

Network Virtualization Project at NICT/UTokyo

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Project Outline

- AKARI Project

- NICTJapan started New Generation Network Research (beyond NGN) with government fund.
- Naming as AKARI Project
- Looking for “Clean Slate”

- Network Virtualization

- “Network Virtualization” is part of AKARI project subjects.
- So far many “Clean Slates” have been proposed and continue to be proposed.
- We should pick the right one among them?
- “Network Virtualization” can give us answer.

Purpose of Network Virtualization

“Network Virtualization” has been evolving as a technique to enable test-beds

- Existing vehicles to “test” future networks
 - Emulab
 - PlanetLab/OneLab/EverLab/CORE
- Future test-beds
 - GENI
 - VINI (planetlab)
 - ProtoGENI (emulab)
 - Europe, Asia
 - G-lab (wurzberg/Germany)
 - OneLab (EU)
 - Core(NICT/Utokyo/Japan)

Public and Private PlanetLab

- Birth of Private PlanetLab enabled by MyPLC
 - PlanetLab → Public PlanetLab
 - Private PlanetLab : Smaller-scale, experimental PlanetLab-like environment

- From JGN2/NICT stand point
 - Public PlanetLab Activity
JGN/NICT Collocation
 - Private PlanetLab Activity
CORE (Utokyo/NICT)

JGN2/NICT PlanetLab Collocation

- JGN2/NICT Collocation
 - Princeton has donated machines



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PlanetLab

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Federation

PlanetLab is engaged in a federation trial with the OneLab Project. The plan is to migrate European nodes and slices to an independent EU authority. Follow the [federation link](#) to learn more.

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PlanetLab

PlanetLab is a global research network that supports the development of new network services. Since the beginning of 2003, more than 1,000 researchers at top academic

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Sites

- University of Tokyo
- NICT JGN2 Sendai
- NICT JGN2 Nagoya
- NICT JGN2 Osaka
- NICT JGN2 Okayama
- NICT JGN2 Hiroshima
- NICT JGN2 Kochi
- NICT JGN2 Fukuoka

