Computer Networking – Part 1

Contents

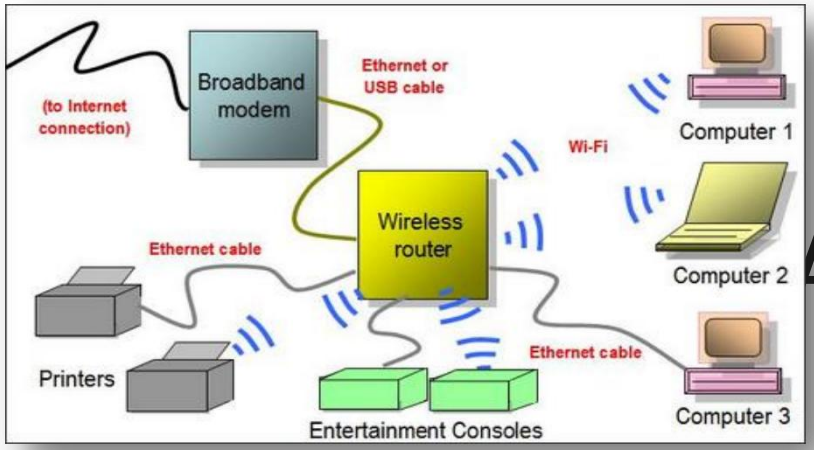
- What is a Computer network?
- Advantages & Disadvantages of a computer network
- Types of Networks
- LAN Topologies
- Network Models/Architectures
- Virtual Private Networks
- Testing Methods

What is a Computer Network?

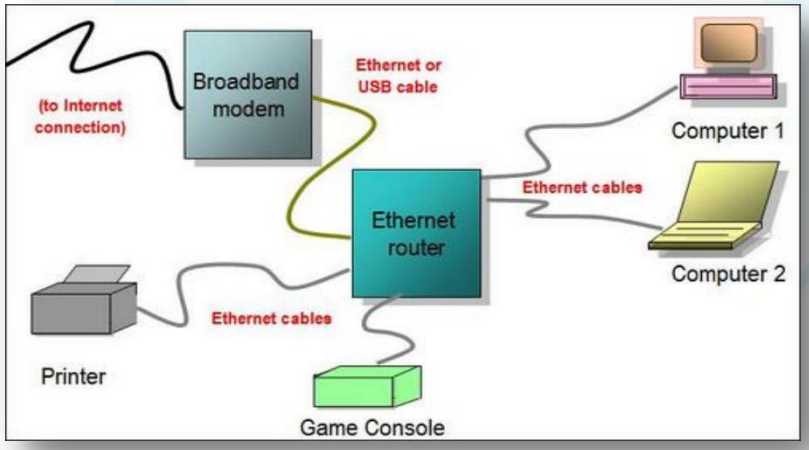
- A computer network is a system of interconnected computers and peripheral devices.
- For example, it may connect computers, printers, scanners and cameras.

What is a Computer Network? Cont.

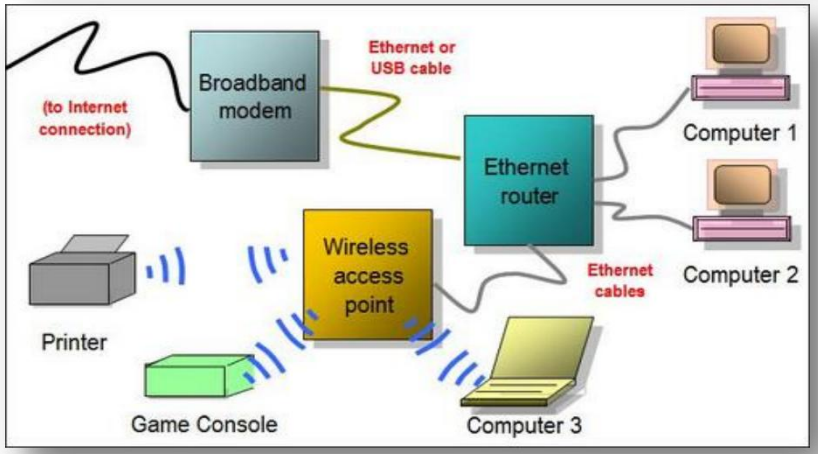
Wireless network



Wired network



Hybrid network



Advantages & Disadvantages of a Computer Network

Advantages

- File Sharing
- Resource Sharing
- Increased Storage Capacity
- Increased Cost Efficiency
- Fast

Disadvantages

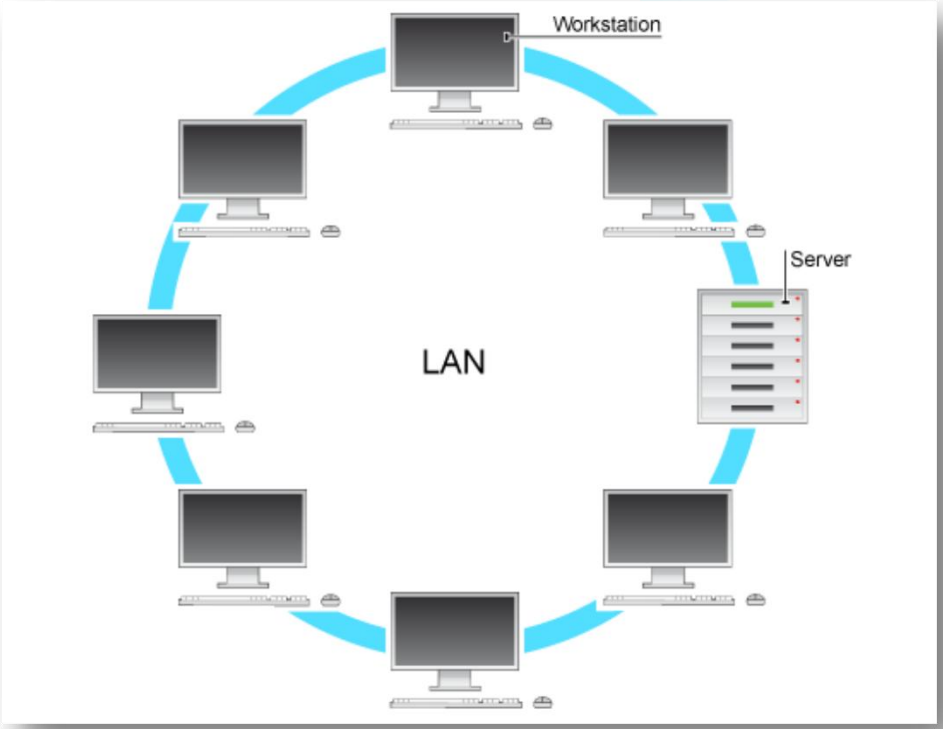
- Expensive Set Up
- Rapid Spread of Computer Viruse
- Security Issues

Types of Networks

LAN - Local Area Network
WAN - Wide Area Network
MAN - Metropolitan Area Network
DAN - Desk Area Network
CAN - Campus Area Network

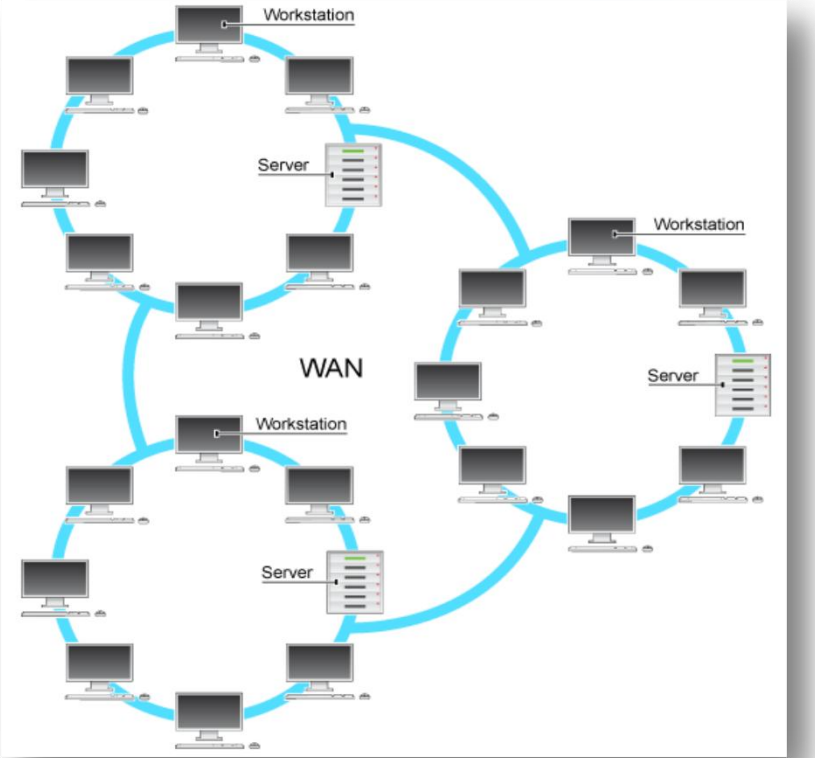
LAN - Local Area Network

- A network that connects a relatively small number of machines in a relatively close geographical area



