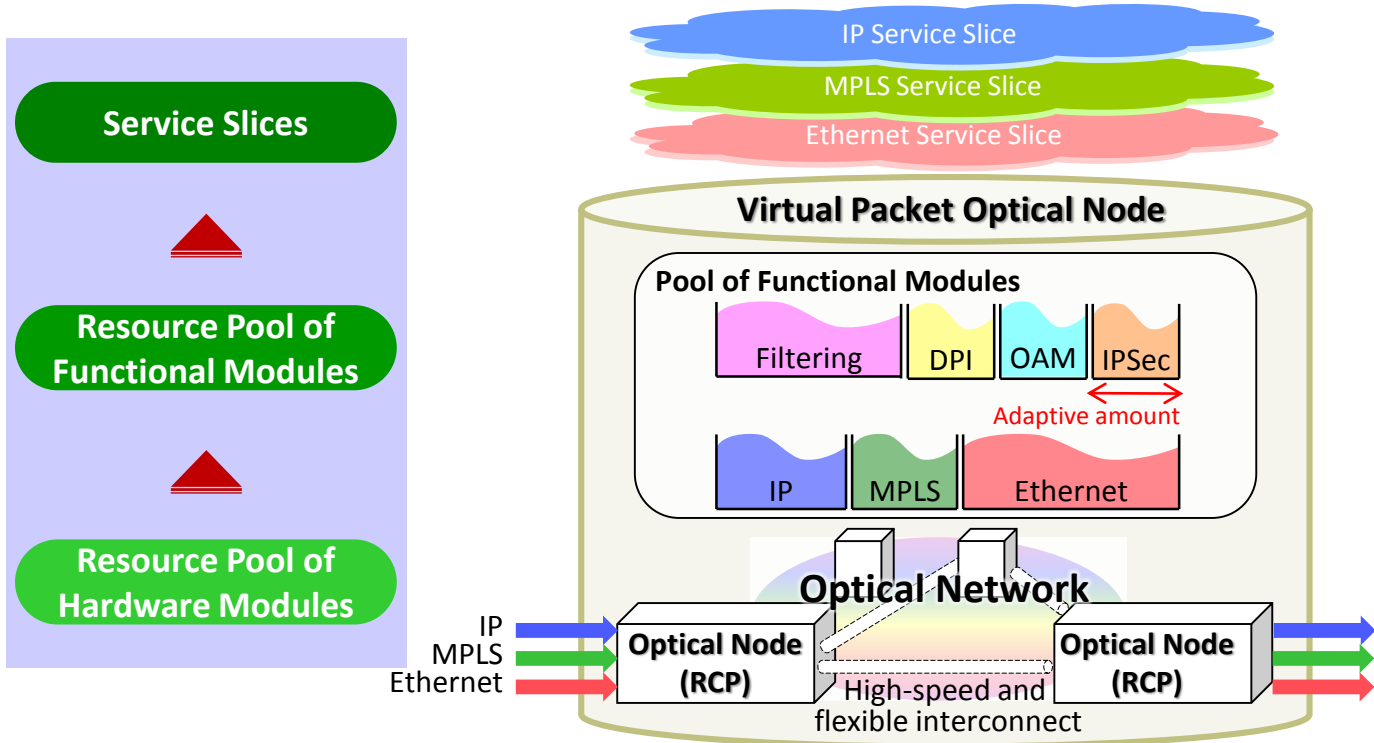# "Reconfigurable Communication Processor over Lambda" Project
ALAXALA Networks Corporation, NTT Network Innovation Labs., Keio University

Concept
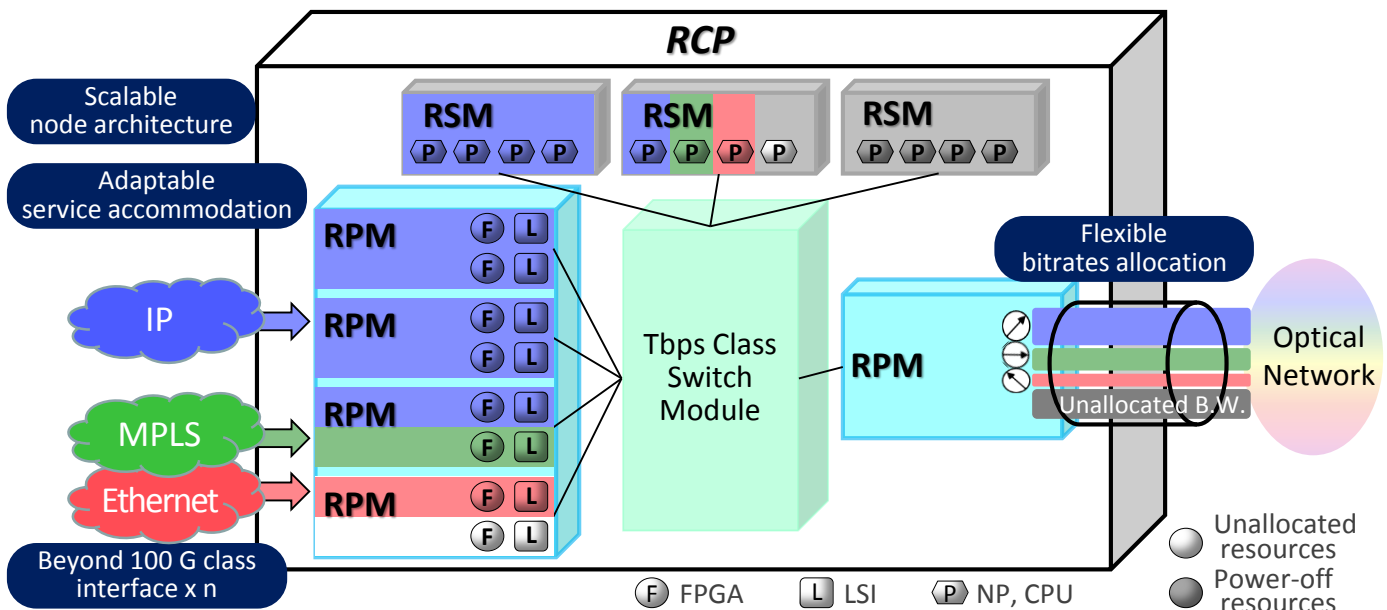
Virtual Packet Optical Node: is constructed with Reconfigurable Communication Processor resources interconnected via high-speed and flexible optical network. "Resource pool" of hardware modules on RCPs can adaptively provide multiple service slices.

