

# CP1402/CP5631 - WANs

## 1. What makes WANs different to LANs and MANs?

WAN (wide area network) traverses a significant distance and usually supports very high data throughput.

LAN (local area network) is a group of computers and network devices connected together, usually within the same building.

MAN (metropolitan area network) is a larger network that usually spans several buildings in the same city or town.

WAN and LAN differences:

- LANs connect nodes; WANs connect networks spread over wide geographic area
- Differ at Layers 1 and 2 access methods, topologies, media
- Both LANs and WANs use the same protocols from Layer 3 and higher
- LANs are typically privately owned
- WANs are typically owned and operated by telcos, also known as NSPs (network service providers)
  - Examples include AT&T, Verizon, Spectrum, and Comcast

## 2. For connectivity, what do Symmetrical and Asymmetrical Mean?

Bandwidth is asymmetrical (asynchronous) which means download speeds are faster than upload speeds

Bandwidth is symmetrical (synchronous) which means download and upload speeds are about the same

## 3. What is Digital Subscriber Line (DSL)? How many types are there? List them and explain.

- DSL (digital subscriber line) is a WAN connection method that operates over the PSTN (public switched telephone network)
- DSL supports multiple data and voice channels over a single line
  - It requires repeaters for longer distances
  - The distance between the customer and CO affect actual throughput
- DSL uses advanced data modulation techniques
- A DSL connection might use a modulation technique based on amplitude or phase modulation to alter the waves at higher frequencies to carry data

Different types of DSL:

- ADSL (asymmetric DSL) – faster download speeds than upload speeds
- VDSL (very high bit rate DSL or variable DSL) – faster than ADSL and is also asymmetric

- SDSL (symmetric DSL) – has equal download and upload speeds maxing out around 2 Mbps

4. Explain Geosynchronous earth orbiting satellites.

GEO (geosynchronous earth orbit) satellites orbit at the same rate the Earth turns

5. How many cellular technology generations are there? List each of them and explain.

There are 5 cellular technology generations.

- 1G (first generation) were analog
- 2G (second generation) used digital transmission up to 240Kbps
- 3G (third generation) supported data rates up to 384Kbps. Data communications use packet switching
- 4G (fourth generation) services are characterized by an all-IP network for data and voice. Specifies throughputs of 100 Mbps to 1 Gbps speeds
- 5G (fifth generation) services require minimum speeds of 1 Gbps and max out at 20 Gbps and upload speeds of 10 Gbps