Press Release
May 27, 2014

Successful interoperability among 100Gbit-class core, metro and access optical networks with Software Defined Transport Network technology

- A step toward the future integrated control of network between data centers -

KDDI R&D Laboratories, Inc. ("KDDI R&D Labs.," President & CEO: Yasuyuki Nakajima), Mitsubishi Electric Corporation ("Mitsubishi Electric," President & CEO: Masaki Sakuyama), National Institute of Information and Communications Technology ("NICT," President: Dr. Masao Sakauchi), Keio University ("Keio Univ.," President, Professor: Atsushi Seike), Ixia Communications K.K. ("Ixia," County General Manager: Kenji Murakami) and TOYO Corporation ("TOYO," President and CEO: Masaru Gomi) have successfully built interoperable 100Gbit/s-class core, metro or access optical networks using SDN (Software defined networking)*1 technology. The technology tested this time is expected to be applied to the technology realizing a wide-area cloud network that connects data centers and handles large-volume of data.

This open interoperability demonstration was conducted at the 10th International Conference on IP + Optical Network (iPOP2014) held in Musashino-city, Tokyo between May 22 and 23.

[Background]

The volume of data transmitted within or outside data centers has dramatically increased with the spread of cloud business and use of big data, and it is expected to be about 8 times more in 2020 than that in 2012. In light of this, the network within and around data centers will require 100Gbit/s-class optical network devices and the mechanism to separate and manage network resources for efficiently converging various services having different communication qualities, bandwidths and such in a single carrier's network. On the other hand, an increase in the operational cost would be an issue when the network comprised of multiple devices and networks achieves higher speed and becomes more complicated. Though the –technology to enable integrated management of such a complicated network by use of open source interfaces such as SDN/OpenFlow*2 has attracted attention as a means of reducing the operational cost, integrated management of a large-scale network handling a large volume of data with a single device has been difficult to achieve.

[Project result and outline of open demonstration]

These six organizations were the first in the world to witness the Software Defined Transport Network successfully controlling a large-scale network including 100Gbit/s-class transport network in an integrated manner. To enable such control, each network control device deployed in the core, metro or access optical network*3 (please refer to Figure 1 below) has provided information to the integrated control system (SDN controller), considering the physical network controlled by itself as a simplified logical network. An open demonstration at iPOP2014, the international conference held between May 22 and 23, showed visitors a virtual optical network built between emulated data centers with 100Gbit/s optical network devices (prototypes). The metro core optical networks were built as optical networks

connecting data centers with 100Gbit/s wavelength division multiplexing equipment*4 (supplied by Mitsubishi Electric) and 100Gbit/s-class optical packet and circuit integration switches*5 (supplied by NICT). In the access part connecting to emulated data centers (supplied by IXIA and TOYO), an "elastic*6" device prototype*7 of next-generation optical aggregation network*8 (supplied by Keio Univ.) was deployed, and the optical network built with different types of devices was controlled by the SDN/OpenFlow-based integrated control system*9 (supplied by KDDI R&D Labs.). The integrated control system built a virtual optical network at the request (request for a bandwidth) from data center users. This was the world's first open test*10 of SDN/OpenFlow control of 100Gbit/s-class transport.

