RECAP UNIT 2

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Multiplexing



Bandwidth utilization is the wise use of available bandwidth to achieve specific goals.

Efficiency can be achieved by multiplexing; i.e., sharing of the bandwidth between multiple users.

POLL 1

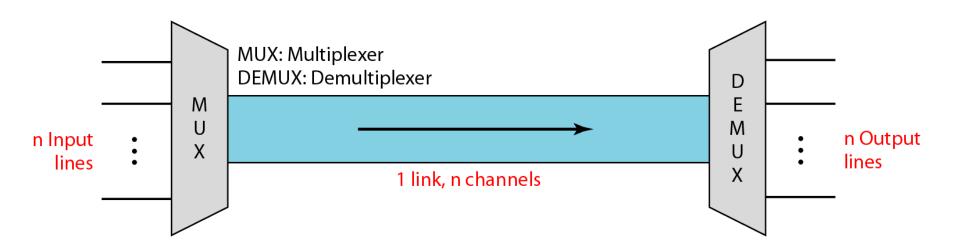
Multiplexing means

- Sharing Bandwidth between two users
- Sharing Bandwidth between multiple users

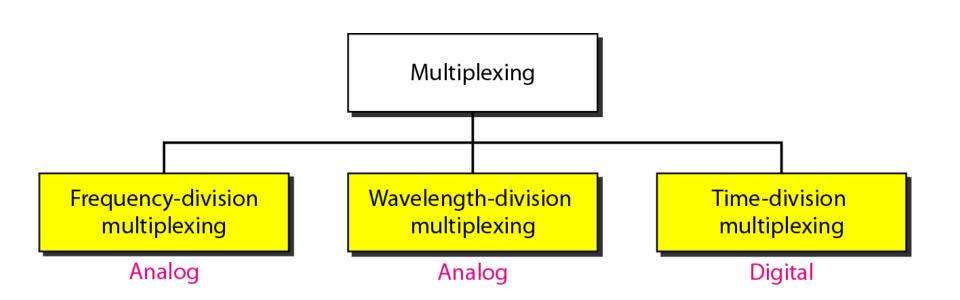
MULTIPLEXING

Whenever the bandwidth of a medium linking two devices is greater than the bandwidth needs of the devices, the link can be shared. Multiplexing is the set of techniques that allows the (simultaneous) transmission of multiple signals across a single data link. As data and telecommunications use increases, so does traffic.

Dividing a link into channels



Categories of multiplexing



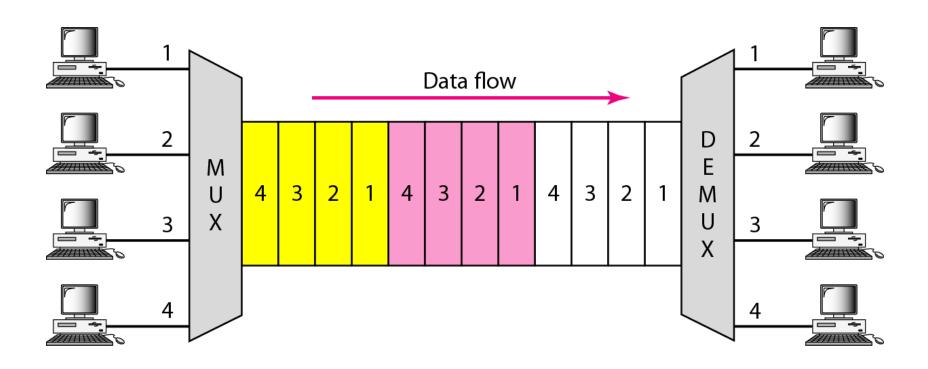
Frequency-division multiplexing (FDM)



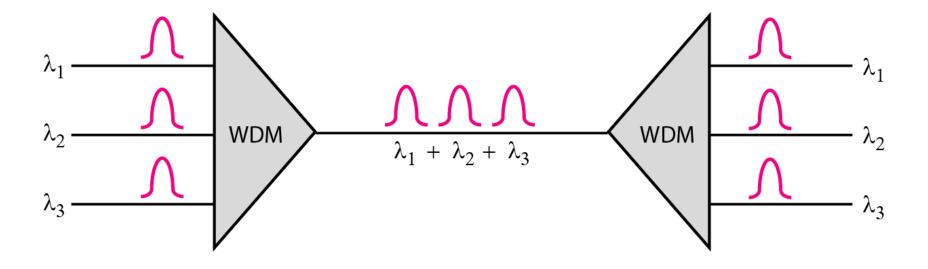
Note

FDM is an analog multiplexing technique that combines analog signals. It uses the concept of modulation

Time Division Multiplexing (TDM)



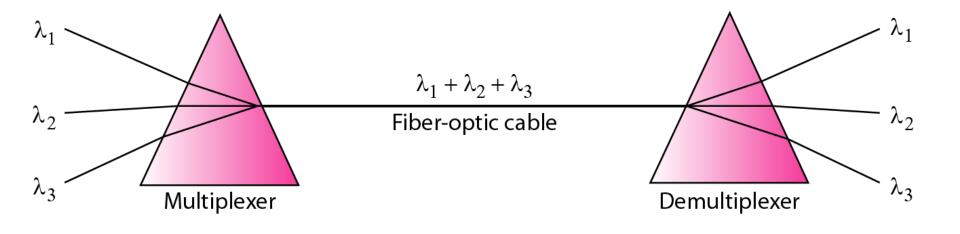
Wavelength-division multiplexing (WDM)



Note

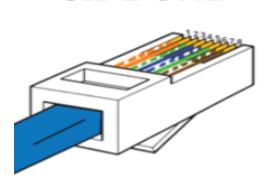
WDM is an analog multiplexing technique to combine optical signals.

