Chapter Four

Multiplexing

Multiplexing

((PHYSICAL LAYER))

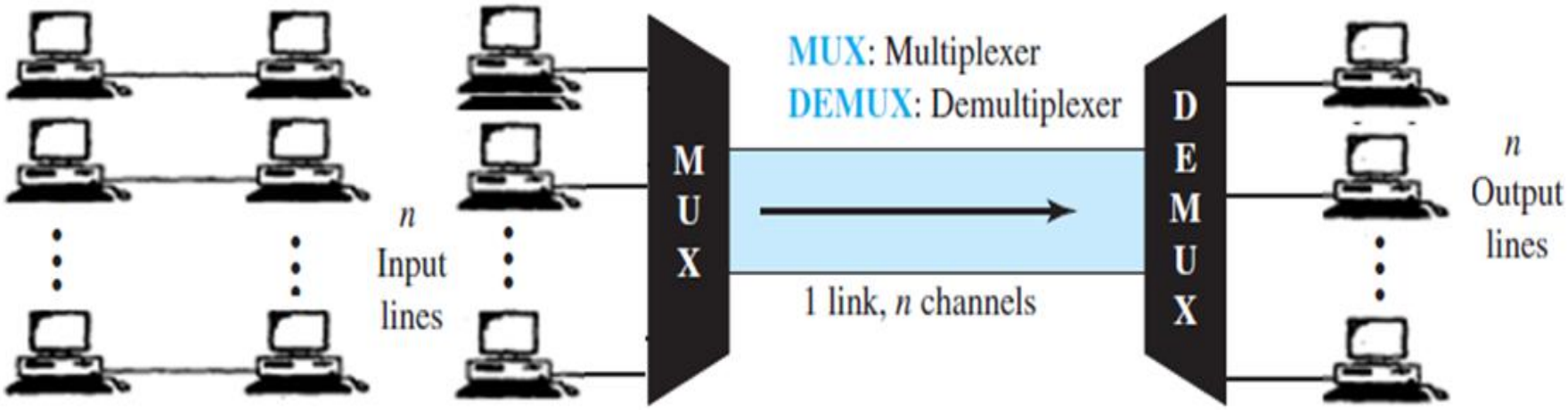

Figure (1-a) :No Multiplexing

Figure (1-b): Multiplexing

4.2- Types of Multiplexing

Signals are multiplexed using ***three*** basic techniques:

- **Frequency Division Multiplexing (FDM)**
- **Wavelength Division Multiplexing (WDM)**
- **Time Division Multiplexing (TDM)**

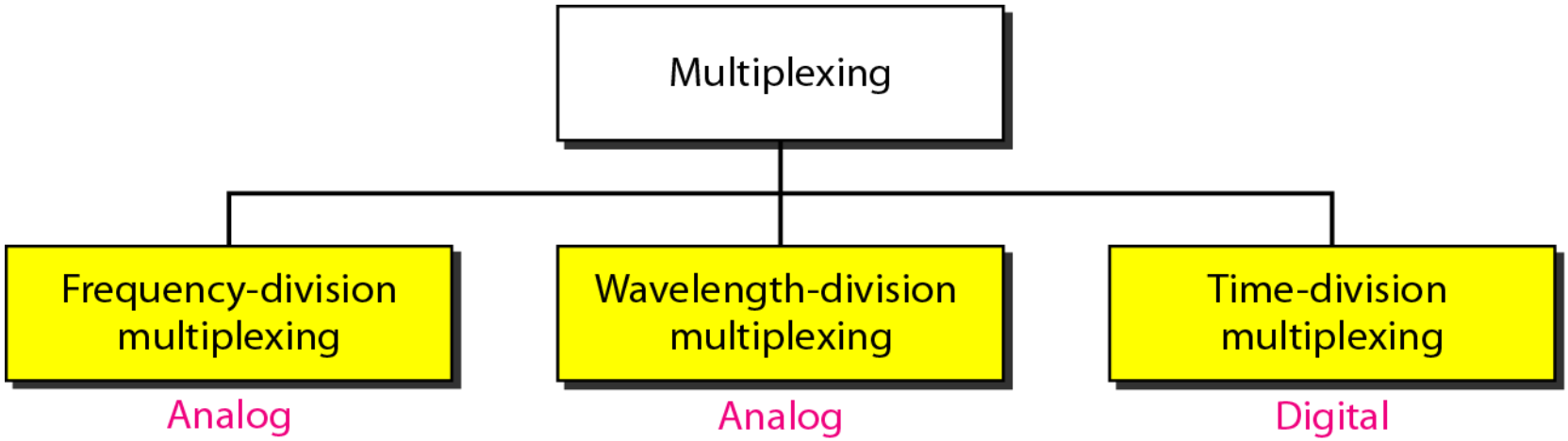

Figure (2) :Types of Multiplexing

4.2.1- Frequency-Division Multiplexing (FDM)

