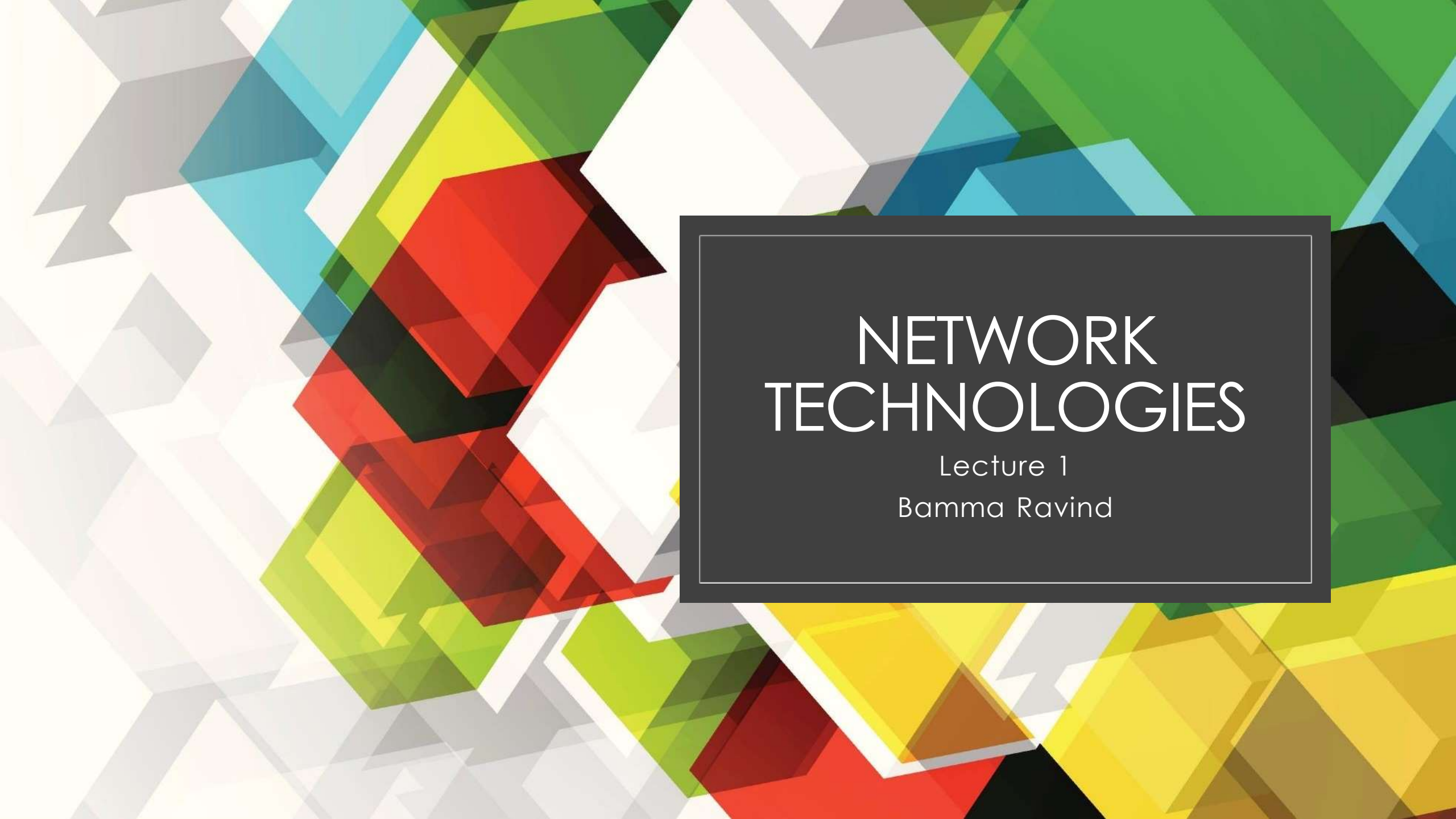
