

## NTT Press Releases

(News Release)

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Nippon Telegraph and Telephone Corporation

### NTT, in collaboration with Nicira Networks, Succeeds in Remote Datacenter Live-Migration

-Building flexible cloud environments by enabling live migration to any datacenter through network virtualization technology-

Nippon Telegraph and Telephone Corporation (Chiyoda Ward, Tokyo, President and CEO: Satoshi Miura, "NTT") has succeeded in live migration<sup>\*1</sup> of cloud computing ("cloud") environments in remote datacenters located in NTT Musashino R&D Center and in NTT Atsugi R&D Center by connecting virtual networks, without disrupting cloud services and datacenter operations. Through this network virtualization technology, redirecting to backup sites can be done promptly and services can be continued even during disasters and overload.

The live migration of remote virtual machines used Nicira's Network Virtualization Platform<sup>\*2</sup> (NVP) to migrate different network segments located in remote datacenters using OpenvSwitch<sup>\*3</sup>, KVM<sup>\*4</sup>, and other open technologies, without the use of special network hardware devices or configuration.

#### Background

New cloud services (hybrid-cloud<sup>\*5</sup>, inter-cloud<sup>\*6</sup>) that enable customers to connect their cloud environments to those of cloud providers and enable cloud providers to share virtual resources and connect to each other during overload and other emergency situations have recently gained wide attention because of their importance in maintaining Business Continuity Plans (BCP).

In particular, after the Great East Japan Earthquake, the demand for cloud technologies that enable undisrupted services even when datacenters incur damage during disasters through construction of backup offices and Disaster Recovery (DR) sites has greatly increased.

Technologies for migration of virtual machines under the same network conditions through server virtualization technologies, sharing network settings by linking specific switches using special devices, and connecting datacenters by tunneling<sup>\*7</sup> of previously specified datacenters have existed. However, connection between these remote datacenters, which usually have different network conditions, requires prior planning and specification, so that live migration to previously unspecified target nodes have not been possible.

#### Achievements

In this experiment, through the full-stack open-source cloud platform technology developed by NTT Information Sharing Platform Laboratories ("NTT Laboratories") and the world's most advanced network virtualization technology developed by Nicira, a software-based L2 over L3 logical network was constructed and live migration of virtual machines was carried out using open technologies like OpenvSwitch and KVM, without the use of special network hardware devices or configuration (Figure).

#### The following are the main features of the live-migration technology:

##### 1. Live migration to any datacenter is possible.

Because the logical network is software-based and independent from physical networks, by installing only the prescribed software, target virtual machines can be specified and network settings can be made during execution, making live migration to any previously unspecified datacenter possible.

##### 2. By enabling migration to particular servers only, energy conservation measures can be implemented in datacenters.

Because live migration functions can be used to optimize server resources by migration of operations to particular servers only, excess servers can be turned off and equipment maintenance can be scheduled, enabling implementation of energy conservation measures in datacenters.

## Future Plans

With the success of the live migration experiment, NTT Laboratories plans to continue R&D on network virtualization technologies for the following two applications:

### 1) DaaS (Desktop as a Service) service

By bringing the cloud environment to the customer's PC and smartphone, DaaS service will enable the customer to have the full benefits of an advanced user experience without the need for expensive devices. NTT Laboratories will conduct experiments on how to make the virtual network available over the DaaS environment and how to create dedicated networks and special shared servers for its customers. This technology will enable creating cloud environments that will allow customer-specified users to use dedicated networks through software, and only specified customers to use special shared servers within the dedicated networks.

### 2) Gateway to secured networks

NTT Laboratories will launch its own research on network virtualization through OpenFlow<sup>\*8</sup> overlay and gateway technologies to secured networks like MPLS/VPPLS. We will also explore technologies for end-to-end traffic management between multiple cloud environments.

## Collaboration with Nicira Networks

Nicira is a startup company with headquarters in California, U.S.A., and it has developed the world's most advanced network virtualization solution. Starting October 2010, NTT Information Sharing Platform Laboratories has been conducting collaborative work on virtual networks with Nicira Networks.

## Glossary

\*1 Live migration

Live migration is the movement to chosen servers without disruption of services using network virtualization technology.

\*2 NVP: NetworkVirtualization Platform

NVP is the brand name for Nicira's network virtualization solution.

\*3 Open vSwitch

Open vSwitch is a virtual switch used in virtual environments. It integrates total physical platforms to provide enterprise-level functions such as virtual local area network (VLAN), Quality of Service (QoS), tracking, and hardware acceleration support (single route I/O virtualization (IOV) network adaptors, etc.)

\*4 KVM: Kernel-based Virtual Machine

KVM is one of the main hypervisors for Linux. It enables virtualization of computers and parallel execution of multiple OS's.

\*5 Hybrid cloud

Hybrid cloud is a service that combines the "public cloud", the general services through the Internet and the "private cloud", the services within an industry or a company (within a firewall).

\*6 Intercloud

Intercloud is the network of cloud systems linked to each other.

\*7 Tunneling

Tunneling is a technology for building logical networks over the physical network layer.

\*8 OpenFlow

OpenFlow is an open-source network control technology proposed by the OpenFlow Switch Consortium.

Conventional network control had been carried out by IP address routing, but in OpenFlow, the combination of the MAC address, IP address, port number, etc. defines the "flow", enabling flow-based routing control. This technology is expected to improve quality and network utilization ratio.

## Attachment-Reference

▶ [Network virtualization technology for live migration of remote centers](#)

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