Prisms in wavelength-division multiplexing and demultiplexing



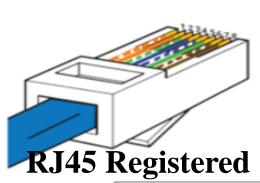
STRAIGHT-THROUGH

SIDE ONE





SIDE TWO





- White Orange
- 2. Orange
- 3. White Green
- Blue

- 5. White Blue
- 7. White Brown
- Brown

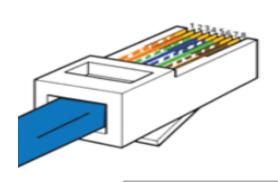
Green

- **Jack**
- 1. White Orange
- Orange
- 3. White Green
- 4. Blue

- White Blue
- Green
- 7. White Brown
- 8. Brown

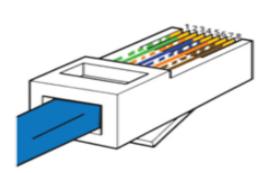
CROSSOVER

SIDE ONE





SIDE TWO



- White Orange
- 2. Orange
- White Green
- Blue

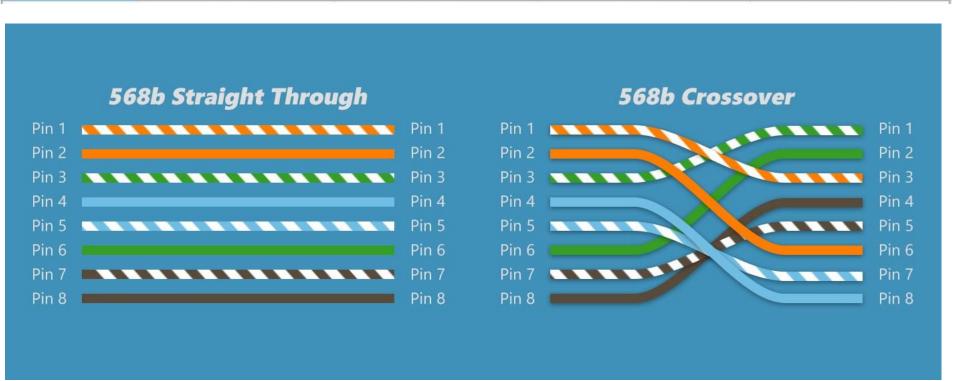
- White Blue
- Green
- 7. White Brown
- 8. Brown

- 1. White Green
- Green
- White Orange
- 4. Blue

- 5. White Blue
- Orange
- White Brown
- 8. Brown

Uses of cable

	HUB	SWITCH	ROUTER	PC
HUB	Crossover	Crossover	Straight	Straight
SWITCH	Crossover	Crossover	Straight	Straight
ROUTER	Straight	Straight	Crossover	Crossover
PC	Straight	Straight	Crossover	Crossover

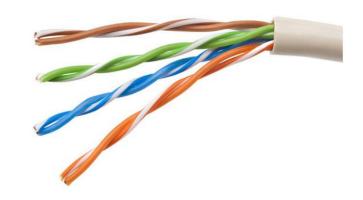


UTP Cabling

Properties of UTP Cabling

UTP has four pairs of color-coded copper wires twisted together and encased in a flexible plastic sheath. No shielding is used. UTP relies on the following properties to limit crosstalk:

- Cancellation Each wire in a pair of wires uses opposite polarity. One wire is negative, the other wire is positive. They are twisted together and the magnetic fields effectively cancel each other and outside EMI/RFI.
- Variation in twists per foot in each wire Each wire is twisted a different amount, which helps prevent crosstalk amongst the wires in the cable.



POLL

Cables are twisted to overcome the problem of

- a) Noise
- b) Distortion
- c) Attenuation
- d) Cross-talk

UTP Cabling

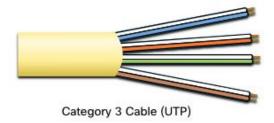
UTP Cabling Standards and Connectors

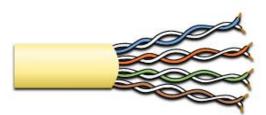
Standards for UTP are established by the TIA/EIA. TIA/EIA-568 standardizes elements like:

- Cable Types
- Cable Lengths
- Connectors
- Cable Termination
- Testing Methods

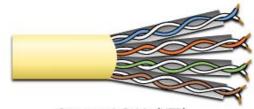
Electrical standards for copper cabling are established by the IEEE, which rates cable according to its performance. Examples include:

- Category 3
- Category 5 and 5e
- Category 6





Category 5 and 5e Cable (UTP)



Category 6 Cable (UTP)

UTP Cabling

UTP Cabling Standards and Connectors (Cont.)





RJ-45 Connector





RJ-45 Socket



Poorly terminated UTP cable



Properly terminated UTP cable

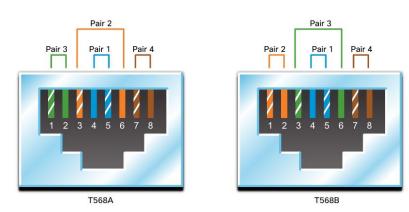
POLL

Router-Router can be connected using

- a) Crossover cable
- Straight through Cable
- Any of the above
- d) None of the above

UTP Cabling

Straight-through and Crossover UTP Cables



Cable Type	Standard	Application		
Ethernet Straight-through	Both ends T568A or T568B	Host to Network Device		
Ethernet Crossover *	One end T568A, other end T568B	Host-to-Host, Switch-to-Switch, Router-to-Router		
* Considered Legacy due to most NICs using Auto-MDIX to sense cable type and complete connection				
Rollover	Cisco Proprietary	Host serial port to Router or Switch Console Port, using an adapter		