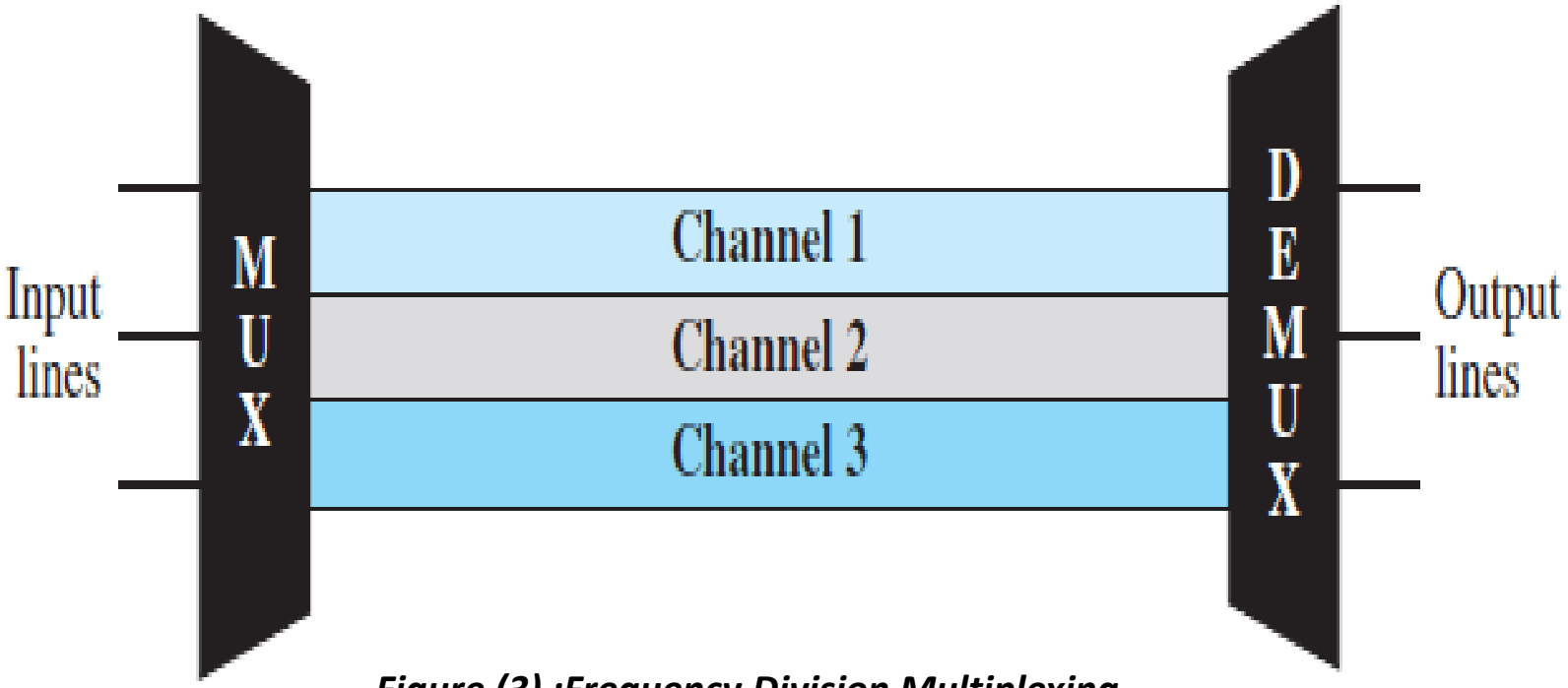

Figure (3) :Frequency Division Multiplexing

- **The FDM Process:**

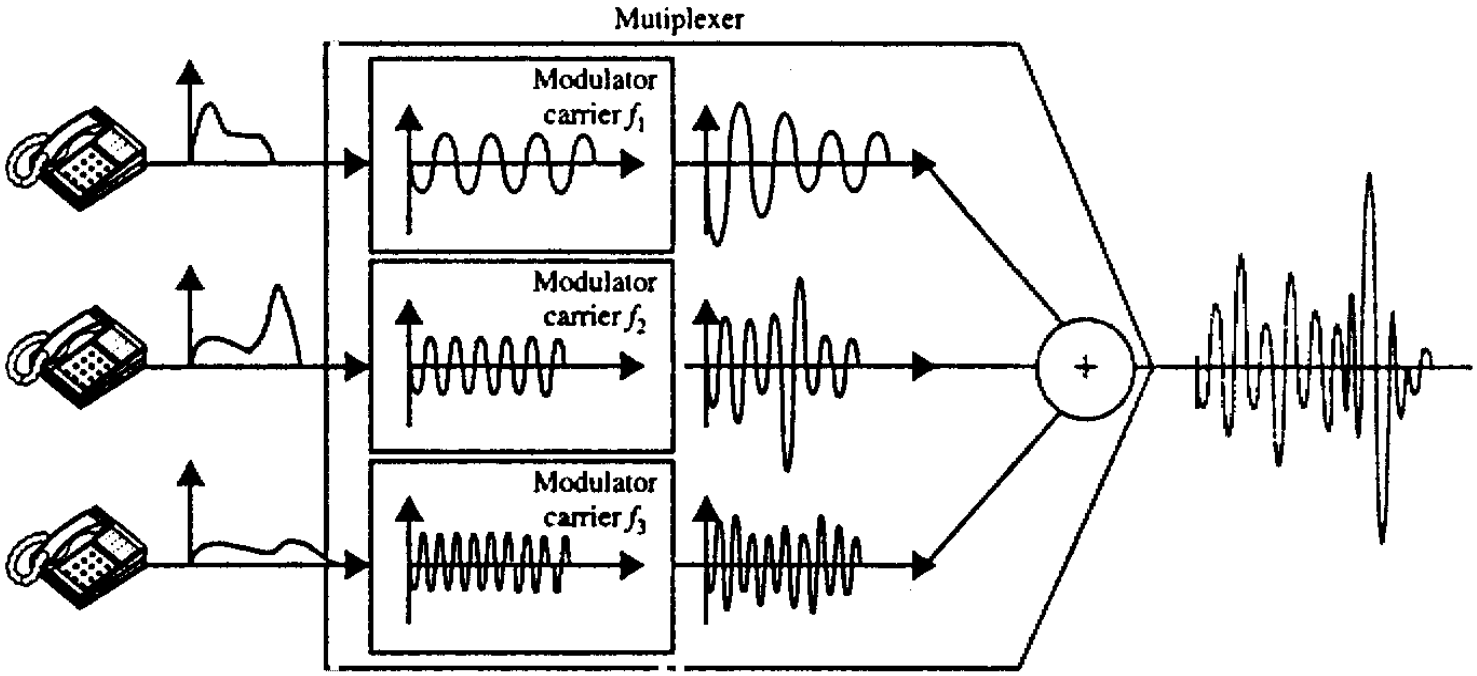

