NETWORKING BASICS

PREPARED BY
G.K.ARAVIND KUMAR

BASIC OF NETWORKING

WHAT IS NETWORKING?

Networking:

•The connection of computers using network devices is called networking

Purpose of networking:

•Sharing files from one pc to another pc

•Communication between two users

How can we perform networking?

•Through internet we can perform networking (ie) connection of computers

INTRANET & INTERNET

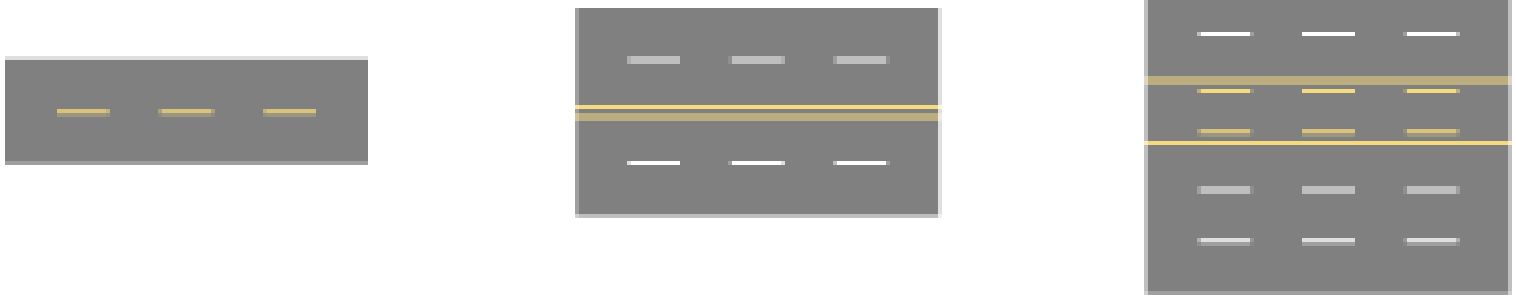
- **Intranet:**
  - A private network that is contained within an enterprise
  - Could be LANs and WANs
- **Internet:**
  - A public network of networks

Bandwidth

Why bandwidth is important:

- Bandwidth is limited by physics and technology
- Bandwidth is not free
- Bandwidth requirements are growing at a rapid rate
- Bandwidth is critical to network performance

Bandwidth is like the number of lanes on a highway.



Measuring Bandwidth

Unit of Bandwidth	Abbreviation	Equivalence
Bits per second	bps	1 bps = fundamental unit of bandwidth
Kilobits per second	kbps	1 kbps = ~1,000 bps = 10^3 bps
Megabits per second	Mbps	1 Mbps = ~1,000,000 bps = 10^6 bps
Gigabits per second	Gbps	1 Gbps = ~1,000,000,000 bps = 10^9 bps
Terabits per second	Tbps	1 Tbps = ~1,000,000,000,000 bps = 10^{12} bps

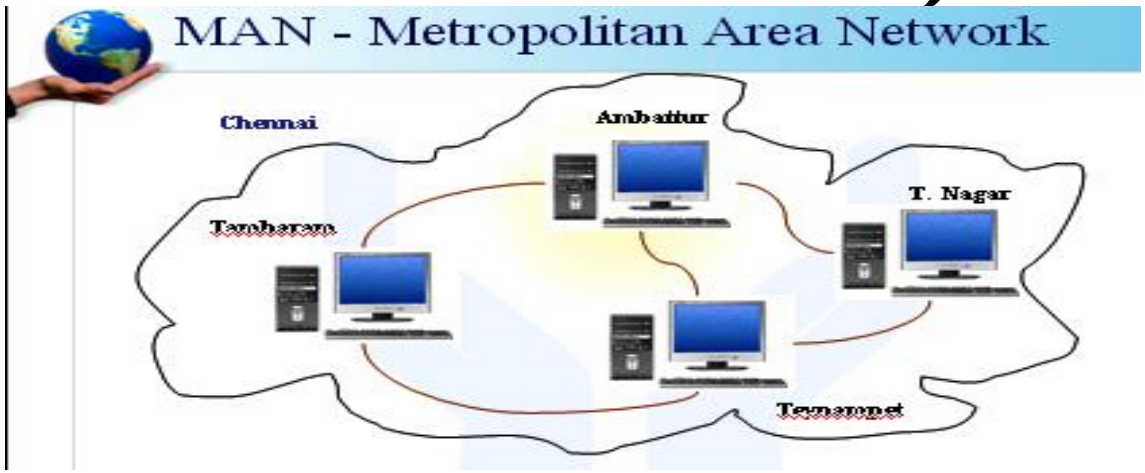
Types of network connections:

- LAN (Local Area Network)
- MAN (Metropolitan Area Network)
- WAN (Wide area network)
- SAN (Storage Area Network)
- VPN (Virtual Private Network)

LAN (Local Area Network):

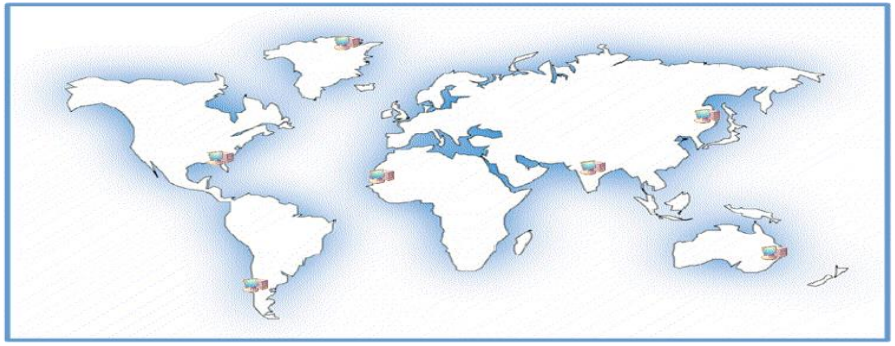
- A network of computers that are in the same physical location, such as home or building
- Usually connected using Ethernet
- A standard on how computers communicate over a shared media (cable)

MAN (Metropolitian Area Network):



- Group of LAN is called MAN. Its geographical area network

WAN (Wide Area Network):

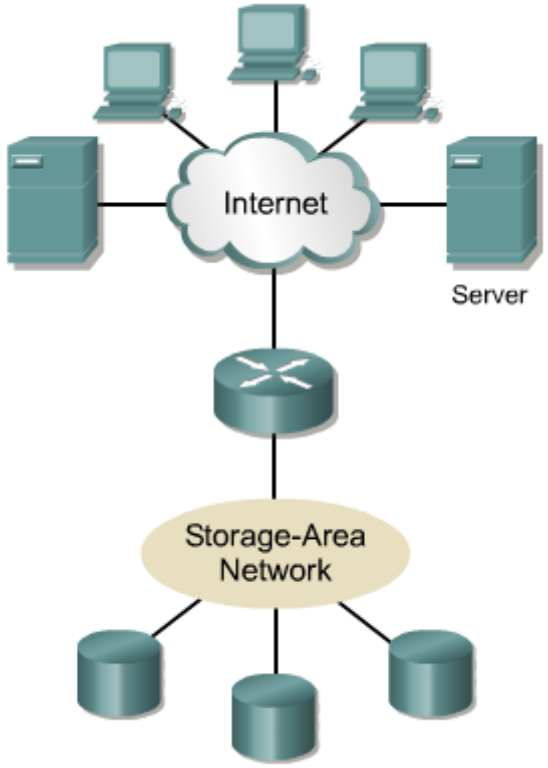


- A LAN spans a large geographic area, such as connections between cities
- Usually connected using leased line