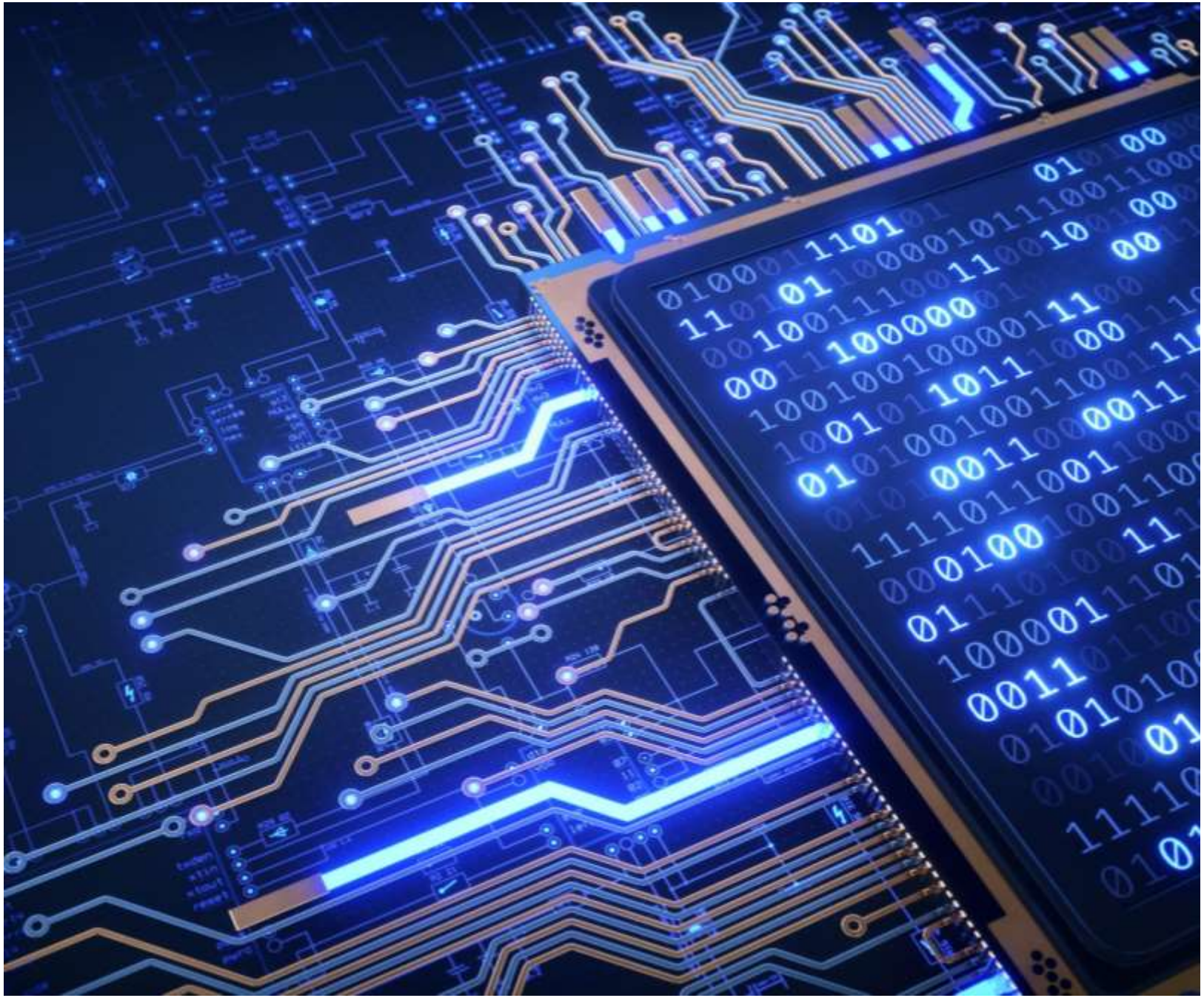

