Optical Packet Routing

A simple label processing and forwarding scheme for all-optical packet switching network

Overview

To realize packet routing in optical domain, we are developing a novel label processing and packet forwarding scheme. Our scheme simplifies packet processing in intermediate nodes to be done without RAM, complicated logic circuits, which enables all-optical packet processing.

Concepts

■ Core & Edge Network Model

By separating packet routing and forwarding functions among the core and the edge of the network, the core concentrates on transmission and the edge does all the route control; forwarding process in the intermediate nodes is simplified and all-optical processing becomes feasible.

■ Physical Interface-based Routing

By describing paths with identifiers of physical interface, inter-layer processing in the optical-domain is excluded and the bit length of the label recognized at each node is reduced.

Core Technologies

■ Physical Interface-based Label

Optical route is described as a sequence of the physical interface identifiers of the each intermediate nodes along the path.

■ Scalable Route Advertisement

Path-vector route advertisement enables scalable label construction.
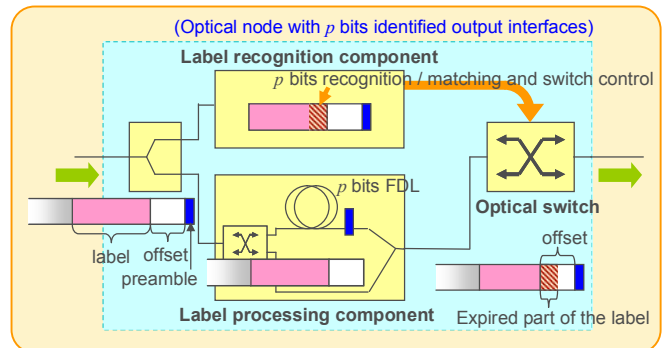
■ Edge-controlled Routing

Edge node makes decision of end-to-end route for packet transmission and the intermediate nodes forward packets just by recognizing several bits in the label.

■ Simple Packet Processing

Label recognition is performed for a few bits identifier space, and label update is performed with optical switches and FDLs.

Packet processing in nodes

(Optical node with p bits identified output interfaces)

Label recognition component

p bits recognition / matching and switch control

p bits FDL

Optical switch

label offset preamble

offset

Label processing component

Expired part of the label

Label distribution & Packet forwarding

Routing table at A'	
NW2	01100
NW2	1001100
NW3	0101110
NW3	10101010
…	…

Dest: NW3
Node: A,B,C
Port: 01,011,10

Dest: NW3
Node: B,C
Port: 011,10

Dest: NW3
Node: C
Port: 10

Dest: NW3
Node:
Port:

Route Advertisement

Packet Forwarding

Core Network (Optical Packet Routing Domain)

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