Figure (4) :FDM multiplexing process, time-domain

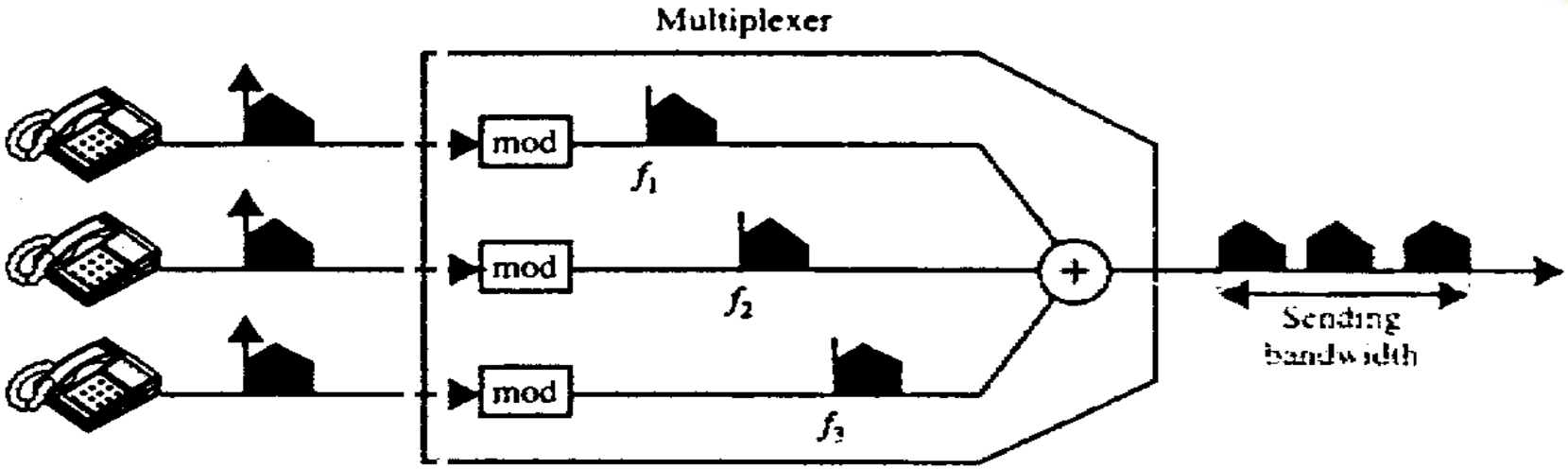

Figure (5): FDM multiplexing process, frequency-domain

• Demultiplexing:

