Networks

Cloudlytics

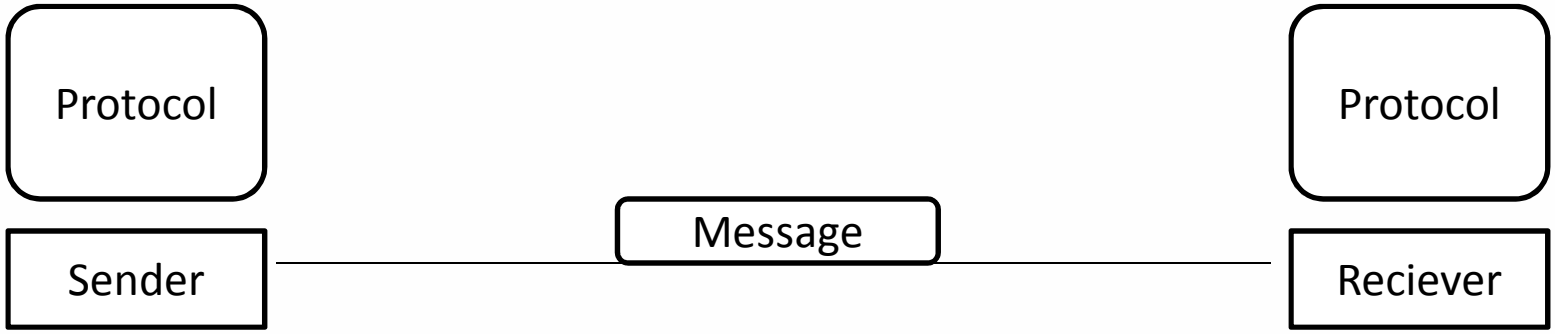
Introduction to Networking

- A network is a group of computers and computing devices connected together through communication channels.
- The computers connected over a network may be located in the same geographical area or spread across the world.

A network is used to:

- Allow the connected devices to communicate with each other.
- Enable multiple users to share devices over the network, such as printers and scanners.
- Share and manage information across computers easily.

Data communication



Protocol – set of rules that govern data communication.

Without protocol they might be connected but not communicating

Data flow

- Simplex – one way
  - Eg : keyboard
  - Utilizes full strength of channel

- Half duplex – Can receive and send; but not at same time
  - Eg : walkie talkie
  - Full capacity – the one transmitting data

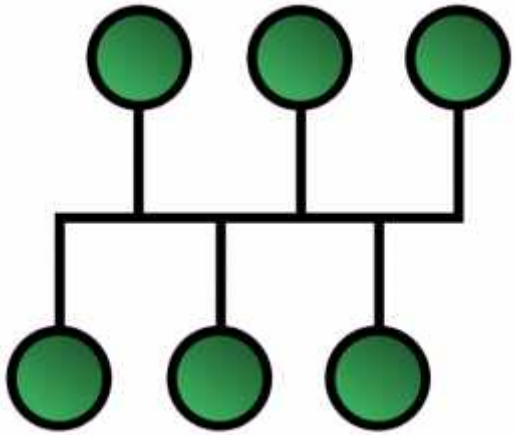
- Full duplex – can receive and send at same time
  - Eg : telephone

Network criteria

- Performance – based on transmit time and receive time
- Reliability – no of failures ; ability to recover from failure ; time required to recover from failure
- Security – protecting from unauthorised access of data; damage to data

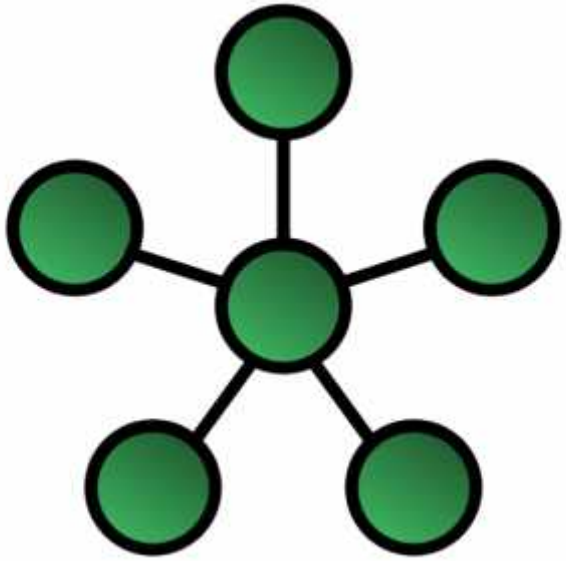
Topologies

- Bus Topology – easy installation
  - best for small nw
  - due to short cable length, no of nodes limited
  - bus fails, entire nw fails