SAN(STORAGE AREA NETWORK)

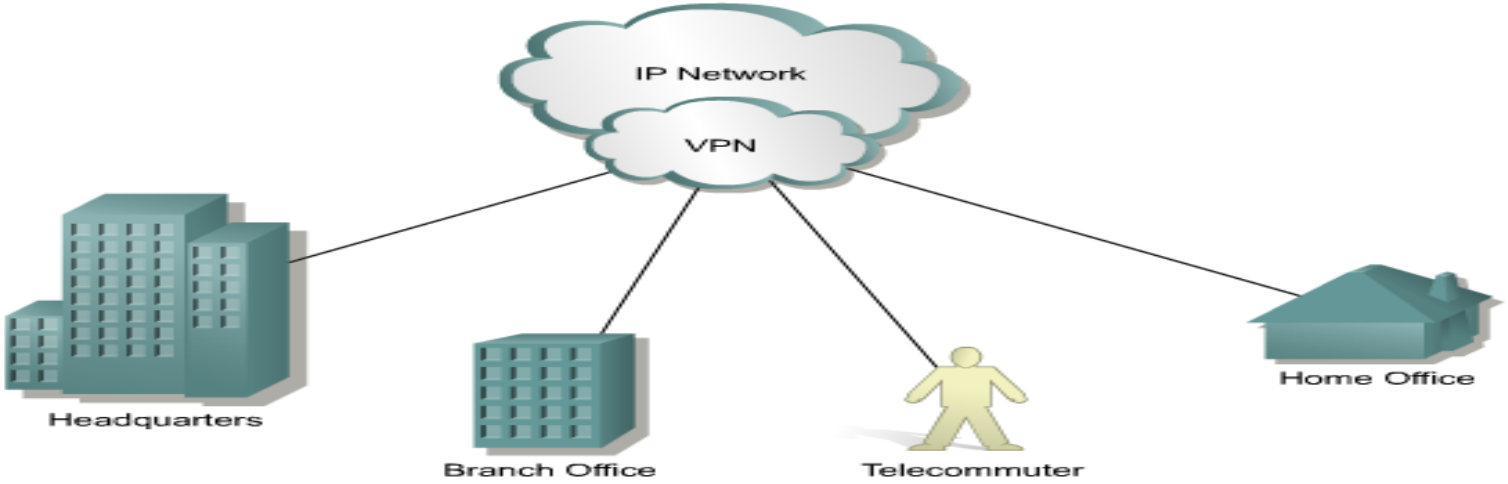
- A SAN is a dedicated, high-performance network used to move data between servers and storage resources.

- Because it is a separate, dedicated network, it avoids any traffic conflict between clients and servers.



Virtual Private Network

- A VPN is a private network that is constructed within a public network infrastructure such as the global Internet. Using VPN, a telecommuter can access the network of the company headquarters through the Internet by building a secure tunnel between the telecommuter's PC and a VPN router in the headquarters.



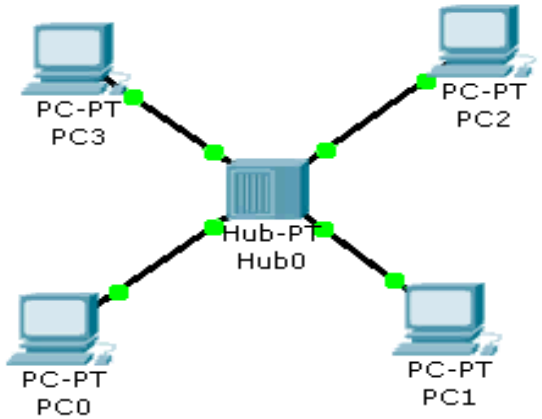
Network Interface Card

- Puts the data into packets and transmits packet onto the network.
- May be wired or wireless.
- It have MAC address

MAC ADDRESS

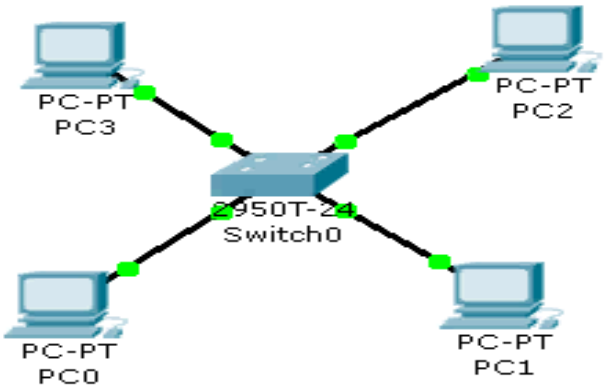
- **MAC(Media Access Control):**
- MAC address is a unique identification of pc
- Its designed by IEEE standards
- Its 48 bit hexadecimal address
- Its address of Ethernet port or NIC card
- Eg: 0A:F2:G2:U3:01:02

HUB:



- **It have 8-16 ports**
- **It is half duplex**
- **It is layer 1 device**
- **An unintelligent network device that sends one signal to all of the stations connected to it.**
- **It speed is 10mbps**

