Lecture 23
SDH/SONET

Topics Covered

- Introduction to SDH
- SONET/SDH Architecture
- SONET Layers
- Device-Layer Relationship in SONET
- SONET/SDH
- SONET Network
- Applications

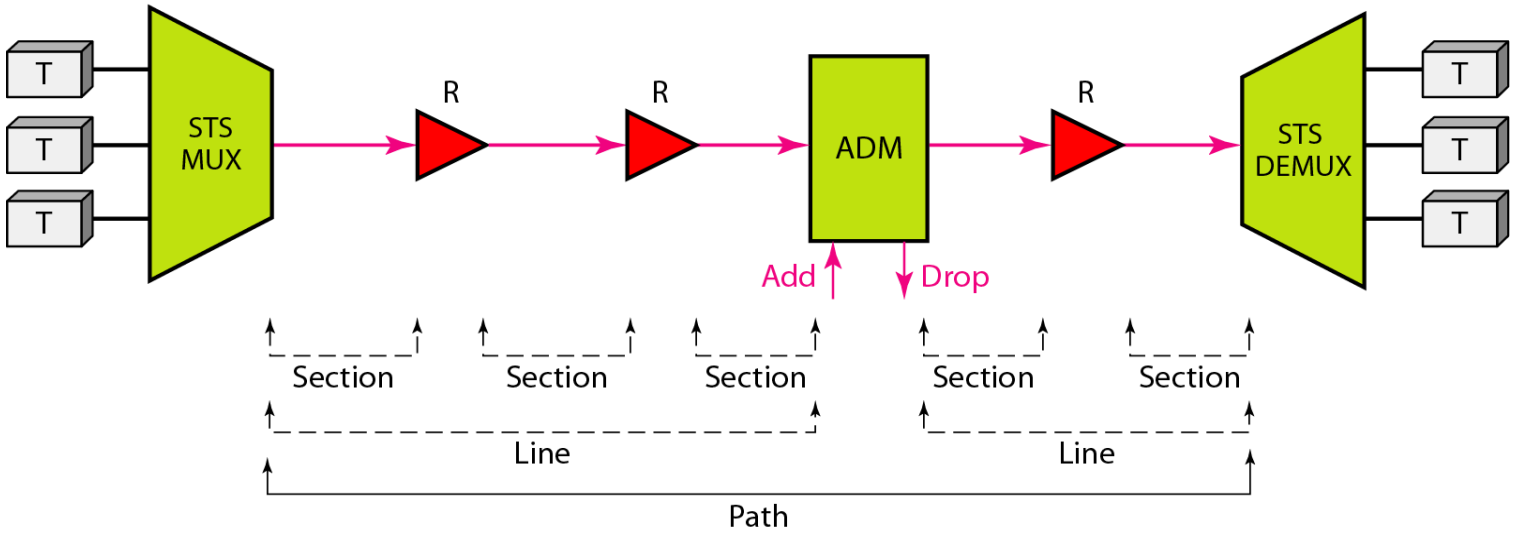
Introduction to SDH

- The basis of Synchronous Digital Hierarchy (SDH) is synchronous multiplexing that is data from multiple tributary sources are byte interleaved.
- In SDH the multiplexed channels are in fixed locations relative to the framing byte.
- Demultiplexing is achieved by gating out the required bytes from the digital stream.
- This allows a single channel to be 'dropped' from the data stream without demultiplexing intermediate rates

SONET/SDH Architecture

- SONET devices: STS multiplexer/demultiplexer, regenerator, add/drop multiplexer, terminals

ADM: Add/drop multiplexer
STS MUX: Synchronous transport signal multiplexer
STS DEMUX: Synchronous transport signal demultiplexer
R: Regenerator
T: Terminal

