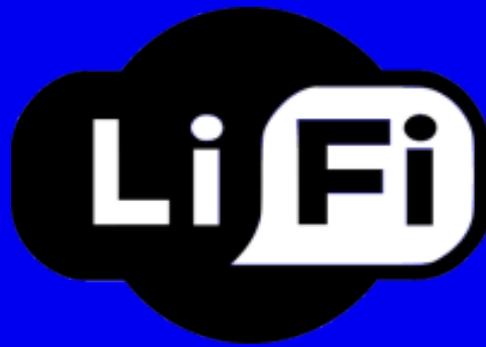


# Everything You Need To Know About LiFi



## Contents of this eBook

About this eBook	3
<b>Chapter 1. What is Light Fidelity Technology?</b>	<b>4</b>
How do LiFi Systems Work?	4
The Man Who Coined LiFi: Harald Haas	5
<b>Chapter 2. Strengths and Limitations</b>	<b>6</b>
Strengths of LiFi	6
Limitations of LiFi	7
<b>Chapter 3. LiFi Use Cases</b>	<b>8</b>
Smart Buildings	8
Dense Urban Environments	8
Mobile Connectivity	8
Indoor Positioning System	9
Hazardous Environments	9
Vehicle and Transportation	9
Defense and Security	10
Hospitals and Healthcare	10
Aviation	11
Augmented Reality	11
Localized Advertising	12
Underwater Communication	12
Disaster Relief Operations	12
Education Systems	12
WiFi Spectrum Relief	13
<b>Chapter 4. Misconceptions about LiFi</b>	<b>14</b>
LiFi Doesn't Work in the Dark	14
LiFi Doesn't Work Under Sunlight	14
LiFi Interferes with Radio Frequency	14
LiFi is Expensive and Cannot be Afforded by the Average Consumer	14
LiFi Bulbs Have Short Lifespans	15
LiFi Bulbs Need to be Special	15
LiFi Requires Line of Sight	15

LiFi is a Disruptive Technology	15
<b>Chapter 5. The LiFi Market: A Look At The Top LiFi Companies And Their Products</b>	<b>16</b>
The LiFi Market	16
Market Size	16
Key Players	17
pureLiFi	17
Luciom (Signify)	17
FireFly LiFi (Signify)	18
Oledcomm	18
Velmenni	19
General Electric (GE)	19
LVX System	19
Panasonic	20
Other Players	20
Commercial Opportunities in LiFi	20
<b>Chapter 6. The Future of LiFi</b>	<b>23</b>
Emerging Startups	23
LiFi.co (LiFi Platform)	23
nextLiFi (LiFi for the Medical Field)	23
Infinity Technology Services (Provider of High-Speed Internet Connectivity)	23
SLUX (Long Distance LiFi Connectivity)	24
HAVR (LiFi-Based Security Solutions)	24
Laser LiFi	24
<b>Conclusion</b>	<b>26</b>

## About this eBook

According to the United Nations, being connected through the internet is now considered a necessity. From something that was just an afterthought two decades ago, the internet has come a long way. And with the advent of smartphones and mobile technology, connectivity has come within our reach.

However, the ever-expanding need for more connectivity comes with a price. As the demand for connectivity increases, a looming spectrum crunch grows closer than ever.

As more consumer devices offer network connection capability, the demand for more frequency allocations expands. That's because the number of available frequencies is a finite source, which is limited further by the fact that we depend on the radio spectrum. As we continue to fulfill the demand, our networks are getting more crowded, making services slower - and pricier.

Ultimately, all available frequencies will be allocated for specific purposes, leaving no more space for future projects.

Enter LiFi.

# Chapter 1. What is Light Fidelity Technology?

LiFi, short for Light Fidelity, is a game-changing innovation that enables the high-speed transmission of high volumes of data. As a form of Visible Light Communications (VLC) technology, LiFi uses visible light as its transfer medium with a slight difference. Unlike other VLC systems, LiFi transmits data bidirectionally, which is an ideal choice for internet connectivity.

## How do LiFi Systems Work?

LiFi systems have two main components: a photodiode and a light source. As a bidirectional network, both the photodiode and the light source act as transceivers to facilitate the two-way transfer of data. Within the system, they both receive and transmit data to complete the system.

Data is transferred within LiFi systems through the rapid modulation of light. To convey data through the light source, light is rapidly modulated at speeds imperceptible by the unaided eye.

