

# Free-space optical could ‘hop’ over railroads with fiber-like speeds

By [Linda Hardesty](#) Aug 20, 2024 10:00am



X-Lumin wants to support middle-mile networks, as well as backhaul, tower-to-tower and tower-to-data-center deployments. (Art by Midjourney for Fierce Network)

- **Free-space optical uses the same laser light beams as fiber optic cables**
- **The technology can bring fiber-like speeds to places that are difficult to span with fiber**
- **The free-space optical company X-Lumin wants to get the word out to all the ISPs deploying fiber**

Is it still fiber broadband if it doesn't include the optical glass or the cable coating surrounding the glass? [X-Lumin](#), a company that does free-space optical technology, says the answer is "yes." And the company thinks it has something special to offer operators deploying fiber because its technology is useful in places where physical fiber connections are impractical.

Free-space optical technology uses laser-light beams to wirelessly transmit data without having to use fiber optic cable. [Zev Suissa](#), chief growth officer with X-Lumin, said of the company's technology, "It's the same beam of light that goes down a fiber optic cable. The only difference is, we shoot over free space."

The beam is transmitted from one optical head and received by another optical head that have line of sight with each other. The technology can be used to "hop" the beams over long distances without losing any throughput.

**"The same beam of light moves faster over air than through glass," said Suissa.**

The company is hoping to participate in all the activity to deploy fiber across the United States. To that end, Suissa was at the recent Mountain Connect conference in Denver, which was heavily attended by people in the fiber industry.

"There might be a perspective from the industry in general that it's a fiber-first kind of world," he said. "My concern, given the time and cost it takes for fiber infrastructure, is that BEAD funding will not be enough to achieve the mission of broadband for all. If we really want to hit these milestones, we're going to need to look at a mix of technologies."

He said a "powerful use case" would be to use free-space optical to "hop" over railroads and rivers. It's taking operators up to a year to [get a permit](#) to dig fiber under railroads, and it can cost as much as \$25,000 in non-refundable fees just to explore the idea of letting a fiber company dig under the railway, said Suissa. Given the expense and time, it can be a huge benefit to hop right over the rail-line without having to sacrifice any throughput.

Suissa said X-Lumin wants to support middle-mile networks, as well as backhaul, tower-to-tower and tower-to-data-center deployments.

At the recent Mountain Connect conference in Denver, Gary Bolton, CEO of the Fiber Broadband Association, said, "I won't argue against free-space optics. I think it's a great solution to be able to address a short-term problem. But we're not sending free-space optics to any home, yet." But Suissa said, "It's not really meant as a last-mile device to the home. We're not going to put our devices on tops of homes. We have far too much speed and range for that to be necessary." However, if there are very rural areas with a smattering of homes, X-Lumin's technology could bring free-space fiber to a nearby point, and then regular fiber optic cables could connect to that point and be deployed directly to the homes.

### **Are there downsides?**

Any wireless solution can be prone to some interference, but free-space optical does much better in that regard than fixed wireless access (FWA), according to Suissa.

Interference is one of the biggest problems for FWA, which can be hampered by things such as rain and snow. And FWA usually needs clear line of sight to work properly and can be foiled by foliage. Tarana, however, has made a name for itself [with its FWA technology](#) that runs very complex algorithms to do interference canceling and multi-path signaling.

Suissa said FWA and microwave use a "very wide Fresnel zone," which refers to the width of the signals. Conversely, laser communications use a very narrow beam. In addition, "RF is very susceptible to humidity," he said, while "laser com is impervious to humidity." Additionally, X-Lumin has artificial intelligence software that optimizes the laser signal for atmospheric turbulence.

X-Lumin claims that its signals can be used for short-range distances up to a half-mile, mid-range distances up to 10 miles and long-range systems up to 30 miles, depending on-line of sight and the curvature of the Earth.

### **X-Lumin's pedigree**

X-Lumin was founded in 2019 as a spinoff company from [Vision Engineering Solutions](#), which builds long-range laser systems primarily for government and defense clients.

John Stryjewski, who had been a co-founder of Vision Engineering came over to X-Lumin as a co-founder. Although X-Lumin is currently small, with less than 10 employees, it's pursuing opportunities in wireless optical communications. But it's only got a handful of small clients at this point. It's hoping to scale.

Suissa said it's only done a "friends and family" round of funding so far, but expects to announce an institutional round soon.

The company's technology is scalable from a commercial perspective because it works with standard telco-grade equipment. "We have found great performance out of Cisco gear," said Suissa, mentioning [Cisco's NCS 540](#) routers and [XR operating system](#).