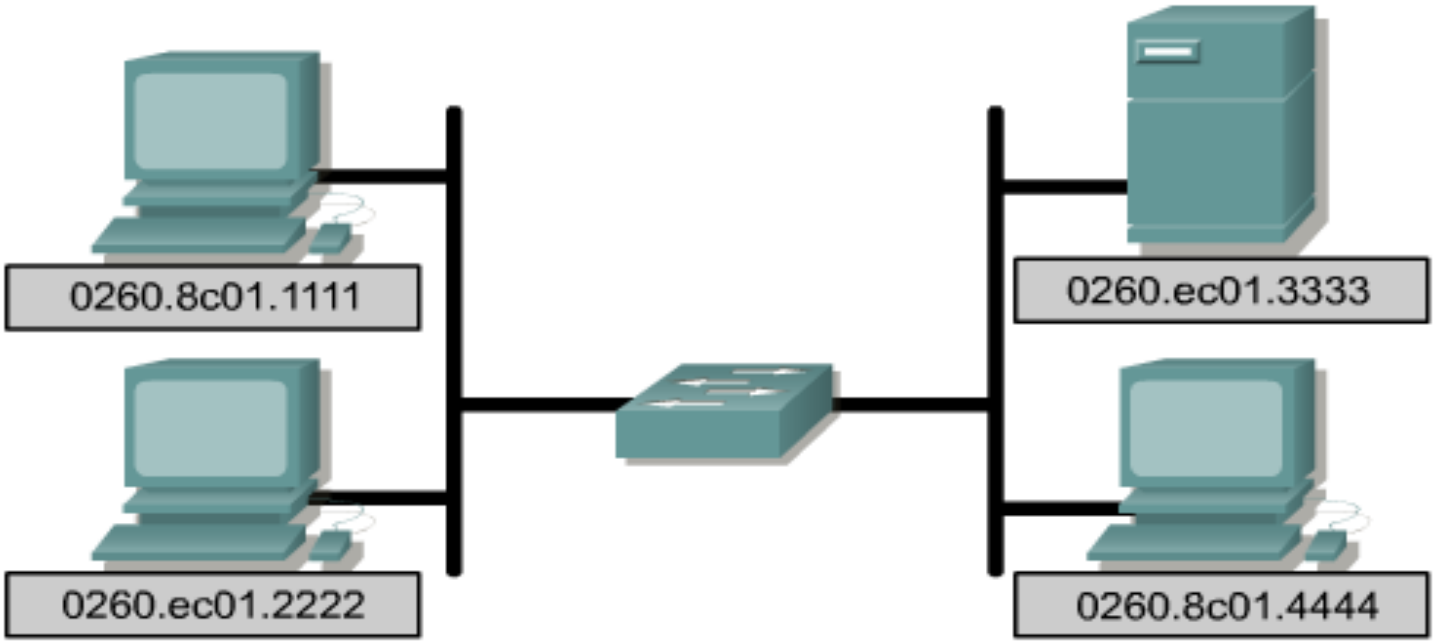
SWITCH



- It have 16-64 ethernet port
- It is full duplex
- It is layer 2 device
- It speed is 100mbps
- It have two types
- Managable and unmanagable

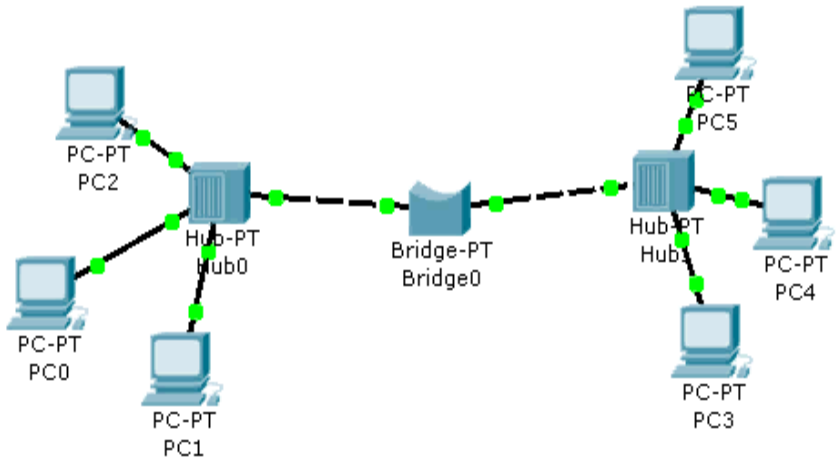
Switches – MAC Tables

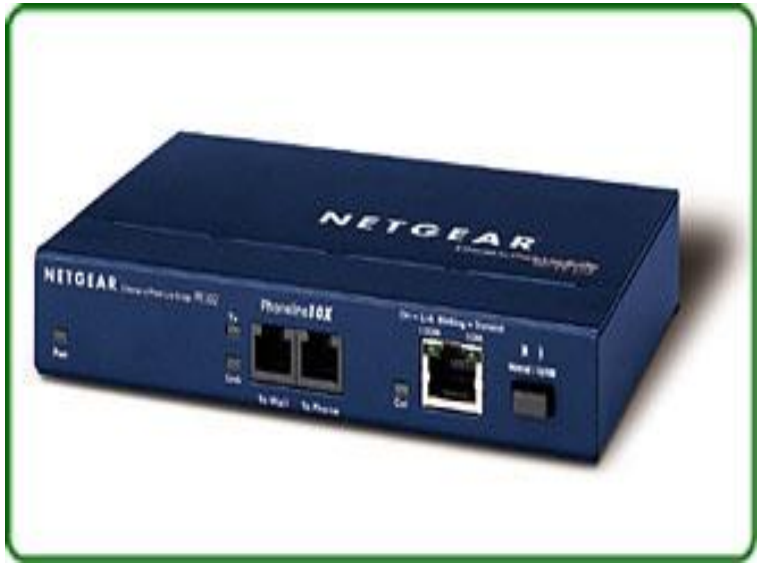
Interface	MAC Address
E0	0260.8c01.1111
E0	0260.ec01.2222
E1	0260.ec01.3333
E1	0260.8c01.4444



Bridge

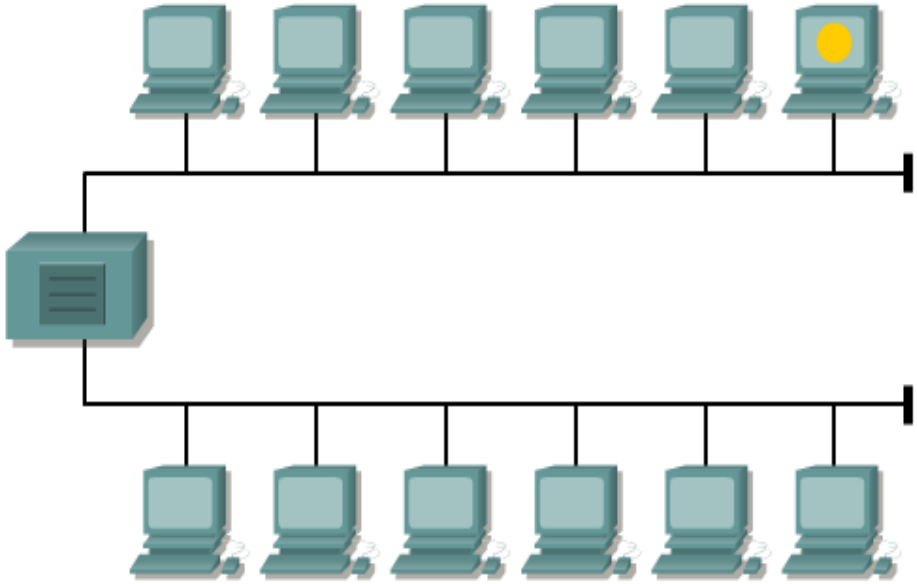
Bridges convert network transmission data formats as well as perform basic data transmission management. Bridges, as the name implies, provide connections between LANs. Not only do bridges connect LANs, but they also perform a check on the data to determine whether it should cross the bridge or not. This makes each part of the network more efficient.





