A Study of Slot Switching-based All-optical Service Aggregation Network

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Current Network

- Various types of networks coexist.
- High energy consumption by many electrical signal processing

Service Aggregation Network

- Support various network services by a solitary programmable OLT and a large-scale single all-optical aggregation network
- Low energy consumption
- Facilitate the introduction of new services

*DBA, encoding, framing, and transferring*

OLT: Optical Line Terminal
ONU: Optical Network Unit
DBA: Dynamic Bandwidth Allocation

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**Implementation method**

### WDM-based

- Allocate each wavelength to each network service
- Technology of WDM-PON is appropriable.

#### Disadvantage
- The number of services is limited by the number of multiplexable wavelength.
  - \( \Rightarrow \) **Low scalability**
- The granularity of bandwidth allocation is coarse.
  - \( \Rightarrow \) **Low bandwidth efficiency**
- Transceivers adapting various wavelengths is needed.
  - \( \Rightarrow \) **High CAPEX**

### Slot Switching-based

- Allocate one or more fixed-length time slots to each service dynamically

#### Advantage
- The number of services depends on the number of time slots per cycle.
  - \( \Rightarrow \) **High scalability**
- The granularity of bandwidth allocation is higher than WDM-based method.
  - \( \Rightarrow \) **High bandwidth efficiency**

#### Challenge
- Tight synchronization of optical switches
- Clock distribution in SDH and mobile backhaul