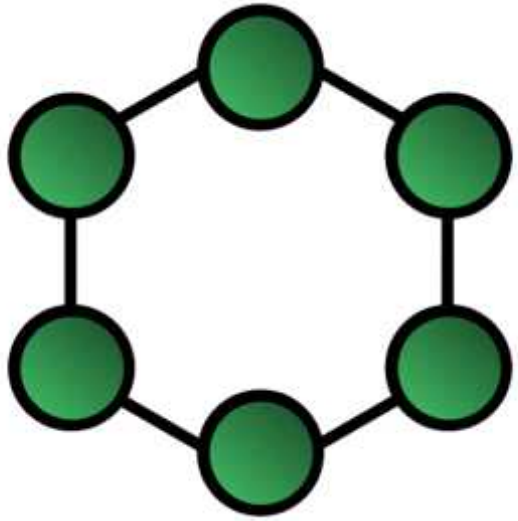
Topologies

- Star Topology – simple
  - failure of one device doesn’t affect the nw
  - depends on hub



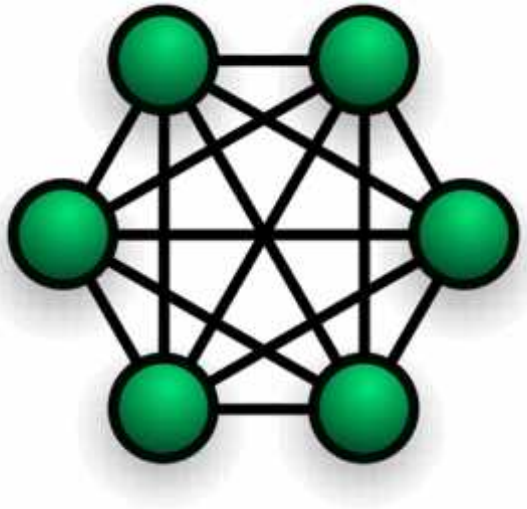
Topologies

- Ring Topology – no need of hub
  - communications takes place through nodes
  - single node fails entire nw fails



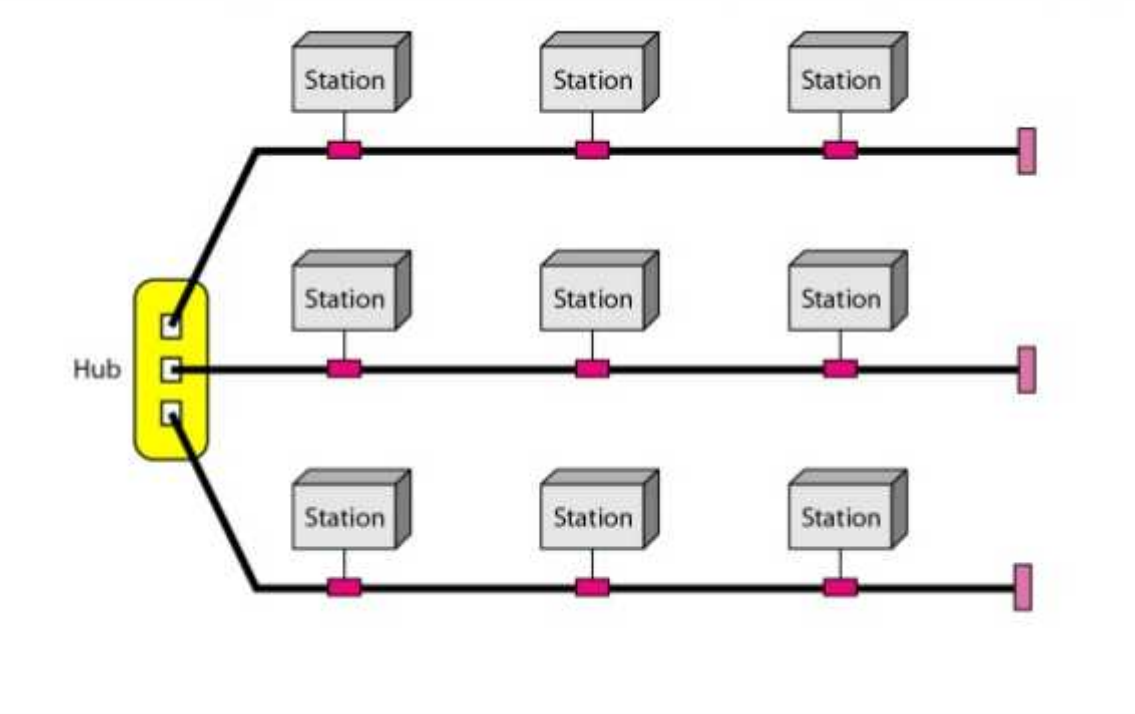
Topologies

- Mesh Topology – A dedicated link is provided between each node
  - High transfer rate
  - Require large cabling; very expensive
  - More no of ports



