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NTT Press Releases

World's Highest Performance SDN Software Switch to be Unveiled as Open Source Software
- Promoting expansion of SDN eco-systems based on Open Source Software -

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Tokyo, June 2014 - Nippon Telegraph and Telephone Corporation (NTT, TSE: 9432, NYSE: NTT) today announced that the SDN software switch "Lagopus" will be unveiled in July 2014 as Open Source Software (OSS). The switch is widely compliant with OpenFlow 1.3 and features performance and functions suitable for both data centers and wide area networks.
The corporation has also established the SDN Switches Test Center, which is leveraging the "Ryu SDN Framework" already released as OSS.
Through these activities NTT aims to expand OSS-based SDN eco-systems with the participation of various companies, universities, and research organizations.
Promotional demonstrations of the forwarding performance and interoperability of Lagopus will be given at the Interop Tokyo 2014 conference (http://www.interop.jp/2014/english/) exhibition starting June 11.

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1. Background

In recent years SDN[1] and NFV[2] have become particularly important in the drive to achieve adaptive and rapid network deployment and added functionality for network services. The focus of these technologies is on software-oriented rather than hardware-oriented network functions, especially dedicated LSIs. As SDN begins to be implemented into data centers, it is expected that its advantages will also be applied to wide area networks[3]. Thus, wide functionality and high-performance forwarding are required for controllers and switches, both of them principal components of SDN.
In the field of SDN switches, NTT Network Innovation Laboratories are promoting R&D in the O_3 Project[4] as part of a "Research and Development of Network Virtualization Technology" program commissioned by the Ministry of Internal Affairs and Communications. A prototype SDN software switch "Lagopus" that enabled 10 Gbps forwarding was successfully developed in December 2013. Demonstrations and presentations of Lagopus have been warmly applauded by network experts and given them high expectations for its future.
In the area of SDN controllers, NTT Software Innovation Center released the "Ryu SDN Framework" as OSS in 2012. The framework has since been modified to extend its functionality with the participation of various companies, universities, and research organizations. Specifically, the Ryu SDN Framework can handle not only OpenFlow[5], one of the leading specifications for SDN development, but also a wide variety of protocols needed for coordination with existing network nodes. In consequence it was unhesitatingly selected by Broadcom Corporation, a firm which is developing OpenFlow enabled LSIs, OpenStack Project[6] engaged in cloud platform construction and other activities.
With the Lagopus switch updated from a prototype to a product qualified for general use, NTT will be providing it as OSS to further accelerate the expansion of SDN eco-systems with the Ryu SDN Framework.

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2. Challenges for expanding SDN eco-systems

To assist SDN developers and users, NTT Network Innovation Laboratories and NTT Software Innovation Center will establish a test center for OpenFlow switches and will provide Lagopus as OSS. The expectation is that the combined use of the updated Lagopus switch and the Ryu SDN Framework will help to expand the SDN applicable area from data centers to wide area networks. NTT is also aiming at the expansion of SDN eco-systems based on OSS.
Challenges to be faced are as follows:

(1) Providing Lagopus as OSS

With NTT providing the highly-functional, high-performance Lagopus switch as OSS, the organization aims to work together with companies, research organizations, and universities to accelerate SDN R&D. Since Lagopus was designed and developed for servers widely sold in markets, its inclusion in them will better enable buyers to select a server whose price and performance suits their purposes. In particular, Lagopus can be applied in wide area networks due to its fast packet processing performance that previous software switches cannot achieve. It is expected that ongoing user growth will help to expand developers' communities. Likewise, it is expected that the use of Lagopus will help to expand and mature eco-systems through the addition of new functions, the stabilization of software, the development of tie-in tools, the maintenance of documents, and the accumulation of know-how.
The first version of Lagopus will be available as OSS in July 2014 (http://lagopus.github.io/).

(2) Development of a conformance test tool for OpenFlow switches

The Ryu SDN Framework is used by many switch developers due to its high conformance with OpenFlow specifications. In conjunction with this, NTT has been developing a conformance test tool for OpenFlow switches. Since OpenFlow specifications tend to be updated frequently and since they describe the determination of wide areas, it is difficult to speedily develop SDN switches that are highly compliant with them. To address this issue, NTT has co-developed a better conformance test tool with the help of various developers and users, in the same way as in the Ryu SDN Framework development process. This test tool is included in the Ryu SDN Framework and can be used by anyone.

(3)   Providing results obtained with the conformance test tool for various OpenFlow switches

Results obtained with the conformance test tool for various OpenFlow switches' have been published online (http://osrg.github.io/ryu/certification.html , Fig.1). When system developers or application developers want to use OpenFlow switches, they should inspect suitable hardware- or software-based switches on the basis of their needs. By referring to these published test results, developers and users can easily check the conformance scores of various SDN switches. Thus, the results are expected to aid in promoting the use of OpenFlow switches.

Through these approaches taken at the test center, NTT aims to accelerate cooperation with SDN developers and SDN users and also aims to expand SDN eco-systems.

3.   Features of products

(1) Fast SDN software switch "Lagopus" (Fig.2)

A fast SDN software switch that can be applied to wide area networks and that conforms to OpenFlow specifications

<1>   It is highly conformable with the latest and long-term-support OpenFlow 1.3.4. It also supports various protocols in not only data centers but also wide area networks.

<2>   With its fast packet processing implementation leveraging recent server architecture components such as multi-core CPUs, and its fast I/O processing by Intel DPDK, Lagopus can achieve the 1M flow control rule support and 10 Gbps forwarding performance needed for large scale and broadband forwarding processing in wide area networks.

(2) SDN controller "Ryu SDN Framework" (Fig.3)

A software platform that provides tools and libraries for easy deployment of SDN networks

<1>   Controlling various OpenFlow switches
In comparison with other SDN controllers, Ryu can handle a wider range of OpenFlow versions (1.0, 1.2, 1.3 and 1.4) and thus can control more OpenFlow switches.

<2>   Interoperability of existing network nodes
Since Ryu supports various protocols for existing network nodes, it can be applied even during network migration.

Details on the Ryu SDN Framework are available at http://osrg.github.io/ryu/

4. Future plans (Fig.4)

NTT will expand open source communities to accelerate not only widespread utilization of our approaches but also functional extension and performance increase with the cooperation of co-developers. The organization will also promote market expansion by leveraging open source software and aim at expanding SDN/NFV technology and stimulating business.

Glossary

*1)   SDN stands for "Software Defined Networking."

*2)   NFV stands for "Network Functions Virtualisation."

*3)   Wide area networks span a wide geographical area provided by carriers.

*4)   See the press release, "O$_3$ Project launched for achieving the world's first wide area SDN."
http://www.ntt.co.jp/news2013/1309e/130917a.html

*5)   OpenFlow is the first standard interface designed specifically for SDN, providing high-performance, granular traffic control across multiple vendors' network devices.
(Cited from ONF SDN White Paper https://www.opennetworking.org/images/stories/downloads/sdn-resources/white-papers/wp-sdn-newnorm.pdf)

*6)   OpenStack is a global collaboration of developers and cloud computing technologists producing the ubiquitous open source cloud computing platform for public and private clouds.
(Cited from OpenStack web site. https://www.openstack.org/)

Attachment·Reference

▶ Fig.1: Test Center for OpenFlow Switches

▶ Fig.2: Application Areas of "Lagopus"

▶ Fig.3: SDN Controller "Ryu SDN Framework"

▶ Fig.4: Future plans

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