Versatile and Cost-Effective

A technology with many uses, FSO is often called "fiber optics without the fiber"

By Ken Ito ■ *Canon Broadcast & Communications Division*

All builders, property owners, and municipal officials agree that today broadband connectivity is an essential selling point, as the Internet has become universally indispensable to homes, offices, and even out-of-the-way destinations.

There are multiple options for delivering broadband to these properties – including fiber, DSL, and cable – but getting near the "last mile" connected can be difficult due to physical barriers. Highways, streets, waterways, or rail lines can block the drop, necessitating costly solutions. And even if one building in a complex has fiber access, the need to extend that bandwidth out to other buildings on the property can still present a challenge.

This is why Free Space Optics (FSO) is an attractive and affordable option for final-link broadband connectivity. FSO is also a cost-effective choice as a backup to a broadband connection. FSO uses a line-of-sight beam of light to transmit broadband data through the air.

Unlike a microwave or other RF link, FSO does not require frequency coordination or licensing. An FSO broadband connection is secure and can't be pirated. And an FSO link can be set up quickly and is far more affordable than having to dig a trench for fiber or lease expensive lines from the phone company.

Canon's Broadcast & Communications Division is one of many companies offering an FSO solution. In fact, our Canobeam was the very first. Canon is a global leader in cameras and lenses, and it has applied its decades of expertise in optical engineering toward engineering Canobeam to be a versatile and reliable broadband connectivity solution.

Canobeam can bridge distances as great as 2 km (1.24 miles) with a wide range of data speeds up to 156 Mbps at that distance, and even greater bandwidth closer-in. The top-of-the-line Canobeam model DT-130 delivers Ethernet networking at data speeds of 1.25 Gbps at a range of 100 to 1,000 meters (approximately two-thirds of a mile).

Canobeam's DT-130

Solutions and Advantages

Is FSO reliable enough for your needs? Hospitals use Canobeam to securely transmit critical patient data between buildings. Broadcasters use it for mission-critical transmission of video signals across difficult terrain and in places where the RF environment is too crowded.

But almost all buildings move a bit. Canobeam also features Auto Tracking to automatically adjust the FSO light beam to "instantly" compensate for vibrations that may be caused by wind, temperature changes, HVAC systems within a building, or other factors. Canobeam's optical beam axis continually self-corrects, maintaining precise, continuous, and reliable data transmission between the bi-directional transmit and receive sites of Canobeam systems at all times.

Canon is the only manufacturer to offer Auto Tracking as a standard feature at price points that are highly competitive with systems that do not offer tracking as standard equipment.

Like fiber, Canobeam is protocol-independent. And if a broadband connection of more than 2 km is required – or if it doesn't have clear line of sight – pairs of Canobeam units can be connected to relay the signal. The Canobeam DT-130's 3R Function (re-shaping, re-timing, and re-generating), allows its data signal to be relayed without loss of strength or quality.

FSO data transceivers can also be installed indoors for window-to-window or window-to-roof transmission as long as the two units are located with a direct line of sight. And Canobeam's DT-MNG-100 Management Board is a standard feature of all DT-100 series Canobeams. This feature enables users to monitor the status of Canobeam transceivers via SNMP or Telnet (for monitoring and setting). In addition, diagnostic logs can be stored in a PC via FTP (for log data transmission).

User Examples

Examples include the Edmonton Economic Development Corporation, which needed to establish Gigabit

Ethernet connectivity to their recently renovated heritage building. Jackhammering the sidewalk to install a fiber connection was not possible because the office to be connected was in a city-protected historical landmark, but a Canobeam DT-130 system provided the necessary network link.

Shortly after the Canobeam was installed, Edmonton suffered a once-in-200-year storm that dropped nearly six inches of rain on the city in less than two hours. Despite the deluge, the Canobeam system continued to work without interruption, providing a reliable link between the buildings.

Stratasys, an Eden Prairie MN manufacturer of what are known as Rapid Prototyping Systems, also needed to establish a broadband link between its buildings but was prevented by the four-lane highway that runs between them. Tearing it up to run fiber was out of the question. Instead they chose a Canobeam DT-130 to ensure that the huge computer-aided design files sent across their network always result in precision-made prototypes.

Exempla Healthcare, the Denver-based operator of major hospitals and health-care centers, worried about privacy. Federal law requires that hospitals keep patient records confidential, which is why Exempla installed a Canobeam DT-120 to provide a secure link between a major medical center and leased offices in a building approximately a quarter mile away.

In addition to being secure, the link needed to be established quickly and it had to bridge a nearby road. The Canobeam DT-120 answered all of these needs, and its wide-bandwidth capabilities handled transmission of large medical-imaging files between the buildings with ease.

Rapid expansion to additional buildings was also the challenge faced by Toronto-based ATI Technologies, which needed to establish a broadband data connection between its entire campus and a central data center. The company needed to deploy its network quickly, but telco procedures, signatures, approvals, and other red tape needed for trenching and then ordering fiber circuits meant they'd miss their target date.

Instead they installed a Canobeam DT-120 over the course of one weekend and quickly established the broadband connectivity they sought. Two months later, when a fiber connection was finally established, the Canobeam became their redundancy system, providing back-up for the critical data transmitted within their campus. **BBP**

About the Author

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