Oki Electric Industry Co., Ltd.

Lightera Japan Co., Ltd.

Keio University

World's First Demonstration of Single-Fiber Bidirectional Wideband WDM Transmission Using Hollow-Core Fiber

- Progress toward realizing a low-latency, energy-efficient optical communications infrastructure with an eye on 100G-PON and IOWN -

TOKYO, May 26, 2026 — As part of the Ministry of Internal Affairs and Communications-commissioned research and development project, "Research and Development (JPMI00316) of Advanced Optical Transmission Technology Contributing to a Green Society", Oki Electric Industry Co., Ltd. (OKI), Lightera Japan Co., Ltd. (Lightera), and Keio University have used the "Keio Future Photonic Network Open Lab (Note 1)" established by Keio University, and announced the result of a demonstration of a next-generation optical line using hollow-core fiber. By combining a prototype of a next-generation optical line system developed by OKI with the hollow-core fiber (Note 2) developed by the Lightera Group, we succeeded, for the first time in the world, in the single-fiber bidirectional wideband WDM transmission in 1.26 μm - 1.58 μm, and also confirmed minimized power consumption by switching to the optimal optical line system. When commercialized, it is expected to reduce wasted power (theoretically to one-tenth of current electricity consumption) while meeting the increasing traffic demands. Three members will continue to advance research and development, aiming to realize carbon neutrality by 2050 and to generate new services leveraging low-latency of transmission.

The communication traffic has been rapidly increasing by new lifestyles such as tele-work, the distribution of ultra-high-definition video, and the advancement of a digital twin society using cutting-edge technologies including generative AI. As a result, power consumption for tele-communication infrastructure has also been increasing and large-capacity low-power-consumption optical transmission networks are required as the social infrastructure. To respond these requirements, three members conducted research commissioned by the Ministry of Internal Affairs and Communications on "Research and Development of Advanced Optical Transmission Technology Contributing to a Green Society" and developed large-capacity optical transmission technology and efficient optical access reception technology. This project enabled telecom carriers to establish the high-quality service infrastructure in the future that requires low-latency and large-capacity, and to reduce the energy cost of running the facilities, while meeting the increasing traffic demands of the users.

In the future, OKI will promote research on use-cases that take advantage of the features of hollow-core fiber in addition to next-generation PON systems (Note 3) and will work on further research and product development aiming the practical application of 100G-PON (Note 4) and the access system required for

IOWN® (Note 5). Lightera will further advance hollow-core fiber technologies, including related peripheral technologies, to improve performance and accelerate mass production toward early practical application, and will conduct demonstrations with various users using the "Keio Future Photonic Network Open Lab" and other facilities.