Nodes

- University of Tokyo

CORE: Private PlanetLab

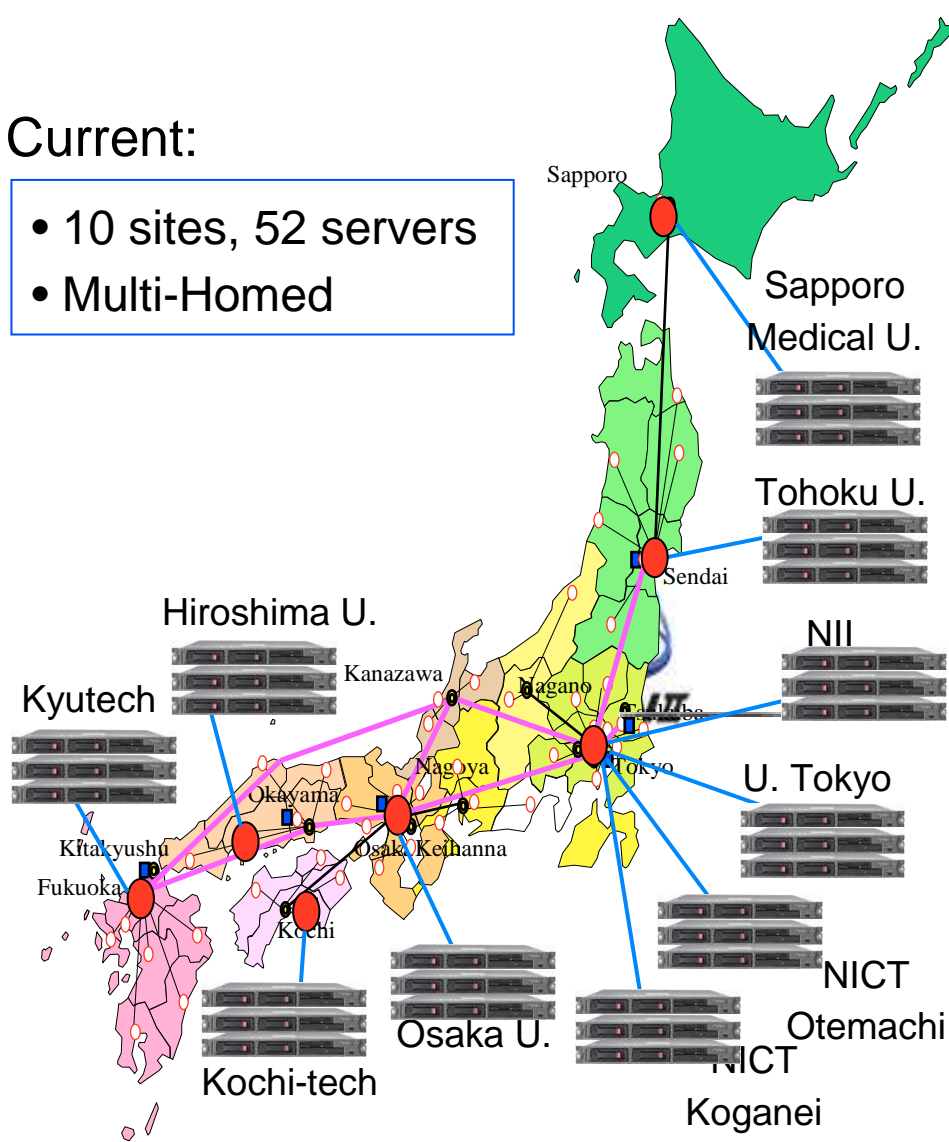


THE UNIVERSITY OF TOKYO



Current:

- 10 sites, 52 servers
- Multi-Homed



CORE

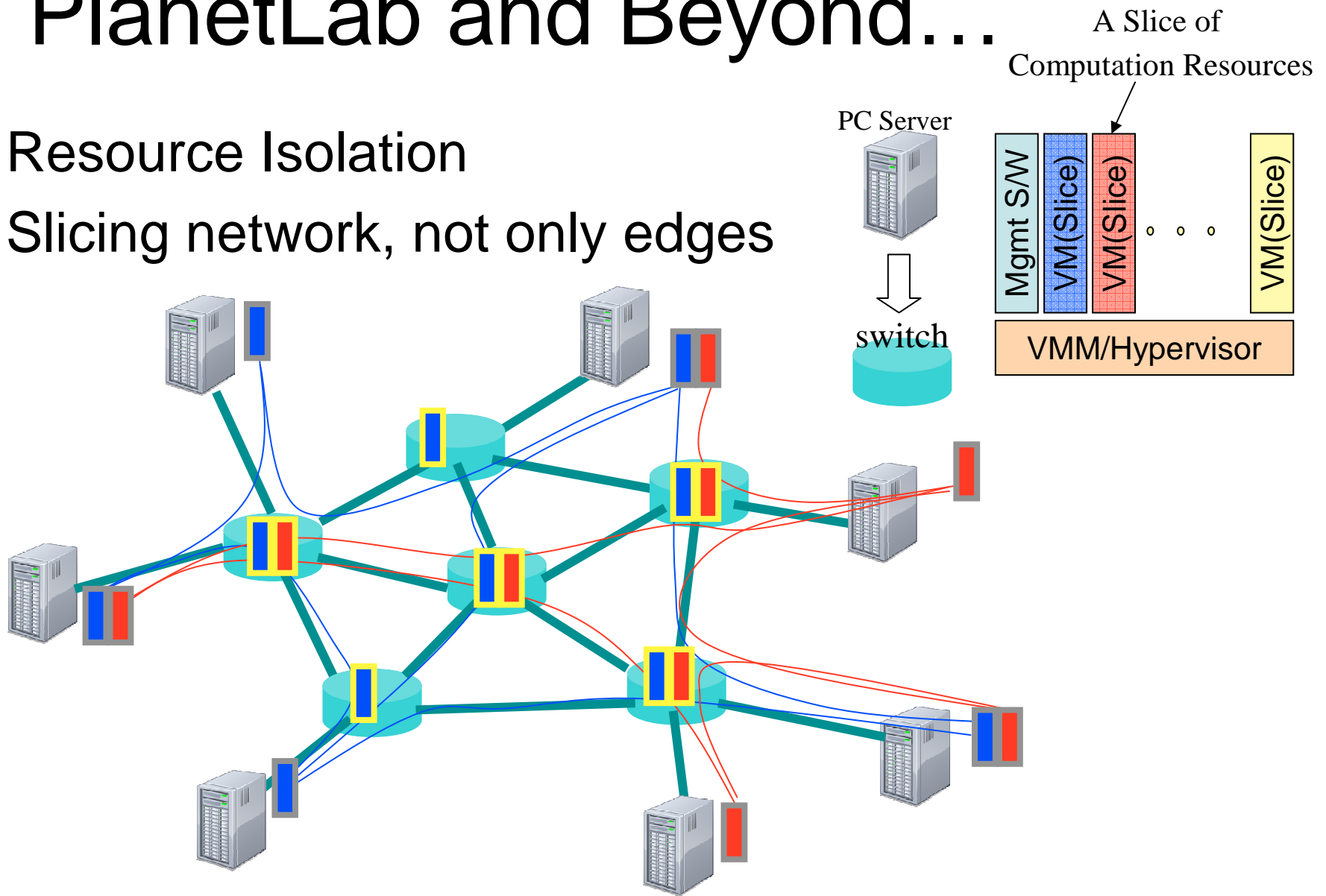
- Collaborative Overlay Research Environment
 - ▣ Overlay test-bed based on “Private PlanetLab”
 - ▣ Provision resources for mission critical services
- Features we would like to have...
 - ▣ Custom hardware to optimize overlay forwarding
 - ▣ PoP/Core collocation (nodes “inside” network)
 - ▣ Custom hardware to optimize overlay forwarding
- Federation (e.g. PlanetLab, OneLab)
- Target overlay research
 - ▣ Not just on distributed system apps
 - ▣ More on network core architectures
- Utilize both private & public environments
 - ▣ Local v.s. Global / Provisioned v.s. Best-Effort

