>
<td>No</td>
<td>2 Mbps</td>
<td>The original 802.11 standard ratified in 1997</td>
</tr>
<tr>
<td>802.11b</td>
<td>Yes</td>
<td>No</td>
<td>11 Mbps</td>
<td>Introduced in 1999</td>
</tr>
<tr>
<td>802.11g</td>
<td>Yes</td>
<td>No</td>
<td>54 Mbps</td>
<td>Introduced in 2003</td>
</tr>
<tr>
<td>802.11a</td>
<td>No</td>
<td>Yes</td>
<td>54 Mbps</td>
<td>Introduced in 1999</td>
</tr>
<tr>
<td>802.11n</td>
<td>Yes</td>
<td>Yes</td>
<td>600 Mbps</td>
<td>HT (high throughput), introduced in 2009</td>
</tr>
<tr>
<td>802.11ac</td>
<td>No</td>
<td>Yes</td>
<td>6.93 Gbps</td>
<td>VHT (very high throughput), introduced in 2013</td>
</tr>
<tr>
<td>802.11ax</td>
<td>Yes</td>
<td>Yes</td>
<td>4x 802.11ac</td>
<td>High Efficiency Wireless, Wi-Fi6; expected late 2019; will operate on other bands too, as they become available</td>
</tr>
</tbody>
</table>
Welcome

IEEE 802.11bb

The Future LiFi Standard
Traditional RF WiFi Deployment

LiFi Deployment w/ multiple classifications
LiFi compliments WiFi

**WiFi Interference**
Radio frequencies are easily interfered with by other radio signals. Controlling RF emissions and spectrum planning is increasingly challenging in coalition environments or when operating across multiple host nations due to licensing and regulation.

**WiFi Security**
Radio frequencies can be detected through walls and other surfaces. This leaves RF vulnerable to jamming, man-in-the-middle, replay or other attacks.

**LiFi Interference Free**
LiFi doesn’t interfere with Radio Frequencies and vice versa. The lack of interference means that WiFi, Cellular and LiFi networks can work alongside each other seamlessly.

**LiFi Inherently Secure**
LiFi is inherently secure as it can be contained in a physical space. The same encryption protocols used for WiFi can be used with LiFi for an added layer of security. Additionally, multiple networks can be deployed in the same physical location with no cross-domain information sharing.

**Shared Standard Protocol**
LiFi 802.11bb, like WiFi utilises the 802.11 protocol meaning a LiFi network will integrate well with existing network infrastructure and existing baseband chipsets in devices.
Naval surge capacity

THE PROBLEM

- Surge of personnel on-board can sometimes find it difficult to find sufficient connection terminals and connect to the relevant networks on-board
- Specific personnel may require bespoke access to data networks that cannot be shared with others

LiFi SOLUTION

- LiFi Access Points can be added in any environment without impacting other RF-based systems
- LiFi APs do not interfere with each other even in relatively close proximity as long as the cones of illumination do not overlap.
- Each AP can host multiple end-users and multiple LiFi APs can be added to accommodate an arbitrarily large number of users
  - The ORION-XC system also allows multiple enclaves to be physically co-located with no information cross-sharing, enabling users to deploy multiple network types quickly and scale them as required.
- Dedicated connectivity areas can be stood-up and torn down quickly in hangar bays or other environments completely decoupled and independent from the wider ship networks.

Each LiFi AP inside the TOC can accommodate multiple users and more can be added as needed.
LiFi for carriers

pureLiFi & John Hopkins University Applied Physics Lab partnered to install and connect the pureLiFi APs on the USS Carl Vinson (Nimitz Class carrier).

- “The Navy wanted to see what the effects of shock and vibration would have on the wireless link and the equipment,” explained APL communications engineer Ryan Mennecke, who along with APL’s Eddie Holzinger led the Li-Fi experiments. “We designed and manufactured custom mounts to install commercial Li-Fi equipment within the library of the aircraft carrier, which is located underneath catapult three. The test included setting up a standalone network to stream live video and collect test data of the optical link.”

- “The optical link performed as expected with no loss in [signal-to-noise ratio] or throughput related to the shock and vibration of the catapult system that was launching and retrieving aircraft three feet above the system,” he said. “The system performed flawlessly.”

https://www.jhuapl.edu/pressrelease/180927
Defense System Products

Military Grade Security
Near Zero Electromagnetic Signature
Quick Deployment & Take Down
Ready for the Field & the Office
Unlicensed Spectrum

Proven in field trials with the United States Army and Navy, pureLiFi’s defense system family of specialised access points & stations are designed according to the exacting standards of active duty military users.

"We must make a critical decision. Start deploying optical wireless technology or continue to push highly detectable RF systems to the tactical edge, putting soldiers and systems in dire straits".

US Army, Command CTO
US Army Europe field trial, Oct 2019
The Big 3 in LiFi
<table>
<thead>
<tr>
<th>Speed</th>
<th>Distance</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>LiFi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 Mbps up</td>
<td>6ft – 30 ft</td>
<td>$</td>
</tr>
<tr>
<td>500 Mbps down</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oledcomm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>48 Mbps down</td>
<td>6ft – 10 ft</td>
<td>$$$</td>
</tr>
<tr>
<td>48 Mbps up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pureLiFi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>220 Mbps down</td>
<td>6ft – 10 ft</td>
<td>$$</td>
</tr>
<tr>
<td>160 Mbps up</td>
<td></td>
<td></td>
</tr>
<tr>
<td>trulifi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>by @signify</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brand</td>
<td>Weight</td>
<td>POE</td>
</tr>
<tr>
<td>------------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>OLEDComm</td>
<td>.5 lbs.</td>
<td>15W</td>
</tr>
<tr>
<td>pureLiFi</td>
<td>7 lbs.</td>
<td>90W</td>
</tr>
<tr>
<td>trulifi</td>
<td>.75 lbs</td>
<td>30W</td>
</tr>
</tbody>
</table>
Laser LiFi & Sanitization Evaluation Kits Available Soon!
737/757 PSU Read Light Drop-in Replacement

- Designed as a mechanical drop-in replacement to existing PSU lights to minimize integration efforts & costs

Overhead Can/Ceiling Light

- Spectrum Light Design: Existing Spectrum design
- Mechanical Drop-in Replacement Light: Spectrum will design a mechanical drop-in replacement to your existing lights to minimize integration efforts & costs
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Seeing is Believing