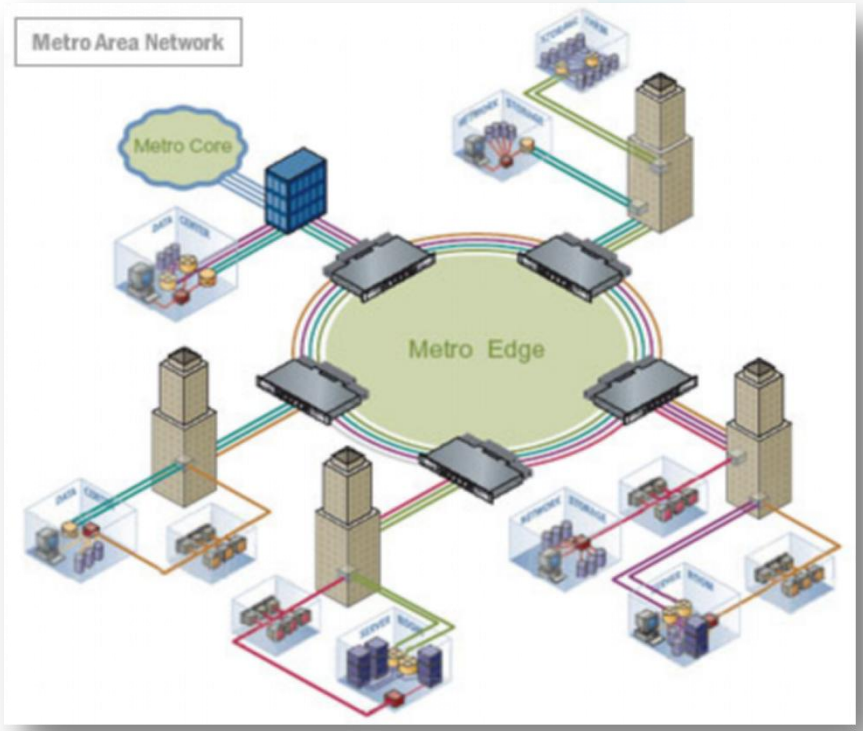
WAN - Wide Area Network

- A network that connects two or more local-area networks over a potentially large geographic distance



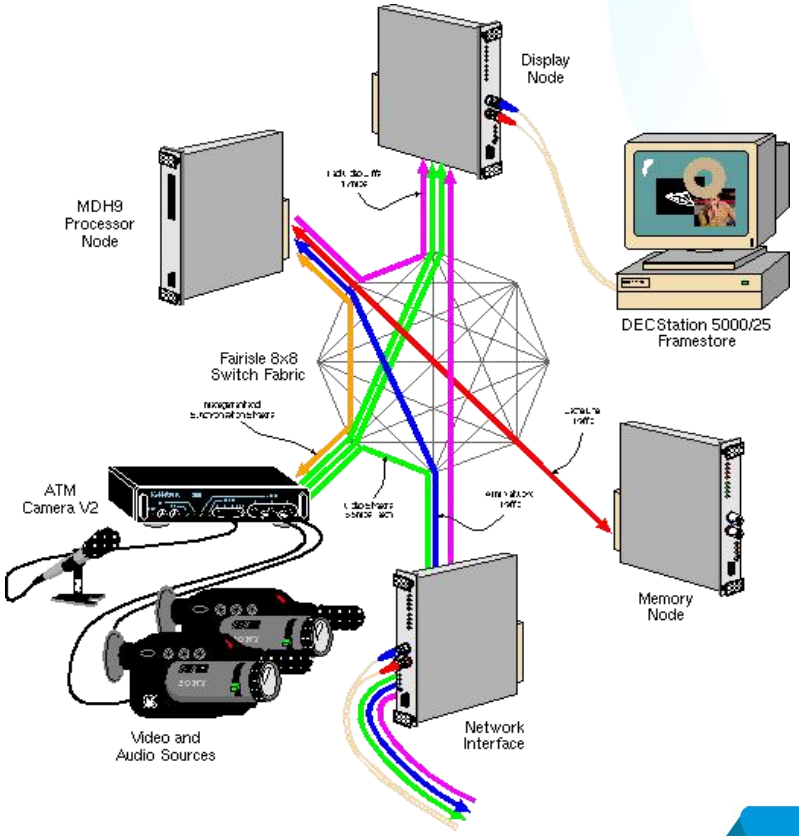
MAN - Metropolitan Area Network

- A large computer **network** that spans a metropolitan area, Its geographic scope falls between a WAN and LAN.



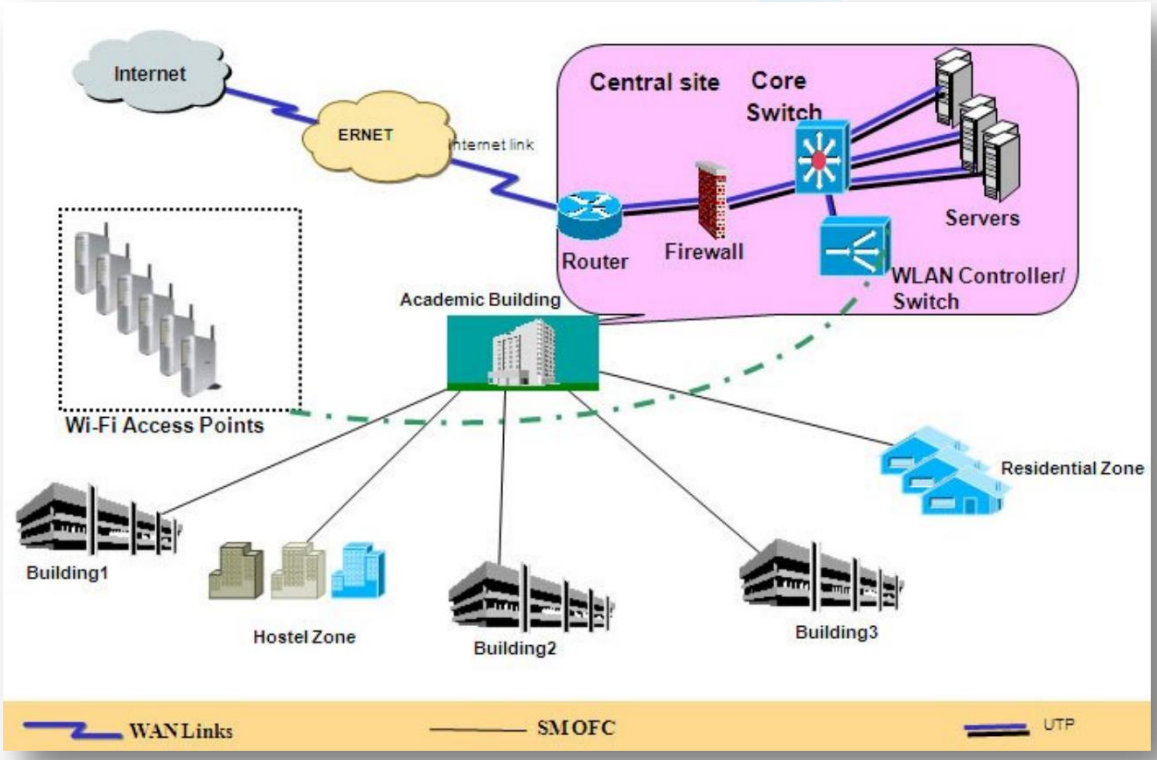
DAN - Desk Area Network

- A network that connects a relatively small number of machines in a relatively close geographical area



CAN - Campus Area Network

- A network that connects a relatively small number of machines in a relatively close geographical area