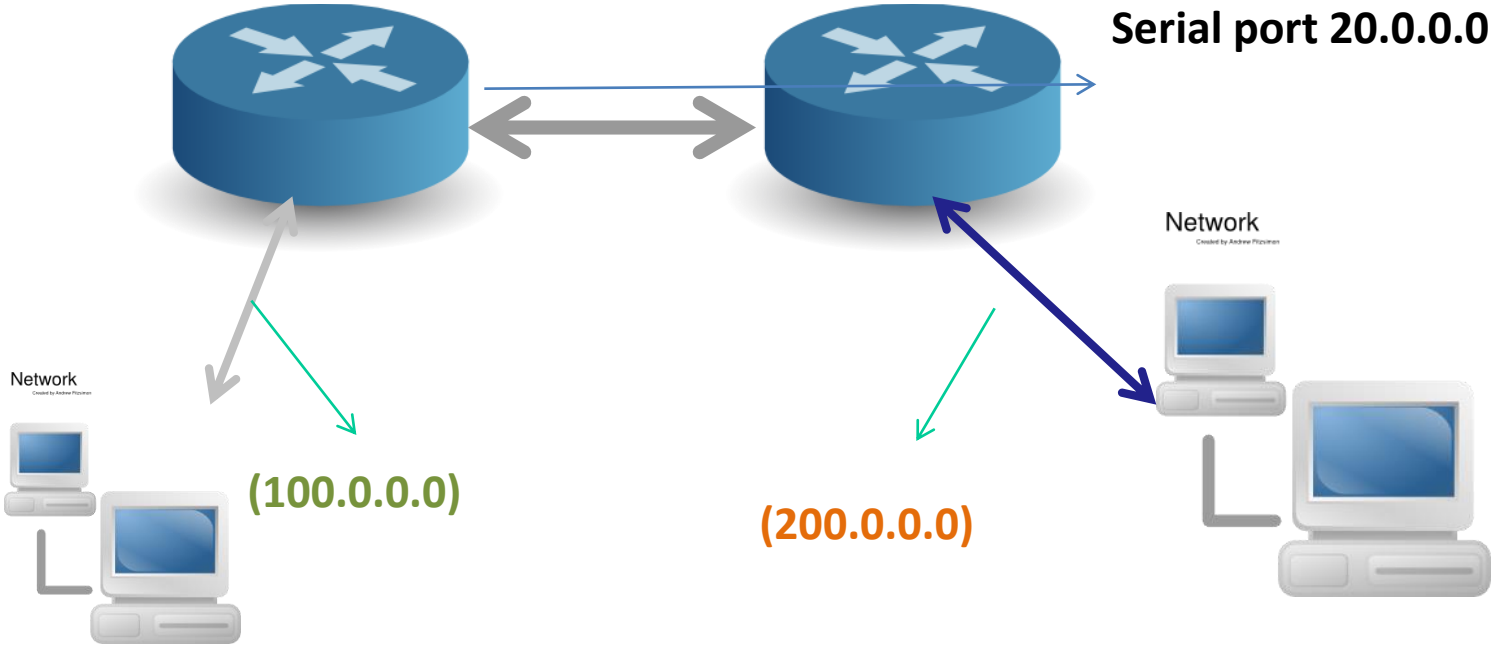
Repeater

A repeater is a network device used to regenerate a signal. Repeaters regenerate analog or digital signals distorted by transmission loss due to attenuation. A repeater does not perform intelligent routing.



Router

Routers have all capabilities of the previous devices. Routers can regenerate signals, concentrate multiple connections, convert data transmission formats, and manage data transfers.They can also connect to a WAN, which allows them to connect LANs that are separated by great distances.



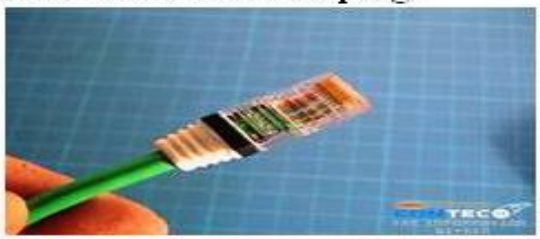
CRIMPING

Arrange the cable in proper crimping Type:

Insert the wire inside the jack:

Punch the jack properly using crimping tool:

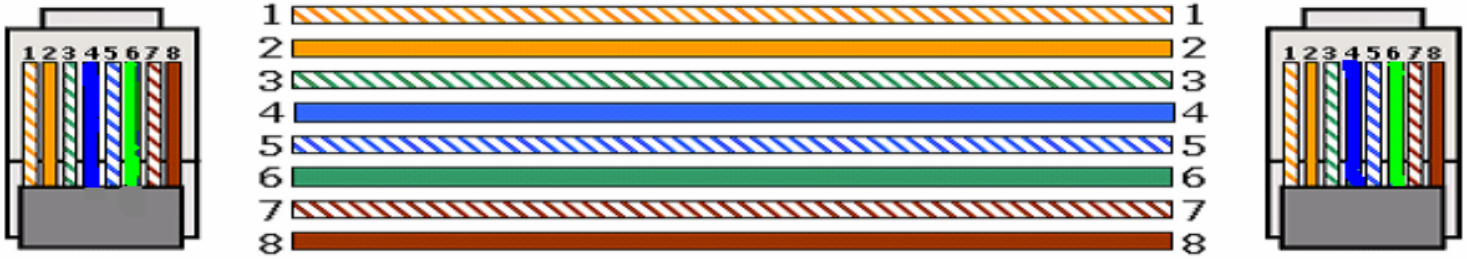
Now check the crimping:



- STRAIGHT CRIMPING
- CROSS OVER CRIMPING
- ROLLED OVER CRIMPING

STRIGHT THROUGH CABLE

Pin Number	Wire color	Wire	Becomes	Pin number	Wire color
Pin 1	R+ Orange /White	1	1	Pin 1	Orange / White
Pin 2	R- Orange			Pin 2	Orange
Pin 3	T+ Green White	2	2	Pin 3	Green White
Pin 4	NC Blue			Pin 4	Blue
Pin 5	NC Blue/White	3	3	Pin 5	Blue/White
Pin 6	T- Green			Pin 6	Green
Pin 7	NC Brown/White	6	6	Pin 7	Brown/White
Pin 8	NC Brown			Pin 8	Brown

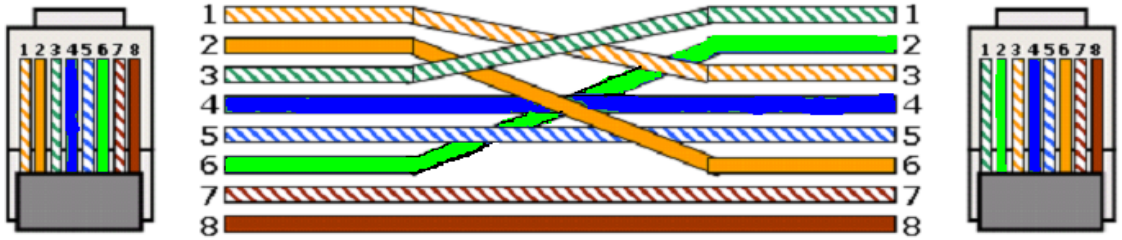


USES

- Pc to switch
- Pc to HUB
- Pc to bridge
- Switch to router
- HUB to router
- Bridge to router