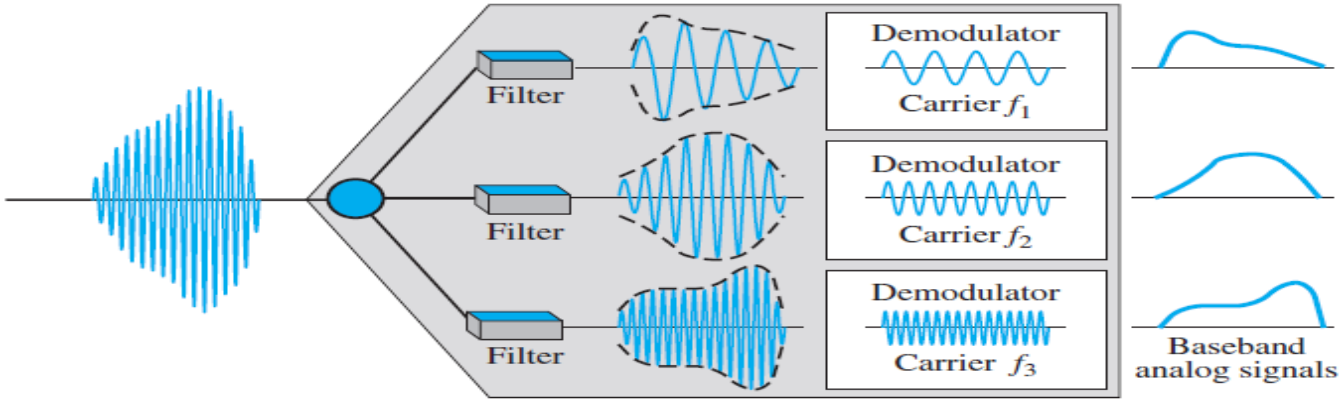

Figure (6) :FDM demultiplexing process, time-domain

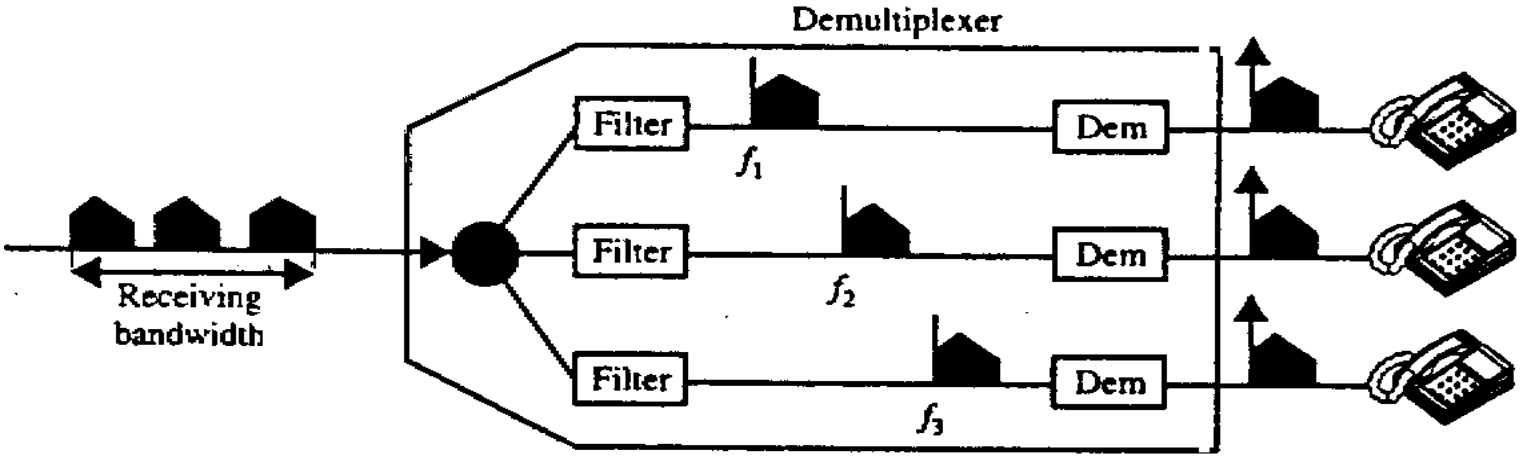

Figure (7) :FDM demultiplexing process, frequency-domain

4.2.2- Time-Division Multiplexing (TDM)