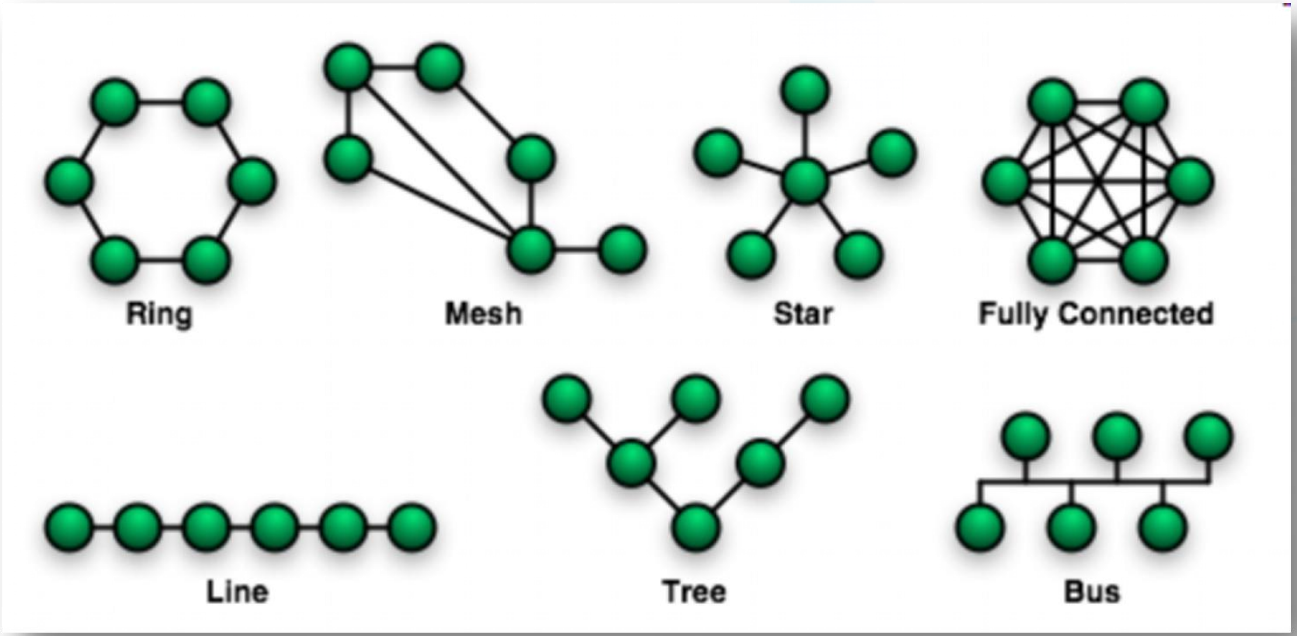


Comparison of LAN,MAN,WAN

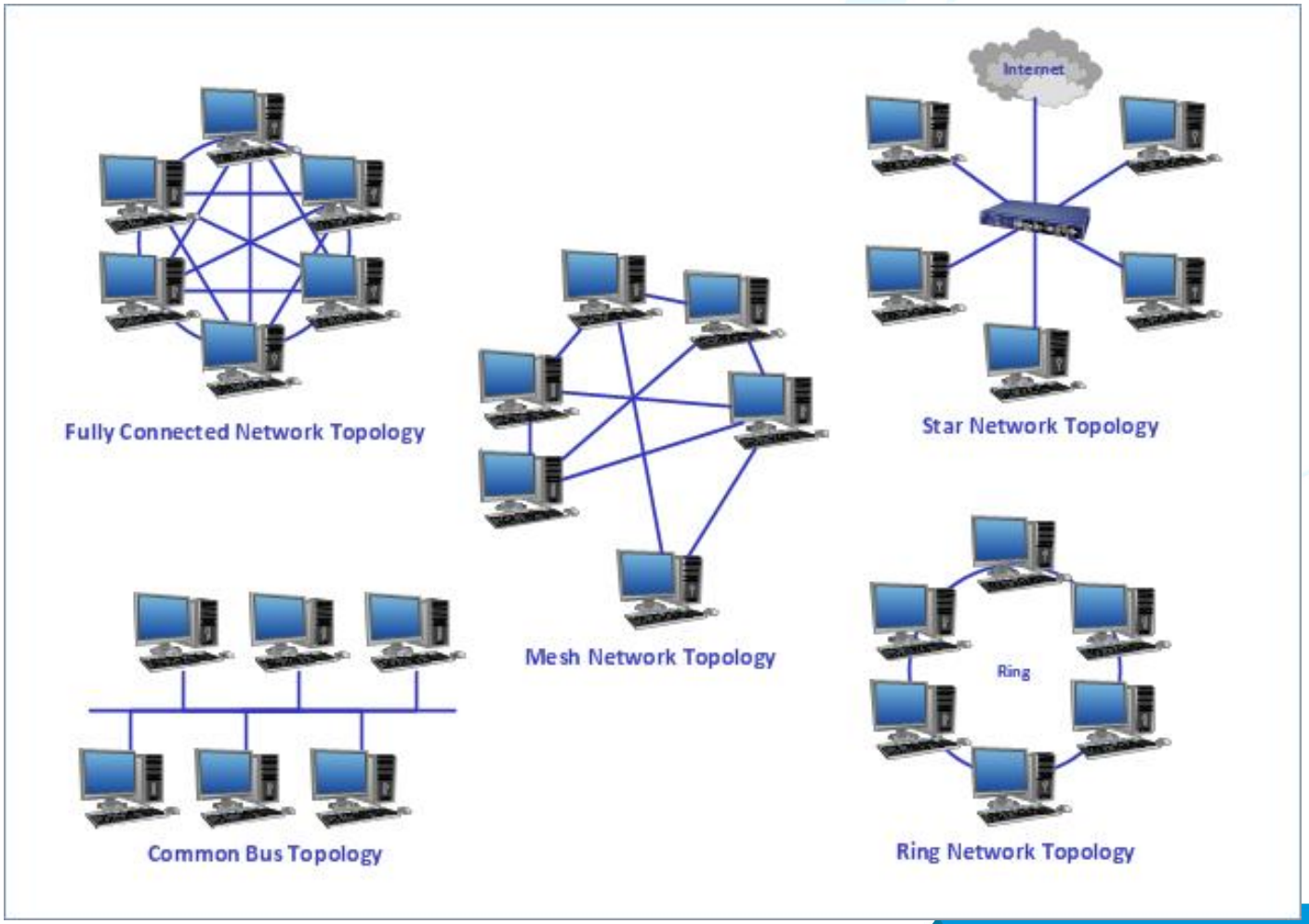
CRITERIA	LAN	MAN	WAN
Cost	Low	High	Higher
Network Size	Small	Larger	Largest
Speed	Fastest	Slower	Slowest
Transmission media type	Twisted-pair	Twisted-pair and fibre-optic cables	Fiber optic, radio wave and sattelite
Number of computers	Smallest	Large	Largest

LAN Topologies

- A Various configurations, called topologies, have been used to administer LANs

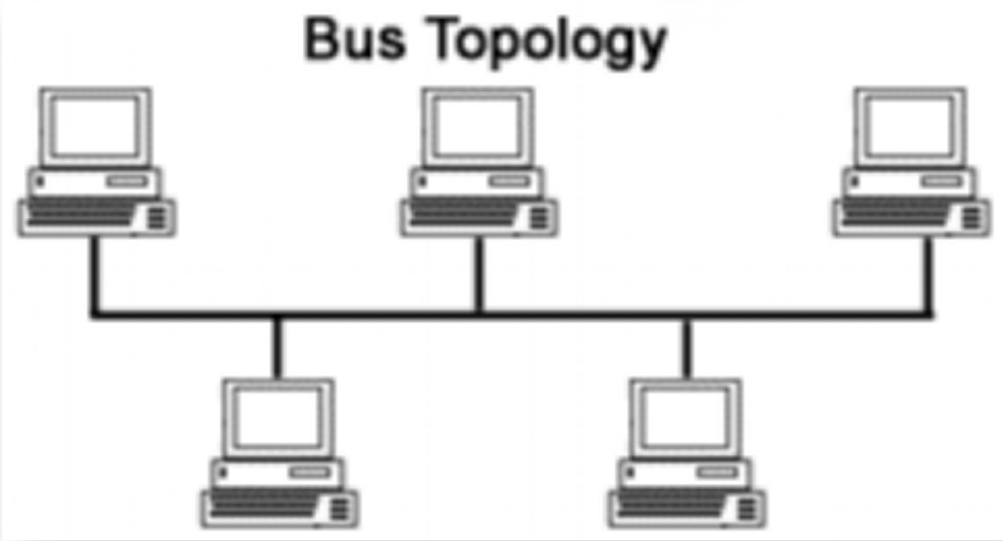


LAN Topologies Cont.



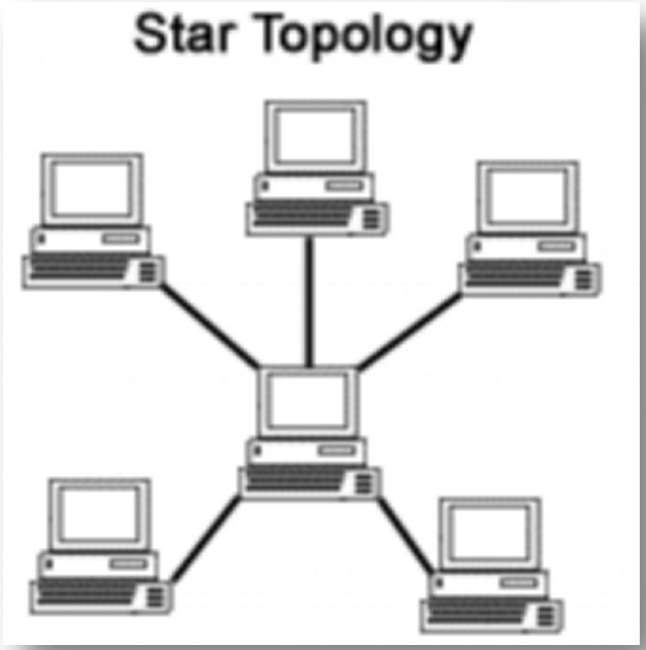
Bus Topology

- A Bus topology is a type of network setup where each computer and network device is connected to a single cable or backbone.



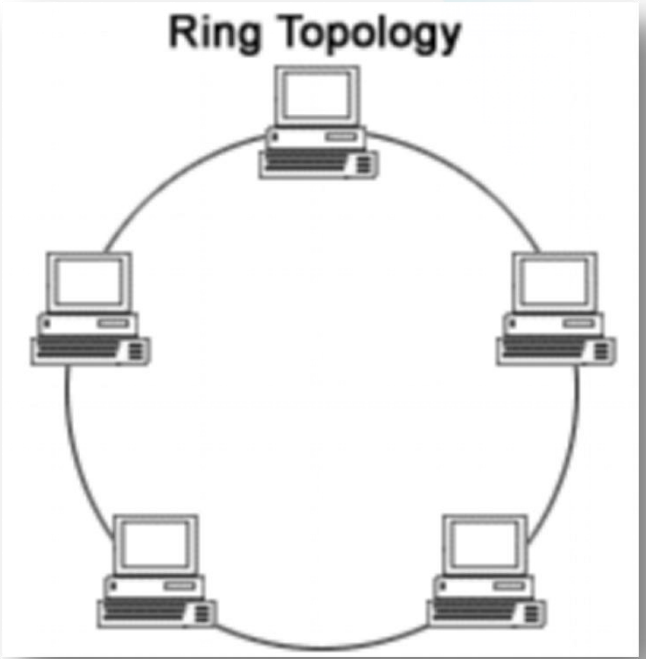
Star Topology

- A Star topology is one of the most common network setups where each of the devices and computers on a network connect to a central hub.



