Space Photonics, Inc.
700 Research Center Blvd
Fayetteville, AR 72701

T+ 1.479.856.6360
www.spacephotonics.com

Not Your Average FSO

We all know the story. Back in the 90s, free space optics (FSO) was thought to be one of the foremost accomplishments that could drive the digital era. We imagined the possibilities. Science fiction was becoming science fact. But the real world and real world environmental considerations stopped the development of FSO in its tracks.

With digital computing capacity doubling every two years, the need for consistent, reliable data transmission was more important than the higher bandwidths made possible by FSO. Fiber optics became the benchmark by which all other technologies were judged and continues to provide solid, dependable data transmission wherever cabling can be laid. In the end, the issues inhibiting the deployment of free space optics technologies turned FSO into a fairytale technology that simply didn't work for land-based data transmission. Oh, how times have changed.

Technology and computing capacity is growing and developing at an exponential rate. What was a fairytale a decade ago has matured as well. The FSO you know, the one that could only transmit on a clear, windless day, is a thing of the past. It's not just last generation, it's last century. Recent advancements have been tested and proven to enable 10 Gbps communication and data transfer capability – regardless of environment conditions or platform stability.

When free space optics was initially implemented, the technology was subject to any number of environmental conditions. If the wind was too strong, the platform could sway and beam transmission would be lost. If it was foggy or dusty or raining or snowing, the beam would be interrupted and communications would be lost. Vibrations, ambient temperatures, the angle of the sun or even the amount of shadow could all cause the beam to wander and the connection would be lost. In all of these scenarios, a technician would have to go out to the site and manually reset the system – a task that could take hours. You get the picture – the concept was sound, but it just didn't meet the rigors of the real world.

Many engineers and companies tried to tackle these diverse problems. The most common response has been to make the beam bigger and upgrade the gimbal upon which the technology is mounted, but this introduces its own set of issues. A larger beam can help compensate for a swaying platform, but you lose fidelity and introduce optical noise into the communications. In addition, a larger beam diameter decreases the security of the signal, opening it up to signal tapping and spying. Moreover, a larger beam as well as the gimbal significantly increases the system's power consumption and results in much higher costs. A larger beam just isn't the answer.

A small company located in Fayetteville, Arkansas, looked at the problem from a different perspective. The engineers at this company, Space Photonics, looked at free space optics and determined that a small beam was essential to providing the best quality signal with low noise levels and little to no bit error rates. If they couldn't mess with the beam, how could they improve FSO performance? The answer they came up with was to develop and automated tracking, acquisition, and pointing (TAP) capability. It took some time, but they achieved this objective, and then integrated it into a compact, all-in-one FSO product with extremely low power consumption that can be deployed and running in a matter of minutes.

Space Photonics, Inc.
700 Research Center Blvd
Fayetteville, AR 72701

T+ 1.479.856.6360
www.spacephotonics.com

The automated TAP capability Space Photonics developed completely eliminates the need for external gimbals and steering mirrors, which means that frequent servicing by a specialized technician is a thing of the past. This unique capability enables a 30 degree field of regard on two axes for ultra-stable optical power and link performance with active signal tracking. Moreover, the system works no matter the environment conditions. In many respects, the fairytale of free space optics has now become reality.

Fiber optics is what it is – fast, safe, secure and expensive data transmission. For short distances and in urban areas, fiber has its place. However, as the digital age has progressed, individual landowners have become savvy to the importance and value of the fiber optic cabling crossing their land. As a result, the cost of laying a line has increased considerably. When laying cable has not been possible, communications companies have relied on RF transmissions.

RF has its own hurdles, including government licensing, bandwidth limitations, and the always present potential for interference. The goal of RF-based communications is to squeeze the last drop of juice out of a finite resource. The advancements of free space optics technology enables completely different resources to be deployed concurrently with older, more dated technologies while exponentially increasing data transfer capabilities without the need to work with numerous independent landowners.

The advancements in free space optical technologies opens up a world of possibilities in a number of industries – not the least of which is the cellular backhaul arena. It's time to wash away our old prejudices and look again at a technology that truly is the wave of the future.