



Lab Testing Summary Report

August 2001
Report 010801

Product Category:
**Wireless
MAN Links**

Vendor Tested:
Canon USA, Inc.

Product Tested:
**Canobeam III/DT-
50, v1.12**



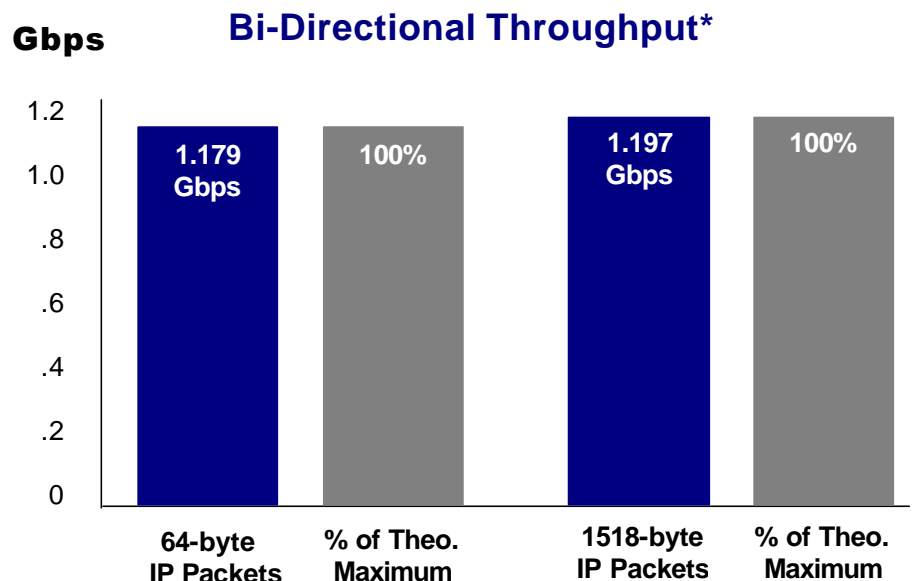
Key findings and conclusions:

- Achieved line-rate bi-directional throughput with very low latency and jitter
- Proved easy to install and configure
- Supports a very impressive auto-tracking capability for maintaining signal alignment
- Only wireless MAN product test that supported an OC-12 (622 Mbps) interface

Canon, Inc. submitted its Canobeam III/DT-50 wireless MAN link for testing by Miercom in a competitive review of leading products in this market sector. Testing was based on a test-bed and methodology developed by Miercom. The focus of testing was on wireless network links that span modest campus and metropolitan-area distances, up to several kilometers. The Canobeam was tested with v1.12 firmware. It was the only product (among seven) that supported an OC-12 (622 Mbps) link, which we tested up to one kilometer (km). The Canobeam delivered impressive performance, supporting over one gigabit of throughput using both small (64-byte) and large (1518-byte) IP packets sizes. (See table below.) We were also impressed with the product's auto-tracking capabilities. Results of the comparative tests were published in *Business Communications Review*, August 2001.

