



東京大学情報基盤センター
INFORMATION TECHNOLOGY CENTER, THE UNIVERSITY OF TOKYO

Current challenges for R&E networks

- from a viewpoint of university's network -

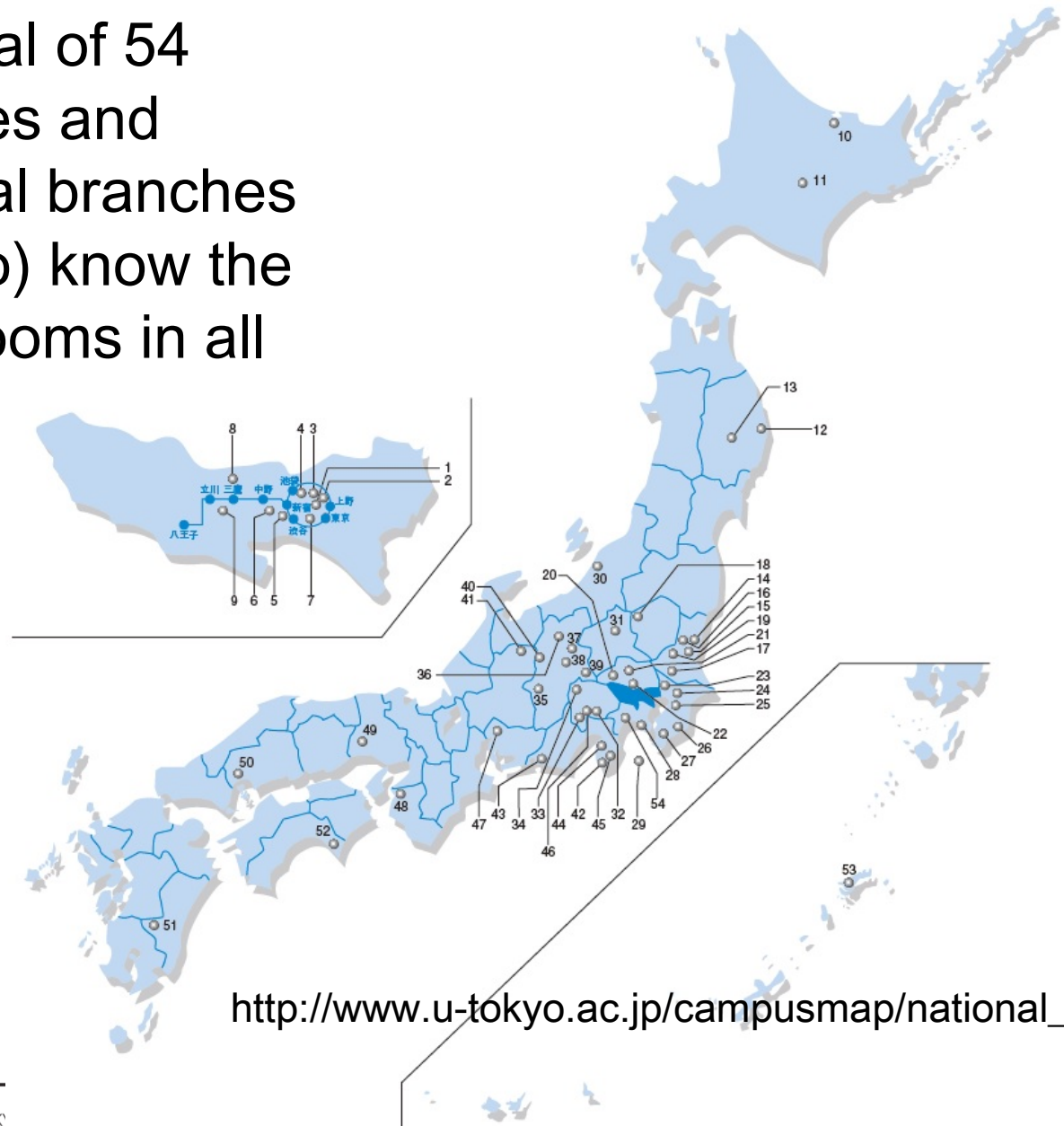
Tomohiro Kudoh
The University of Tokyo

Situation surrounding university's network is rapidly changing

- Structure of network is getting more and more complicated
 - Many buildings are used by multiple departments / schools
 - Many outside-campus labs
 - Not a “campus network” anymore
 - Wide spread use of wireless network I
- Personnel structure is complicated
 - So many different kinds of positions
 - Students, visiting researchers...

UTokyo's domestic branches

- UTokyo has a total of 54 domestic branches and some international branches
- No one (seems to) know the total number of rooms in all the buildings



http://www.u-tokyo.ac.jp/campusmap/national_j.html

University's network (cont.)

- Increasing security threats
 - New types of threats are emerging
 - Strong “guidance” from presiding ministry (incl. penalty)
 - Organization-wide security measures is mandatory
- Different demands from different departments / labs
 - Need to segment in-university network
 - Security policies are also different
- Increasingly tightened budget
 - At least in Japan....