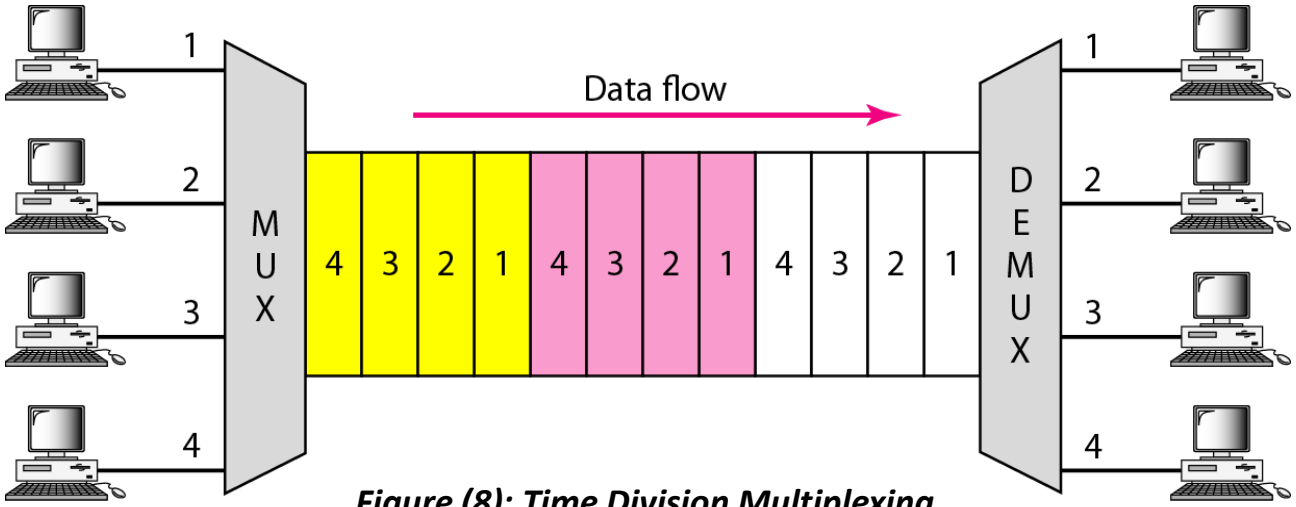

Figure (8): Time Division Multiplexing

a) Synchronous TDM

Time slots are grouped into *frames*.

