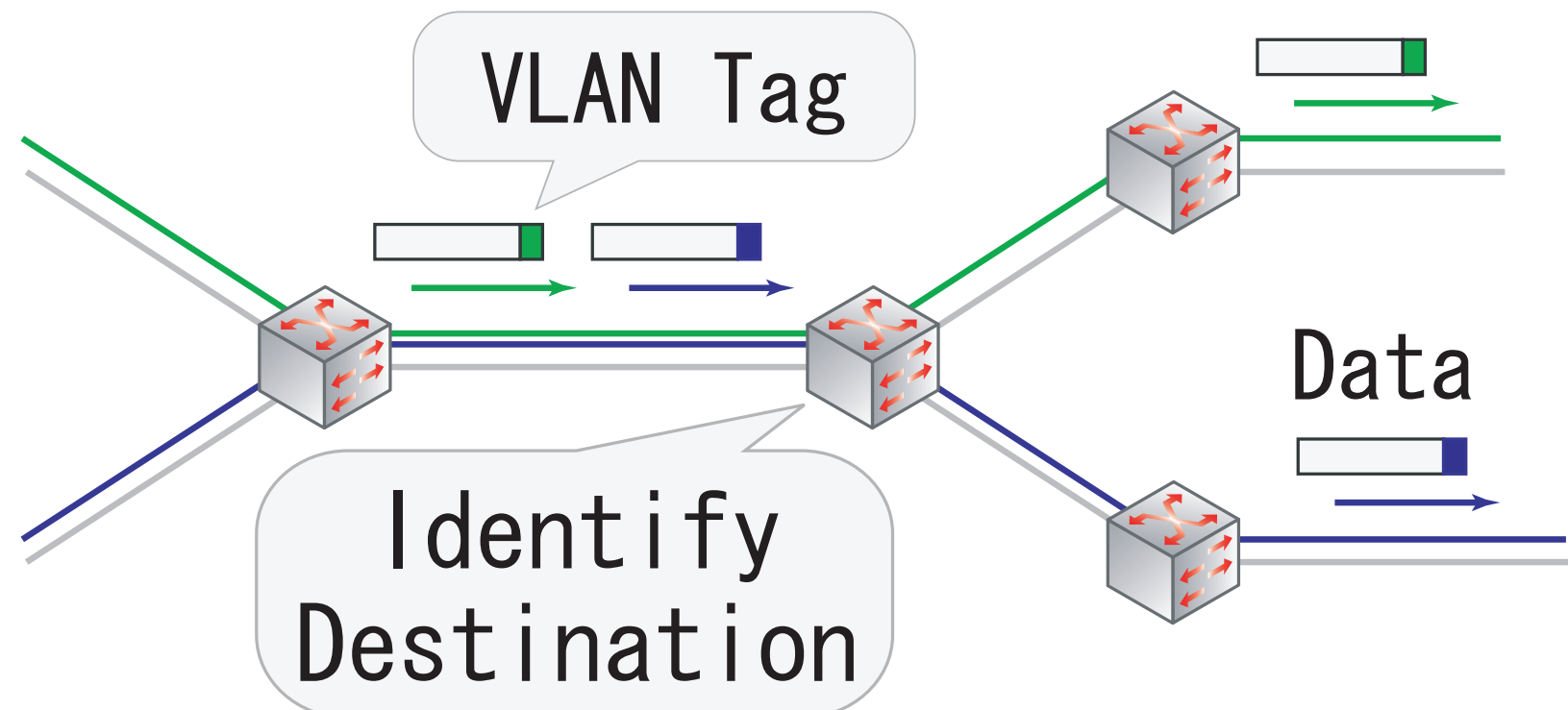# Next-Generation Layer-2 Network Technology —Research Background—

Wide-Area Ethernet

Request of dynamic Point-to-Point connection setup between LANs over high-speed network ➜ Provide an Ethernet Virtual Private Line (EVPL) over wide-area Ethernet

- VLAN is commonly used in Wide-Area Ethernet

VLAN Tag is attached to Ethernet frames for identifying destination ⟶ Establish EVPL

Features of the current Ethernet
- Low cost
- Easy use for Users

Existing Ethernet Technology is not enough to support Wide-Area Network
- Too small and inflexible VLAN ID space
- Poor security and control function
- Complicated configuration for VLAN setup