Service Slices

▲

Resource Pool of Functional Modules

▲

Resource Pool of Hardware Modules

IP Service Slice

MPLS Service Slice

Ethernet Service Slice

Virtual Packet Optical Node

Pool of Functional Modules

Filtering | DPI | OAM | IPSec
Adaptive amount

IP | MPLS | Ethernet

Optical Network

IP
MPLS
Ethernet

Optical Node (RCP) — High-speed and flexible interconnect — Optical Node (RCP)

RCP Architecture

Reconfigurable Communication Processor (RCP): is composed of **RPM** (Reconfigurable Processing Modules), **RSM** (Reconfigurable Service Modules), and Tbps class (optical) switch modules which interconnect with intra/inter RCP modules.

RCP

Scalable node architecture

Adaptable service accommodation

RSM — P P P P
RSM — P P P P
RSM — P P P P

RPM — F L / F L
RPM — F L / F L
RPM — F L / F L
RPM — F L / F L
F L

IP

MPLS

Ethernet

Beyond 100 G class interface x n

Tbps Class Switch Module

Flexible bitrates allocation

RPM

Unallocated B.W.

Optical Network

F FPGA   L LSI   P NP, CPU

○ Unallocated resources
● Power-off resources

Recursively Clustered RCP

RCP: Reconfigurable Communication Processor
RPM: Reconfigurable Processing Module
RSM: Reconfigurable Service Module

- Virtual packet optical node is created over RCPs

  ➔ **Hardware on RCPs can be treated as "resource pool" thanks to high-speed optical interconnection**

- Middleware manages resource pool to satisfy QoS requirements of each flow

  – Several protocol types of RPMs
  – Hundreds of service types of RSMs

IP MPLS Ethernet …
Pool of RPMs (FPGAs/LSIs)

Filtering DPI OAM IPsec …
Pool of RSMs (CPUs/NPs)

Logical mount
Use other RCP's resource as if they are own ones

Saitama

2
RSMs

Switch Module

Optical Inter-connection

1 **RPMs** *Yokohama*

3

Tokyo

Chiba
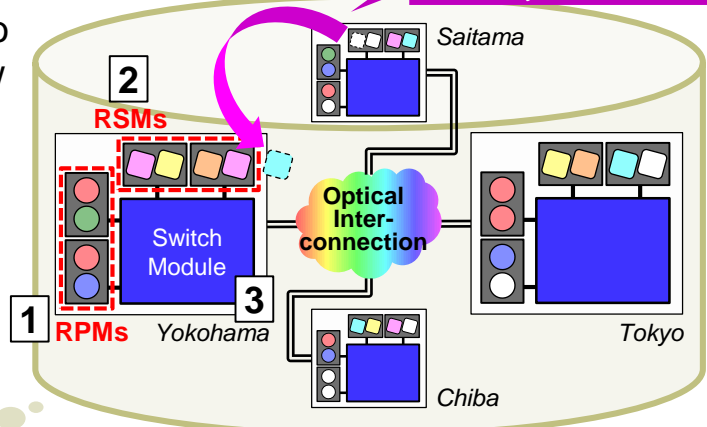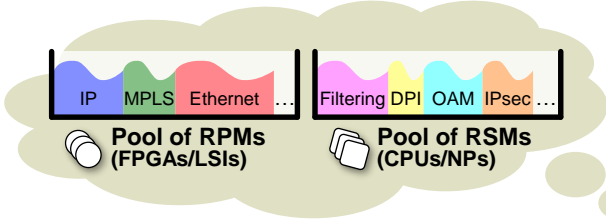
Recursively clustered "Kanto" RCP

RCP Development

2 **RSM**

1 **RPM**

3

X-bar X-bar X-bar X-bar

Pool of NPs

Tbps Class Switch Module

RSM **2** RSM
RSM   RSM

Pool of LSIs and FPGAs

RPM

1

Beyond 100G class interface

IP   MPLS   Ethernet

Pool of interconnect

Flexible Channelized link

Physical Link
Physical Link
Physical Link
Physical Link

Optical Network