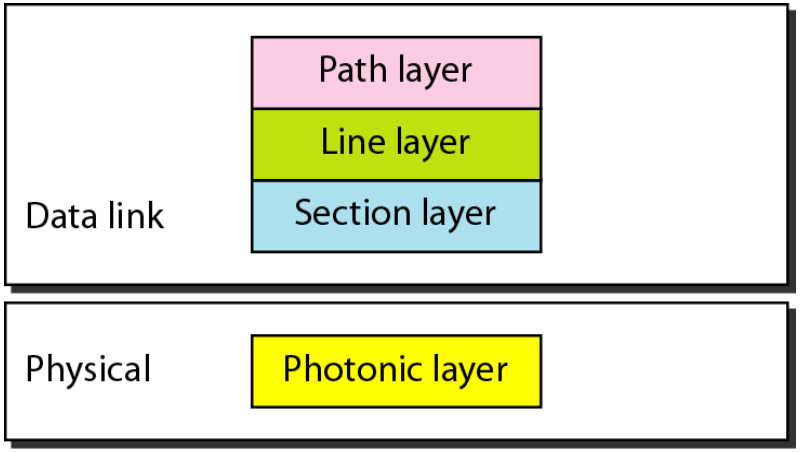


SONET/SDH Architecture

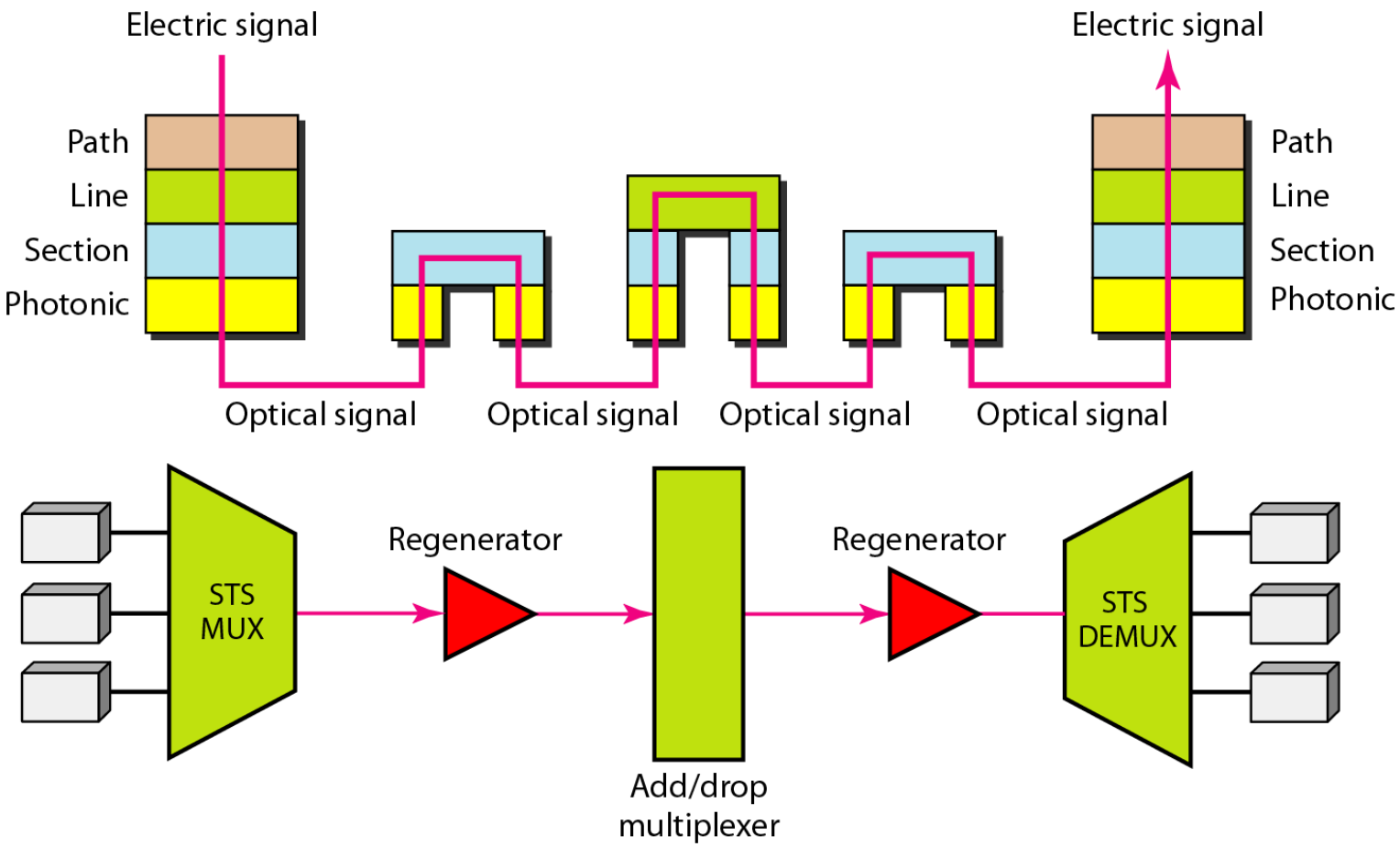
- **Connections:** SONET devices are connected using *sections*, *lines*, and *paths*
- ***Section:*** optical link connecting two neighbor devices: mux to mux, mux to regenerator, or regenerator to regenerator
- ***Lines:*** portion of network between two multiplexers
- ***Paths:*** end-to-end portion of the network between two STS multiplexers