Research Goal

Variety of Services over Wide-Area Network by Next-Generation Layer-2 Technology.
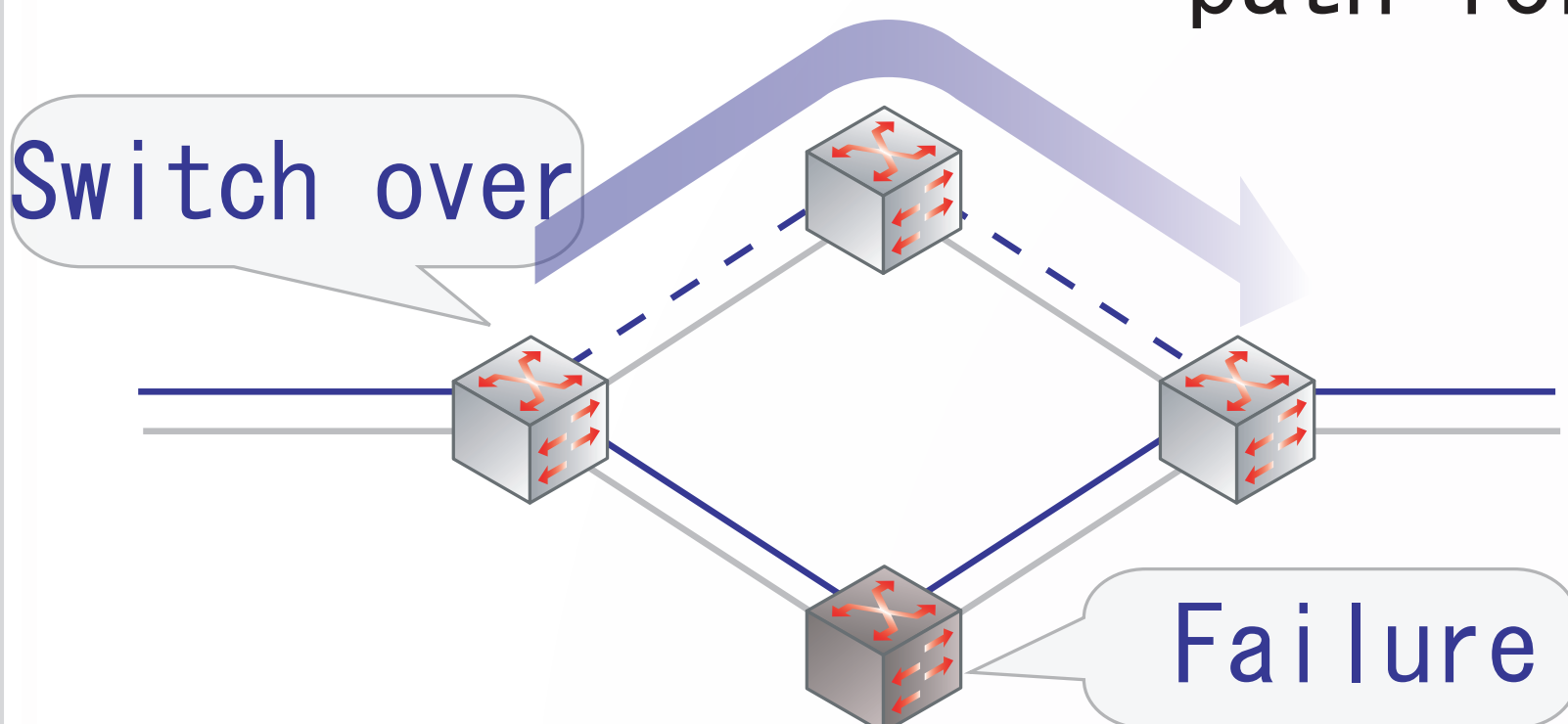
Autonomously establish an EVPL as a first step