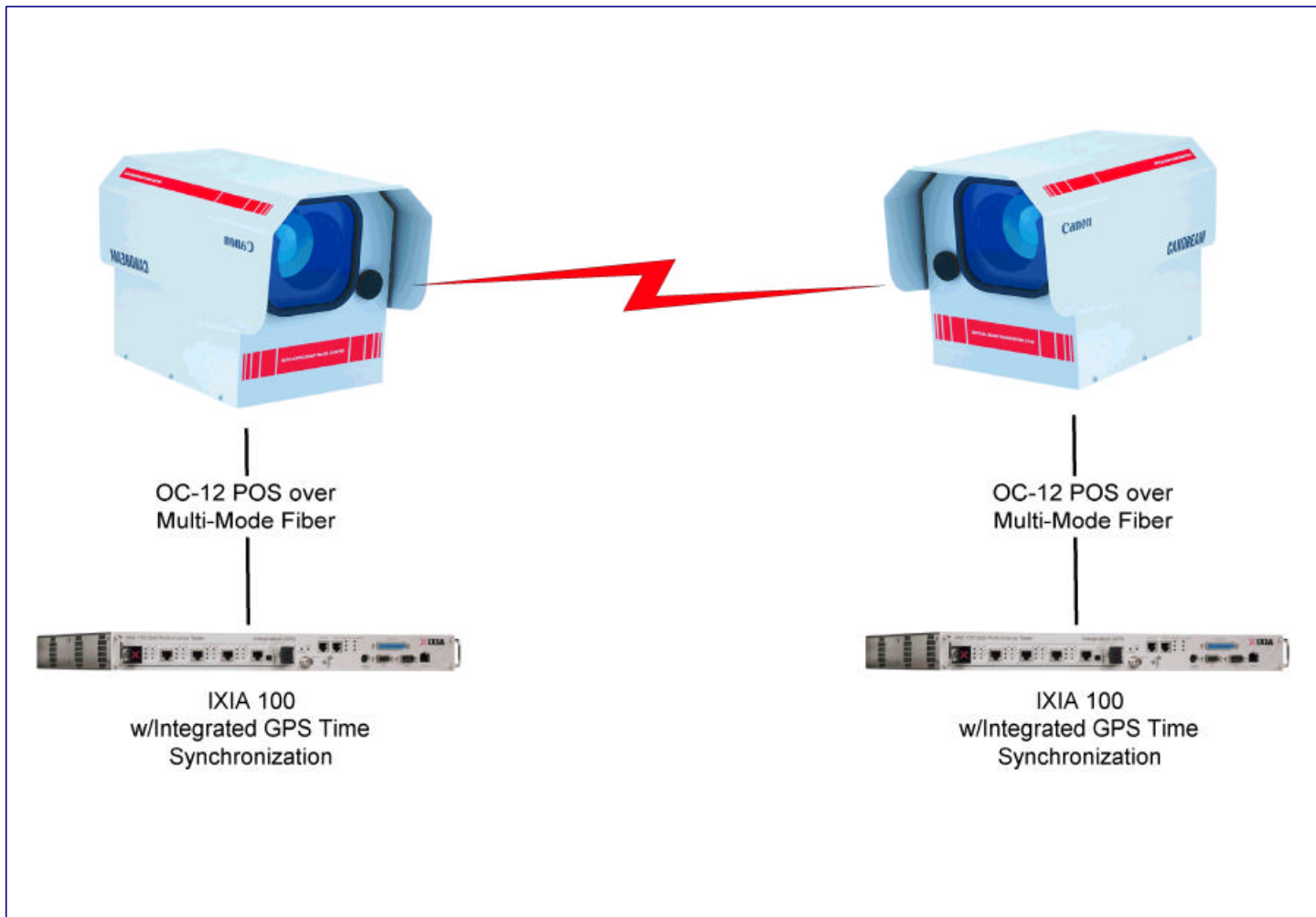
Performance

Testing was conducted outdoors with transceivers situated one-km apart. The bi-directional throughput results shown below are based on



*Achieved on a 1-km link with an average 0.065-millisecond one-way latency.

Test Bed Set-up



About the testing...For performance testing of the wireless links, we required test systems that could perform two main functions. First, the systems had to concurrently generate and receive test traffic via both ends of a wireless link, unidirectionally and bi-directionally, over a wide range of interfaces and data rates ranging from 1 Mbps to 1 gigabit per second (1,000 Mbps). We used two Ixia 100 systems (www.ixiacom.com) to synchronize time stamps between two devices on either side of the wireless link in order to accurately assess latency and jitter. In addition to providing traffic generation, the Ixia 100's offered integrated GPS- (global positioning satellite) based time synchronization. Accommodating swapping out of modules, the Ixia 100 supported all of the data-network interfaces and traffic-generation and analysis loads required: OC-3 and OC-12 Packet-over-SONET (PoS), as well as 10BaseT and 100BaseT Ethernet. To emulate an enterprise customer with "typical" MAN requirements, we defined two specific, fixed-location, wireless-link environments. One was a 1-km "short-range" course (0.62 miles). The other was a 3.4-km (2.1 miles) "long-distance" course. The roof of our two-story main lab building served as the common end for both wireless spans. The far end of the short course was a spot in a field one kilometer away, which we served with a portable generator. The other end of the long-distance course was atop a nearby 130-foot high municipal water tower. Both courses were unobstructed and offered clear lines-of-sight.

Performance – continued

the following conditions. The temperature was 62° F with 75-percent humidity; the barometric pressure was 29.95 inches Hg; overall visibility was 10 miles. The Canobeam achieved a maximum bi-directional throughput of 1.179 Gbps when tested with 64-byte IP packets and 1.197 Gbps using 1518-byte IP packets—representing

100-percent of the theoretical maximum throughput rate. One-way latency, measured at only 0.065 milliseconds (ms), was the lowest among the products tested. (Latency results ranged from 0.065 ms up to 1.477 ms.) Jitter, measured at 0.0007 ms, was negligible. These results were obtained using the Canobeam's OC-12 Packet-over-Sonet (PoS) card.

Performance – continued

We also conducted a series of tests to gauge the effects on throughput when the laser signal was impaired by one of the following: a fiberglass mesh, a plexi-glass panel with and without a protective green plastic cover and water precipitation. With one exception (the green plastic cover on the plexi-glass did disrupt the signal a bit), 100-percent line-rate throughput was achieved with no packet loss.