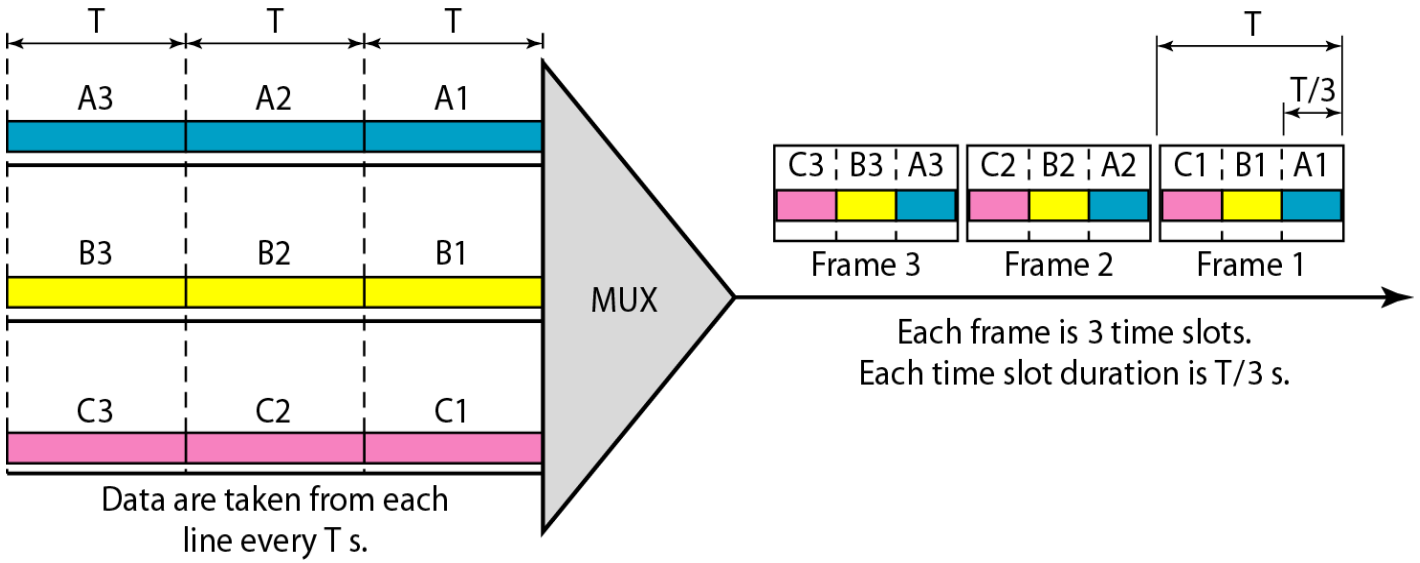

Figure (9): Synchronous TDM

4.2.3 Interleaving

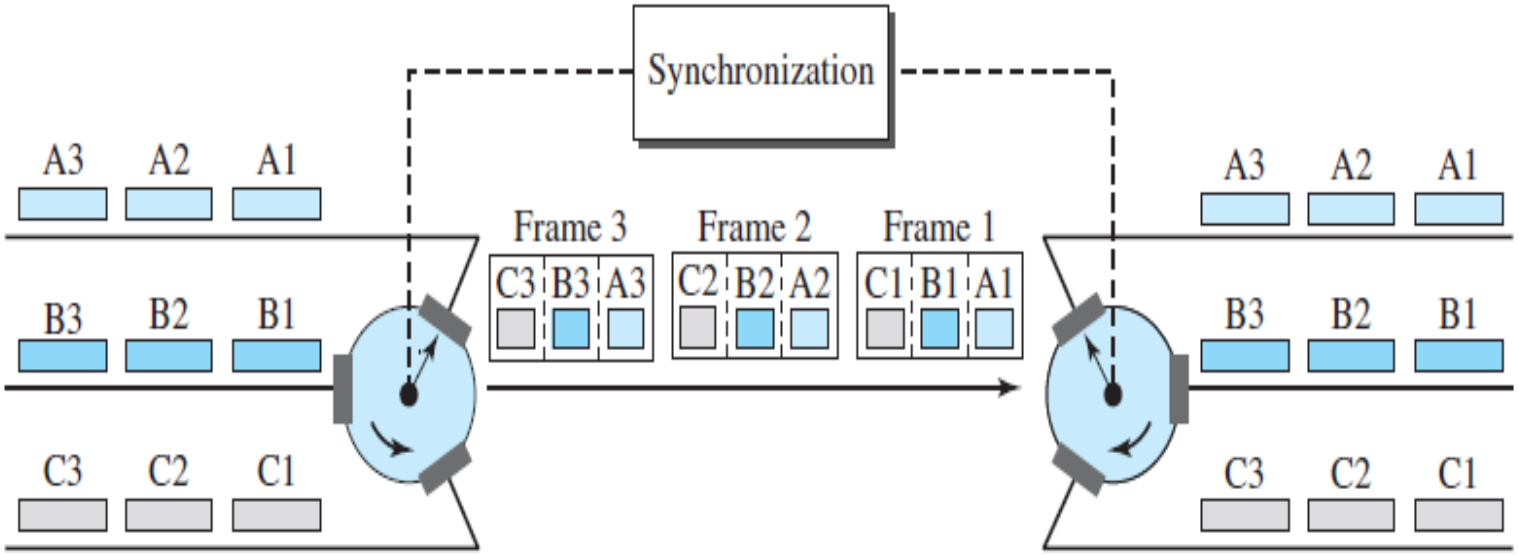

Figure (11): Interleaving

4.2.4 Empty Slots

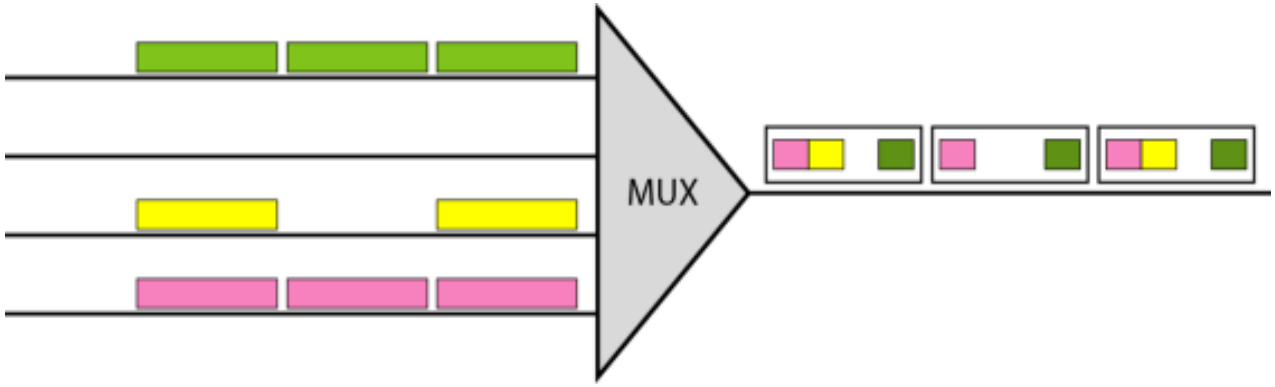

Figure (12)