SONET Layers

- SONET defines four layers: path, line, section, and photonic
- Path layer is responsible for the movement of a signal from its optical source to its optical destination
- Line layers is for the movement of a signal across a physical line
- Section layer is for the movement of a signal across a physical section, handling framing, scrambling, and error control
- Photonic layer corresponds to the physical layer of OSI model



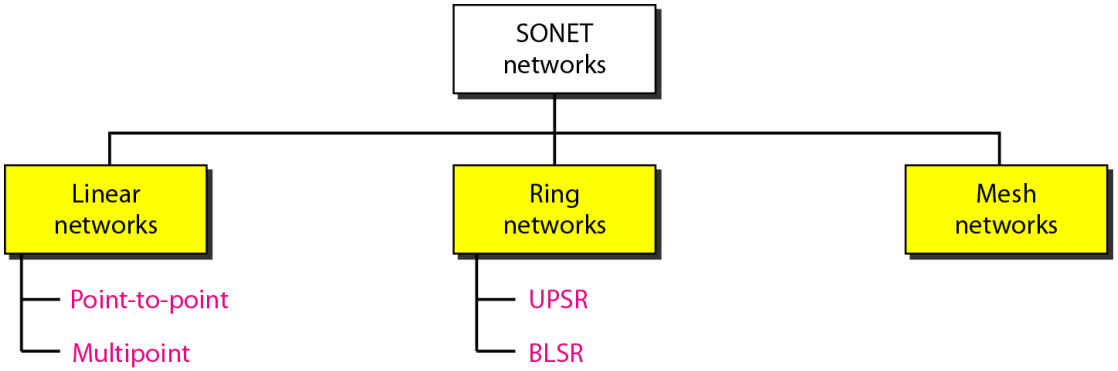
Device-Layer Relationship in SONET



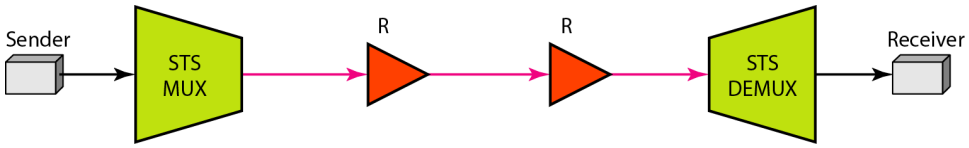
SONET/SDH

- Digital transmission standards for fiber-optic cable
- Independently developed in USA & Europe
  - SONET (Synchronous Optical Network) by ANSI
  - SDH (Synchronous Digital Hierarchy) by ITU-T
- Synchronous network using synchronous TDM multiplexing
- All clocks in the system are locked to a master clock
- It contains the standards for fiber-optic equipments
- Very flexible to carry other transmission systems (DS-0, DS-1, etc)

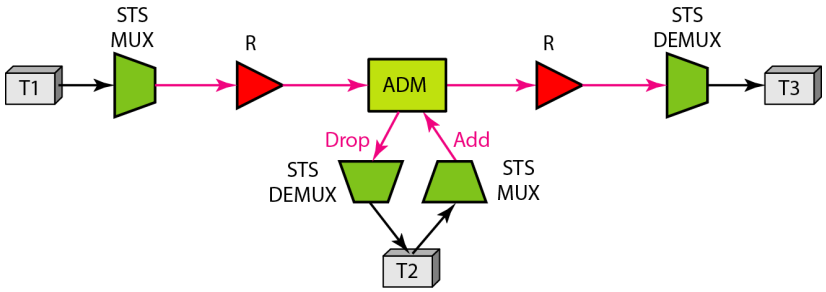
SONET Network



- Point-to-point network



- Multipoint network



Applications

- SONET is used for connecting different LANs using optical fiber
- To connect different campuses or buildings with optical fiber cables

Scope of research

- SONET based network architectures.