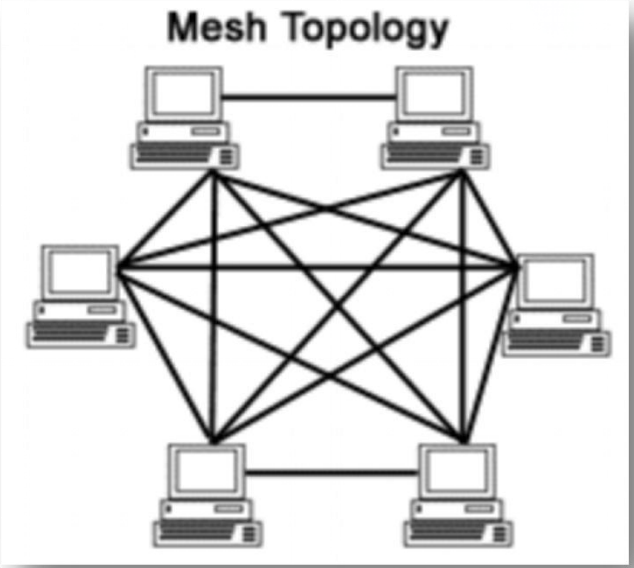
Ring Topology

- A Ring topology is a computer network configuration where the devices are connected to each other in a circular shape.



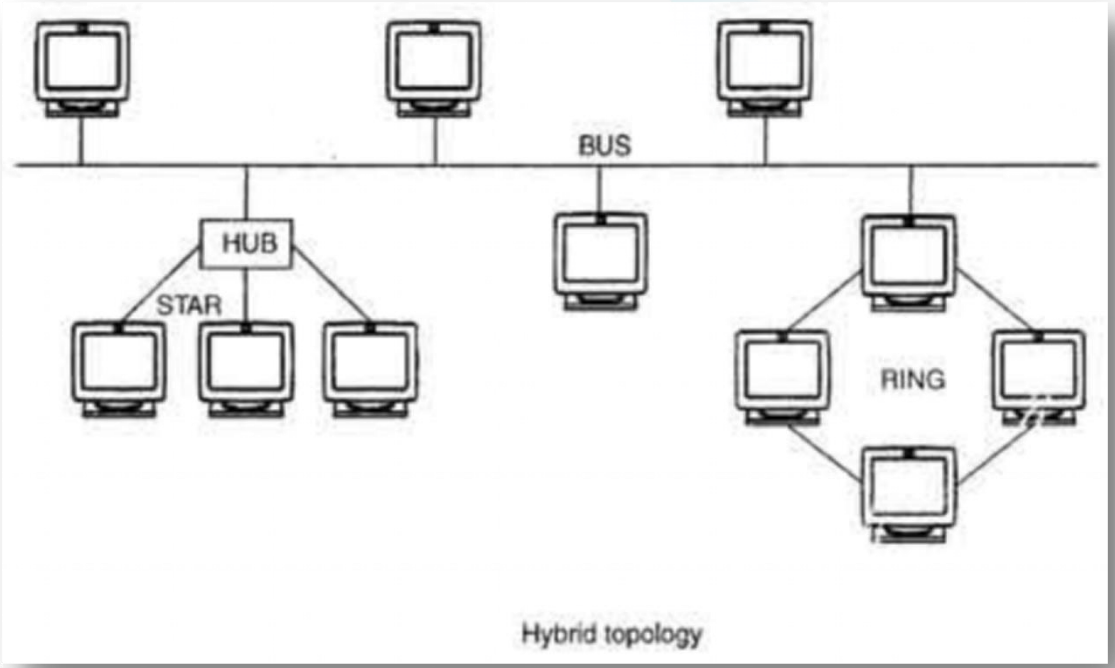
Mesh Topology

- A network setup where each computer and network device is interconnected with one another, allowing for most transmissions to be distributed, even if one of the connections go down..



Hybrid Topology

- A hybrid topology is a network topology that uses two or more network topologies.



Hybrid topology

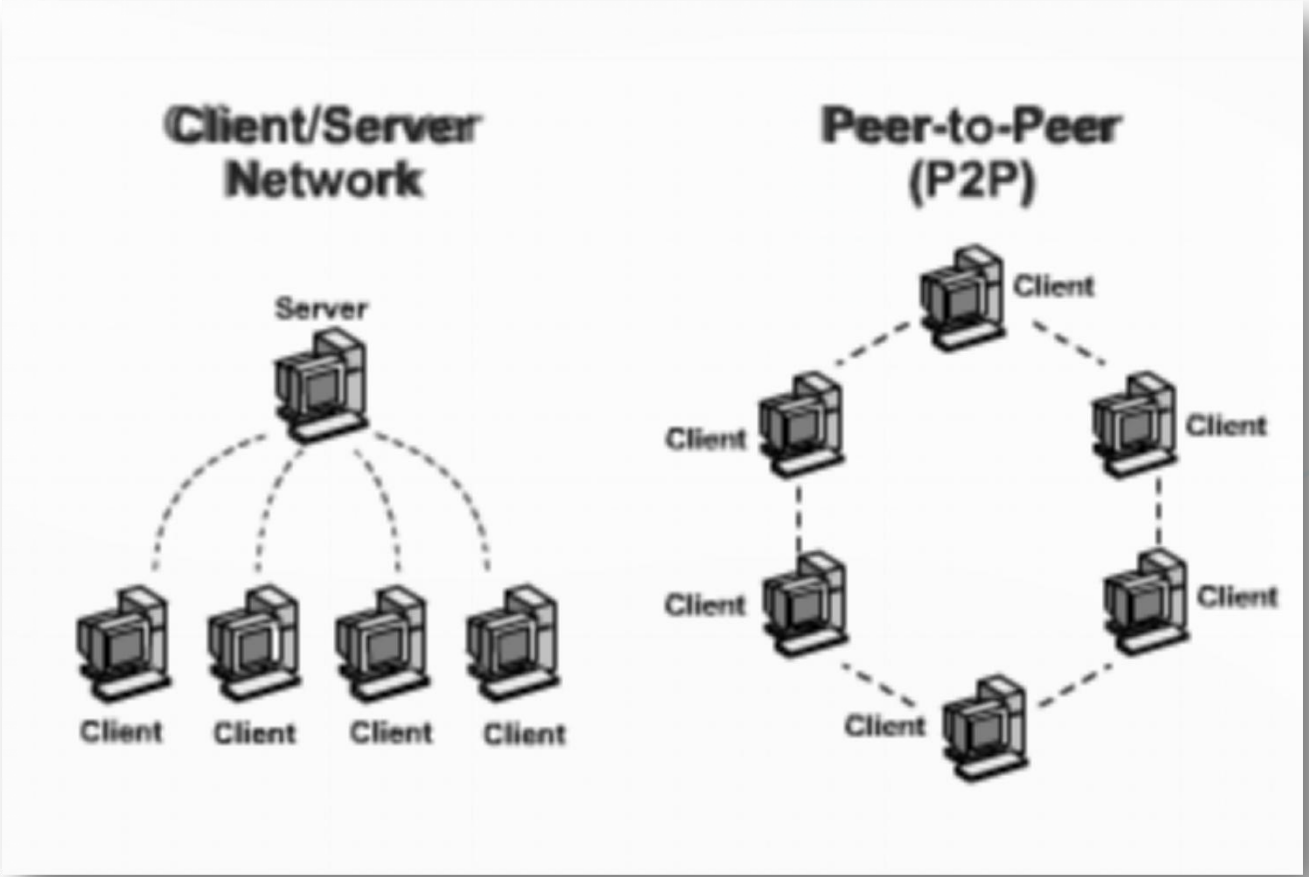
Comparison of Topologies

	Bus Topology	Ring Topology	Star Topology
Structure	there is a single central cable (backbone) and all computers and other devices connect to it	all computers and other devices are connected in a circle	there is a central host and all nodes connect to it
Host existence	depends on network needs	depends on network needs	yes
Connection between nodes	It has no connection between the nodes.	yes	no
Host failure	network can still run	network will fail	network will fail
Node failure	network can still run	network will fail	network can still run
Ease of troubleshooting	difficult. Need to search for the problematic node one by one	depends on backbone. If there is a backbone, troubleshooting is difficult. If there is no backbone, the focus is on the two nodes not communicating	depends on the host. It is easier to repair the problematic host. However, if the nodes fail, then each node has to be searched
Ease of adding or removing nodes	easy	difficult	average
Number of nodes when extending network	many	limited	limited

Network Models

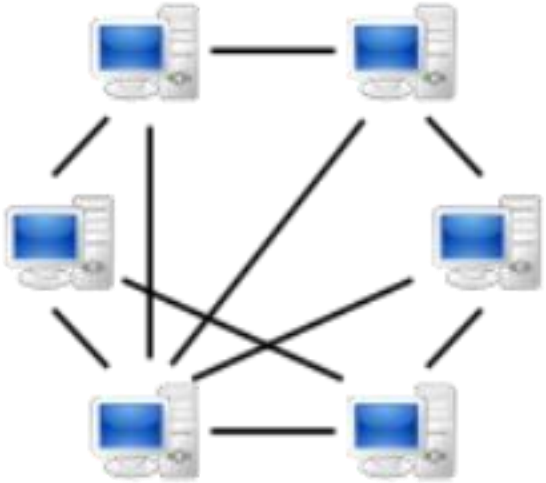
- A Overall design of a computer network that describes how a computer network is configured and what strategies are being used.
- Mainly focuses on the functions of the networks.
- Also known as network architecture or network design.

Network Models Cont.



Peer-to-peer or P2P Model

- A It is a network with all the nodes acting as both servers and clients.
- All computers in the peer-to-peer network has equal responsibilities and capabilities to use the resources available on the network

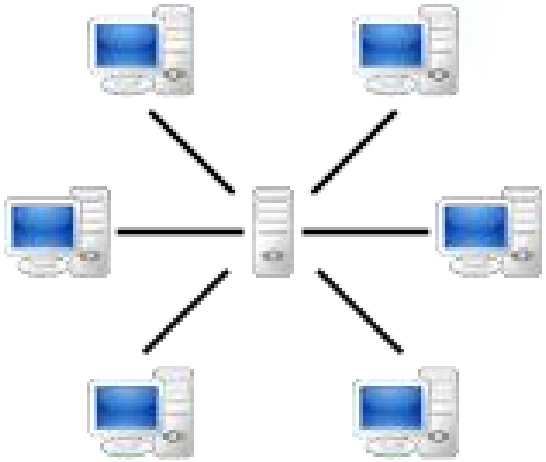


Peer-to-peer or P2P cont.