4.2.5 Synchronization

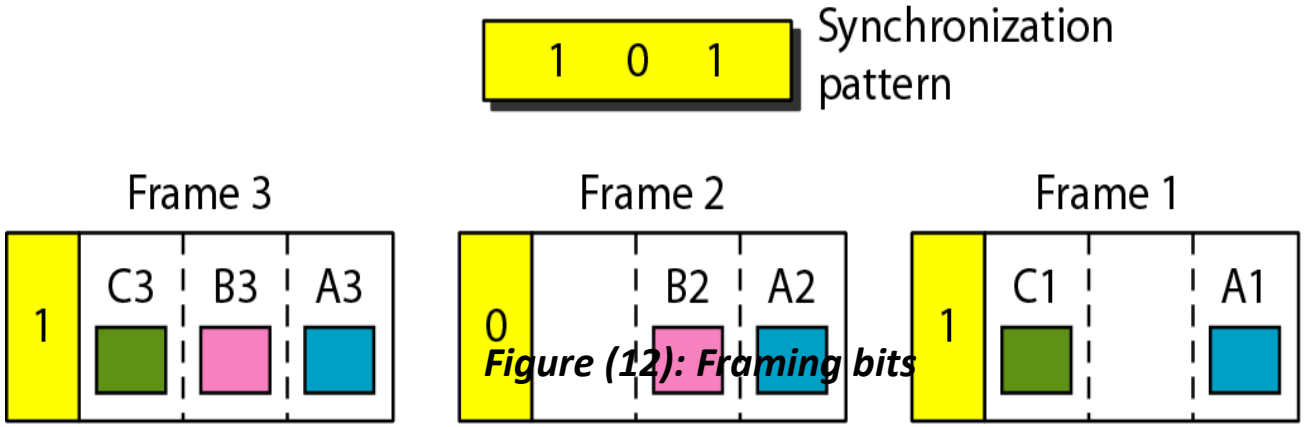

Figure (12): Framing bits

4.3- Bit Padding

b) Asynchronous TDM

