

Meet Li-Fi: Internet Using LED Light Waves

It's more energy-efficient than Wi-Fi, and also more secure.

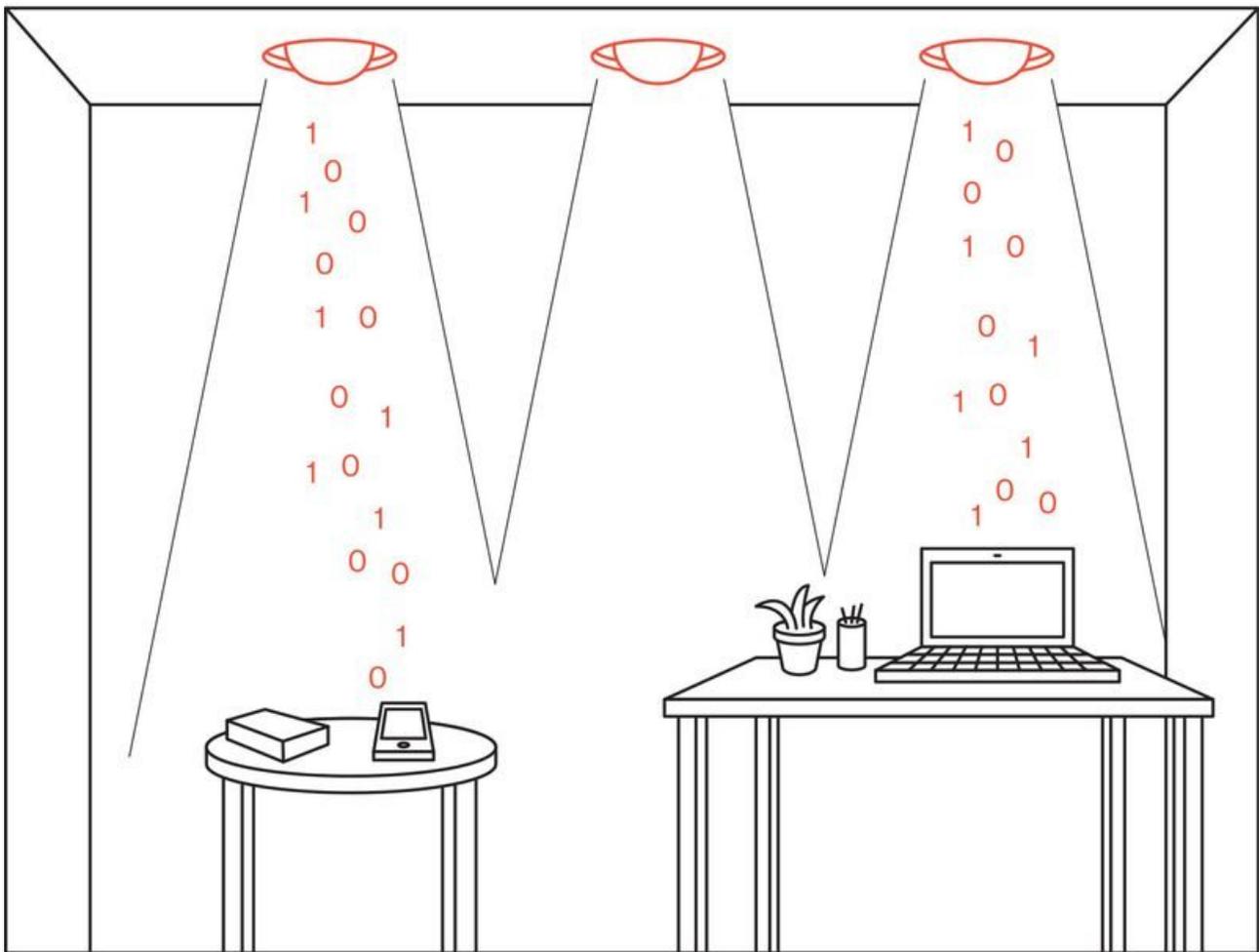
by

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Wi-Fi networks dependent on radio waves are growing more congested all the time—and can't be used everywhere—so various researchers and companies are betting light waves from LED lamps and overheads can also stream data and connect people to the internet. So-called Li-Fi technology, which uses a much more abundant slice of the wireless spectrum, is also more energy-efficient than Wi-Fi, though for now people need a special USB drive to use it. Light waves can't pass through walls like radio waves do, but that also makes the networks more secure. A group from the world's largest technical association, IEEE, will have draft standards for Li-Fi ready by yearend for companies that want to commercialize the technology, says its chairman, Bob Heile.