NETWORK
TECHNOLOGIES
Lecture 1
Bamma Ravind



Introduction to networking

Agenda:

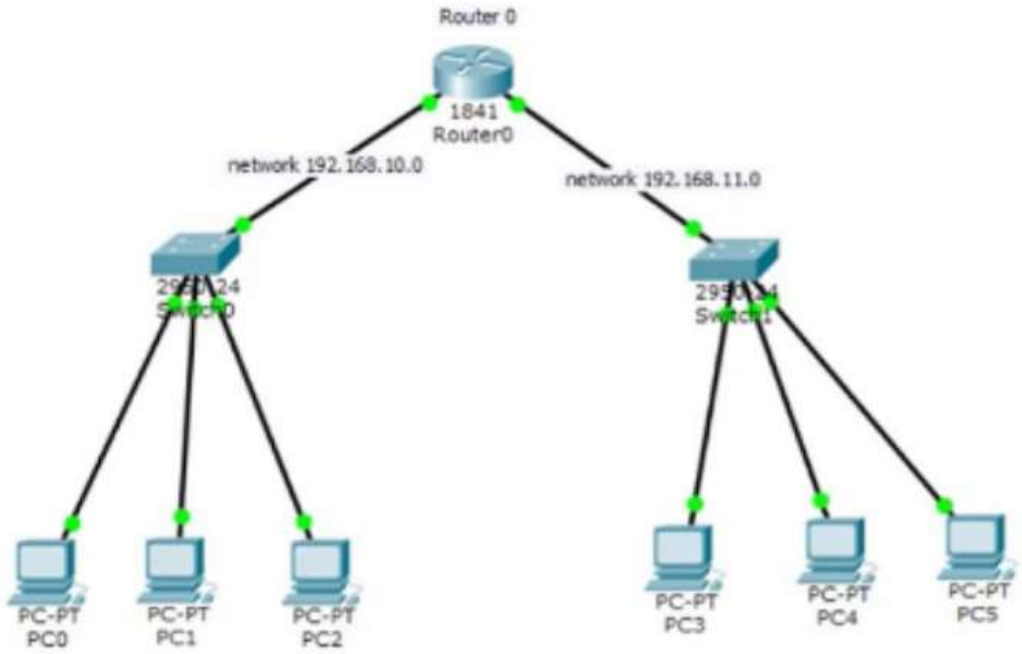
1. Introductions
2. Syllabus
3. Class rules
4. Expectations
5. Packet Tracer
6. Lecture 1
7. Labs
8. Practice Questions
9. Learning Methodology and resources

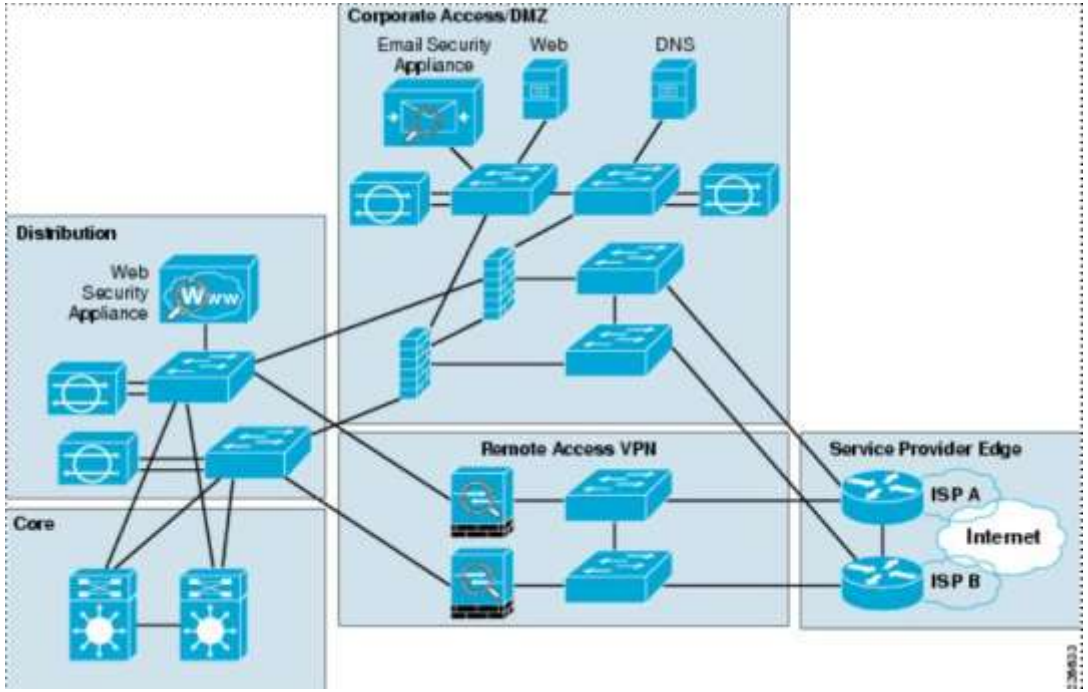
- What is a Network?
- Logical vs Physical topologies
- Functions of a Router and a Switch
- Router or a switch.
- LAN/MAN/PAN/WAN/Internet/Intranet/Extranet
- OSI and TCP/IP model
- Encapsulation
- Connection Oriented vs Connectionless
- Subnetting and IP Addressing
- NAT
- ICMP/ARP/DHCP

