Optical P2P Network
-HDTV on Fiber-

Yamanaka Lab.

Background

High-speed Internet by ADSL and FTTH becomes popular.

Users can easily exchange data files.

The size / The quality } of data increases every day.

HD (High Definition) contents (over 4GB DVD) delivery will become popular soon.

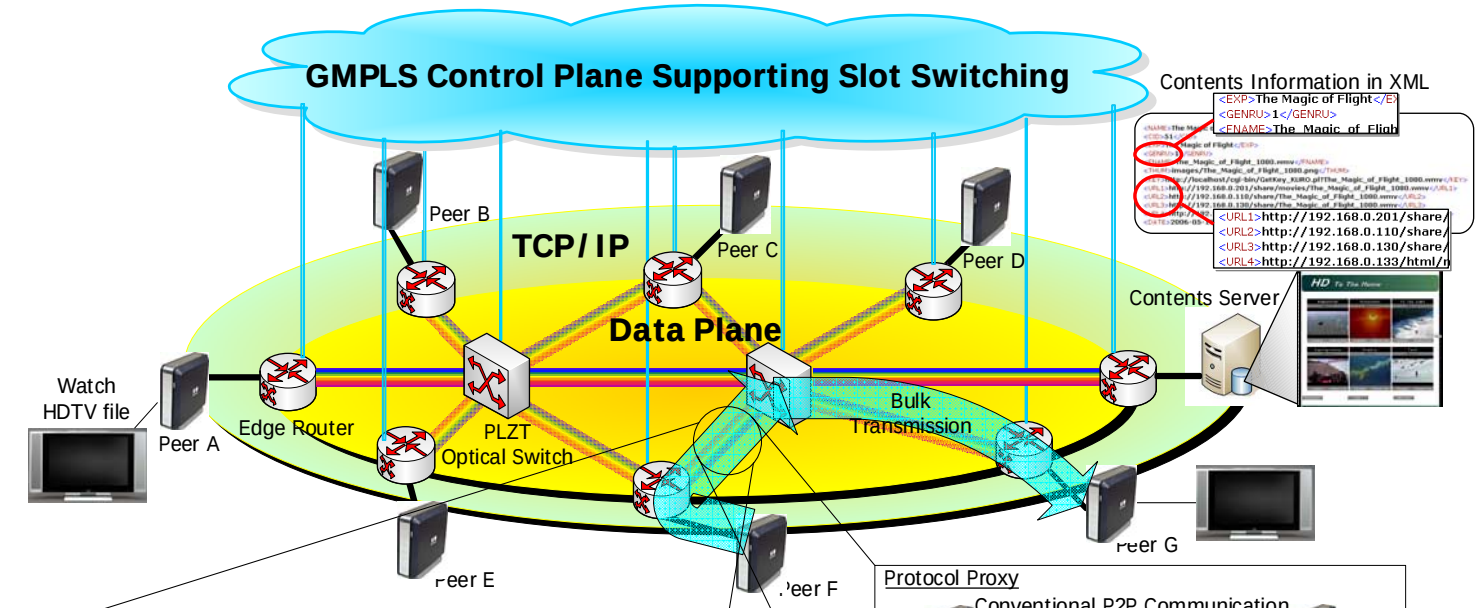
But, a present IP network is not suitable for HD contents delivery

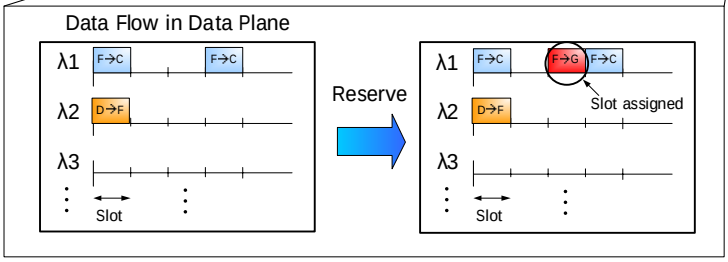
Backbone Router Bottleneck: Bandwidth is shared by many flows.	Optical Network without bandwidth sharing
Server-Client Network: traffic load congestion at servers	P2P network that enables traffic load distribution