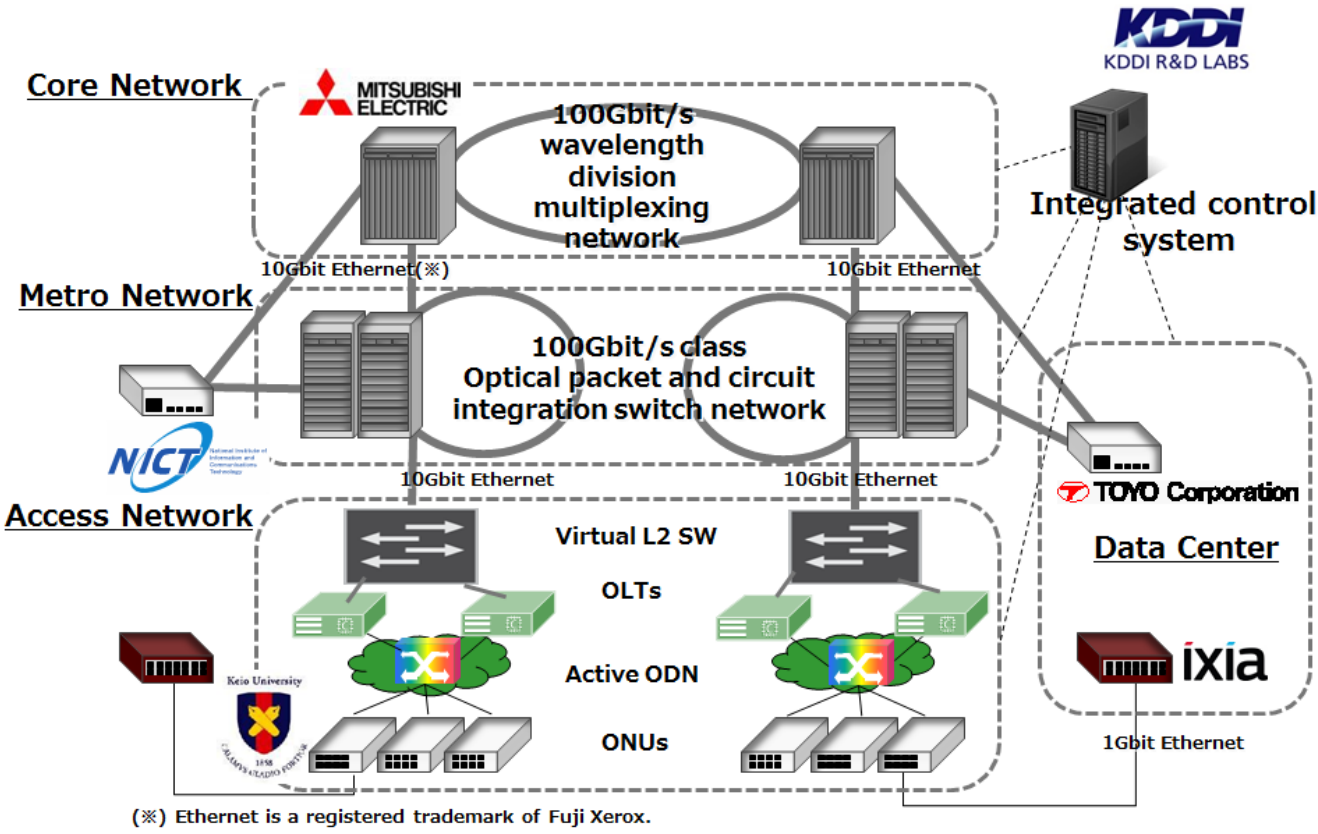

Figure 1　Configuration of Optical Network between Data Centers

*1: SDN (Software Defined Networking) is a network technology that enables you to dynamically make settings and changes to the network configuration using software. In this white paper, the term Software Defined Transport Network (SDTN) refers to the technology for dynamically making changes to the settings on the optical transport network.

*2: OpenFlow is a registered trademark of Open Networking Foundation (ONF).

*3: Information in the access network is gathered in the metro networks, and the core network is built by aggregating metro networks.

*4: Optical communication device that transports multiple-wavelength optical signals on an optical fiber - the device used for the test this time is capable of transporting 100Gbit/s of data per wavelength or a few terabits of data per optical fiber line. This work is partly supported by the R&D project on "Digital Coherent Optical Transceiver Technologies (FY. 2009)" and "High-speed Optical Edge Node Technologies (FY. 2010-2011)" by the Ministry of Internal Affairs and Communications

(MIC) of Japan.

*5: Optical device that provides a communication path suitable for the purpose - an optical circuit is provided to end users who require high-definition image transmission or high quality communication for telemedicine or TV conference, and the optical packet switching is used for web access, e-mail forwarding and transfer of sensor data from a large number of devices.

*6: "Elastic" refers to the nature that allows users to flexibly change the signal bandwidth according to the requested bandwidth.

*7: The prototype supplied by Keio Univ. has been created based on the achievements obtained in the "Research and development on elastic optical aggregation technology," a NICT-commissioned research project.

*8: The aggregation network resides in between the access networks for services deployed locally and the core networks connecting communication stations and serves as a concentrator network for all services that aggregates traffic from the access networks before forwarding it to the core network. The next-generation optical aggregation network is aimed at realizing the integrated network supporting each service using the network virtualization technology and SDN technology by extending the Fiber to the Home (FTTH) technology and expanding the part where signals are converted into optical signals by integrating the aggregation network into the access network to create the active optical distribution network.

*9: The integrated control system (prototype) supplied by KDDI R&D Labs. has been created based on the achievements obtained in the "Scalable and efficient orchestration of Ethernet services using software-defined and flexible optical networks (STRAUSS)," a project commissioned by the MIC.

*10: This test will be conducted as part of the "Research and development project on Multi-Technology Transport Network Control Technology" promoted by the Interoperability Working Group (Chair: Naoaki Yamanaka, Professor for Faculty of Science and Technology, Keio Univ.) of the Research Promotion Council of Keihanna Info-Communication Open Lab. This council has been working to contribute to the development of economy in the Kansai region by promoting the research and development in the ICT field through government-industry-academia collaboration. The Interoperability Working Group consisting of 9 organizations including KDDI R&D Labs., Mitsubishi Electric, NICT and Keio Univ. is one of the working groups of this council and has been making various proposals and performing verification on the interoperability of the next-generation optical network.

<Contact for inquiries about this press release>
- R&D Marketing Group, KDDI R&D Laboratories
Tel: +81-49-278-7545 E-mail: inquiry@kddilabs.jp

- Public Relations Division, Mitsubishi Electric Corporation
Tel: +81-3-3218-2359 FAX: +81-3-3218-2431

- Office of Communications and Public Relations, Keio University
Tel: +81-3-5427-1541 Fax: +81-3-5441-7640 E-mail : m-koho@adst.keio.ac.jp

- Public Relations Department, National Institute of Information and Communications Technology
Tel: +81-42-327-6923 Fax: +81-42-327-7587 E-mail: publicity@nict.go.jp

- PR Center for Ixia Communications K.K.
Tel: +81-3-5269-2301 Email: ixia@inoue-pr.com

- TOYO Corporation
Tel: +81-3-3279-0771 E-mail: spirent-web@toyo.co.jp