

Open-Architecture Router for Enlarging Network

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1. Diversification of services in IP networks

- ◆ network carriers request :
 - ◆ new and customized services that they want provide as soon as possible
 - ◆ new functions can be more easily added to router
- ⇒
- ◆ open architecture router (OAR) :
 - ◆ an open architecture and standard interfaces

2. Increase traffic in IP networks

- ◆ network carriers request : network stability and reducing maintenance cost in large-scale networks
- ⇒
- ◆ distributed OARs and a consolidated control plane procedure for reducing route computation

Concept for OAR(Open Architecture Router)

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- Objectives
 - Getting more flexible router
 - Adding new function
 - Adding calculation and control power
 - Customizable
 - Cost reduction
 - Adoption to large scale network
- What's open ?
 - architecture and interfaces
 - Using standard & modular architecture
 - Hardware
 - Software

Introduction(1/2)

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- Diversification of IP services (Issue 1):
 - economical and more flexible architectures routers
 - vs. conventional commercial routers
 - A modular architecture : efficient and flexible routers to be constructed by assembling standard commercial hardware, software components
- Many industry standardization activities for telecom equipment
 - Advanced Telecom Computing Architecture (ATCA) : PCI Industrial Computer Manufacturers Group (PICMG)
 - Control and forwarding plane separation framework : IETF Forwarding and Control Element Separation (ForCES) WG
 - Line card API (NPF-API) : Optical Internetworking Forum
 - Carrier-grade Linux (CGL) : Open Source Development Labs
 - High-availability middleware: Software Availability Forum(SAF)

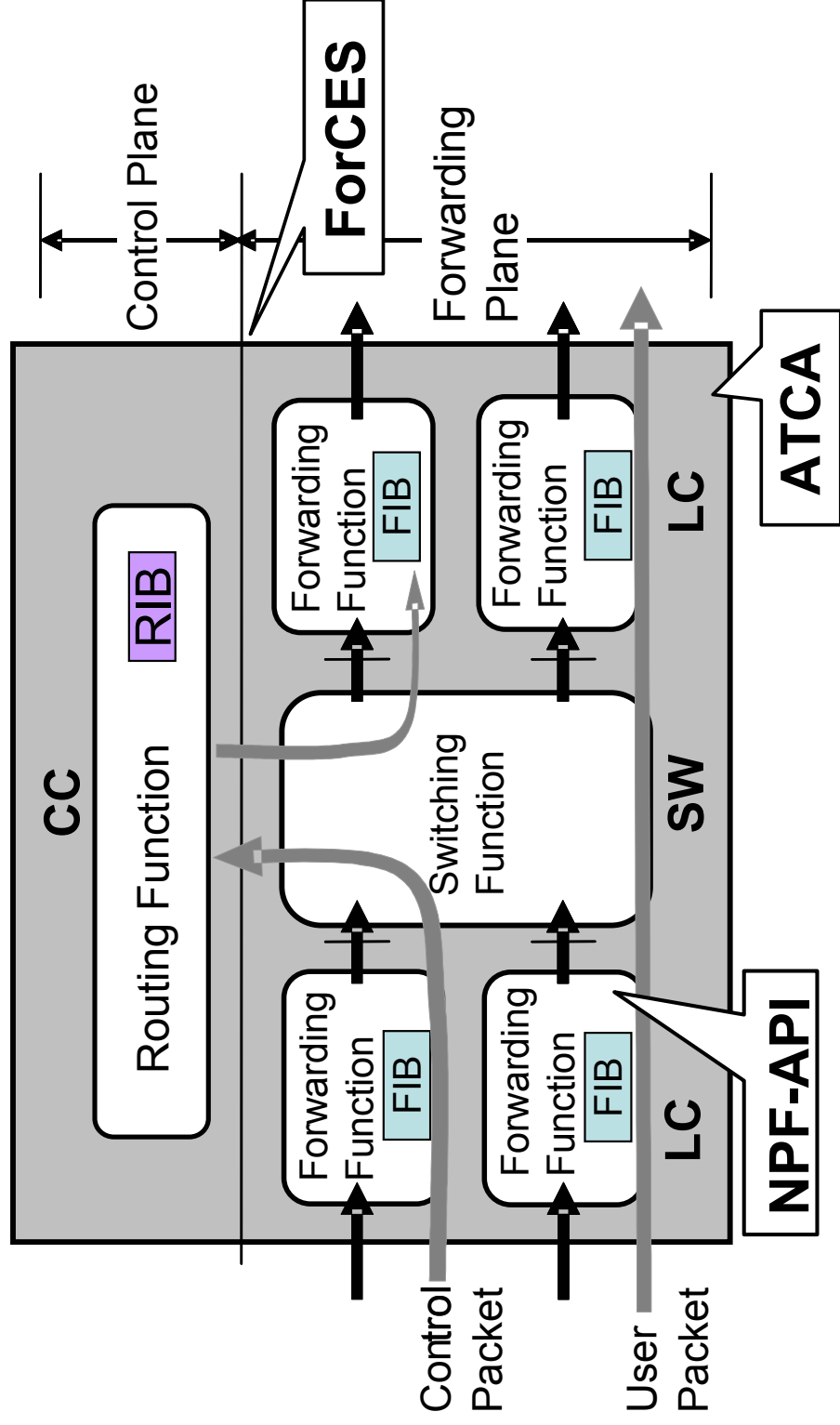
Introduction(2/2)