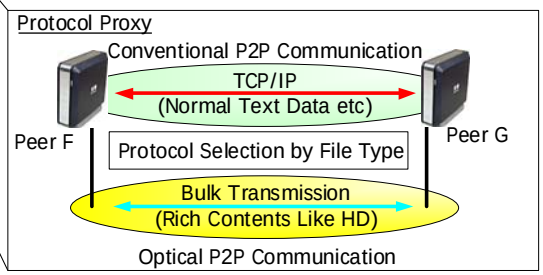
Optical P2P Network

is a solution for “HDTV on Fiber”.

Network Model

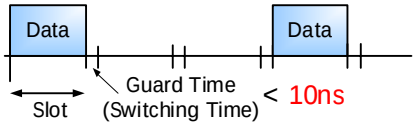






OSS (Optical Slot Switch) using PLZT Optical Switch

Guarantee Bandwidth by reserving Slot
Enormously reduced Guard Time by using PLZT Optical Switch



HD contents delivery on the Optical P2P Network

Step1: Contents are uploaded to the contents server.
Step2: Each peer gets Contents Information in XML from the contents server.
- If other peer(s) already download the HD contents file, the peer(s) are listed in XML

Step3: Select the most suitable peer or the contents server, Get desired HD contents file by Bulk Transmission
- Protocol Proxy selects Bulk Transmission

●Realize traffic distribution
●Get HD file smoothly

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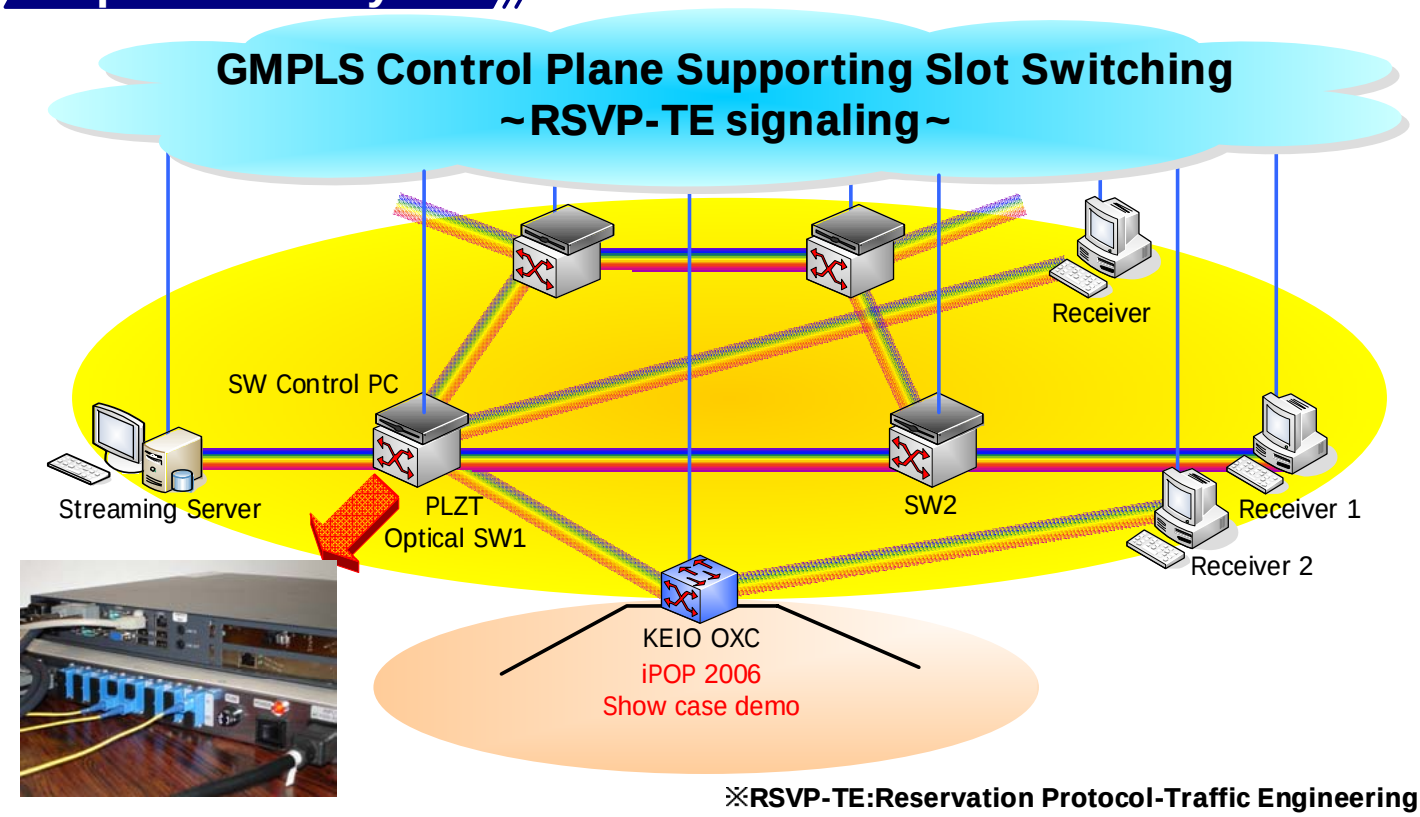
Experimental Slot Switching With PLZT ultra-high speed Switch