Research Framework
- Keep good features
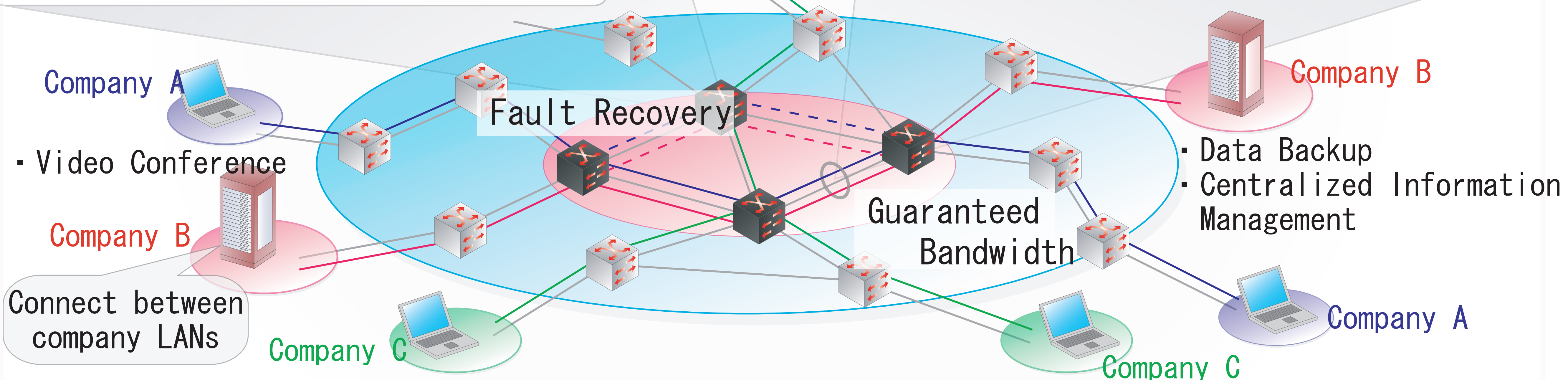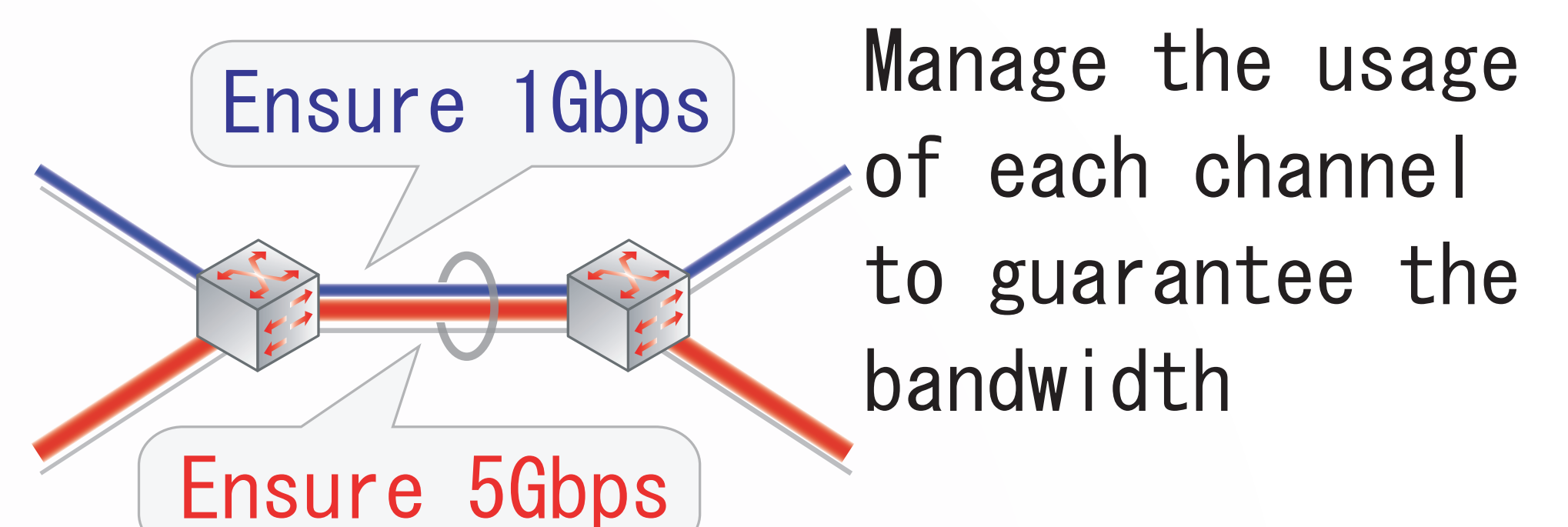- Create layer-2 network technology with breaking the Ethernet