Network Technologies

Lecture 1

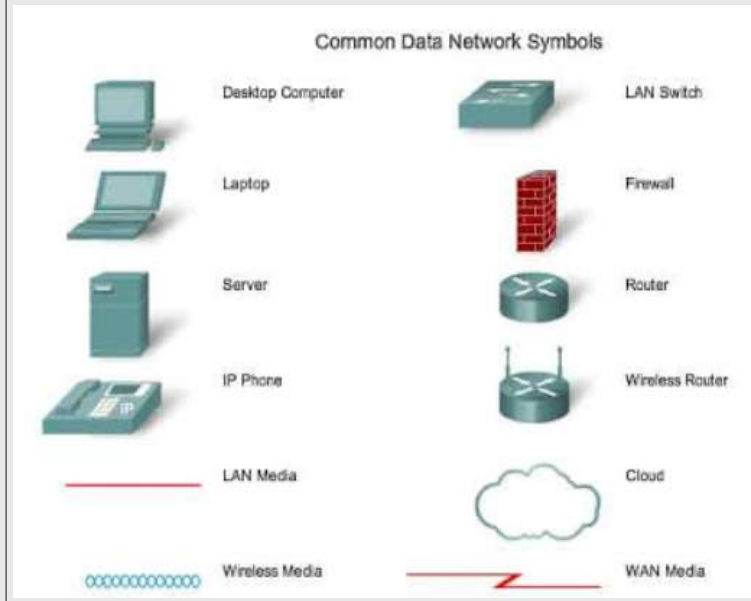
Recap and Revision Lecture

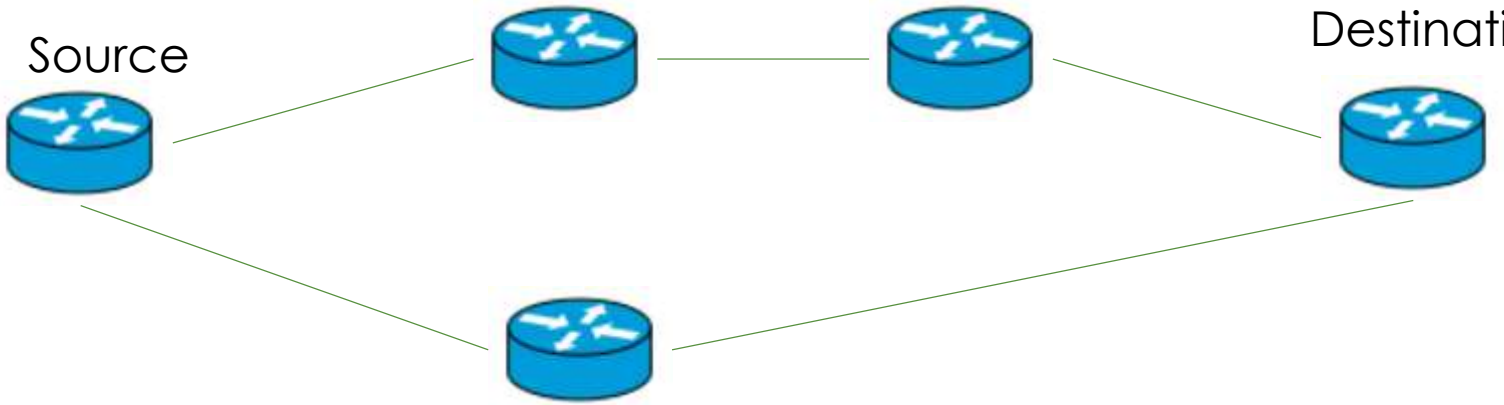




What is a Network?

