

Low-cost multi-fiber optical connector developed

February 3 2014

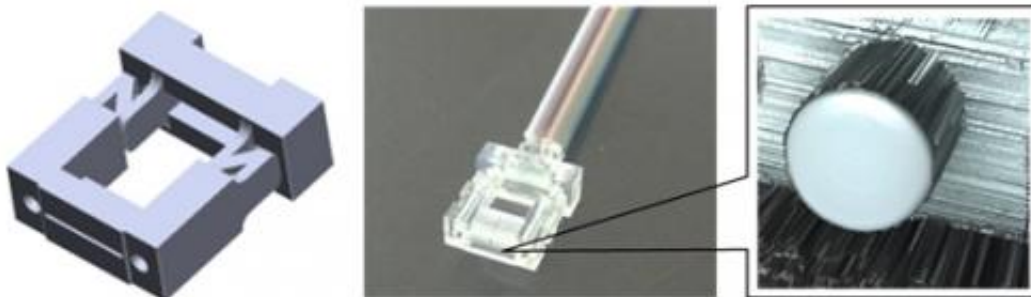


Figure 1: Optical connector with simplified design (left: geometry; center: exterior; right: tip surface of optical fiber)

Fujitsu Laboratories and Furukawa Electric today announced that they have collaborated to develop a new multi-fiber optical connector that enjoins and aligns multiple optical fibers for optical interconnects.

The conventional method of connecting optical fibers requires high-precision polishing that aligns the tips of the fibers, making the cost of this process considerable. Fujitsu Laboratories and Furukawa Electric have developed a connector that can accommodate different lengths of [optical fiber](#) with a spring mechanism that obviates the need for this polishing process, slashing by more than half the cost required to connect optical fibers.

This new jointly developed connector achieves performance on par with

conventional connectors while simplifying the task of installing high-capacity optical interconnects in a server. It is anticipated that this technology will increase data transmission speed between boards, increasing overall server performance.

This technology is being presented in detail at SPIE Photonics West 2014, from February 1, 2014, in San Francisco.

Background

In recent years, the volume of data transmission inside servers has grown in line with greater server processing performance. Today, high-speed data speeds of 25Gbps or greater are required for transmissions between the CPUs, and CPUs and memory. Conventional electrical wiring suffers signal degradation due to attenuation at high speeds, making high-speed transmission between server boards difficult even over short distances. Optical fiber, which suffers little signal degradation, has therefore led to much attention being focused on optical interconnects.

Using optical interconnects for communications between server boards requires numerous multi-fiber connectors, each of which connects and aligns multiple optical fibers to allow for parallel signal transfers. The large volume required, however, leads to the problem of high costs when deploying optical interconnects inside servers.

Issues

With existing multi-fiber connectors, the fibers need to be fixed into the connector and then have their fiber-end faces precisely polished so that their tips align flat for low-loss connections. However, as the polishing process needs to be performed for each connector, the overall cost is high. The problem has been the lack of having a simple optical

connector that offers the benefits of low signal loss without requiring costly polishing.

About the Technology

Fujitsu Laboratories' design technology and Furukawa Electric's manufacturing technology both contributed to the development of a multi-fiber optical connector that can easily be used inside servers.

Key technologies underlying the new connector design are as follows.

A spring mechanism for optical connectors that slightly deforms when connecting optical fibers (Figures 1, 2). This allows for deforming in the optical connector itself to introduce minute bends into the optical fibers as a way to accommodate for differences in their lengths, so that their tips align.

Laser-processing the tips of the optical fibers results in surfaces equivalent to those achieved through polishing (Figure 1), so that optical fibers can align flush without gaps.

The combination of these technologies obviates the need for polishing and results in optical-fiber connections with signal loss levels on par with existing multi-fiber connectors (0.2 dB or less).

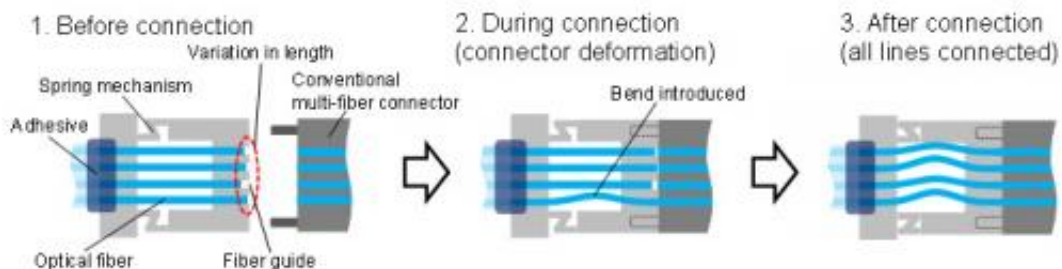


Figure 2: How fibers connect in the optical connector with simplified design

Results

The newly developed optical connector obviates the need for costly polishing, halving the cost while achieving performance on par with existing technology. Fujitsu Laboratories and Furukawa Electric jointly developed this optical connector for use on boards, and with an optical connector housing that accommodates four optical connectors in a compact space, this design allows for as many as 96 optical fibers to be connected (Figure 3).

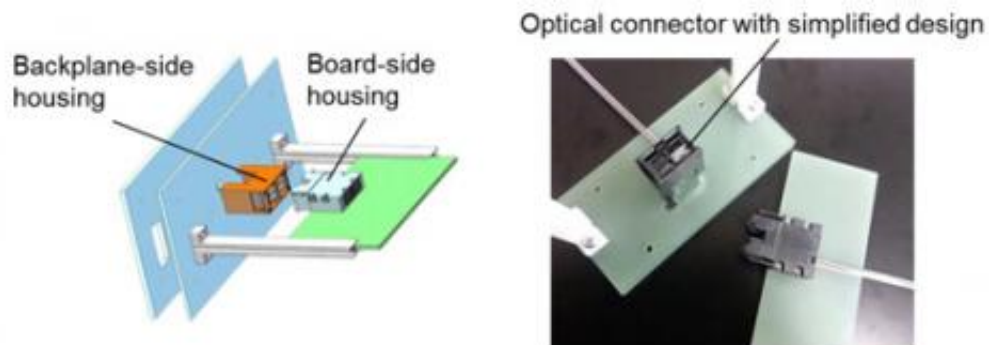


Figure 3: How the optical connector with simplified design mounts to a board with housing

This technology will enable the cost of installing [optical interconnects](#) between boards inside servers to be lower, and increase overall server performance in the future.

Future Plans

Fujitsu Laboratories and Furukawa Electric are continuing development with the goal of applications in servers around 2016. This technology need not be limited to internal server communications; it also has additional potential uses for connecting optical fibers between rack-mounted devices.

Provided by Fujitsu

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