- With peer-to-peer network, no server is needed; each computer in the network is called a peer.
- A PC can access files located on another PC and can also provide files to other PCs.

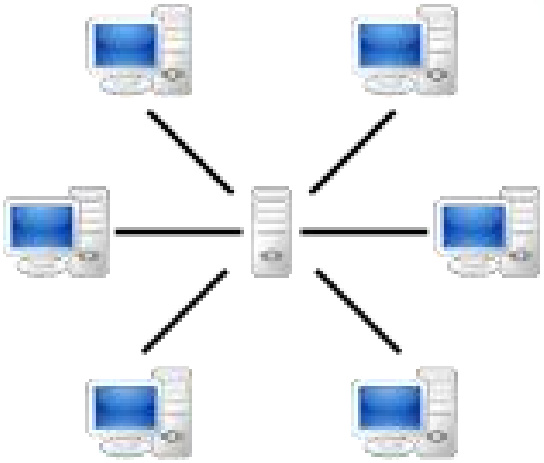
Client/Server Model

- A client/server network is a network in which the shared files and applications are stored in the server but network users (clients) can still store files on their individual PCs.



Client/Server Model

- A server is a computer that shares information and resources with other computers on a network.
- A client is a computer which requests services or files from a server computer.

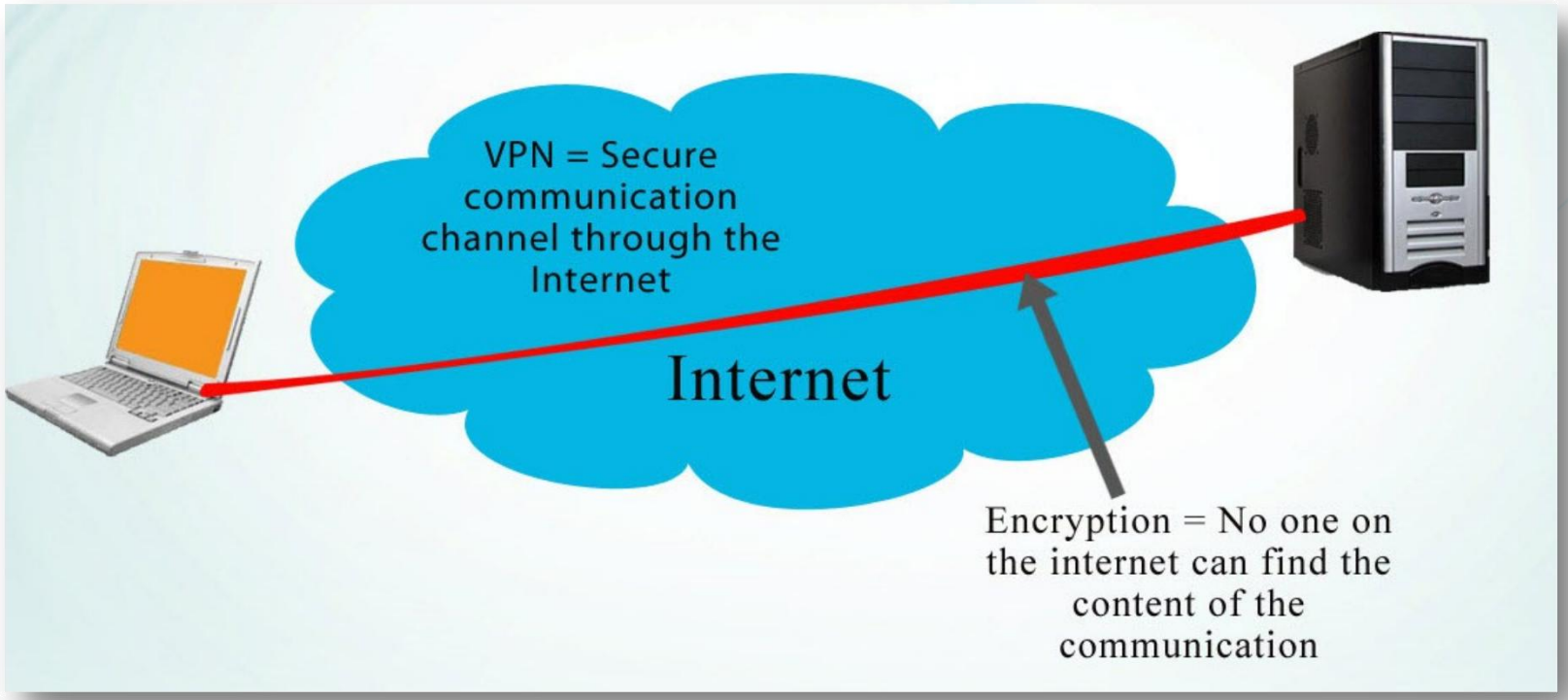


Comparison of Network Models

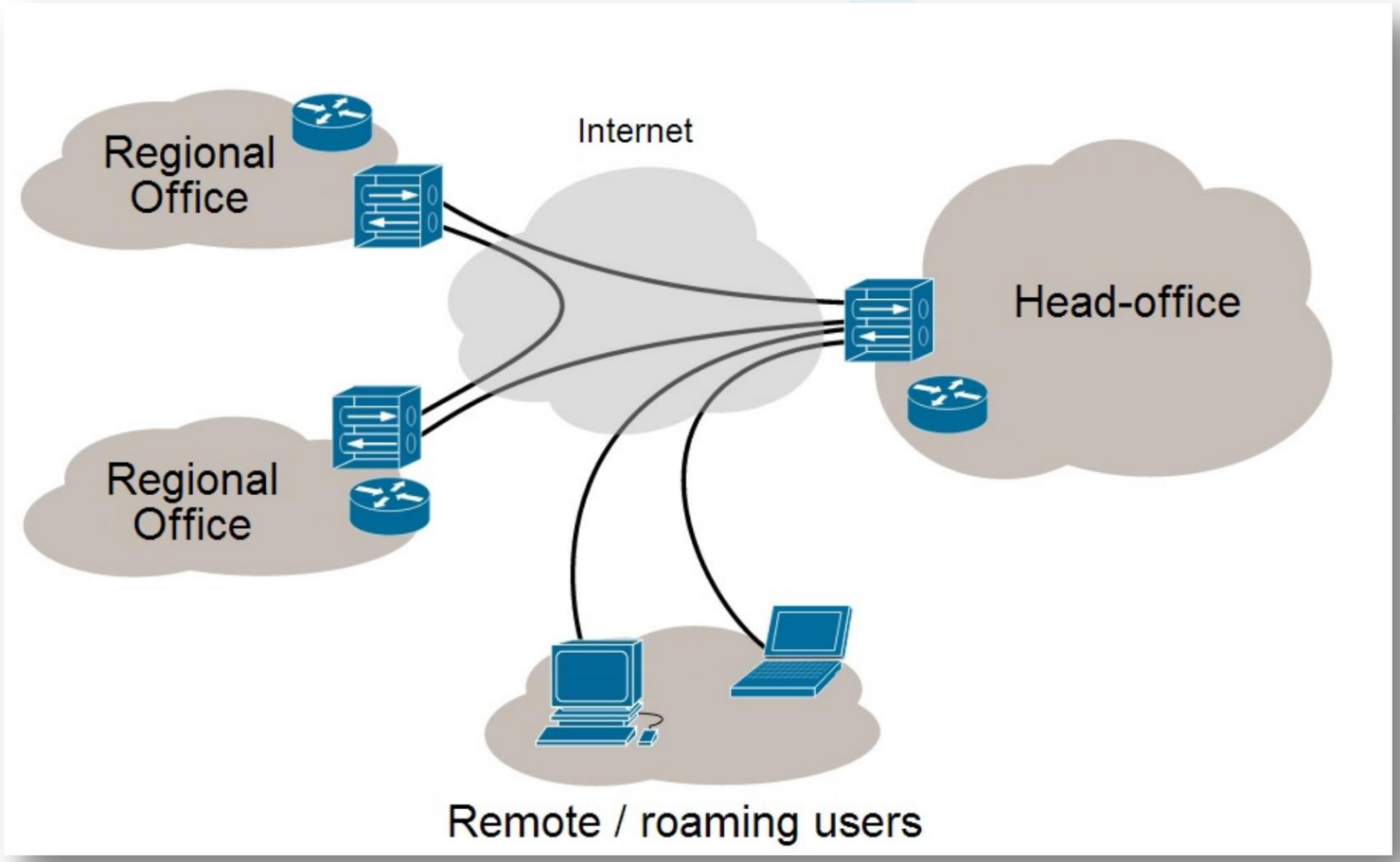
Client/Server	Peer-To-Peer
Server has the control ability while clients don't	All computers have equal ability
Higher cabling cost	Cheaper cabling cost
It is used in small and large networks	Normally used in small networks with less than 10 computers
Easy to manage	Hard to manage
Install software only in the server while the clients share the software	Install software to every computer
One powerful computer acting as server	No server is needed

Virtual Private Networks

- A **virtual private network** (**VPN**) extends a private network across a public network, such as the Internet.



Virtual Private Networks



Virtual Private Networks Cont.