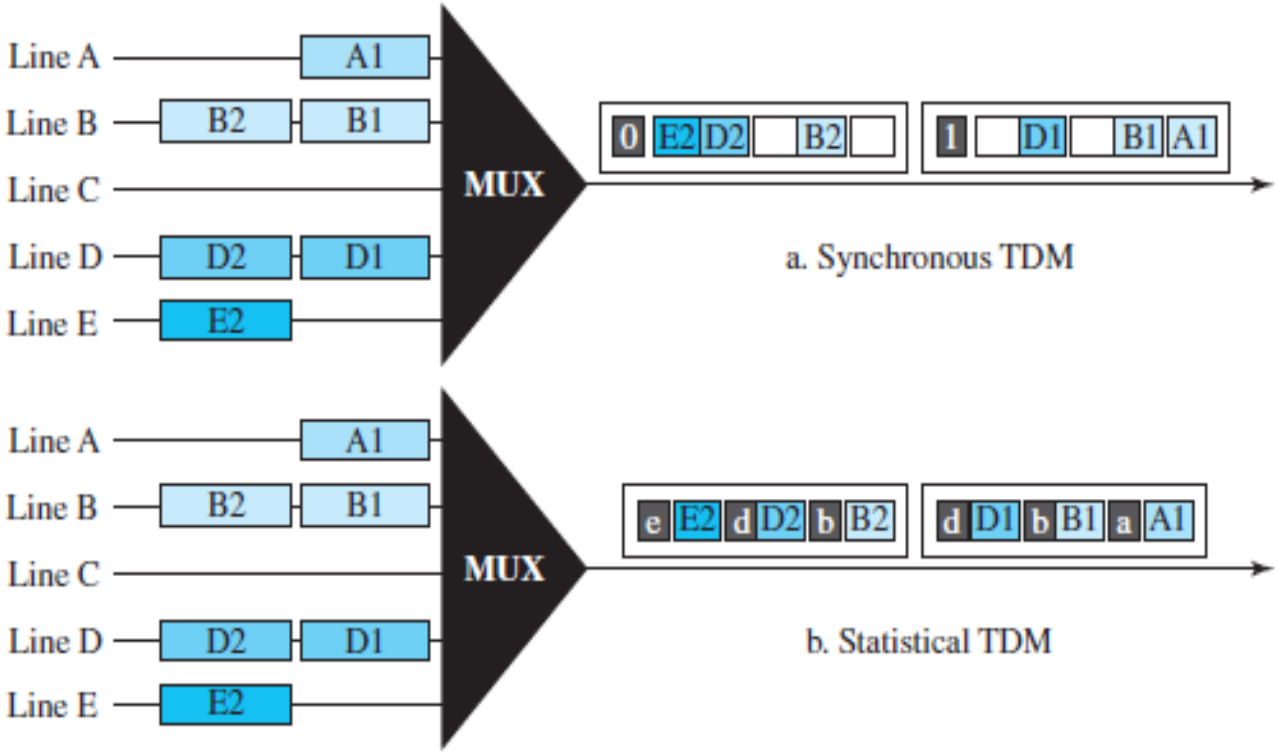

Figure (13) :Asynchronous TDM

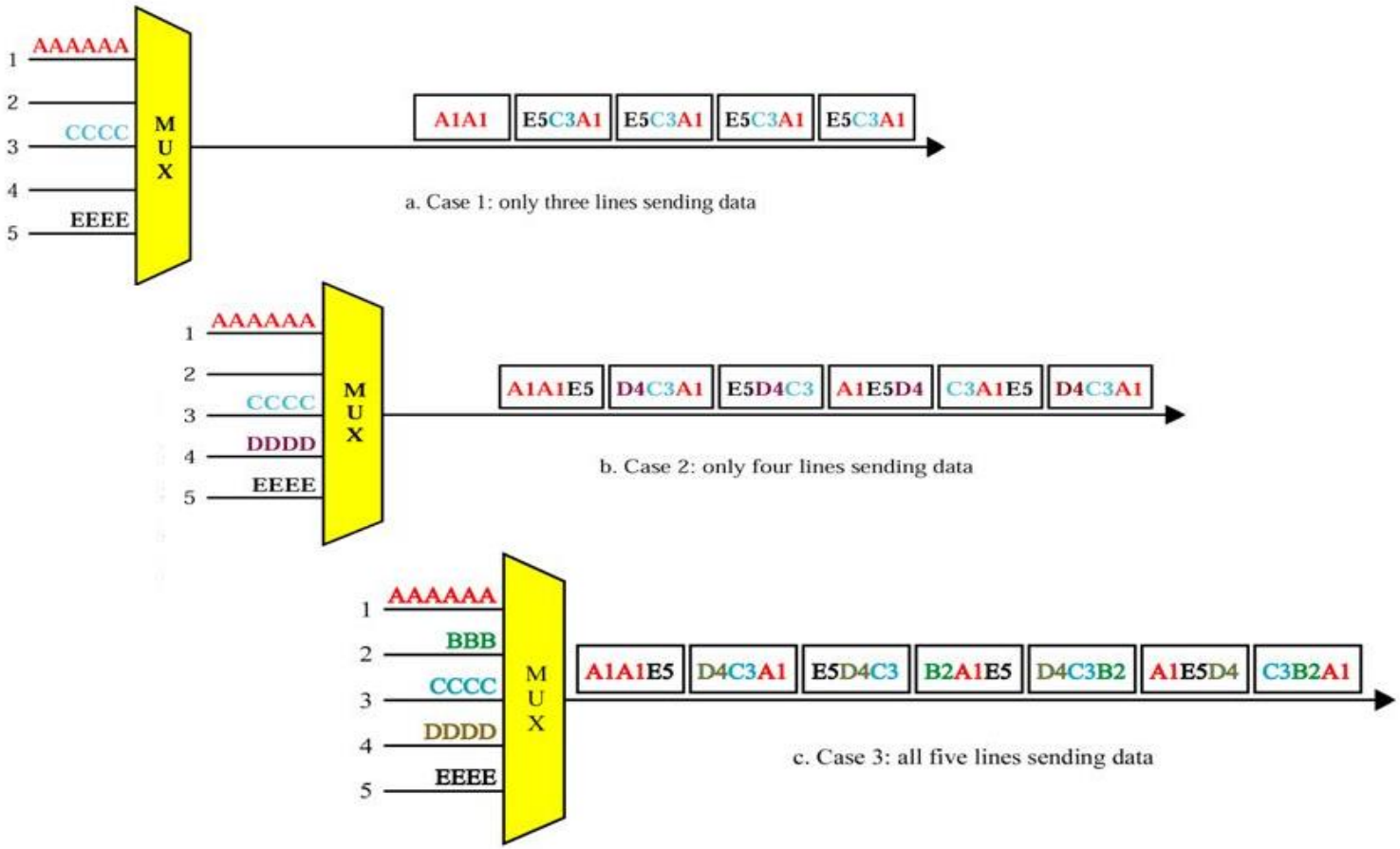

Figure (14): Asynchronous TDM Farmes