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- The standard-based open-architecture router (OAR) is a leading candidate for an economical router with a flexible architecture.
- Increase traffic in IP networks (Issue 2) :
 - For a more flexible, large-scale network, there is a method to separate control elements (CEs) from forwarding elements (FEs) in the network like soft-switch and soft-router.

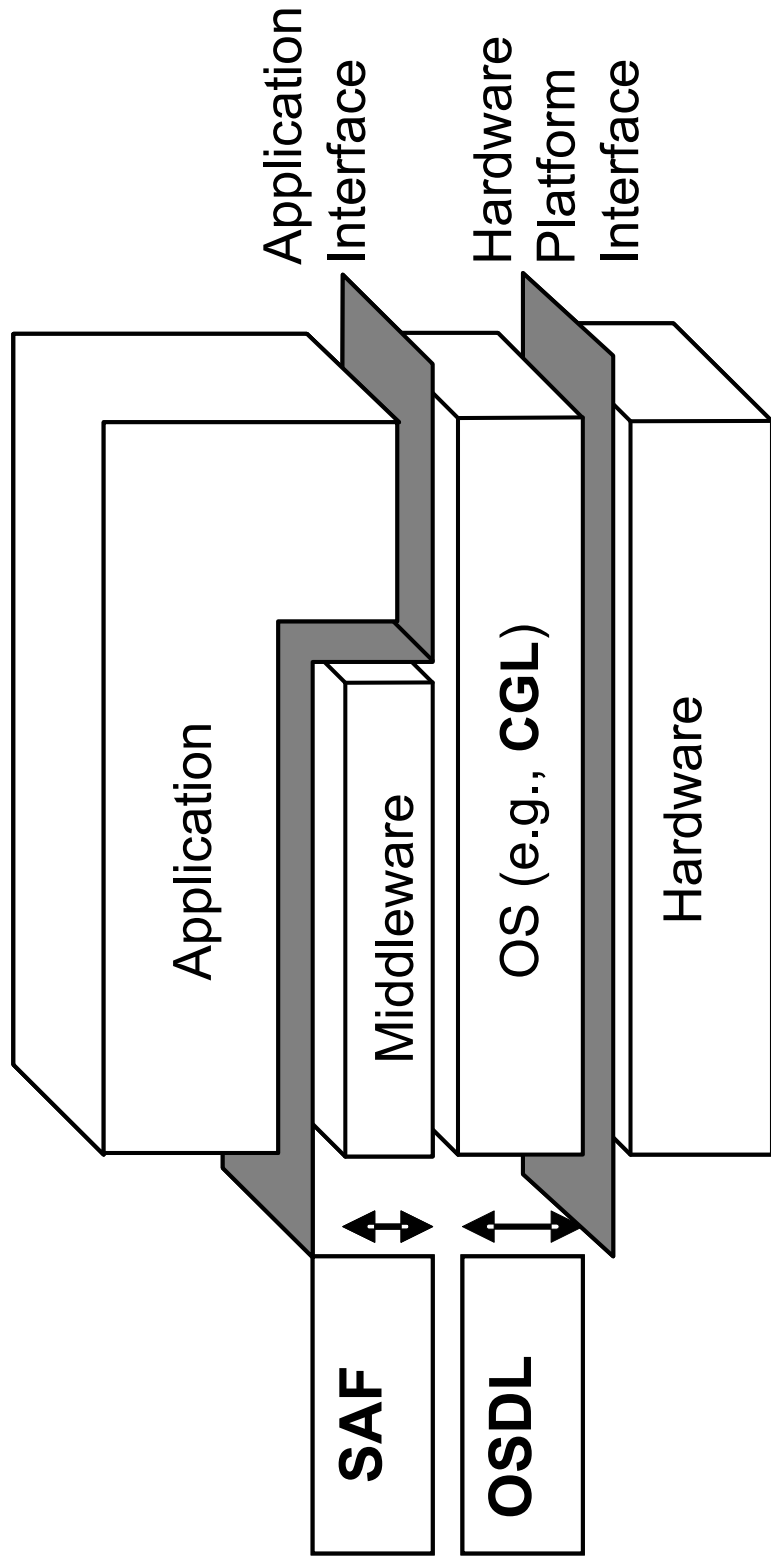
Configuration of Open Architecture Router (hardware)