- It enables a computer to send and receive data across shared or public networks as if it is directly connected to the private network, while benefiting from the functionality, security and management policies of the private network

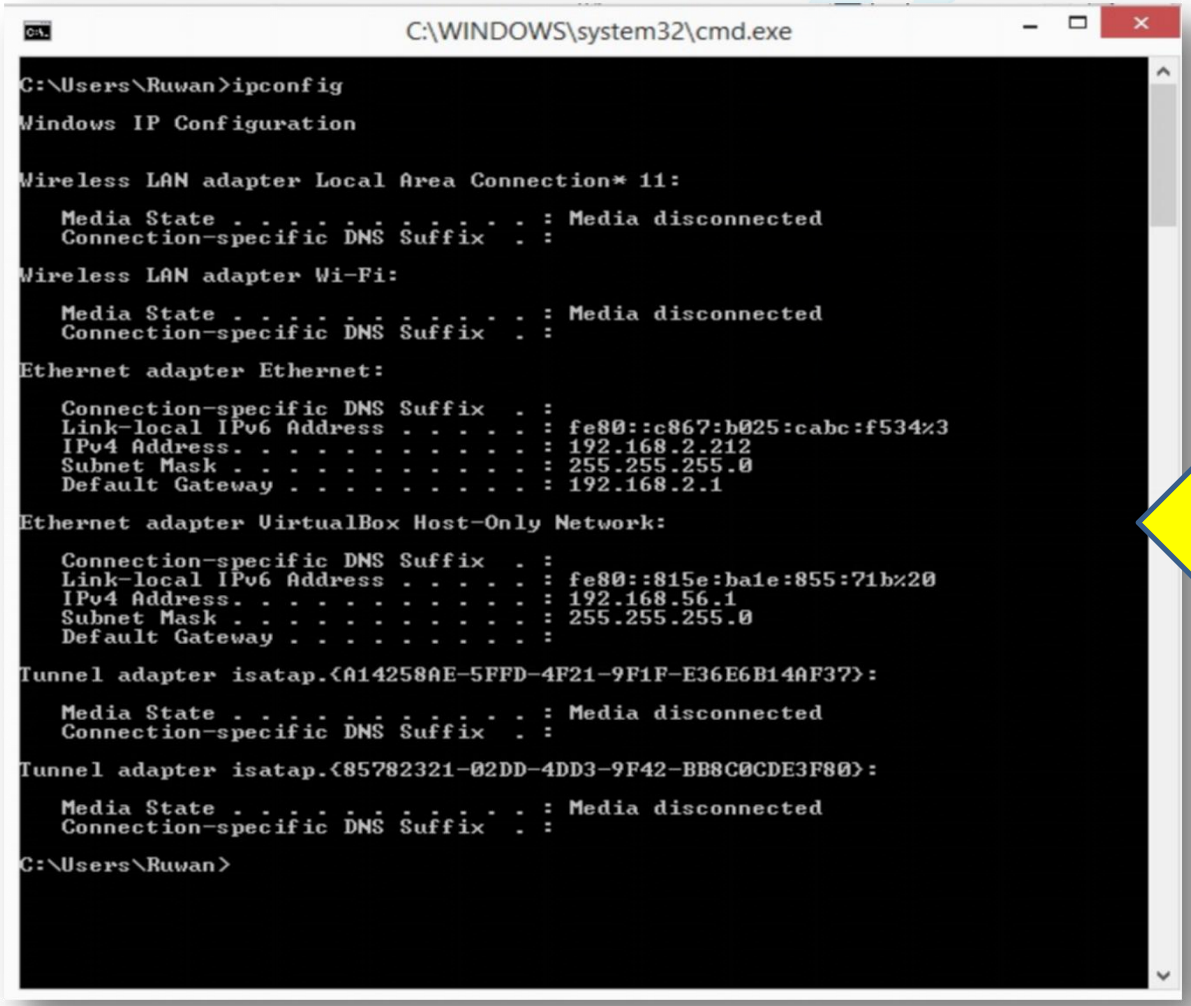
Testing Methods

- Basic Network testing commands/Methods

ipconfig

- A Windows command line utility that is used to manage the IP address assigned to the machine it is running in.
- It displays the computer's currently assigned IP, subnet mask and default gateway addresses.

ipconfig

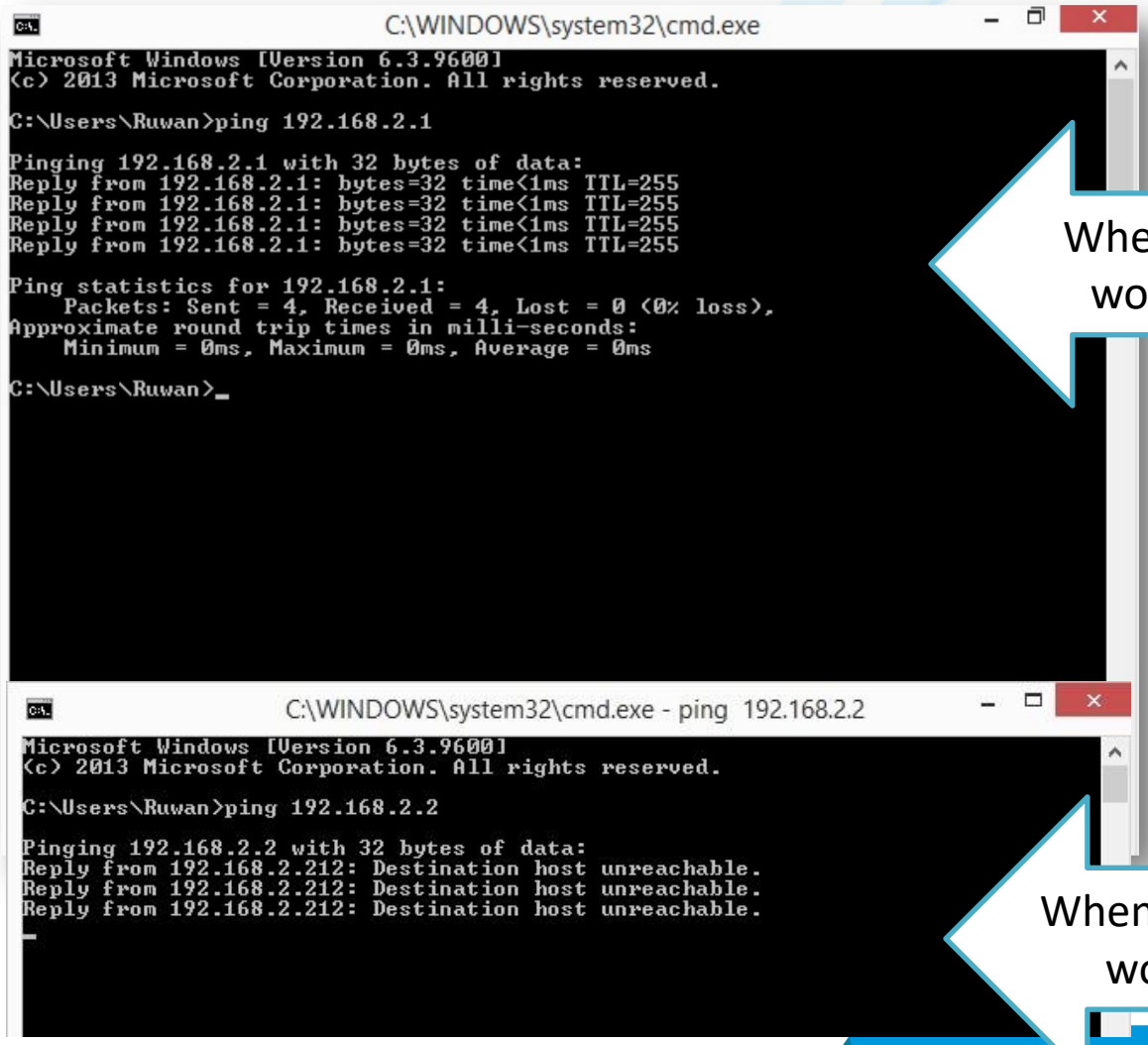


IP Address

ping

- Query or a Command (another computer on a network) to determine whether there is a connection to it.