Expected Services

- Fault Recovery — Prepare backup path for failure

Switch over / Failure

Multiple LANs can be connected

- Guaranteed Bandwidth

Ensure 1Gbps / Ensure 5Gbps

Manage the usage of each channel to guarantee the bandwidth

Company C

Company A
- Video Conference

Company B
Connect between company LANs

Company C

Fault Recovery

Guaranteed Bandwidth

Company B
- Data Backup
- Centralized Information Management

Company A

Company C

Implementation of Next-Generation Layer-2 Technology Provides Low-Cost and High-Speed Network with Freely Ondemand EVPL establishment Supporting Guaranteed Bandwidth and Fault Recovery.
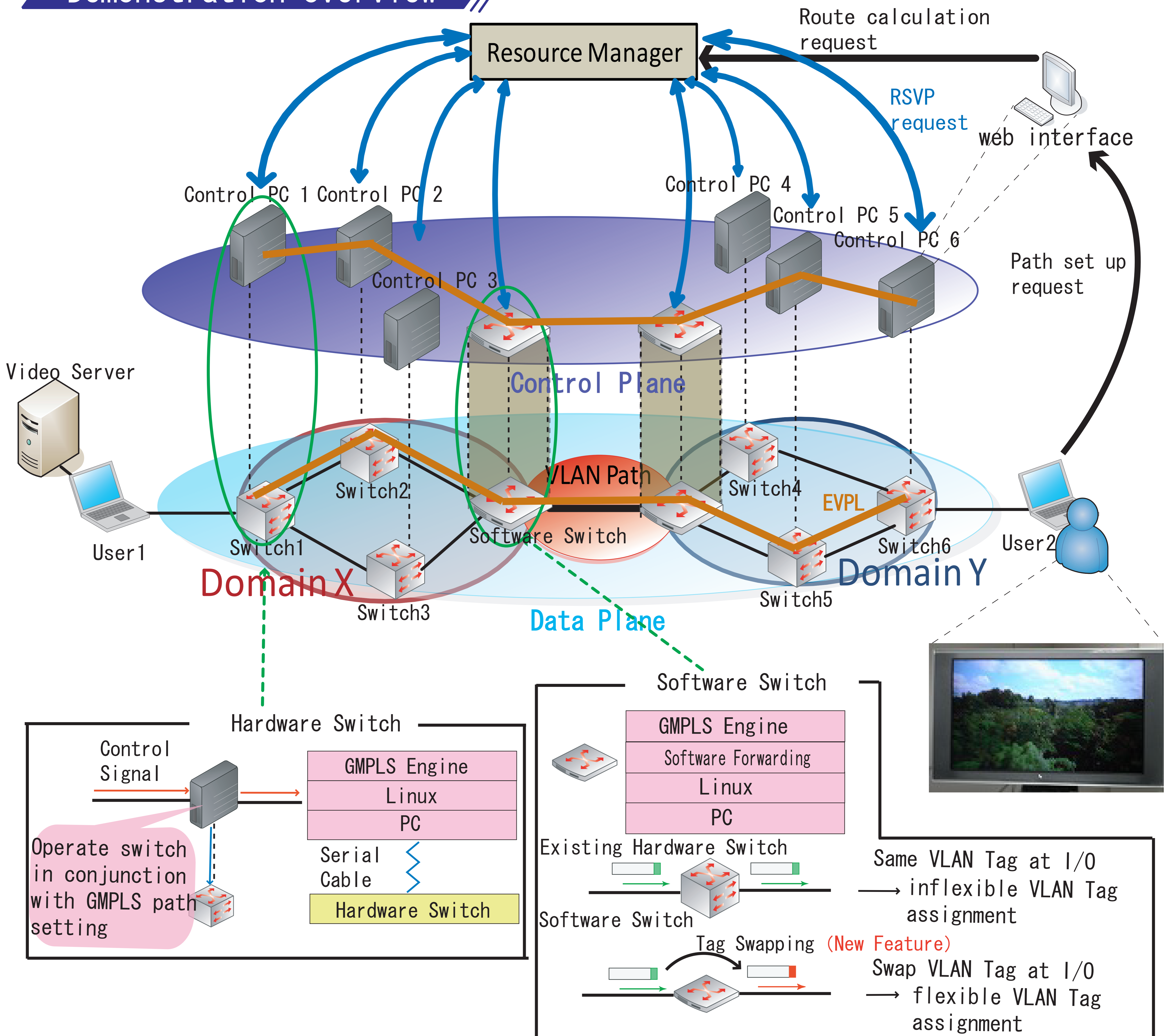
Yamanaka Lab.

http://www.yamanaka.ics.keio.ac.jp
3-14-1 Hiyoshi, Kohoku-ku, Yokohama, Japan

Next-Generation Layer-2 Network Technology
—Experiments—

Summary

①Automatic establishment of EVPL paths using GMPLS
— On demand path set up/tear down requests via Web Interface
— Route calculation on the Resource Manager and path set up by RSVP signaling
②Tag swapping feature using software Layer-2 switch
— Solution to the problem of the VLAN Tag space

Demonstration overview

Resource Manager

Route calculation request

RSVP request

web interface

Path set up request

Control PC 1 Control PC 2
Control PC 3
Control PC 4
Control PC 5
Control PC 6

Control Plane

VLAN Path

Video Server

User1

Switch2
Switch1
Switch3
Software Switch
Switch4
Switch5
Switch6
EVPL

Domain X
Domain Y

Data Plane

User2

Hardware Switch

Control Signal

Operate switch in conjunction with GMPLS path setting

GMPLS Engine
Linux
PC

Serial Cable

Hardware Switch

Software Switch

GMPLS Engine
Software Forwarding
Linux
PC

Existing Hardware Switch

Software Switch

Same VLAN Tag at I/O → inflexible VLAN Tag assignment

Tag Swapping (New Feature)

Swap VLAN Tag at I/O → flexible VLAN Tag assignment

Future Prospects

Create Next-Generation Layer-2 Network with breaking the Ethernet
— Provide High-Speed Failure Recovery and Guarantee QoS by bandwidth control