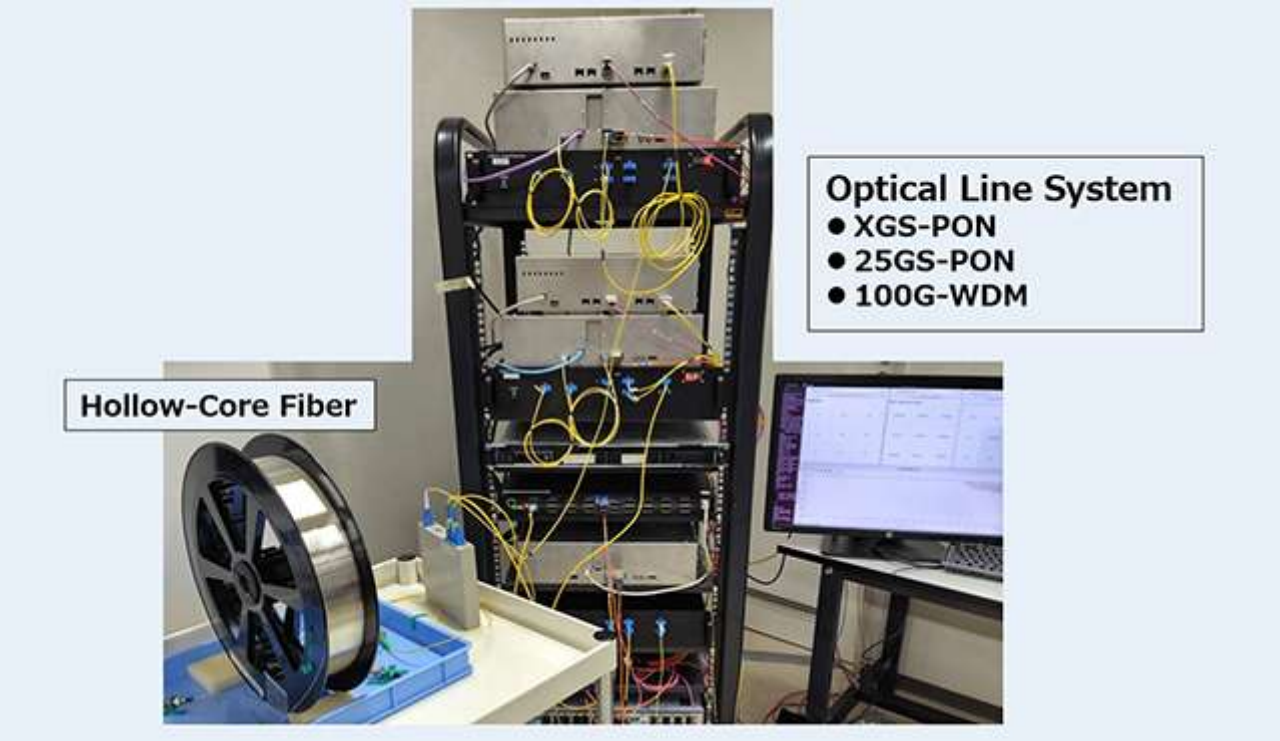

Fig. 1 Prototype of a next-generation optical line system and verification of the hollow-core fiber

[Terminology]

Note 1: Keio Future Photonic Network Open Lab

As part of the "Research and Development of Advanced Optical Transmission Technology Contributing to a Green Society," this open laboratory was established by Keio University at Shin-Kawasaki Town Campus to spread research results to the world.

Web: https://pilab.jp/OpenLab/home/en-top/

Note 2: Hollow-Core Fiber

A hollow center (core) of the fiber transmits the signal light in air. Compared to conventional optical fibers, signal deterioration can be more easily suppressed, making it suitable for wideband and low-latency transmission. The transmission delay is about two-thirds that of single-mode fiber (Note 6).

Note 3: Next-generation PON system

A next-generation system for PON (Passive Optical Network), which is an optical fiber access network for subscribers. In addition to higher speed and larger capacity, it enables lower latency and greater energy efficiency, and is expected to serve as a foundation to support diverse future communications services.

Note 4: 100G-PON
As one of the next-generation PON systems, this optical access system aims to achieve high-speed, large-capacity communications at the 100-gigabit-per-second level. It is expected to meet increasing traffic demand and serve as a foundation for high-quality communications services.

Note 5: IOWN® (Innovative Optical and Wireless Network)
Next-generation communications and information-processing platform concept led by NTT, aimed at realizing ultra-high-speed, large-capacity, low-latency, and energy-efficient communications by linking networks, data processing, and end devices through optical connections.

Note 6: Single-mode fiber
A type of optical fiber that is widely used in communications networks. By restricting the path of light to a single route, it enables stable, high-speed communications even over long distances.

[Related links]
・Keio Future Photonic Network Open Lab: https://pilab.jp/OpenLab/home/en-top/
・Hollow-Core Fiber Technology: https://www.furukawaelectric.com/en/rd/review/fr056/fr56_02.pdf
・Accommodation Control Technology for Heterogeneous PON Systems:
https://www.oki.com/global/technologies/advanced/pon/index.html

About Oki Electric Industry Co., Ltd. (OKI)
Founded in 1881, OKI is Japan's leading information and telecommunication manufacturer. Headquartered in Tokyo, Japan, OKI provides top-quality products, technologies, and solutions to customers through its Public Solutions, Financial & Payments Solutions, and Components & Manufacturing businesses. Its various business divisions function synergistically to bring to market exciting new products and technologies that meet a wide range of customer needs in various sectors. Visit OKI's global website at https://www.oki.com/global/.

About Lightera Group
A global leader in optical fiber and connectivity solutions. Built on a legacy of expertise in optical science, we provide high-performance solutions that enable faster, more reliable, and sustainable connections for businesses, communities, and industries worldwide.
With operational headquarters in Norcross, Georgia, U.S.A., Lightera serves customers across telecommunications, enterprise, industrial, generative AI, data centers, 5G/6G, utilities, medical, aerospace, defense, and sensing markets.
Lightera is part of Furukawa Electric Group, a pioneer in advancing the next generation of infrastructure through integrated solutions in information, energy, and mobility, to create a safe, peaceful, and sustainable world.
https://lightera.com/

About Keio University

Established in 1858 by Yukichi Fukuzawa as a small school of Western learning, Keio has a history as Japan's very first private institution of higher learning. Over 160 years since its founding, Keio has thrived under its founder's motto of jitsugaku, or empirical science, as it continues to transform Japan as a modern nation through contributions to education, research, and medicine.
Website: https://www.keio.ac.jp/en/

Notes:

- Oki Electric Industry Co., Ltd. is referred to as "OKI" in this document.
- IOWN is a registered trademark of NTT,inc.
- Other company names and product names mentioned in this text are generally trademarks or registered trademarks of their respective companies.

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