ping



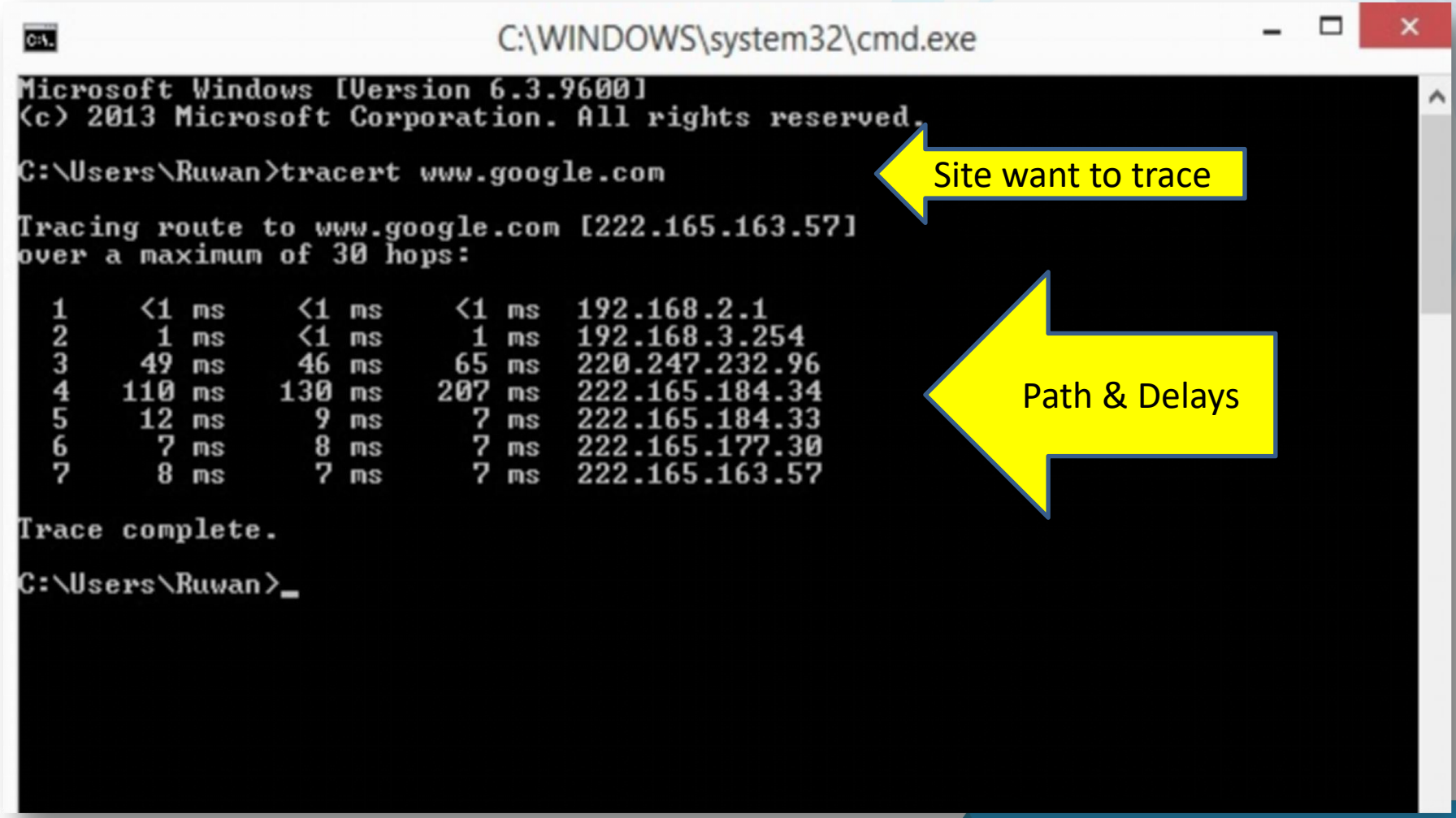
When ping working

When ping not working

tracert

- Displaying the route (path) and measuring transit delays of packets across an Internet Protocol (IP) network.

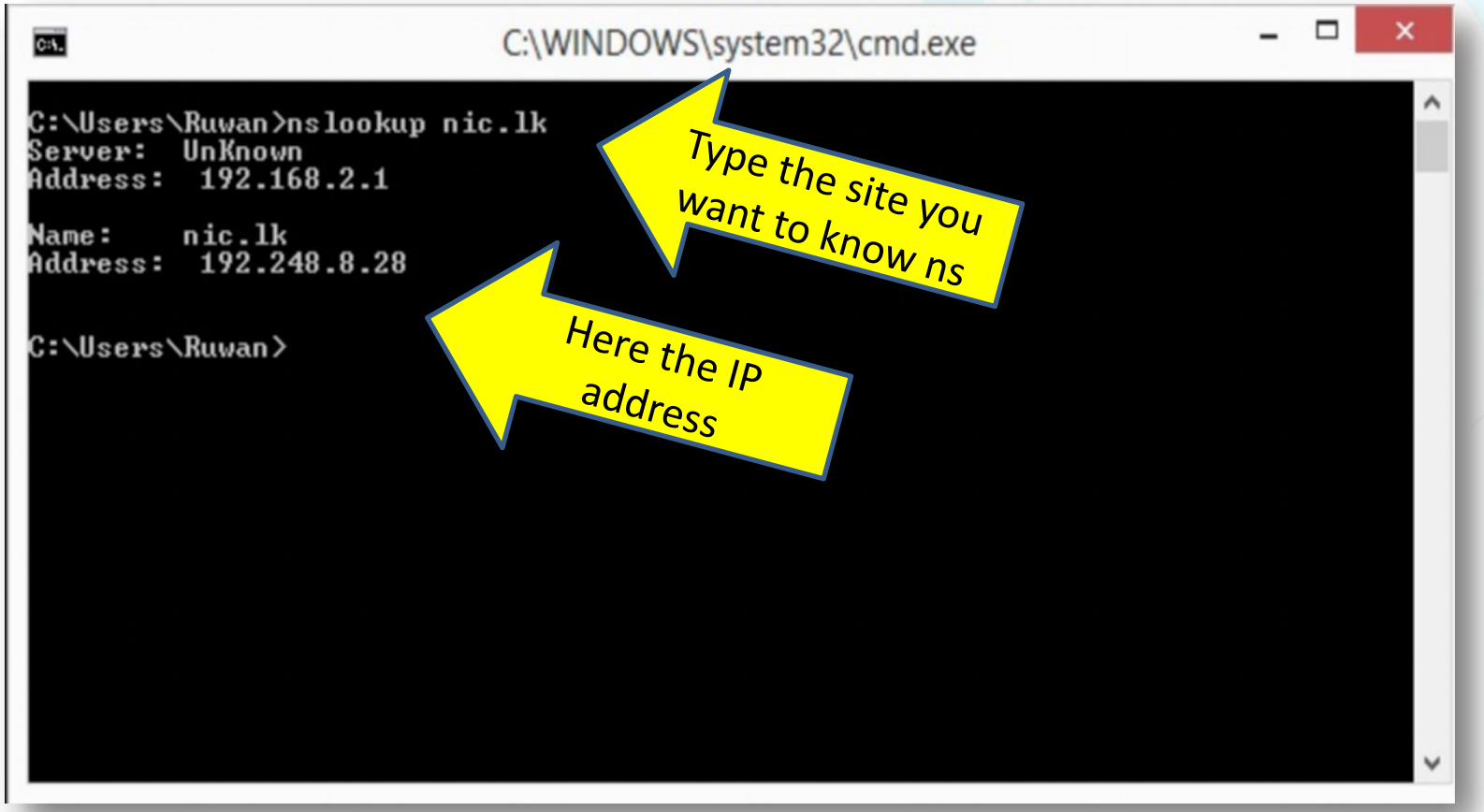
tracert


C:\WINDOWS\system32\cmd.exe
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.
C:\Users\Ruwan>tracert www.google.com
Tracing route to www.google.com [222.165.163.57]
over a maximum of 30 hops:
1 <1 ms <1 ms <1 ms 192.168.2.1
2 1 ms <1 ms 1 ms 192.168.3.254
3 49 ms 46 ms 65 ms 220.247.232.96
4 110 ms 130 ms 207 ms 222.165.184.34
5 12 ms 9 ms 7 ms 222.165.184.33
6 7 ms 8 ms 7 ms 222.165.177.30
7 8 ms 7 ms 7 ms 222.165.163.57
Trace complete.
C:\Users\Ruwan>
Site want to trace
Path & Delays

nslookup

- is a command for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or for any other specific DNS record

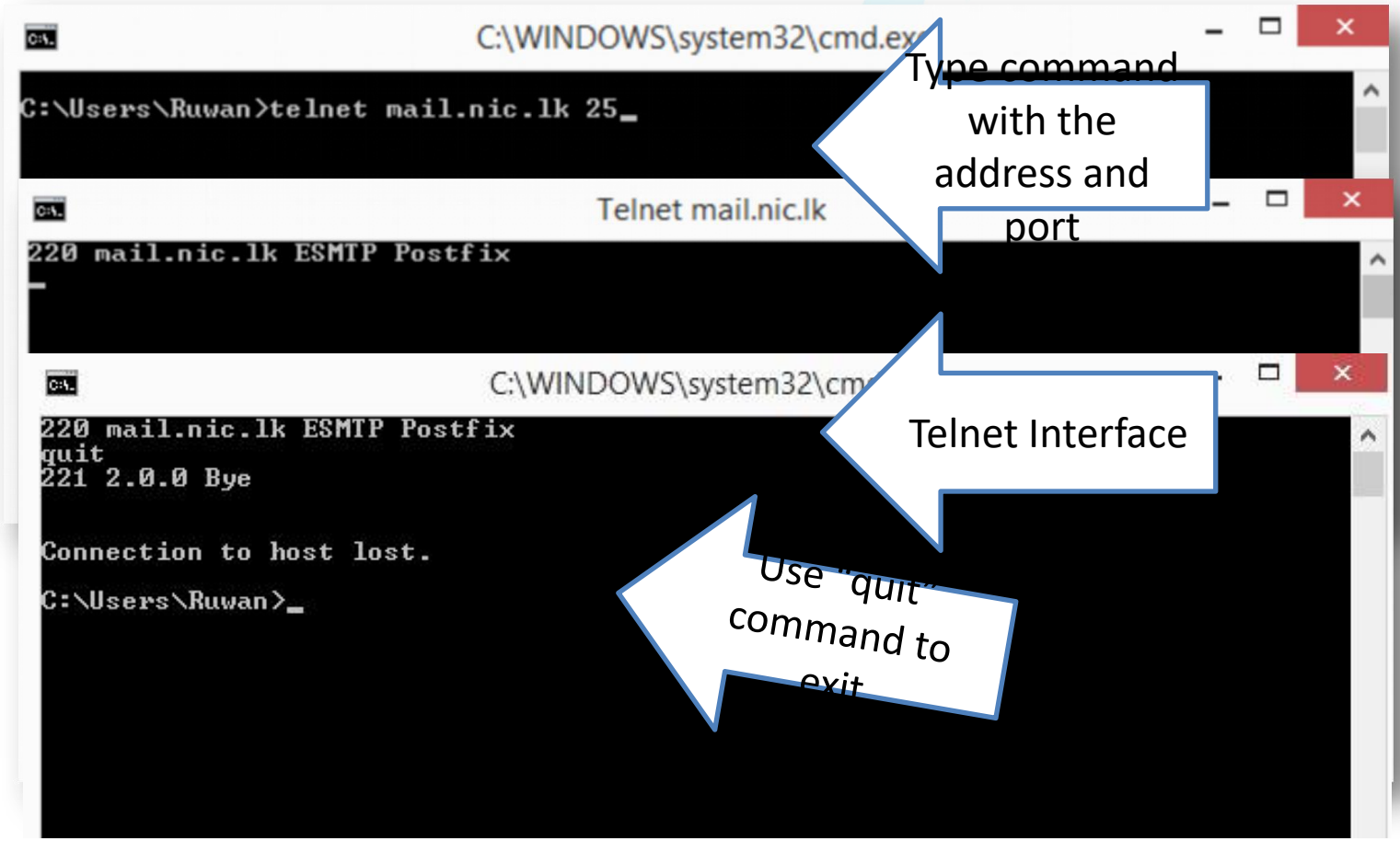
nslookup


C:\WINDOWS\system32\cmd.exe
C:\Users\Ruwan>nslookup nic.lk
Server: UnKnown
Address: 192.168.2.1
Name: nic.lk
Address: 192.248.8.28
C:\Users\Ruwan>
Type the site you want to know ns
Here the IP address