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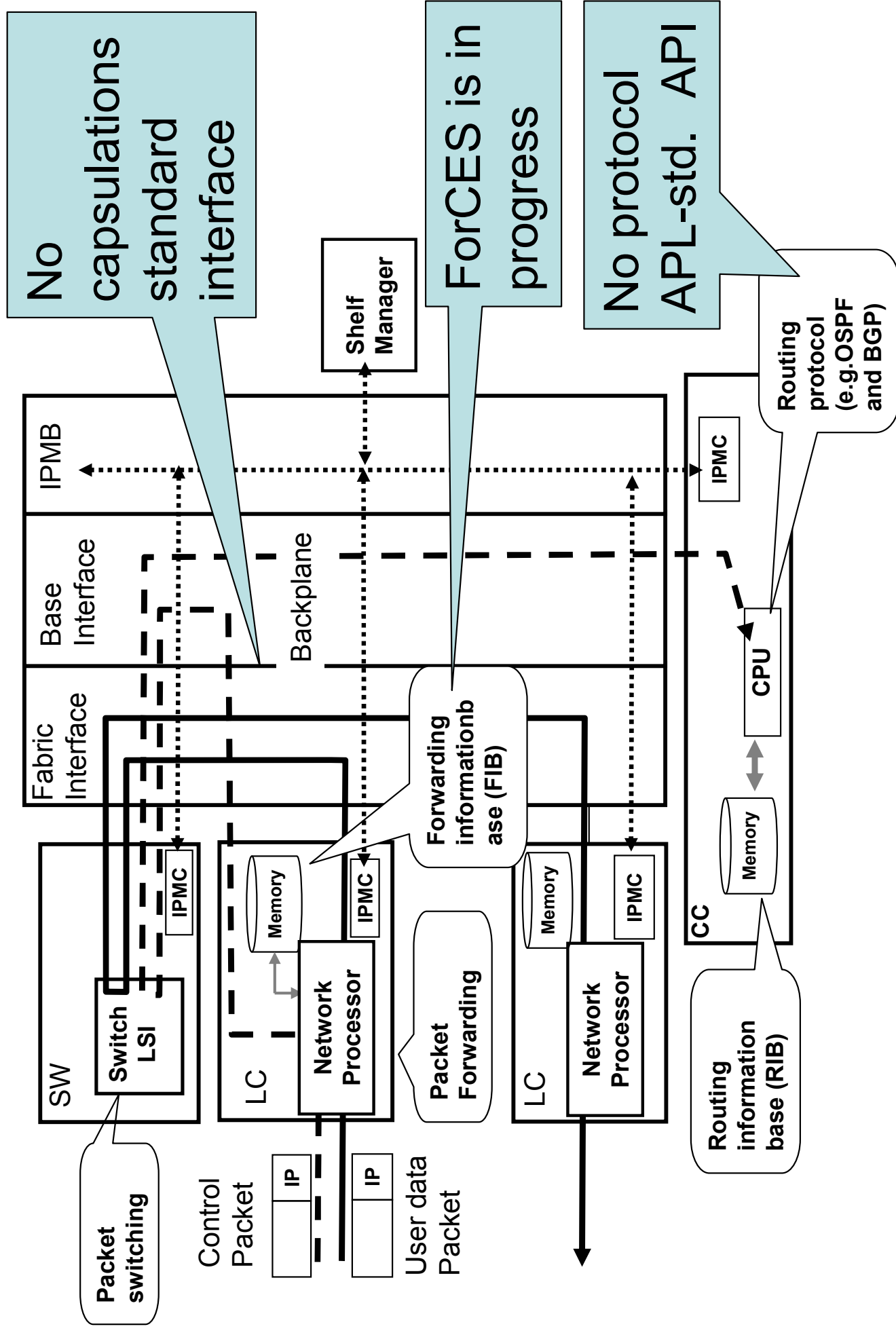