CROSS OVER CABLE

Pin Number	Wire color	Wire	Becomes	Pin number	Wire color
Pin1	R+ Orange/White	1	3	Pin 1	T+ Green/White
Pin 2	R- Orange	2	6	Pin 2	T- Green
Pin 3	T+Green / White	3	1	Pin 3	R+ Orange/White
Pin 4	NC Blue	6	2	Pin 4	NC Blue
Pin 5	NC Blue/White			Pin 5	NC Blue/White
Pin 6	T- Green			Pin 6	R- Orange
Pin 7	NC Brown/White			Pin 7	NC Brown/White
Pin 8	NC Brown			Pin 8	NC Brown

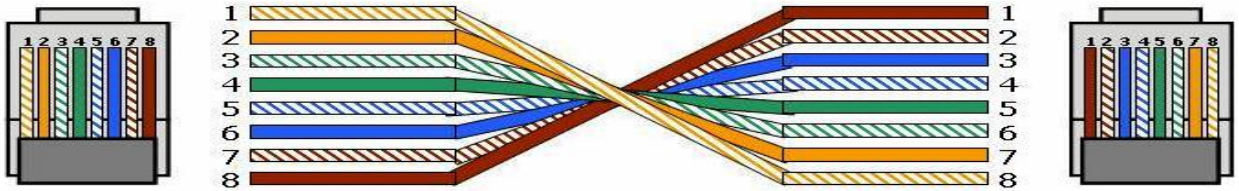


USES

- Pc to Pc
- HUB to HUB
- Pc to router
- Switch to HUB
- Switch to Switch
- Bridge to bridge
- Router to Router

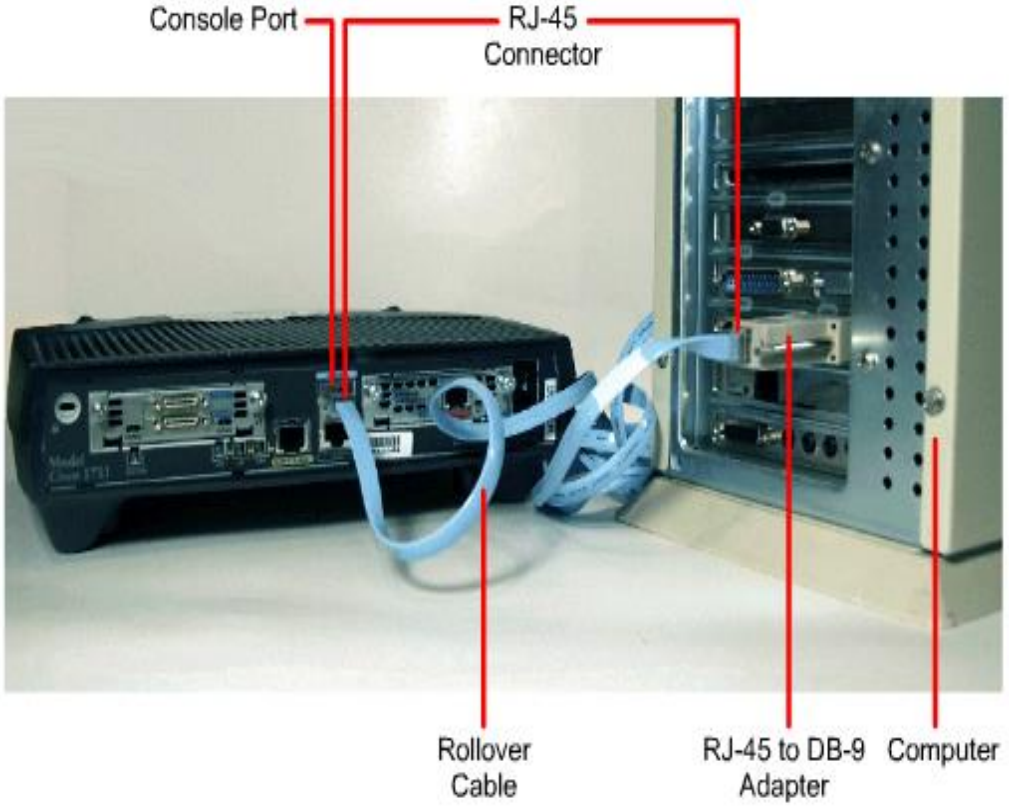
ROLLED OVER CABLE

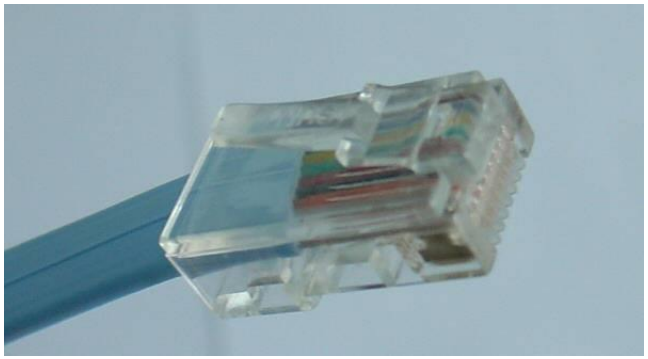
Pin Number	Wire color	Wire	Becomes	Pin number	Wire color
Pin 1	Orange /White	1	1	Pin 1	Brown
Pin 2	Orange	2	2	Pin 2	Brown/White
Pin 3	Green White	3	3	Pin 3	Green
Pin 4	Blue	6	6	Pin 4	Blue/White
Pin 5	Blue/White			Pin 5	Blue
Pin 6	Green			Pin 6	Green White
Pin 7	Brown/White			Pin 7	Orange
Pin 8	Brown			Pin 8	Orange /White



USES

- Used as Console cable for Router

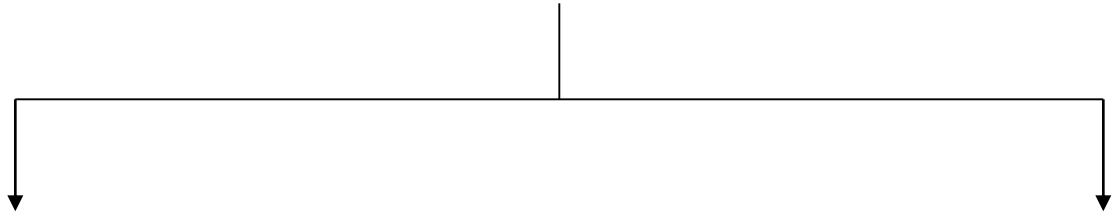




What is an IP address

- A way to identify machines on a network
- A unique identifier

IP VERSIONS



IPV4

- It is 32 bit decimal address
- It have 4 block each block eight bit
- It is easy way of addressing Pc
- It have network id and host id
- It have many classes

Eg: 192.168.10.10

IPV6

- It is 128 bit hexadecimal address
- It have 8 block each block 16 bit
- It provide 2^123 =3.4*10^38 IP's

Eg:200A:1009:2FFF:200F:4000:1000:2001

IPV4 structure

- IP addresses consist of four sections
- Each section is 8 bits long
- Each section can range from 0 to 255
- Each Segment is called as Octet
- The IP address is a combination of Network ID +Host ID
- The Network ID help to identifies the Network and the Host ID helps to identifies the Host in that network