The Canobeam also performed well in our fault-tolerance tests in which we turned off power to the device and then re-established it after ten seconds. The Canobeam recovered within five seconds after receiving power and began transmitting traffic immediately.

Configuration

The Canobeam III/DT-50 is a self-contained unit that transmits via infrared lasers. It supports three configuration cards. One card supports a wireless connection as a 100-Mbps, Fast Ethernet link or a 155-Mbps, Packet-over-SONET (PoS) OC-3 link. Another card supports a 622-Mbps, PoS OC-12 link. And another supports 25-to-156 Mbps variable bit rate. The Fast Ethernet/OC-3 card and the variable bit-rate card span up to two km; the OC-12 spans up to one km. Of the seven wireless MAN links tested by Miercom, the Canobeam was the only product that supported OC-12 capabilities.

Installation & Ease of Use

The Canobeam is initially configured directly through its panel, while setting the SNMP agent's and device's IP address and Read/Write SNMP names, is done via Telnet or the panel. A GUI (Canobeam Management Software, v1.03) is supported, but its major function is to monitor the interface after initial configuration. Setting up and monitoring the Canobeam is fairly simple, and little help is required to get the device up and running. Help, which is available on the GUI, worked on our Windows 98 PC; Canon provided a patch file to view Help via Windows 2000.

Canon USA Canobeam III/DT-50: Key Features

Wireless technology	Layer 1 infrared laser; 785-nanometer wavelength
Configuration	Single integrated transceiver
Interfaces to user network	100BaseT; OC-3 PoS via multimode fiber; OC-12 PoS via single-mode fiber (dual SC)
Practical maximum distance	Up to 2 km with OC-3 card; up to 1 km with OC-12 card
How wireless link appears to network	Functions as a Layer-1 hub/repeater
Power	120 VAC; consumes about 50 Watts
Transmission	Full duplex, auto-sensing
Telnet access	Supported out of band
Management	Canobeam Management Software, v1.03, PC-based GUI for configuration and monitoring; other management available via SNMP; private MIB
Price (US list)	Fast Ethernet/OC-3 configuration costs \$53,500; OC-12 configuration costs \$63,500

We were extremely impressed with the Canobeam's auto-tracking capability that provided constant, optimal signal alignment—a very useful feature during installation and which also contributed to the product's excellent throughput performance. At one point, we incrementally lowered the tripod on which the Canobeam resided by six inches, observing that the device re-aligned perfectly with each lowering.

Management and Administration

The Canobeam Management GUI consists of a monitoring screen and logging screen. Monitored parameters include power supplies, sun protection, beam positioning, levels of receipt and transmission, signal strength, etc. The Canobeam is also managed via SNMP; a private MIB is supported. The Canobeam also supports a full complement of port and LED labels for monitoring system and port status.

Meets Expectations

Canon USA's Canobeam III/DT-50 delivered line-rate performance with very low latency and jitter in tests recently conducted by Miercom. The product was the only one among seven tested competitively that supported OC-12 (622-Mbps) speeds, as well as OC-3 (155 Mbps) and Fast Ethernet. It delivered a 1.179 Gbps maximum bi-directional throughput when tested with 64-byte IP packets and 1.197 Gbps when tested with 1518-byte IP packets. The product performed very well in fault-tolerance tests. The Canobeam was easy to install and configure, and its auto-tracking feature was very impressive.



In the unanimous opinion of the testers, Canon USA's Canobeam III/DT-50 fully meets the expectations and requirements of the target user community for which it was designed and is hereby presented the "NetWORKS As Advertised" award.



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Canon Canobeam III/DT-50

About Miercom's Product Testing Services...

With hundreds of its product-comparison analyses published over the years in such leading network trade periodicals as *Business Communications Review*, *Network World*, and *Internet Week*, Miercom's (formerly MIER Communications') reputation as the leading, independent product test center is unquestioned. Founded in 1988 by Edwin E. Mier, formerly managing editor of *Data Communications* magazine and a practicing network consultant for over 20 years, the company has pioneered the comparative assessment of networking hardware and software, having developed methodologies for testing products from ATM switches to VoIP gateways and IP PBXs. Miercom's private test services include competitive product analyses, as well as individual product evaluations. Products submitted for review are typically evaluated under the "NetWORKS As Advertised™" program, in which networking-related products must endure a comprehensive, independent assessment of the products' usability and performance. Products that meet the appropriate criteria and performance levels receive the "NetWORKS As Advertised" award and Miercom Labs' testimonial endorsement.

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