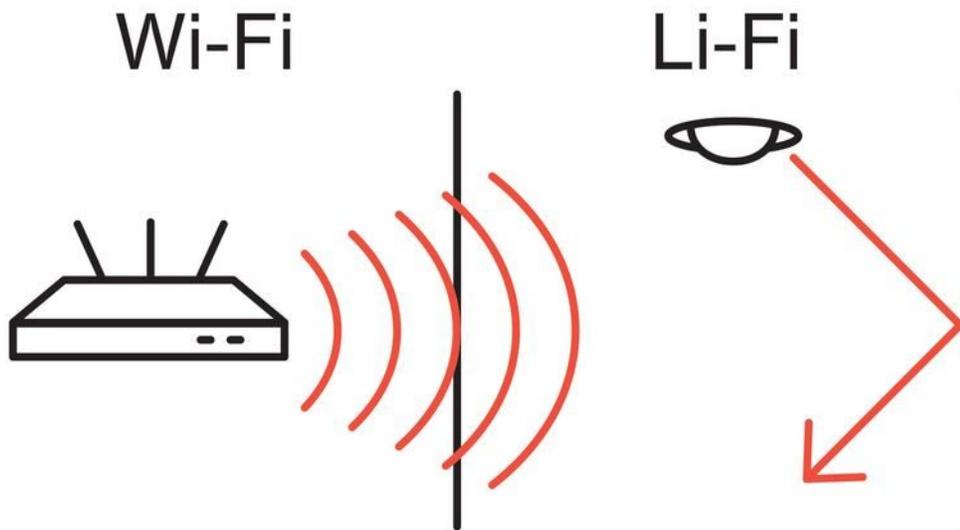


1. **Setup** LEDs outfitted with Li-Fi technology can embed and stream data in the light they emit by modulating the light's intensity faster than the human eye can detect.



Source: Malcolm Cochrane/PureLiFi

2. Use A USB drive that serves as a receiver and transmitter picks up the signals from the LEDs and uploads data to them from a connected PC or mobile device.



3. **Privacy** Because light, unlike radio waves, can't penetrate a wall, Li-Fi isn't as all-purpose as Wi-Fi. But it's more secure.

PureLiFi

Innovators Harald Haas and Mostafa Afgani: co-founders (chief scientific officer; chief technology officer)

Founded 2012 **Based** Edinburgh

Funding £9 million (\$11.4 million)

Background Haas, a professor at the University of Edinburgh, became a public face of Li-Fi research with a 2011 demo in a TED Talk. The lecture has been viewed online about 2.4 million times.

Status The 25-employee startup is testing its technology with customers including Cisco Systems and British Telecommunications. Afgani says it transmits data at up to 43 megabits per second. (The average U.S. broadband speed is about 16 Mbps, cloud-services company Akamai Technologies estimates.) PureLiFi has also partnered with French lightmaker Lucibel, which introduced its Li-Fi-equipped overhead lights in the fall and plans to unveil the next model by April.

VLNComm

Innovators Mohammad Noshad and Maite Brandt-Pearce: co-founders (chief technology officer; adviser)

Founded 2013 **Based** Charlottesville, Va.

Funding \$1.6 million

Background University of Virginia professor Brandt-Pearce and former student Noshad, who recently completed a postdoc at Harvard, spun VLNComm out of their optical communications research.

Status Co-founder Fraidoon Hovaizi says their nine-person team, backed by the U.S. Department of Energy and the National Science Foundation, has been in funding and partnership talks with U.S. government agencies and companies including Lockheed Martin. Their latest overhead-light prototype is as fast as 25 Mbps; Brandt-Pearce says the next one will hit 100 Mbps given their advances in coding, modulation, and signal processing. VLNComm plans to bring a Li-Fi-capable desk lamp to market this year.

Velmenni

Innovators Deepak Solanki and Saurabh Garg: co-founders (chief executive officer; chief technology officer)

Founded 2012 **Based** Tartu, Estonia

Funding Declined to disclose

Background Hardware developer Solanki and software developer Garg started working on Velmenni in India. The 11-person team has created a credit-card-size prototype router capable of converting off-the-shelf LED lights into Li-Fi transmitters.

Status Solanki says the technology can reach 10 Mbps today and will reach 100 Mbps by yearend. Velmenni, which completed an Airbus business-accelerator program in Hamburg in 2015, says it's developing Li-Fi applications for airplane cabins and cockpits with clients it declined to name, as well as hardware for outdoor use.