Topologies

- Hybrid Topology – Any combination of previous



Categories of network

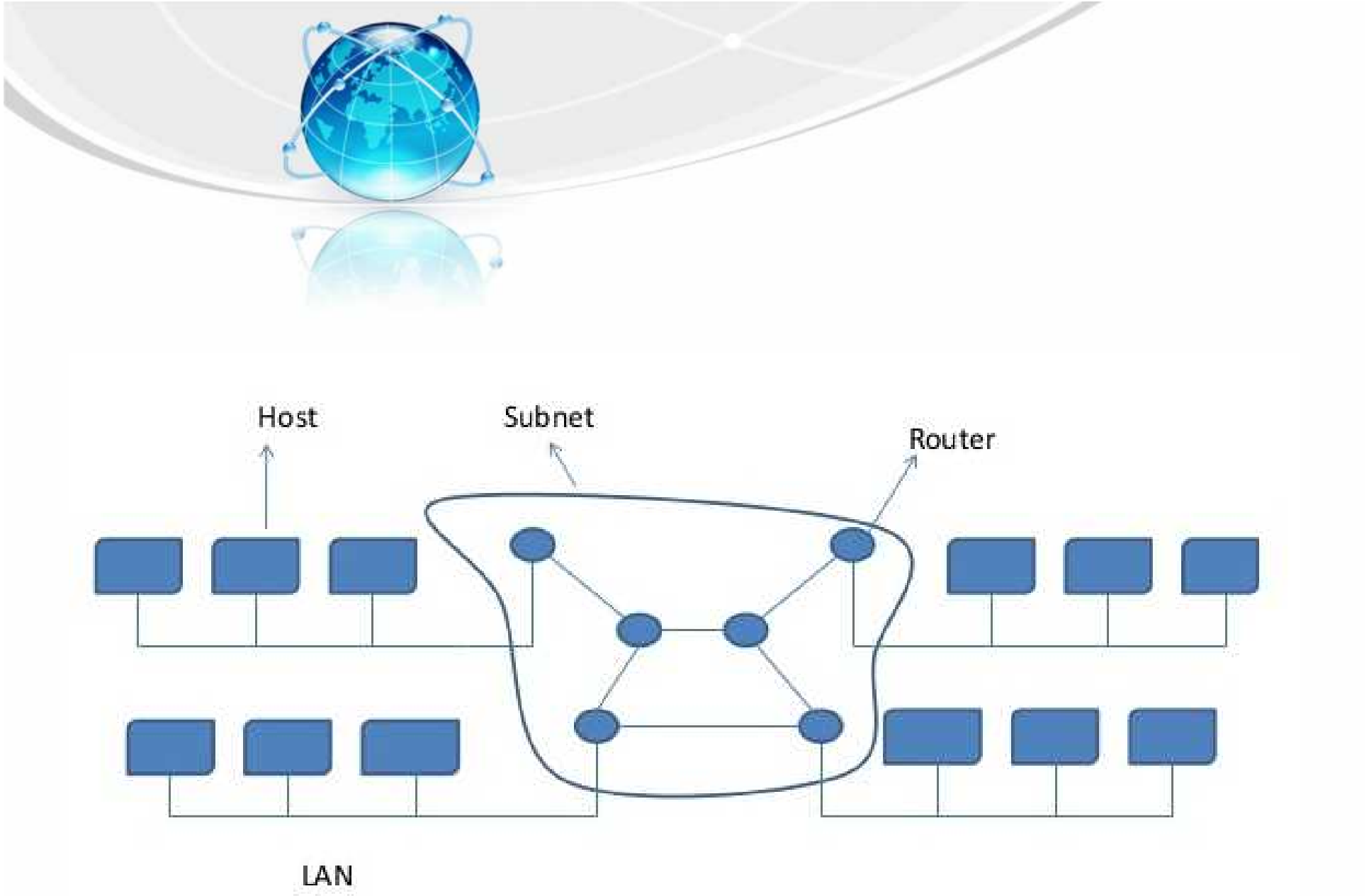
- LAN – privately owned nw
  - limited distance of connectivity
  - used to share resources (both hw and sw)