R&E network challenges

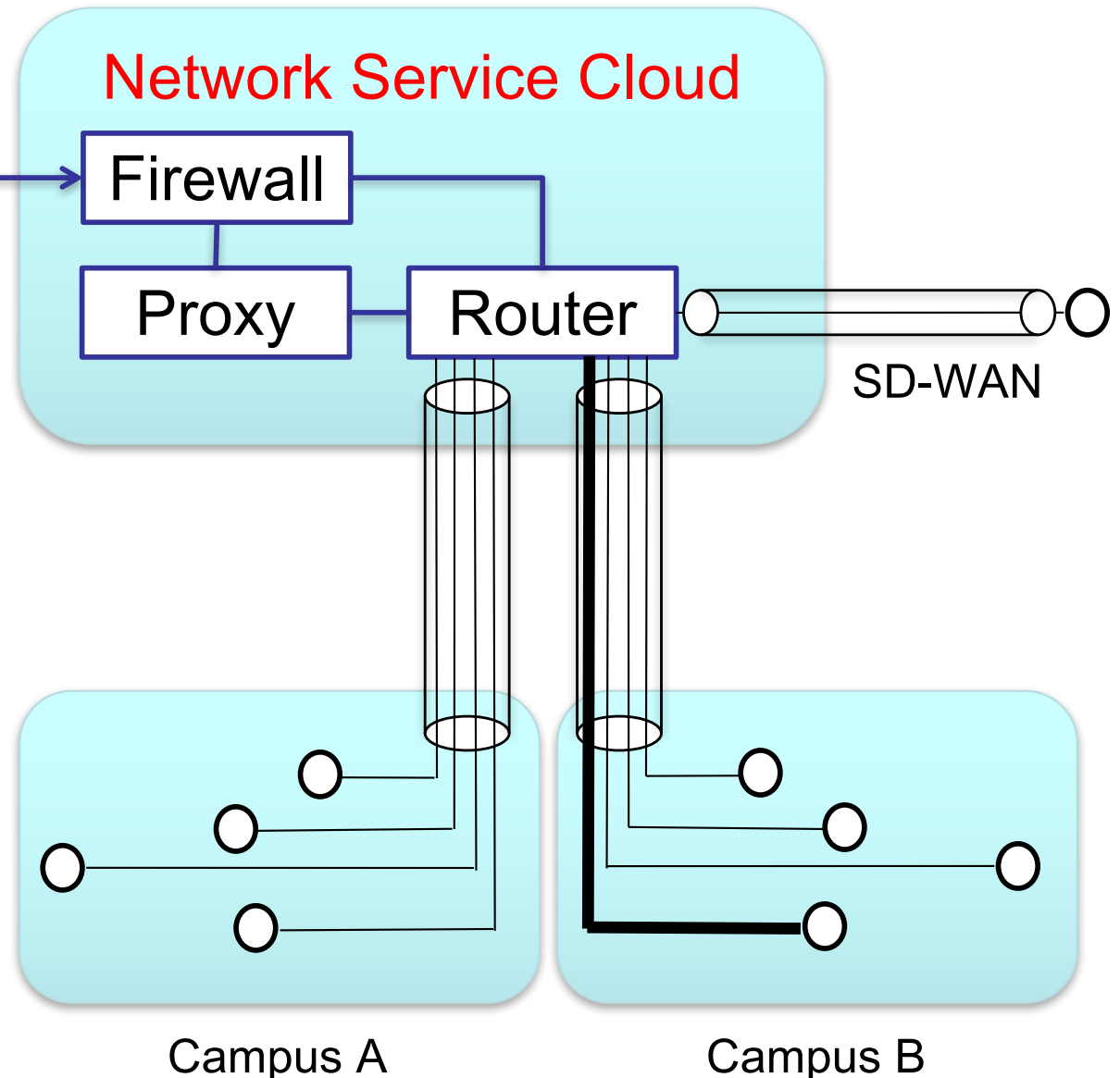
- R&E networks should not be just pipes
 - Services provided by R&E networks are becoming increasingly important
 - Volume efficiency
- R&E networks should support usage from outside of campuses



Network Service Cloud

Network Service Cloud (NSC)

- Network functions (router, firewall etc.) implemented as VNF and built up in Cloud
- Should be able to be connected from anywhere (incl. outside of campuses)
- Campus network can be very simple
 - Physical bandwidth is important



Advantages of NSC

- Cost efficient
 - Cloud infrastructure shared by many R&E organizations
 - Allocate resources according to demands
 - Centralized operation reduces cost for 7D/24H
- Reliable
 - Failed resources can be replaced with new one dynamically
- Position independent
 - Can be accessed from anywhere
 - Disaster prevention by using data centers at distant places

Challenges for NSC

- Cloud for “network”
 - Current clouds are not designed for network
 - Bandwidth hungry applications require stable guaranteed performance
 - Coordination of “physical” and “virtual” is an issue
 - Including connections between clouds and campuses
- Interoperation with university’s AAA/policy
 - University has so many different kind of members who have different rights/duties
- Manageability
 - Division/department/school network manager should be able to manage NFV functions according to their needs/policies

Further challenges

- Coordination with other resources
 - Supercomputers, storages
 - In or outside of the campuses
- Coordination with services
 - Such as DTN
- Coordination with wireless network
 - 5G might replace in-campus WiFi
 - Special MVNO for universities?
- Coordination with sensors, etc.
 - IoT support
 - Huge number of edge devices
 - In and outside campuses