

Title: Location free ONU system by optical power supply over Hollow Core Fiber

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Extended Abstracts:

Fiber optic access such as FTTx (Fiber To The Curb, Fiber To The Building, Fiber To The Home) is becoming more popular every year as a means of accessing the Internet. Telecommunication devices are connected to an ONU (Optical Network Unit), and the connected telecommunications devices are networked to provide various functions and services. Currently, however, this system can only be used in environments where power can be supplied to both the ONU and the telecommunications equipment. These devices require a power source, but there are places where it is difficult to secure a power source, such as in natural environments such as mountains and rivers, or outdoors in urban areas. If these devices can be driven by power via optical fiber, the application area can be expanded.

Hollow Core Fiber (HCF) is an innovative optical fiber that has the potential to break through the limitations of conventional optical fibers [1]. In conventional glass core optical fibers, when the energy density becomes too high, a phenomenon called fiber fuse occurs, causing the inside of the fiber to burn. However, in HCF, light passes through air, which has nothing to burn, so no damage occurs even at energy densities 1,000 times higher than conventional fibers. This feature enables transmission of large power, which could not be achieved with conventional glass-core optical fibers.

Utilizing these technologies, we are aiming to construct an IoT network driven solely by optical fiber power supply. To realize this system, we are working on the following issues.

- High-power transmission and data communication over a single fiber by utilizing HCF.
- Implementation of a radical power-saving algorithm to enable ONUs and IoT devices to operate constantly using only optical fiber power over fiber (PWoF)[2].
- Development of a Proof of Concept (PoC) that incorporates the above two elements.

In this presentation, we will show the completion of the PoC as the first step and the results of some experiments using it.

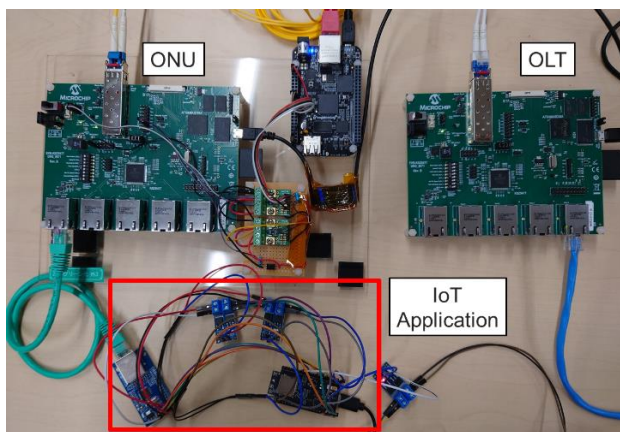


Fig. 1 Constructed PoC

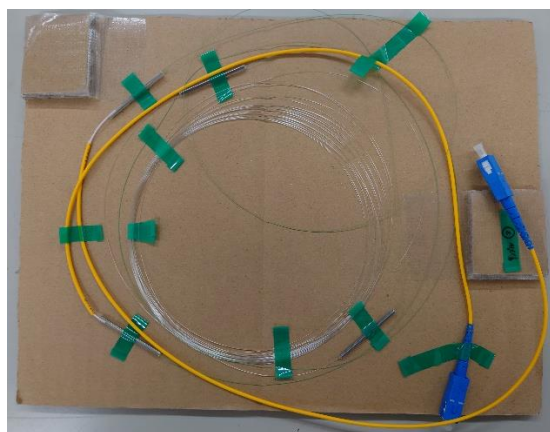


Fig2. Hollow Core Fiber

Acknowledgements:

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References:

[1] Kazunori Mukasa, "Hollow Core Fiber Cable, " Furukawa Electric Review, 2021, no. 140, p. 32-39 [Translated from Japanese.].

[2] Takahiro Ishiyama, Takashi Kurimoto, Satoru Okamoto, and Yamanaka Naoaki, "Power-saving performance evaluation of the adaptive deep sleep enabled PON based on applications and PON management system linkage operation, " 2023 International Conference on Emerging Technologies for Communications (ICETC 2023), Nov. 2023.