## 5.5 SONET Model

- Four layer model of SONET consists of :
    1. Photonic layer - It is the lowest layer. It defines the physical characteristics of the optical equipment.
    2. Section layer - Frame format and electro-optic conversion.
    3. Line - Synchronization and multiplexing onto SONET frames.
    4. Path - End to end transport.
- Physical realization of SONET involves :
    1. Section - Single run of fibre optic cable.
    2. Line - One or more sections.
    3. Path - End to end circuit.
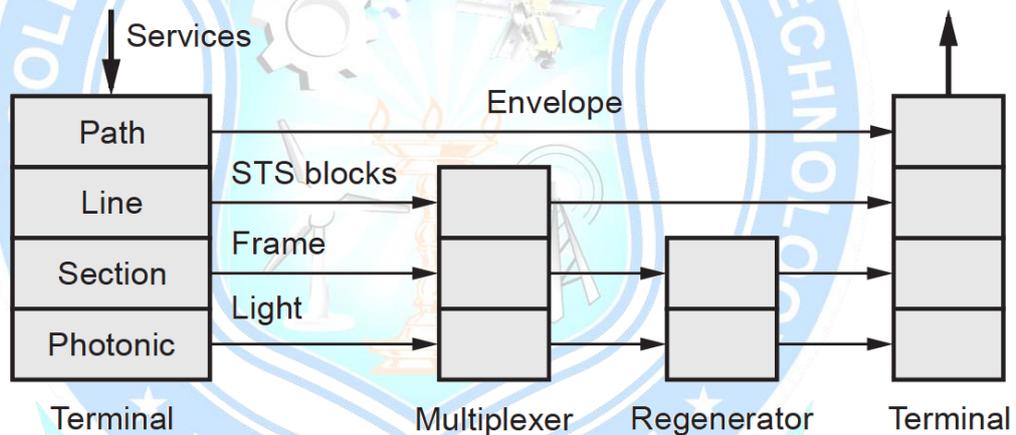
Functions of Photonic Layer

    • The photonic layer deals with the transport of bits across the physical medium. Its main function is the conversion between STS signal and OC signals. The issues are :

            1. Pulse shape 2. Power level 3. Wavelength.

4. Section maintenance

5. Orderwire.

Functions of Line Layer

- The line layer deals with the reliable transport of the path layer payload and it overhead across the physical medium. Its main functions are to provide synchronization and to perform multiplexing for the path layer. It also adds/interprets line overhead for maintenance and protection switching. The issues are :
   1. 1. Synchronization
    2. Multiplexing

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3. Error monitoring
4. Line maintenance
5. Protection switching

Functions of Path Layer

- The path layer deals with the transport of services between Path Terminating Equipments (PTE). Its main function is to map the signals into a format required by the line layer.
- It also reads, interprets, and modifies the path overhead for performance monitoring and automatic protection switching.

SONET Frame

- The basic STS is STS-1, all others are multiples of it abbreviated as STS-N. The (optical) physical layer signal corresponding to an STS-N is an OC-N.
- A standard STS-1 frame is nine rows by 90 bytes. The first three bytes of each row represent the Section and Line overhead. These overhead bits comprise framing bits and pointers to different parts of the SONET frame.
- There is one column of bytes in the payload that represents the STS path overhead. This column frequently "floats" throughout the frame. Its location in the frame is determined by a pointer in the Section and Line overhead.
- The combination of the Section and Line overhead comprises the transport overhead, and the remainder is the SPE.
- For STS-1, a single SONET frame is transmitted in 125 microseconds, or 8000 frames per second. 8000 fps * 810 B/frame = 51.84 Mbs, of which the payload is roughly 49.5 Mbs, enough to encapsulate 28 DS-ls, a full DS-3, or 21 CEPT-ls.
- SONET is based on the STS-1 frame
- STS-1 consists of 810 octets :
- 9 rows of 90 octects
- 27 overhead octects formed from the first 3 octets of each row
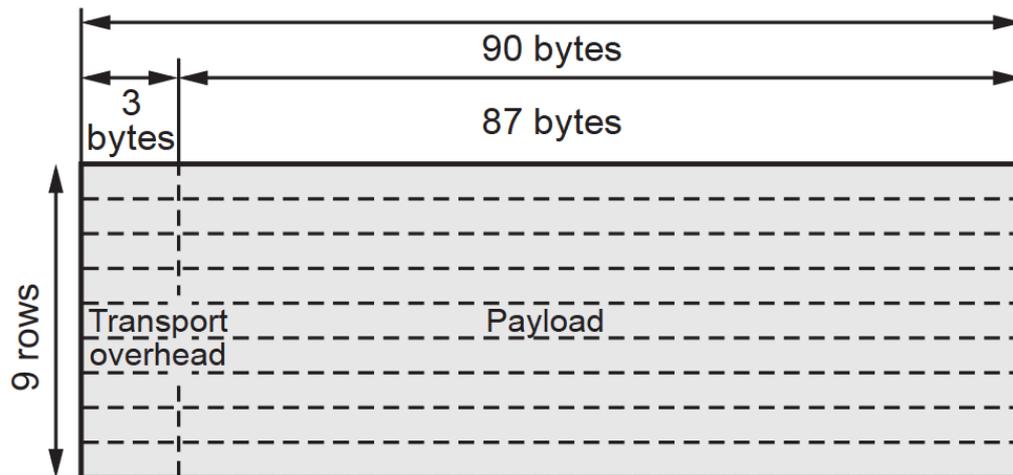
- 9 used for section overhead
- 18 used for line overhead

° *87 x 9 = 783 octets of payload*

One column of the payload is path overhead - positioned by a pointer in the line overhead.

° Transmitted top to bottom, row by row from left to right.