New Generation Perspectives to Overlay Network

- Testbed for prototype and evaluate a new generation network design
- Evolutional nature of overlay network to incorporate into the design

PlanetLab and Beyond...

- Resource Isolation
- Slicing network, not only edges

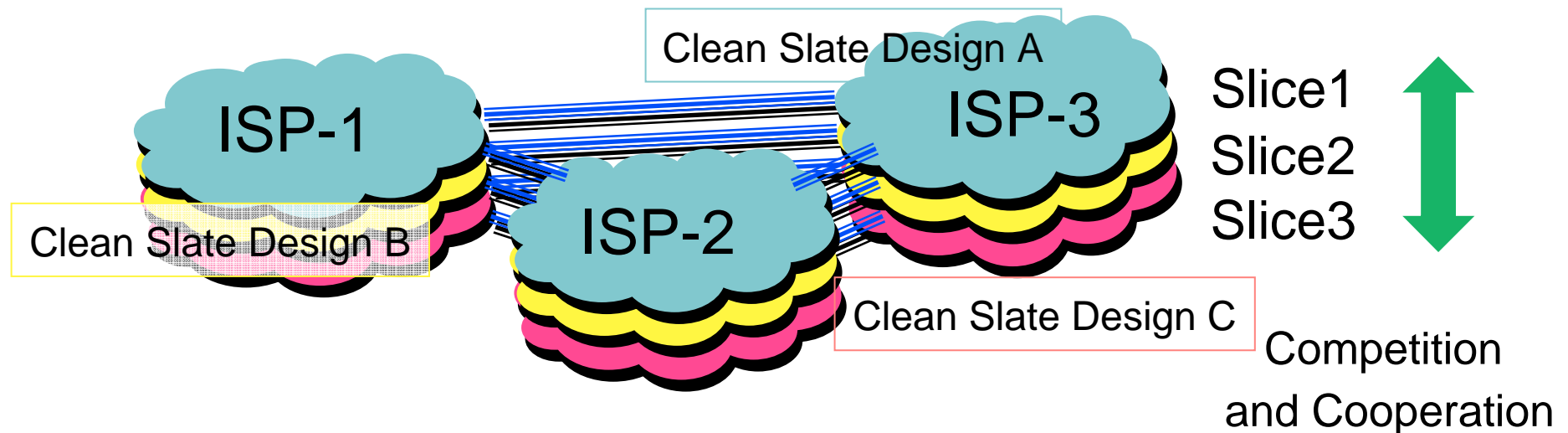


“Network Virtualization” capable routers everywhere⁷

“Clean Slate” Competition and Cooperation

- Competition between “slices” across ISPs

Slice: a set of isolated resources (PlaneLab in GENI context)



This is possible via “**network virtualization**”

Conclusion

- Network virtualization
 - Enable interesting usage of network resources
 - Experimentally validate new generation networks
 - Accommodate multiple architectures validation
 - Emerged for test-beds, but may turn out to be a generic, meta network architecture
- Research Activity Area
 - How to enable network virtualization?
 - How to utilize/apply network virtualization?