LiFi systems use light-emitting diodes (LEDs) as the light source because they are semiconductors. Semiconductors are perfect for VLC systems because they don't use filaments or gases that need to heat up. Instead, current passes through the LED bulb to produce light. The current is then varied to modify the intensity of light emitted.

A chip is attached to the light source, which feeds data into the modulated light. The receiving device, the photodiode, receives the light signals and processes them into a series of 1s and 0s. The device processes the information and displays the embedded data in the form of usable media such as an image, audio, or a video. It then retransmits the data back to the light source, completing the two-way transfer of data.

## The Man Who Coined LiFi: Harald Haas

In a 2011 TED Talk named “Wireless Data from Every Light Bulb,” Prof. Harald Haas from the University of Edinburgh introduced the world to LiFi. During his talk, he introduced the technological innovation that was LiFi and showcased its capabilities using a \$3 off-the-shelf bulb that was used to stream a high-definition video.

As a pioneer in LiFi, Haas wasn’t the inventor of the technology but was instrumental in its rise to prominence. According to the International Solid state Lighting Alliance (ISA), “...[Dr. Haas] not only pioneered the novel concept of communication by lighting devices but also publicized the technology, earning him recognition as the ‘Father of LiFi.’”

Prof. Haas helped establish the LiFi startup pureVLC, which saw the reintroduction of LiFi as a piece of technology that is ready to be rolled out to the public in 2012. The company was later renamed pureLiFi and became an Original Equipment Manufacturer (OEM), which commercialized LiFi products that easily integrated with existing LED-based systems.

## Chapter 2. Strengths and Limitations

LiFi is poised to be a big differentiator for years to come, especially with 5G.

With the visible light spectrum having 10,000 times more available frequencies than the radio spectrum, it frees up much-needed space to provide spectrum relief for RF and avoid the looming spectrum crunch.

### Strengths of LiFi

**Speed.** Preliminary speed tests for LiFi revealed data transfer speeds to reach up to 224 Gbps, 100 times faster than WiFi. This is a significant upgrade over the prevailing technology as even a small fraction, say one percent, outperforms WiFi with a net data transfer speed of 20 megabits per second.

**Near-Infinite Capacity.** The visible light spectrum opens up significantly more available frequencies for use because it is significantly wider than the RF spectrum. This means LiFi-based systems are open to significantly more unique connections.

**Versatility.** Theoretically, all LED bulbs are easily integrated into a LiFi network, making all bulbs potential LiFi networks. This means that as long as there is LED overhead lighting, an internet connection will be available.

**Cost.** The technology to set up LiFi systems cost significantly less than the prevailing technology. Any \$3 off-the-shelf LED bulb can be a potential internet hotspot and will require only a small additional investment for the chip. Additionally, combining overhead illumination with internet connectivity adds more savings due to lesser energy costs.

**Availability.** With green technology being embraced more at this age, LED bulbs are now used environmentally-friendly and energy-efficient alternatives to fluorescent or incandescent bulbs.

**Security.** Inherently, LiFi is more secure since visible light cannot pass through walls or any opaque object. Its main limitation creates a localized hotspot, eliminating threats such as signal hijacking, eavesdropping, and brute force attacks, which are the expected vulnerabilities of RF technology.

## Limitations of LiFi

**Limited Range.** Light being unable to pass through opaque objects hinders the range of any LiFi network. Although localized connections are ideal for certain environments, additional bulbs and lamps are necessary to extend network range.

**Interference.** LiFi-based systems can block interference up to a certain degree. However, significant interferences such as competing light signals and opaque objects can hinder the performance of a LiFi system. This hinders the data transmission capabilities of LiFi in outdoor areas where ample sunlight and other competing light signals abound.

**Infrastructure.** Large-scale implementation of LiFi may still take a significant amount of time, owing to the fact that the basic infrastructure is yet to exist. The current applications for LiFi have yet to exceed that of indoor environments.

This is a free sample. For the full eBook, go to <https://lifi.co/lifi-ebook/>

Some of the information that can be found in the eBook is:

- What the future of LiFi looks like
- Main use cases of LiFi
- Companies that are investing in LiFi
- Common misconceptions about LiFi
- Exchange-listed LiFi companies
- Commercial opportunities in the LiFi market