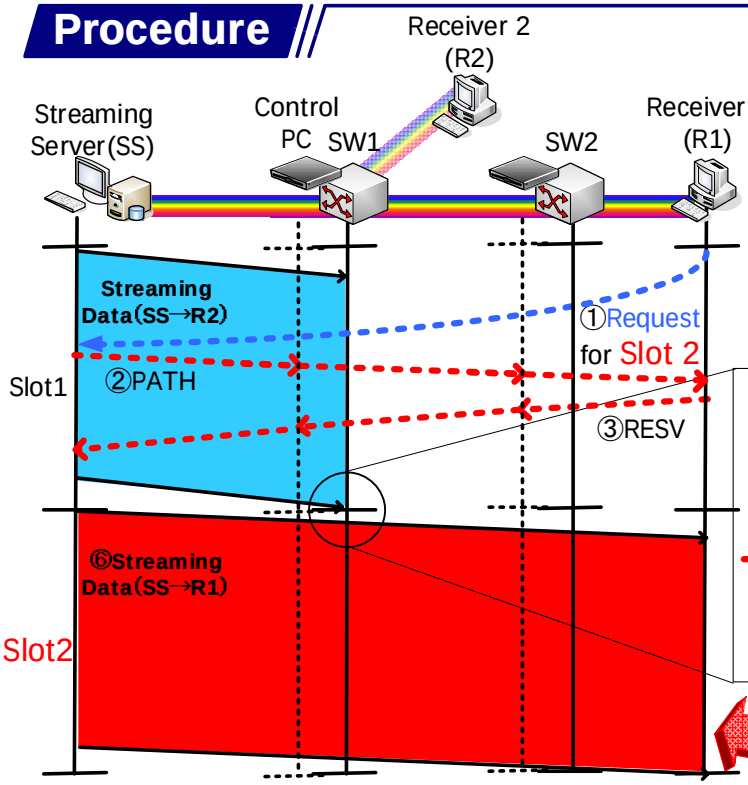
Yamanaka Lab.