telnet

- Telnet is a user command and an underlying TCP/IP protocol for accessing remote computers.
- Through Telnet, an administrator or another user can access someone else's computer remotely..

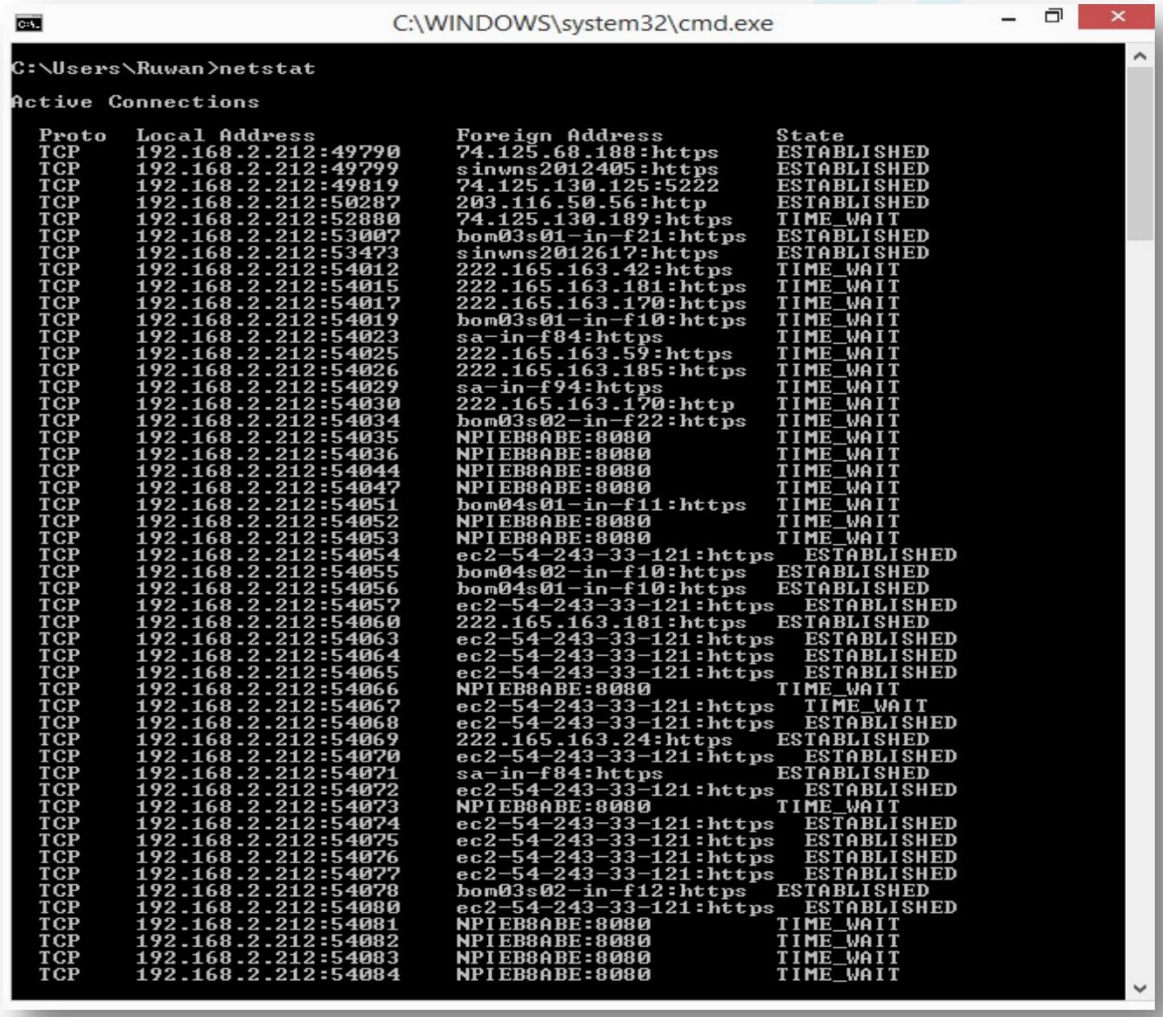
telnet


C:\WINDOWS\system32\cmd.ex
C:\Users\Ruwan>telnet mail.nic.lk 25
Type command with the address and port
Telnet mail.nic.lk
220 mail.nic.lk ESMTP Postfix
C:\WINDOWS\system32\cm
220 mail.nic.lk ESMTP Postfix
quit
221 2.0.0 Bye
Connection to host lost.
C:\Users\Ruwan>
Telnet Interface
Use "quit" command to exit

netstat

- is a command-line tool that displays network connections (both incoming and outgoing), routing tables, and a number of network interface (network interface controller or software-defined network interface) and network protocol statistics

netstat


C:\WINDOWS\system32\cmd.exe
C:\Users\Ruwan>netstat
Active Connections
Proto Local Address Foreign Address State
TCP 192.168.2.212:49790 74.125.68.188:https ESTABLISHED
TCP 192.168.2.212:49799 sinwns2012405:https ESTABLISHED
TCP 192.168.2.212:49819 74.125.130.125:5222 ESTABLISHED
TCP 192.168.2.212:50287 203.116.50.56:http ESTABLISHED
TCP 192.168.2.212:52880 74.125.130.189:https TIME_WAIT
TCP 192.168.2.212:53007 bom03s01-in-f21:https ESTABLISHED
TCP 192.168.2.212:53473 sinwns2012617:https ESTABLISHED
TCP 192.168.2.212:54012 222.165.163.42:https TIME_WAIT
TCP 192.168.2.212:54015 222.165.163.181:https TIME_WAIT
TCP 192.168.2.212:54017 222.165.163.170:https TIME_WAIT
TCP 192.168.2.212:54019 bom03s01-in-f10:https TIME_WAIT
TCP 192.168.2.212:54023 sa-in-f84:https TIME_WAIT
TCP 192.168.2.212:54025 222.165.163.59:https TIME_WAIT
TCP 192.168.2.212:54026 222.165.163.185:https TIME_WAIT
TCP 192.168.2.212:54029 sa-in-f94:https TIME_WAIT
TCP 192.168.2.212:54030 222.165.163.170:http TIME_WAIT
TCP 192.168.2.212:54034 bom03s02-in-f22:https TIME_WAIT
TCP 192.168.2.212:54035 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54036 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54044 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54047 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54051 bom04s01-in-f11:https TIME_WAIT
TCP 192.168.2.212:54052 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54053 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54054 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54055 bom04s02-in-f10:https ESTABLISHED
TCP 192.168.2.212:54056 bom04s01-in-f10:https ESTABLISHED
TCP 192.168.2.212:54057 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54060 222.165.163.181:https ESTABLISHED
TCP 192.168.2.212:54063 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54064 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54065 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54066 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54067 ec2-54-243-33-121:https TIME_WAIT
TCP 192.168.2.212:54068 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54069 222.165.163.24:https ESTABLISHED
TCP 192.168.2.212:54070 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54071 sa-in-f84:https ESTABLISHED
TCP 192.168.2.212:54072 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54073 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54074 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54075 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54076 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54077 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54078 bom03s02-in-f12:https ESTABLISHED
TCP 192.168.2.212:54080 ec2-54-243-33-121:https ESTABLISHED
TCP 192.168.2.212:54081 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54082 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54083 NPIEB8ABE:8080 TIME_WAIT
TCP 192.168.2.212:54084 NPIEB8ABE:8080 TIME_WAIT

Sample Past Paper Questions

Sample Past Paper Questions

- Peer to peer & Client server models are distributed application architectures. State the differences between them?

Click here

2011 A/L Paper 2 ,
Part B
Q3 b2

Sample Past Paper Questions

- A command that can be used to login to a remote computer through a network is?
  - ❑ ipconfig
  - ❑ ftp
  - ❑ telnet
  - ❑ tracert
  - ❑ route

Sample Past Paper Questions

- A command that can be used to check network connectivity to a computer is?
  - ❑ ipconfig
  - ❑ ping
  - ❑ traceroute
  - ❑ netstat
  - ❑ hostname

Sample Past Paper Questions

- A command that can be used to check network configuration of a computer is?
  - ❑ traceroute
  - ❑ netstat
  - ❑ hostname
  - ❑ ipconfig
  - ❑ ping

training@domains.lk