IP Addressing

Network ID:

- It represent the network
- It dose not change

Host ID

- It represent no of hosts in network
- It can change regularly
- Only 255 IP’s can used in one network

Classful IP Addressing

- There are 5 classes of IP addresses:
  - **Class A**
  - **Class B**
  - **Class C**
  - **Class D**
  - **Class E**

Determining Address Class

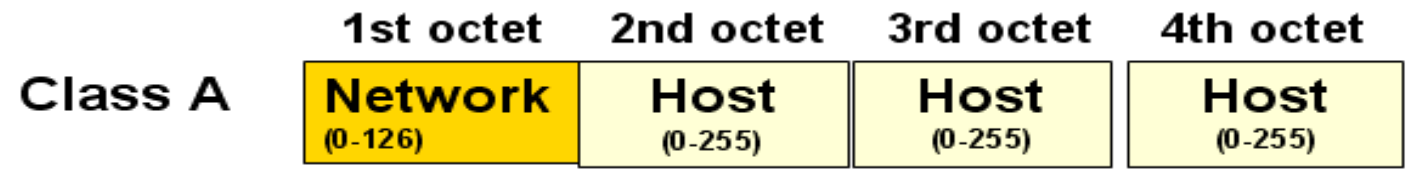
Class A	**First octet is between 0 - 126**
Class B	**First octet is between 128 - 191**
Class C	**First octet is between 192 - 223**
Class D	**First octet is between 224 - 239**
Class E	**First octet is between 240 - 255**

Computers on the Internet can only be addressed using Class A, Class B, or Class C addresses.

127 is used for loop back address

Loop back address :127.0.0.1

Address Classes



SUBNET MASK:255.0.0.0

SUBNET MASK:255.255.0.0

SUBNET MASK:255.255.255.0

Class D	Used for Internet multicasts
Class E	Unused (used "experimentally")

- Class A – 1677216 IP’s
- Class B – 65000 IP’s
- Class C – 255 IP’s
- We should and use network IP and Broadcast IP for pc’s in a network
- Network IP is used for router


My Documents
Mozilla Firefox
µTorrent
My Computer
SMADΔV
Cisco TFTP Server
My Network Places
System Mechanic 5
SRDB
Recycle Bin
VLC media player
Visual CertEx...
Internet Explorer
Cisco Packet Tracer
Acrobat.com
GNS3
Adobe Reader 9
My Lockbox
avast! Free Antivirus
Rainmeter
CCleaner
CamStudio
Admin - hardwarelab
CPU Usage: 2%
Memory:
Total physical memory: 503.4 MB
Used 283.9 MB 56%
Free 219.4 MB 43%
Total virtual memory: 1.2 GB
Used 303.8 MB 24%
Free 924.8 MB 75%
Drives:
[C:\] Total 11.7 GB
Used 4.7 GB 39%
Free 7.0 GB 60%
[D:\] Total 12.7 GB
Used 7.7 GB 60%
Free 5.0 GB 39%
[E:\] Total 12.9 GB
Used 9.1 GB 70%
Free 3.7 GB 29%
Network:
IP: 192.168.68.187
DNS:
GW: 192.168.68.1
UL: 0.0B
DL: 60.0B
Total: 306.4 kB / 20.2 kB
CamStudio
File Region Options Tools View Help
Record to AVI
RenderSoft
CamStudio
OPENSOURCE
Press the Stop Button to stop recording
start
Basic of networking
Microsoft PowerPoint ...
CamStudio
11:03 PM

CHECKING IP ADDRESS

- Goto Run
- Type cmd
- Type ‘ipconfig’
- To view MAC address and all details
- Type ‘ipconfig /all’

PING – POCKET INTERNET GOPHER

- How to check PC is connected to another PC
- Goto run
- Type cmd
- Type ‘Ping <ip add of remote pc>’
- Reply from <ip of remote pc> = connected
- Request time out = not connected

PRIVATE AND PUBLIC IP

Private IP :

- It is used inside the concern
- It is free ip

Public IP:

- It is used outside the concern
- It is purchasable ip

PRIVATE IP RANGE

- **ClassA:** 10.0.0.0 – 10.255.255.255
- **ClassB:** 172.16.0.0 – 172.31.255.255
- **ClassC:**192.168.0.0 – 192.168.255.255

IPV6

- It is 128 bit hexadecimal address
- It have 8 block each block 16 bit
- It provide 2^123 =3.4*10^38 IP’s

Eg:

200A:1009:2FFF:200F:4000:1000:2001

- **200A:1009:2FFF:200F:4000:1000:2001:200F**

NETWORK COMPONENT | **HOST COMPONENT**

DESIGNED BY IANA
IANA=INTERNET ASSIGNED NUMBER AUTHORITY

DESIGNED BY CORPORATE

- *NETWORK COMPONENT SHOULD NOT CHANGE*
- *HOST COMPONET CAN CHANGE*
- *WE CAN GIVE SEPARATE PUBLIC IP FOR EACH HOST*

IPV6 TYPES

- GLOBAL ADDRESS
- LINK LOCAL ADDRESS
- UNIQUE LOCAL ADDRESS

GLOBAL ADDRESS

It is used for corporate

2001:1009:2FFF:200F:4000:1000:2001:A100

By IANA SUBNET HOST COMPONENT

Global address first component ranges from

2000 to 3FFF

LINK LOCAL ADDRESS:

- Link local Address first block starts from FE80
- It is private ip used inside organisation

