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NTT Press Releases

(News Release)

March 7, 2012

World's first field trial of 10Gbit/s-100km class high speed and wide area optical access

-- Introducing optical amplification technology that drastically expands transmission length --

Nippon Telegraph and Telephone Corporation (NTT, CEO: Satoshi Miura, Tokyo) has succeeded in the field trial of an optical amplification technology^{*1} that realizes 10Gbit/s-100km class high speed and wide area optical access networks. We have been advancing this technology under the research contract titled "Research and development of wide area optical access networks" by National Institute of Information and Communications Technology (NICT, President: Hideo Miyahara, Tokyo). A part of these results will be presented on March 8 (PST) at the international conference OFC/NFOEC (Optical Fiber Communication Conference and the National Fiber Optic Engineers Conference) held in Los Angeles, U.S.A..

1. Background

To develop access systems for the next generation that offer efficient network configuration and stable and variable service provision, strong research efforts are needed to increase communication speed, expand transmission length, reduce power consumption of transmission equipment, etc. Given the importance of expanding the transmission length, which enables the efficient accommodation of subscribers and the potential reduction in power consumption, we targeted this goal.

NTT Access Network Service Systems Laboratories (NTT labs.) have been through their research efforts to resolve this issue; the result is the establishment of an optical amplification technology that provides inexpensive wide dynamic range^{*2} optical amplifiers and can handle burst signals^{*3} generated in Ethernet PON^{*4} systems.

2. Research Achievements

The field trial was carried out in a testbed^{*5} configured in Hokkaido prefecture, the north part of Japan, by connecting NTT East buildings in Sapporo, Toyohira, Eniwa and Chitose by optical fibers with total length over 100km. (Figures 1 and 2)

The optical amplification technology developed by NTT labs. includes an automatic level control (ALC) technology that can assess the input burst signals and, at high speed, adjust them to a constant level by controlling optical attenuators^{*6}. For downsizing, reducing cost, and matching wavelengths of optical signals used for access systems, semiconductor optical amplifiers (SOA) are adopted as the gain medium^{*7}.

Combining SOAs with ALC and Ethernet PON systems based on IEEE 802.3av^{*8} standards, we conducted transmission experiments with total span lengths of over 100km and confirmed good transmission characteristics at the communication speed of 10Gbit/s. In addition we demonstrated the real-time bidirectional transmission of uncompressed high definition video^{*9} and confirmed excellent transmission characteristics.

3. Future Developments

We will realize optical amplifiers that offer more performance in smaller packages. We will also develop environmentally-robust^{*10} and highly reliable optical amplifiers.

Gloss

*1 Optical amplification technology:

Technology that directly amplifies one or more optical signals without conversion into electrical signals.

*2 Dynamic range:

Ratio of minimum to maximum signal that can be handled. The bigger the dynamic range of an optical amplifier is, the more subscribers can be accommodated.

*3 Burst signal:

Intermittent signal. In a PON system, signals from each subscriber are bursty to avoid collision on the up link (link from a subscriber to the communication carrier's building).

- *4 PON:
Passive Optical Network. Architecture in which multiple optical fibers are connected by a passive splitter, called optical coupler, in optical networks.
- *5 Testbed:
Experiment environment that closely mimics real operation conditions but is configured for testing of technology in the research and/or development stages.
- *6 Optical attenuator:
A device or equipment that reduces optical intensity to a suitable level.
- *7 Gain medium:
Material that amplifies optical signal in the optical amplifier. Optical fibers doped with specific material and semiconductors are two examples.
- *8 IEEE 802.3av:
Standard for 10Gbit/s Ethernet PON by the Institute of Electrical and Electronics Engineers.
- *9 Uncompressed high definition video:
High Definition video without coding for bitrate reduction.
- *10 environmentally-robust:
Robust enough for outdoor use.

- A : 札幌 Sapporo
- B : 恵庭 Eniwa
- C : 千歳 Chitose
- D : 豊平 Toyohira

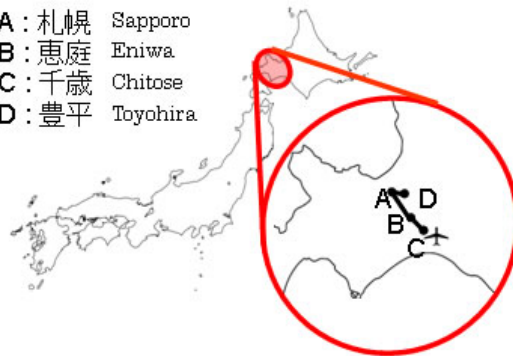


Figure 1 Place of field trial and semiconductor optical amplifiers

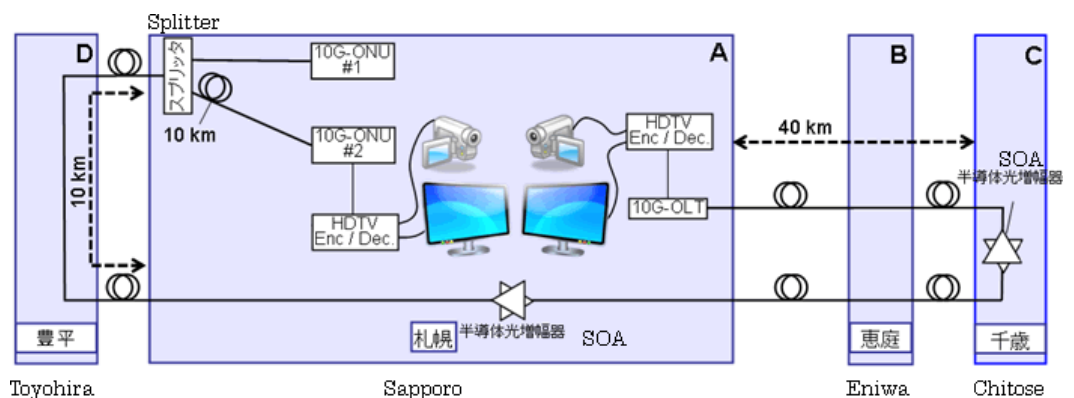


Figure 2 Configuration of field trial

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