Configuration of Open Architecture Router (software)

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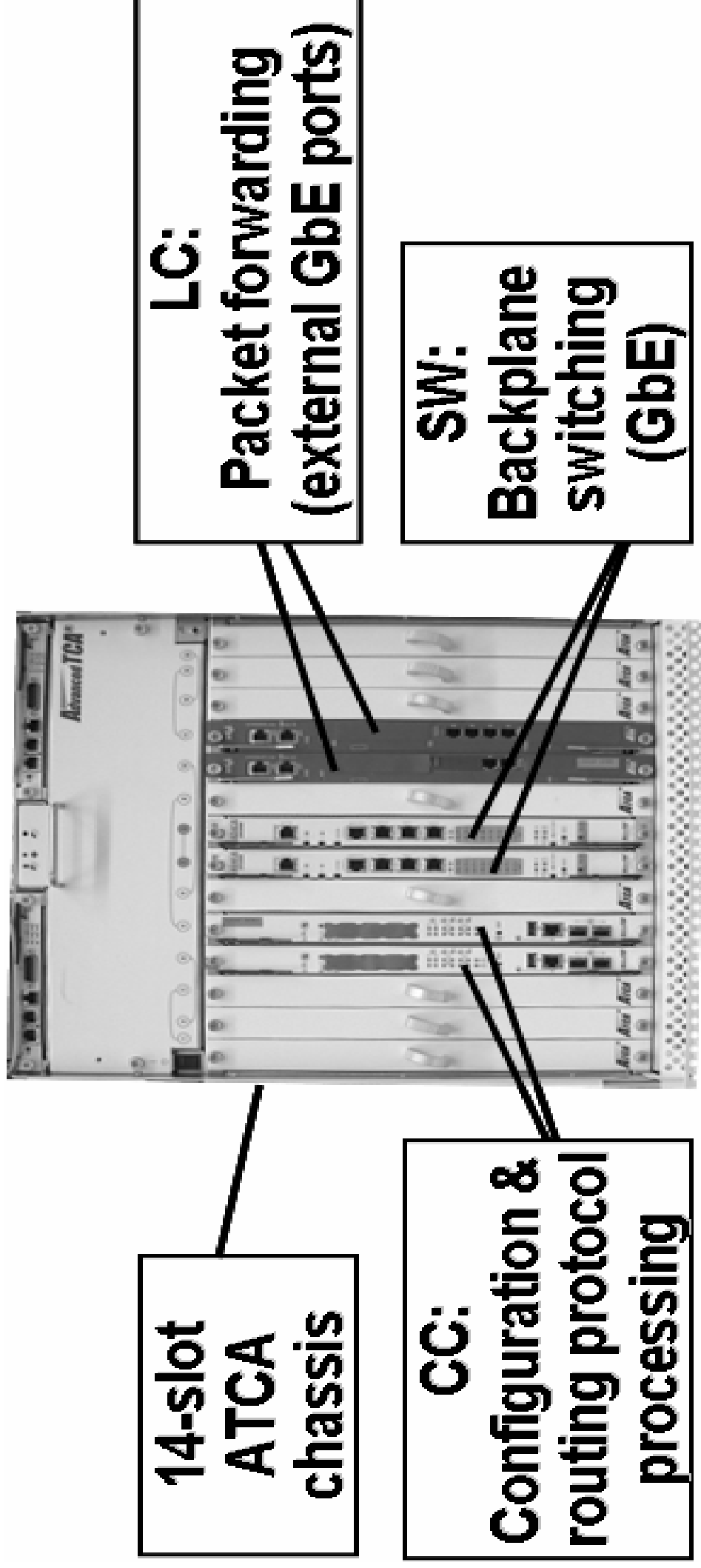