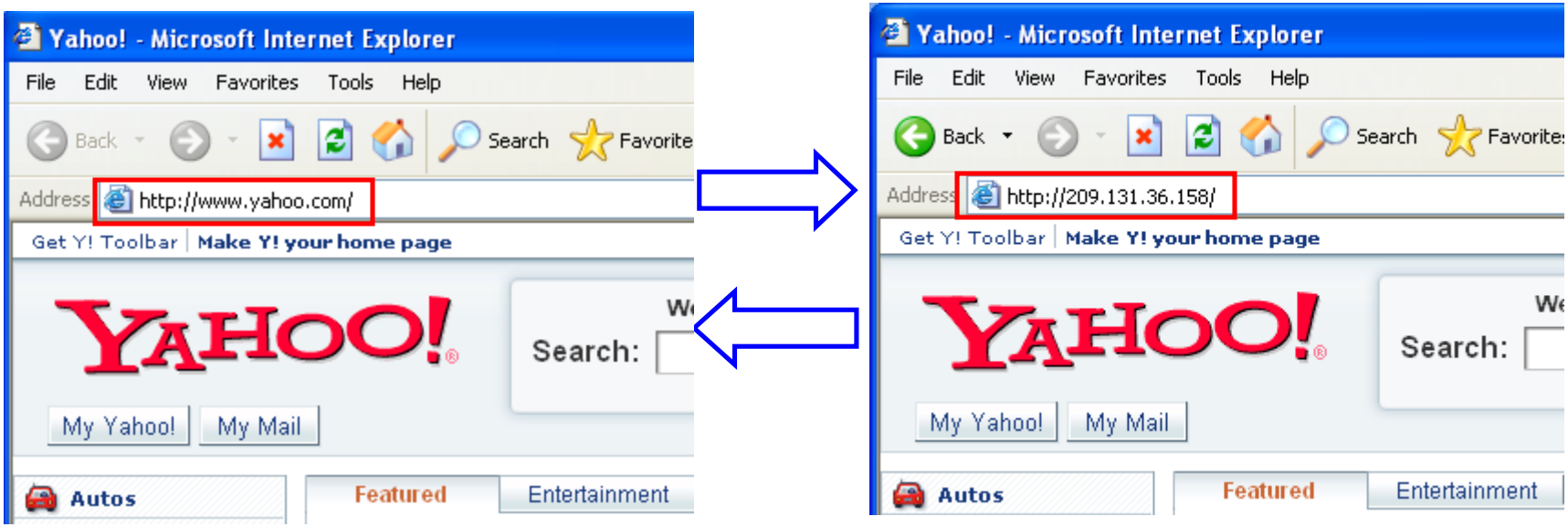
FE80:1009:2FFF:200F:4000:1000:2001:A100

UNIQUE LOCAL ADDRESS:

It is used for multicast first block starts in FD00

DNS (Domain Name System)

- DNS is an internet service that translates domain name (www.slashsupport.com) to IP Address
- Internet is based on IP Address whereas domain names are alphabetic, every time you use an domain name, DNS translates in to corresponding IP Address
- For example www.slashsupport.com to 216.148.62.220


Yahoo! - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorite
Address http://www.yahoo.com/
Get Y! Toolbar Make Y! your home page
YAHOO!
Search:
My Yahoo! My Mail
Autos
Featured
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Yahoo! - Microsoft Internet Explorer
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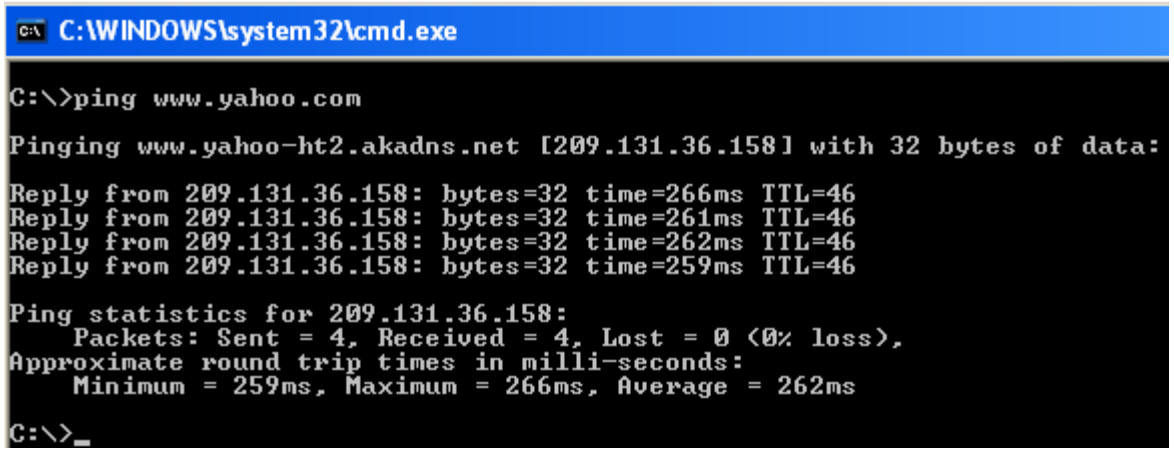
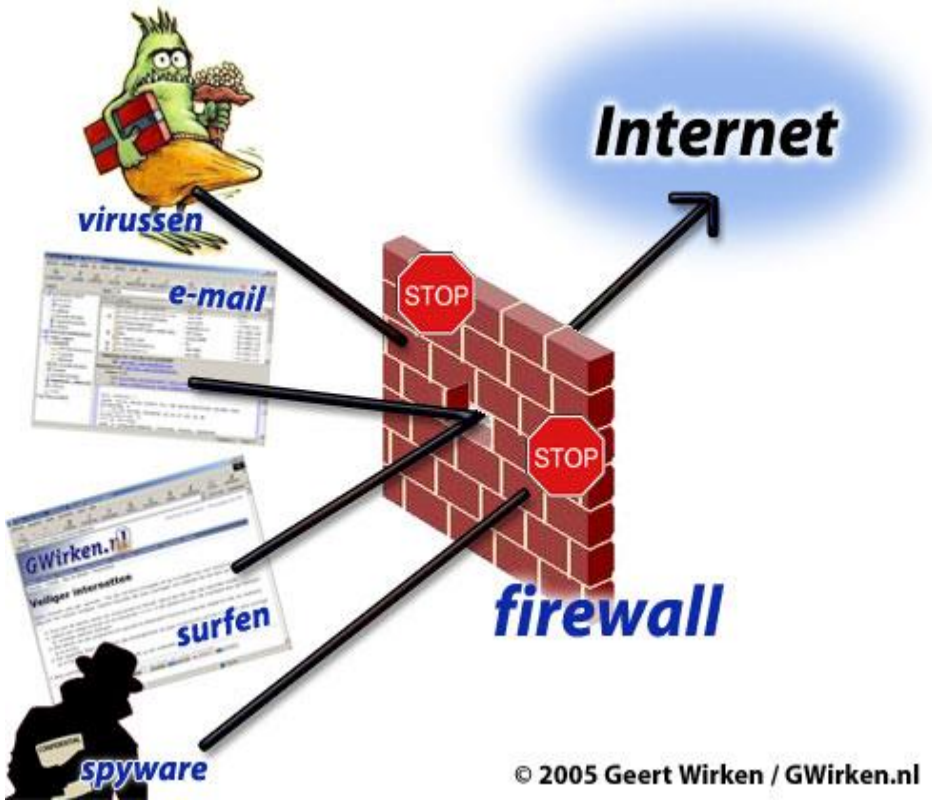
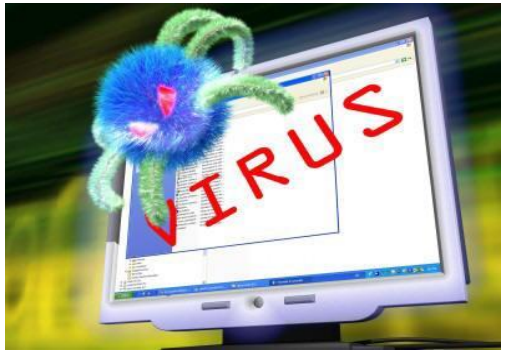

C:\WINDOWS\system32\cmd.exe
C:\>ping www.yahoo.com
Pinging www.yahoo-ht2.akadns.net [209.131.36.158] with 32 bytes of data:
Reply from 209.131.36.158: bytes=32 time=266ms TTL=46
Reply from 209.131.36.158: bytes=32 time=261ms TTL=46
Reply from 209.131.36.158: bytes=32 time=262ms TTL=46
Reply from 209.131.36.158: bytes=32 time=259ms TTL=46
Ping statistics for 209.131.36.158:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 259ms, Maximum = 266ms, Average = 262ms
C:\>

