

CS25010
Basic Terminology and
Concepts of Computer
Communications - Part One

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Computer Science

Analogue v Digital

- **Analogue Data**
 - data drawn from a continuous range
- **Digital Data**
 - data drawn from a discrete set of possibilities

Analogue v Digital Channel

- **Analogue**
 - Designed to carry analogue signals. Often designed for voice traffic. Digital data needs to be converted to be carried by the network. A MODEM, modulator/demodulator, performs the conversion.
- **Digital**
 - Designed to carry digital information. Digital data traffic is carried easily but analogue traffic needs to be converted using a coder/decoder (CODEC).

Serial v Parallel

- **Serial**
 - Data units arrive one binary digit (bit) at a time. Normally the least significant bit arrives first.
- **Parallel**
 - All of the data unit arrives at the same time along multiple ‘wires’.

Synchronous v Asynchronous

- **Synchronous**

- data expected at specific points in time - a clocking or timing signal is available or can be derived

- **Asynchronous**

- data may arrive at any point in time - timing signals are not available.

Local v Wide Area Networks

- Many of the traditional technical measures used to describe the difference between wide area networks (WANs) and local area networks (LANs) are becoming less useful.
- Only 'real' measure left is that of geographic coverage.

Wide Area Networks

- Large Distances
- Low to Medium Speed
- Normally point-to-point
- Normally operated by a PTT for multiple customers

Local Area Network

- Short to Medium Distances
- High Speed
- Normally Broadcast
- Normally Single or Small Group of Users

Media

- Twisted Copper Pairs
- Co-axial Copper Cable
- Fibre Optic Cable
- Radio and other Electromagnetic Waves

Twisted Copper Pairs

- Simple copper cable which has two insulated copper wires twisted around each other in a regular manner. The copper wires may be stranded or solid. The properties of the cable depend on the thickness of the wires, the insulator thickness and the rate of twisting.

Co-axial Copper Cable

- A cable with a single copper centre separated by an insulating dielectric from an outer sheath consisting of a (normally copper) mesh. The centre conductor may be solid or stranded. The properties of the cable depend on the dimensions of the various elements.

Fibre Optic Cable

- A cable with a core made of plastic or glass that will carry light. Various sizes are available which have different properties.

Radio and other Electromagnetic Waves

- Radio and light may be used in open space as a data carrying medium.
- The transmission may be broadcast and unguided.
- The transmissions may be directional and guided.

Media Speeds Etc.

- Twisted Pair
 - noise immunity quite good
 - twist places conductors close together
 - attenuation frequency dependant
 - analogue - amplifier 5 - 6 km
 - digital - repeater 2 - 3 km
 - speeds now, 100Mbps at up to 100 metres

Co-axial Cable

- very good noise immunity
- analogue use up to about 400 Mhz
- used digitally regularly at 10-20 Mbps
- digital use under controlled conditions has been achieved up to 800 Mbps with repeaters at 1.6km.

Optical Fibres

- Potential for very high speed usage
- Stallings reports 2Gbps over ten of kilometres
- BT Technology journal has reported over 500Gbps in laboratory conditions
- Small and light
- very resilient to external electromagnetic interference.
- Spelt FIBER if you are American