A Study of Multicast Delivery System Using PLZT Optical Switch on Active Optical Access Network
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Optical Access Network

- quadruplicate the number of users (128 users).
- double the maximum transmission distance (40 km).

PLZT optical switch structure

- Optical switch chip: switches by 10 ns high speed, low power consumption
- Mach-Zehnder type wave-guide: switches by changing voltage

Difference of switching mode and distribution mode

**Switching mode**
- The number of multicast slots: **4 slots**
- Power loss: **0 dB**

**Distribution mode**
- Only one slot is needed. (**#3, 4, 6, 8**) decreases the number of slots.
- The number of multicast slot: **1 slot**
- Power loss: **6 dB**

Multicast slot allocation with variable distribution mode (proposal)

**Conventional:** (Only 5:5)
- Adjusts distribution ratio to consider the distance.

**Proposal:** Any distribution ratio (2:8, 3:7, 5:5)
- Proposed scheme adjusts any distribution ratio, improves the bandwidth.

Plotted results

- Loss: Optical loss of switch and fiber
- Limited loss: Maximum optical power loss that ONU can be received

Proposed scheme adjusts any distribution ratio, improves the bandwidth.

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**Key Points**

- PLZT: Plomb Lanthanum Zirconate Titanate
- PON (Passive Optical Network)
- OLT: Optical Line Terminal
- ONU: Optical Network Unit
- ActiON (Active Optical Network)

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**Key Equations**

- Optical power is output in different distribution ratio by applying the variable voltage.
- Difference in switching mode and distribution mode:
  - Switching mode (Loss: 0 dB)
  - Distribution mode (Loss: 3 dB)

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**Conclusion**

- The proposed scheme significantly improves the bandwidth by adjusting any distribution ratio.
- The bandwidth is enhanced by quadrupling the number of users and doubling the transmission distance.

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**Further Reading**