Sharing of resources





Functions of a Router:

a. Finding the best path to a destination
b. Connect different Networks

Function of a switch:

Forward packets
Plug in your PCs, IP phones, access points, servers, firewalls etc

Activity: Check out the Config Guide and Data Sheet of a router and a switch
Types of ports

Parameters to consider to select a switch:

1. Number of ports
2. Managed vs unmanaged
3. Layer 2/3
4. Uplink
5. POE
6. Fanless
7. Redundant power
8. Modular/Fixed?
9. Warranty / Smartnet
10. Support
11. Price

HP/Cisco Switch Selector
HP/Cisco Router Selector
HP/Cisco Access Point Selector
Firewalls?
Dlink?

How to Select a router or a switch? Or even an access point/controller?

Activity: A customer is looking for 2 proposals for a switch for an SME which has 20 users, his business is critical and cannot afford downtime. Needs POE for ip phones.

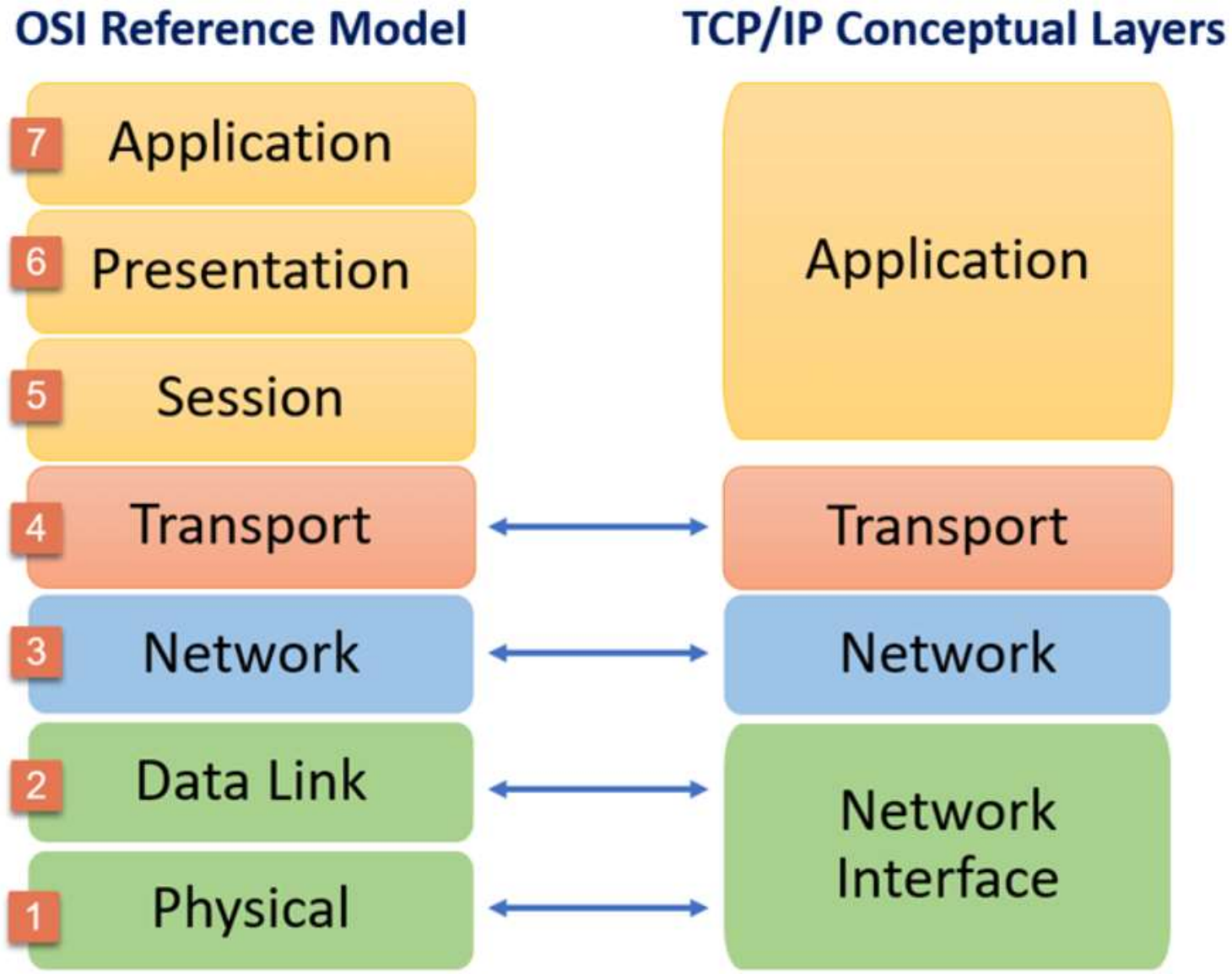
Types of Networks

- LAN: connects a group of computers in a small geographical area.
- MAN: covers relatively large region such as cities, towns.
- PAN: interconnecting electronic devices in an individual person's workspace e.g smartphones
- WAN: spans large locality and connects countries together. E.g Internet.
- Internet /Intranet /Extranet

LAYERS	FUNCTIONS	CORRESPONDING PROCOTOLS
Application	Provide services to applications	HTTP, SMTP, FTP, NFS, Telnet, SMB
Presentation	Formatting, Compression, Encryption	JPEG, MIDI, MPEG etc etc
Session	Data transfer, class of service, control data exchange	Network File System (NFS), SQL, RPC
Transport	Quality and reliability, ensures data received, segments	TCP, UDP, SPX, NetBEUI
Network	Path selection, logical addressing, routing	IP, IPX, RIP, ICMP, ARP, RARP, OSPF, NetBEUI, DLC, DecNET
Data Link	Reliable data transfer across media; physical addressing	HDLC, SLIP, PPP
Physical	Transmit data on media	NONE

OSI Model

Encapsulation -
Eg post a package
Frame Check Sequence -



OSI and TCP/IP models

IP Addressing Decimal to Binary

- What is an ip address?
- Classes of ip addresses
- Public vs private addresses
- Subnet masks
- Network, broadcast and range of usable ip address