Categories of network

- WAN – Wide area network
  - spans large geographical area
  - consists of machines (hosts) connected by communication subnet or just **subnet**
  - hosts are owned by users; subnet by ISP
  - work of subnet – carry message from host to host

Subnet

1. Transmission lines – moves bits ; made of optical fibre, copper wire, radio waves
2. Switching elements – specialised computers that connect 3 or more transmission lines. Named as - Router


Host
Subnet
Router
LAN

Categories of network

- MAN – Metropolitan Area Network
  - covers an entire city
  - Eg : cable Tv network

Devices

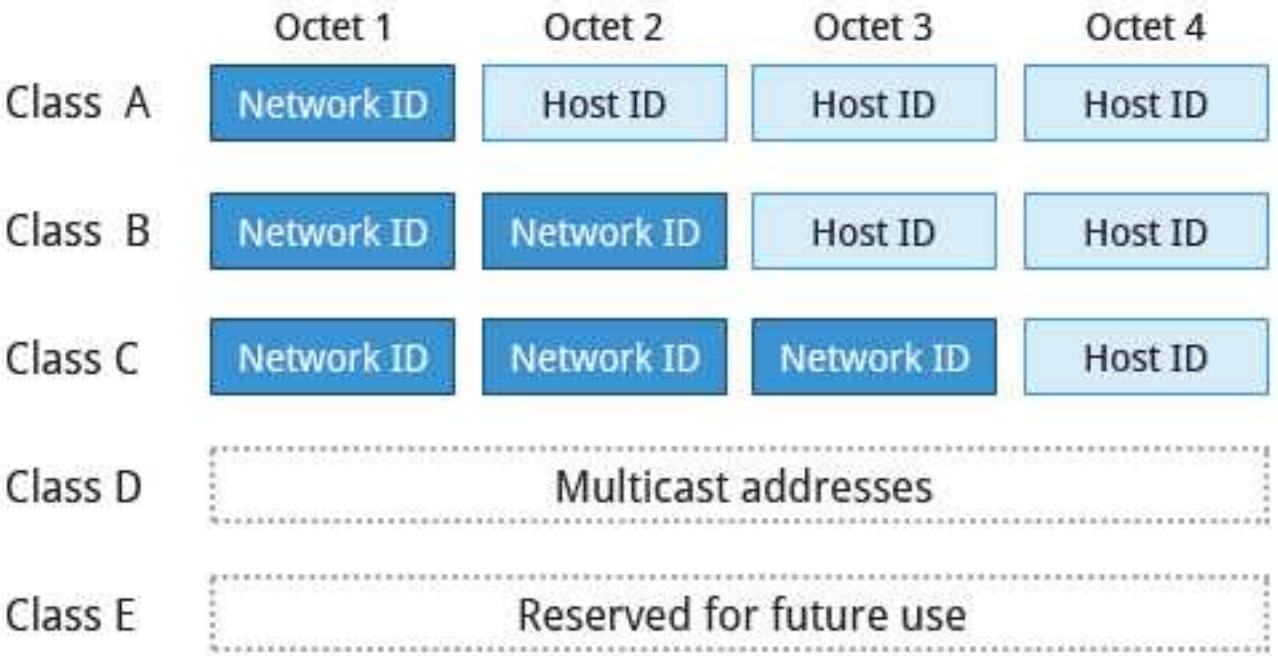
- Hub
- Bridge
- Switch
- Router

IP Address

Uses 32-bits
Only 4.3 billion unique addresses.

Uses 128-bits
allows 3.4 X 10^{38} unique addresses.

IPv4 Address



Domain Name System

- Name resolution : **Name Resolution** is used to convert numerical IP address values into a human-readable format known as the **hostname**.

- DNS

Commands

- $cat /etc/hosts
- $host google.com - lookup host using DNS
- $nslookup google.com - lookup nameserver interactively
- $dig google.com - lookup domain name information from nameserver
- $ping <*hostname*> - ping is used to check whether or not a machine attached to the network can receive and send data; i.e., it confirms that the remote host is online and is responding.

- $route - give routing information
- $traceroute <*hostname*>
- $ethtool eth0
- nmap
  $sudo nmap –A –T4 google.com
  $sudo namp -sP 192.168.0.1/24
- $tcpdump –i eth0
- $iptraf

Points to remember

- Public Ip vs Private Ip
- Public DNS vs Private DNS

Thank You

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