Experimental System

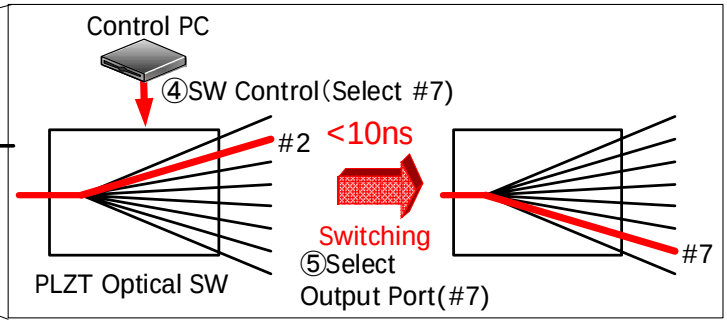


※RSVP-TE:Reservation Protocol-Traffic Engineering

Procedure



① Request for Slot2
② Streaming Server sends a PATH message to Receiver
③ Receiver returns a RESV message to Streaming Server
④ Control PCs send a Control Signal to Optical SWs
⑤ Optical SW1 selects a desired output port (#7), SW2 selects a port(#5)
⑥ Streaming Data Transmission



Reserved Slot2 for SS→R1

Points and Challenges

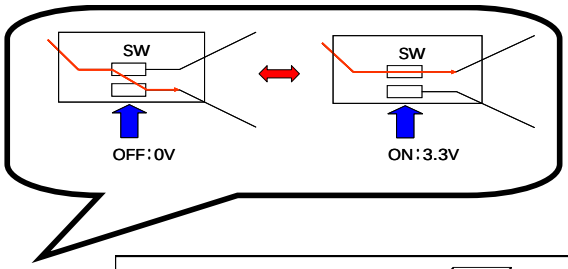
- Implementation of Nano seconds Switching System controlled by RSVP-TE Signaling
- Source node sends a path signal and reserves a Optical Data Slot
- Need to consider proper slot size and slot assignment

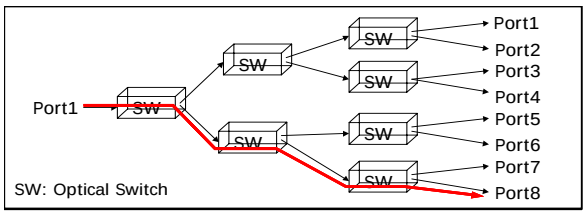
1×N Ultra High Speed Optical Switch Sub-System

Yamanaka Lab.
Nozomi Photonics

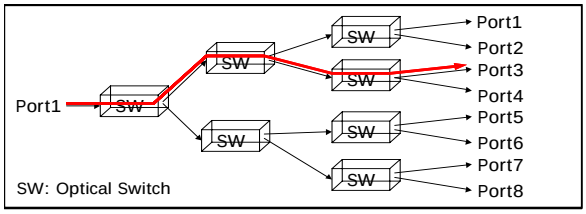
Ultra-High Speed Optical Switch

The direction of light is decided by applying the voltage





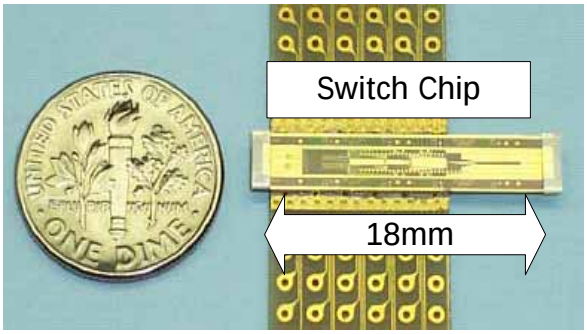
<10ns



The Switching time of an Optical Switch is very high speed with less than 10nsec

☐Specifications(Target)

Wavelength range	C-band
Switching time	<10ns
Crosstalk	>30dB
Insertion loss	7-8dB(1×8)
Polarization dependent loss	<0.5dB
Return loss	>30dB
Power consumption(Chip)	<3mW@1Mhz
Channel number	1×4, 1×8, 4-2×2, 4-1×2
Dimension(W×D×H)	70×45×9mm (modules) 220×160×20mm (sub-systems)



※The information about specification is subject to change without notice.

Switch Control by Serial Port

You can control PLZT Optical Switch by using standard PC with a serial port

Easy to handle PLZT Optical Switch without Pulse Generator

About Serial Communication
- ●Speed: 9600bps
- ●Data Bit: 7bit
- ●Parity Bit: EVEN
- ●Stop Bit: 1bit
- ●Flow Control: NONE