2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
128	*64*	*32*	*16*	*8*	*4*	*2*	*1*
1	0	1	1	0	0	0	1

- 10.0.10.0/24
- 165.96.201.37/26
- 65.26.20.15/34
- 175.32.80.117/22
- 0.38.90.86/16
- 200.0.256.80/28
- 192.168.100.200/26

Subnetting
a. Finding Network Address
b. Broadcast Address
Range of usable IP addresses

NAT
Configure NAT – Static,Dynamic, NAT Overloading

There are two types of NAT translation: dynamic and static.

Static NAT: Designed to allow one-to-one mapping between local and global addresses. This flavor requires you to have one real Internet IP address for every host on your network.

Dynamic NAT: Designed to map an unregistered IP address to a registered IP address from a pool of registered IP addresses. You don't have to statically configure your router to map an inside to an outside address as in static NAT, but you do have to have enough real IP addresses for everyone who wants to send packets through the Internet. With dynamic NAT, you can configure the NAT router with more IP addresses in the inside local address list than in the inside global address pool. When being defined in the inside global address pool, the router allocates registered public IP addresses from the pool until all are allocated. If all the public IP addresses are already allocated, the router discards the packet that requires a public IP address.

PAT (NAT Overloading): is also a kind of dynamic NAT that maps multiple private IP addresses to a single public IP address (many-to-one) by using different ports. Static NAT and Dynamic NAT both require a one-to-one mapping from the inside local to the inside global address. By using PAT, you can have thousands of users connect to the Internet using only one real global IP address. PAT is the technology that helps us not run out of public IP address on the Internet. This is the most popular type of NAT.

Besides NAT gives you the option to advertise only a single address for your entire network to the outside world. Doing this effectively hides the internal network from the public world really well, giving you some additional security for your network.