The RISE Testbed

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What is RISE?

• A large-scale OpenFlow testbed on JGN-X
  – Research Infrastructure for large-Scale network Experiments
  – for researchers, students, engineers, operators, ...

• Our Challenges
  – Initially, demonstration of wide-area deployment of OpenFlow technology (since 2009)
    • Design of under-lay network architecture (tunneling)
    • Know-hows in shooting OpenFlow network troubles
  – Now, development of OpenFlow testbed with ...
    • Isolated user environments that allow user-defined controllers
    • Interconnection of various testbed facilities such as network emulator, wireless/optical network testbed, cloud infrastructure, ...
    • More realistic applications/services
Towards global OpenFlow testbed

- **International RISE**
  - Already extended to US and Thailand
  - Planning to extend RISE to Singapore

- **Inter-connection among OpenFlow testbeds**
  - Planning to connect RISE and OFELIA (EU) and OS3E (US)
    - Prepare OF slices in RISE and OFELIA, and inter-connect them
    - Allows a controller in RISE/OFELIA manages inter-connected slices in RISE and OFELIA
RISE infrastructure (v1.0)

- **JGN-X links**
- **Q in Q trunk links**
- **OpenFlow-enabled vlan links**
- **mgmt and sec-chan seg. links**

Diagram showing network topology with various nodes and links labeled with city names such as "kkanazawa", "kote", "nnagoya", and "nfukuoka".
RISE architecture (v2.0)

User-defined OpenFlow networks

User-application environments (directly connected VMs)

Logically isolated user-networks (VSI-based user slices)

RISE physical infrastructure (OFSs + directly connected VMs)

Higher performance (new PFS5240 switches are installed)

Underlay network infrastructure (MPLS pseudo wires)

Free from MAC address learning issue (move from Q-in-Q to MPLS pseudo wire)

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Related infrastructures on JGN-X

- **vNodes**
  - Next-gen network virtualization infrastructure that supports OpenFlow slices (OFIAS: OpenFlow In A Slice)

- **StarBED**
  - Large-scale PC cluster for network emulation experiments

- **Virtual Storage**
  - Wide-area storage area network infrastructure

- **Wireless infrastructure**
  - Now deploying wireless access points connected to OpenFlow backbone networks in Iwate area (an area seriously damaged by 3.11 earthquake)

- **Cloud infrastructure**
  - Now deploying a large-scale cloud infrastructure in Keihanna area

We are planning to provide reachability to those infrastructures to enhance OpenFlow testbed facilities in RISE 2.0.
Summary

• RISE is an international OpenFlow testbed.

• RISE and OFELIA are planning to provide inter-connected OpenFlow testbed.

• RISE is planning to provide reachability to a wide-variety of ICT facilities such as network storages, servers, and emulation environments.

Thank you !!