Block diagram for OAR using ATCA



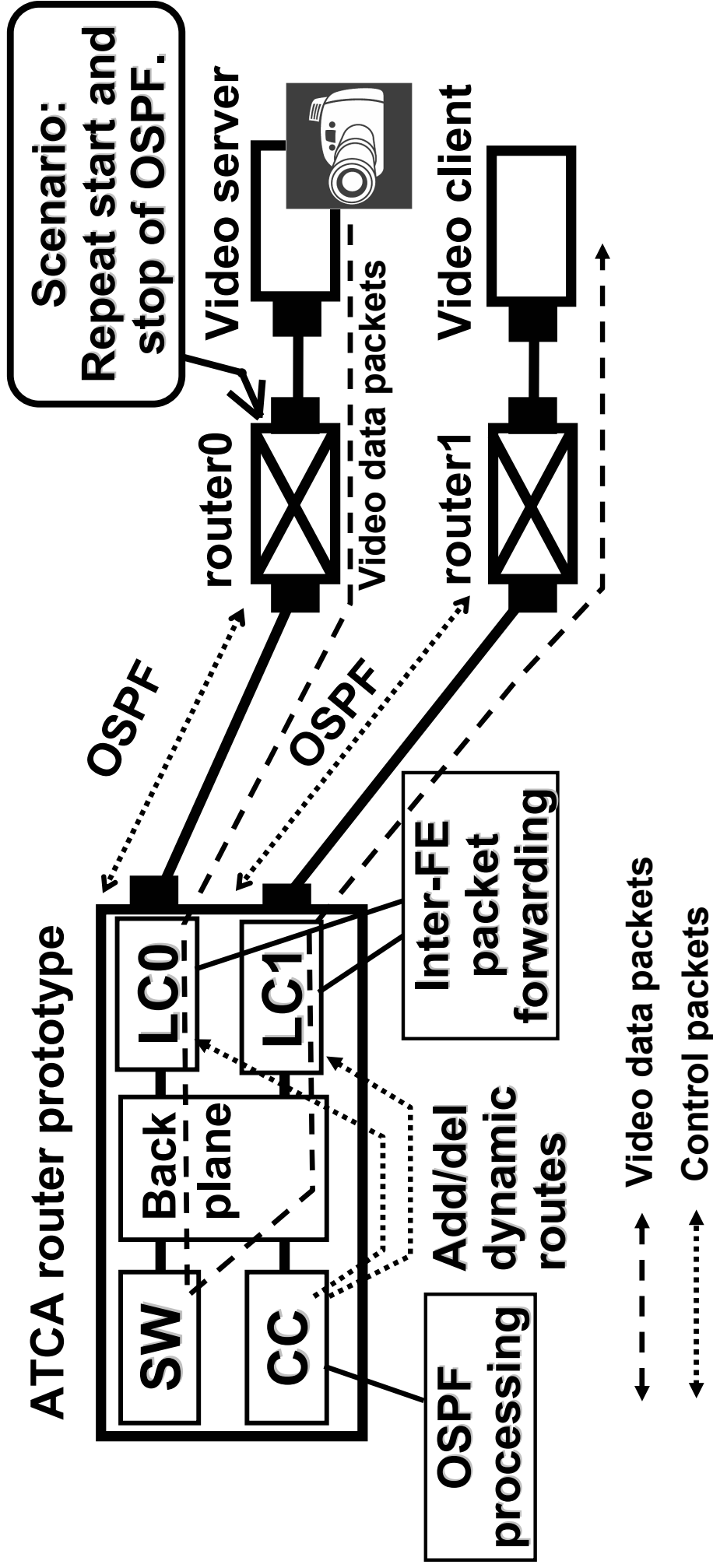
ATCA router Prototype system

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Demonstration

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Open-Architecture Router for Enlarging Network(1/2)

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- Increase the size of networks using OAR
- Composed of separate control elements and forwarding elements in a network.
- Using ForCES, but not enough
 - Binding phase of FE and CE is provided in a pre-association phase in ForCES.
 - Post-association phase, the setting data for the data-plane processing such as the routing table, QoS parameters, and access filters are set at the FE by the CE.
- In consolidating control-plane architecture, path control is achieved by the server calculating all routes and setting the result in the routing table of the router.
- Route exchange processing and the route calculation processing functions become unnecessary in the router.

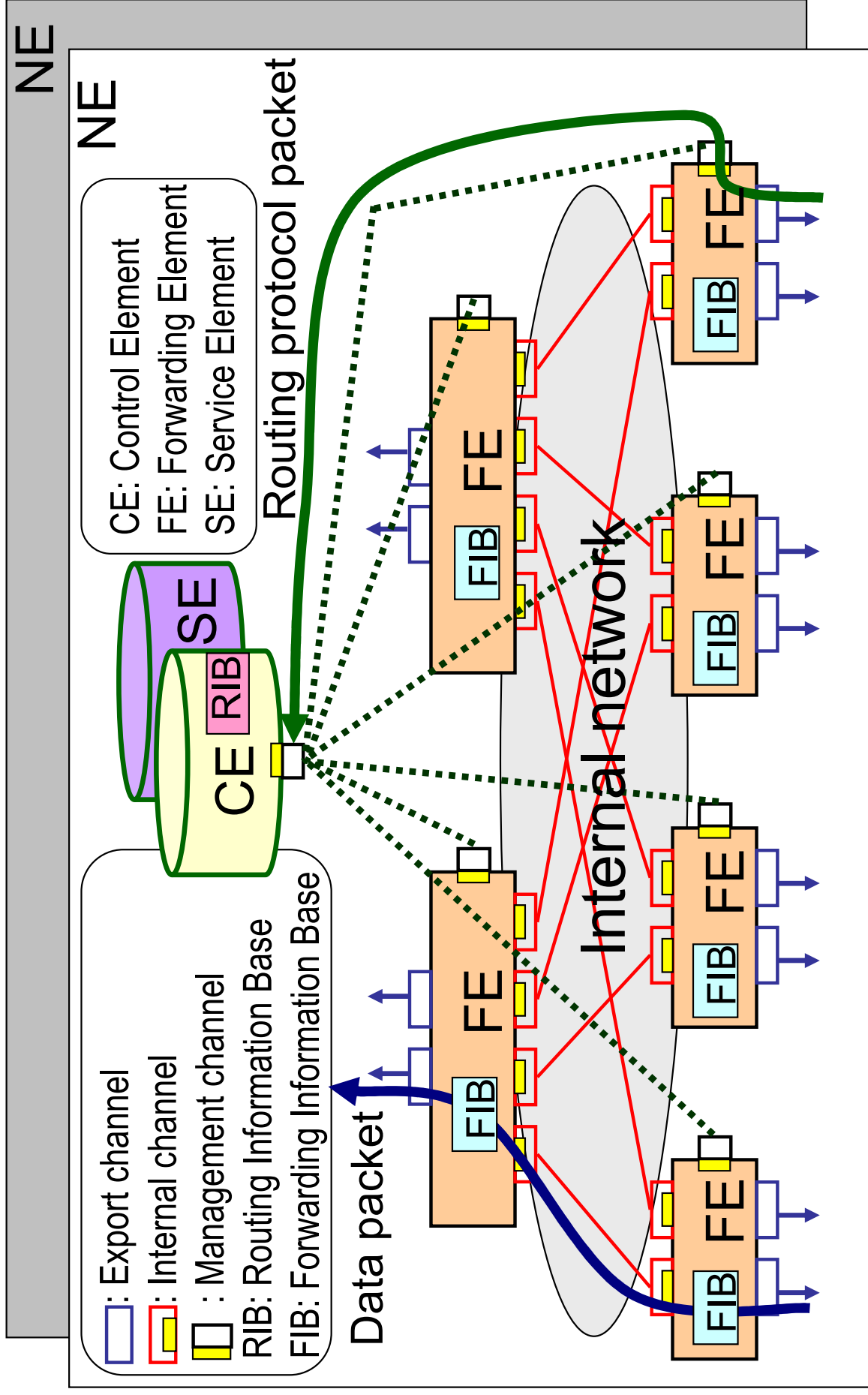
Open-Architecture Router for Enlarging

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Network(2/2)

- Service elements (SEs) are placed in the new service function.
- Service processing (for example, security and access control) is executed and processed by execution demands made by FEs and CEs.
- The number and capacity of CEs and SEs are increased according to processing demand.

Configuration of functionally distributed router



Summary

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- Introduced the OAR and methods for enlarging networks using OAR.
- Some problems in current standards.
- Several problems such as difficulty of adding new functions, instability of routing protocols on large scale network.
- The introduced method is one of the candidate techniques for a carrier network to solve the problems.

Thank you !

“Arigato” in Japanese