NETWORK ATTACKS

- VIRUS
- SPYWARE
- KEYLOGGERS
- HACKERS
- BRUTE FORCE
- PHISHING



VIRUS



- Virus is a unwanted program which cause harm to os and computer

SPYWARE:

- Spy ware is a type of malware that can be installed on computers, and which collects small pieces of Information about users without their knowledge

KEYLOGGERS

- Keystroke logging (often called keylogging) is the action of tracking (or logging) the keys struck on a keyboard,
- **Hardware Keyloggers**
- **Software Keylogger**

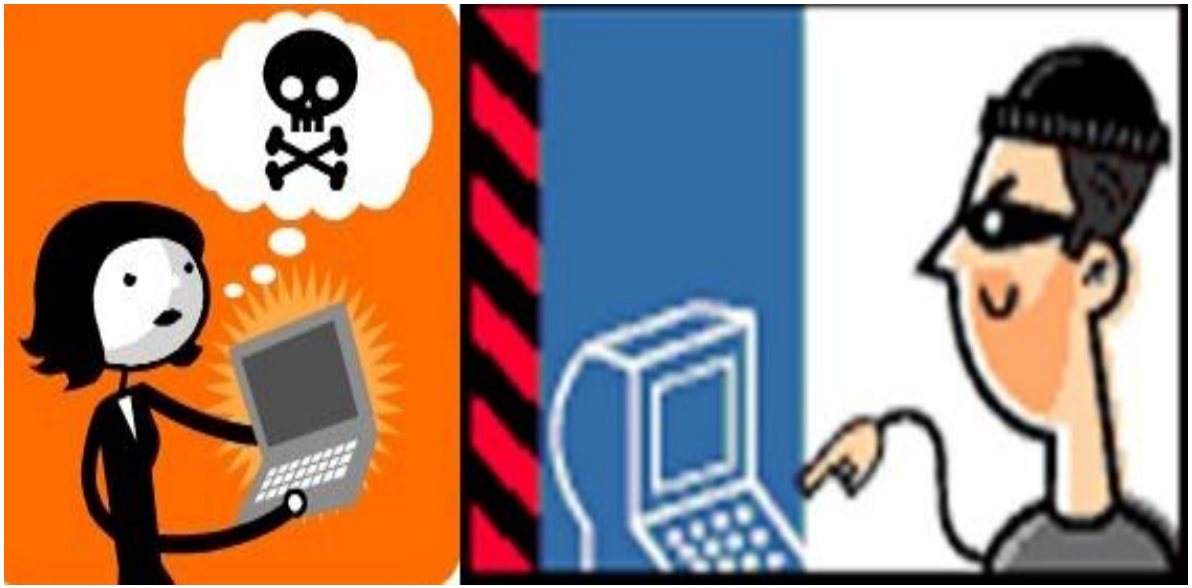
- Hardware keylogger Software keylogger

HACKERS

- **Hacker** is someone who breaks into computers and computer networks.
- Hackers may be motivated by a multitude of reasons, such as profit, protest, or challenge.

WHAT ARE THESE TYPES OF?

BRUTE FORCE



Hacking passwords using random probability password checking programs

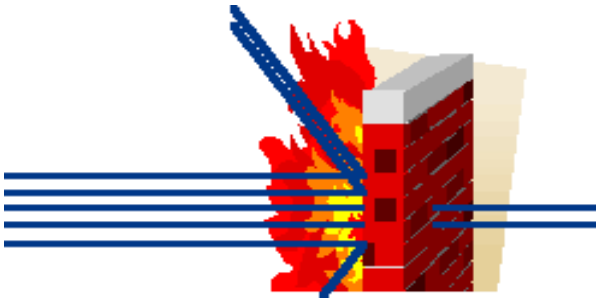
PHISHING


Send out thousands of phishing emails with link to fake website.
Victims click on link in email believing it is legitimate. They enter personal information.
PHISHING
Build fake site.
Fraudsters compile the stolen data and sell it online or use it themselves.
Fraudsters

NETWORK SECURITY

- Corporate use many methods to control network attacks

1. Antivirus/Antispyware
2. Passwords
3. Proxy server
4. Firewall



Antivirus/Antispyware

- Antivirus and Anti spy ware is a program which found the harmfull virus, spy ware and keyloggers

P@ssw0rd

There are three policies for password
To avoid from the attack

- Password length
- Password complexity
- Password history

Password length

- Consider your password is 12345
- Length of the password is 5
- So the maximum terms are 99999

Use the probability to calculate the maximum number of terms

Password complexity

Our keyboard contains 4 set of characters your password must contain
At least 3 set of characters

They are

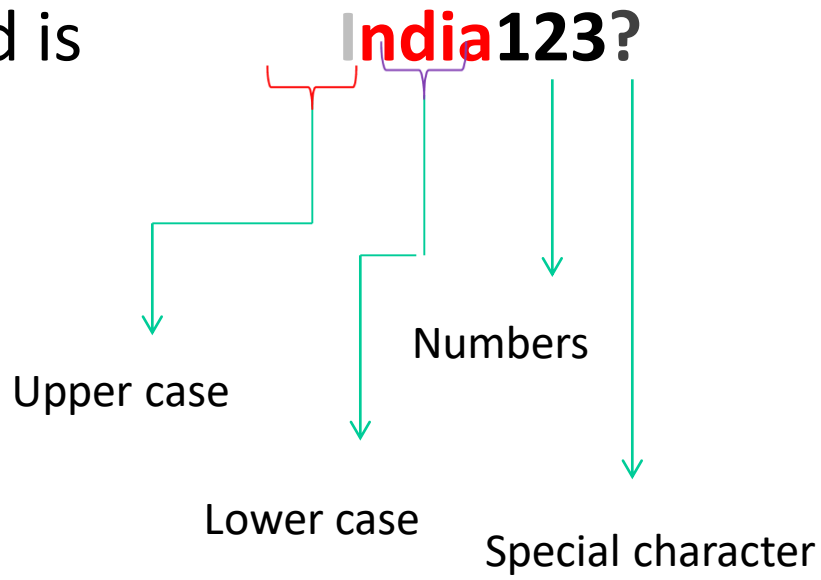
- Small case
- Upper case
- Numbers
- Special characters

Password complexity

Our keyboard contains 4 set of characters your password must contain

At least 3 set of characters

- Consider your password is



Calculate the probability

Password complexity

Probability for the password(**India123?**) is

For the numbers	999999999
For the upper case	26^9= 5429503678976
For the lower case	26^9= 5429503678976
For the special character	31^9=26439622160671
Total number of terms	37299629518622
Software crack in second	1243320983.954
Software crack in minutes	20722016.3
Software crack in hours	345366.9
Software crack in days	14390.28
Software crack in years	**39.53**

Password complexity

- **The software crackers will take**

  39.53 years to crack the password

- **So provide the password like this for your**

  E-mails and other

➢ **You note that only lengthy passwords are not strong**

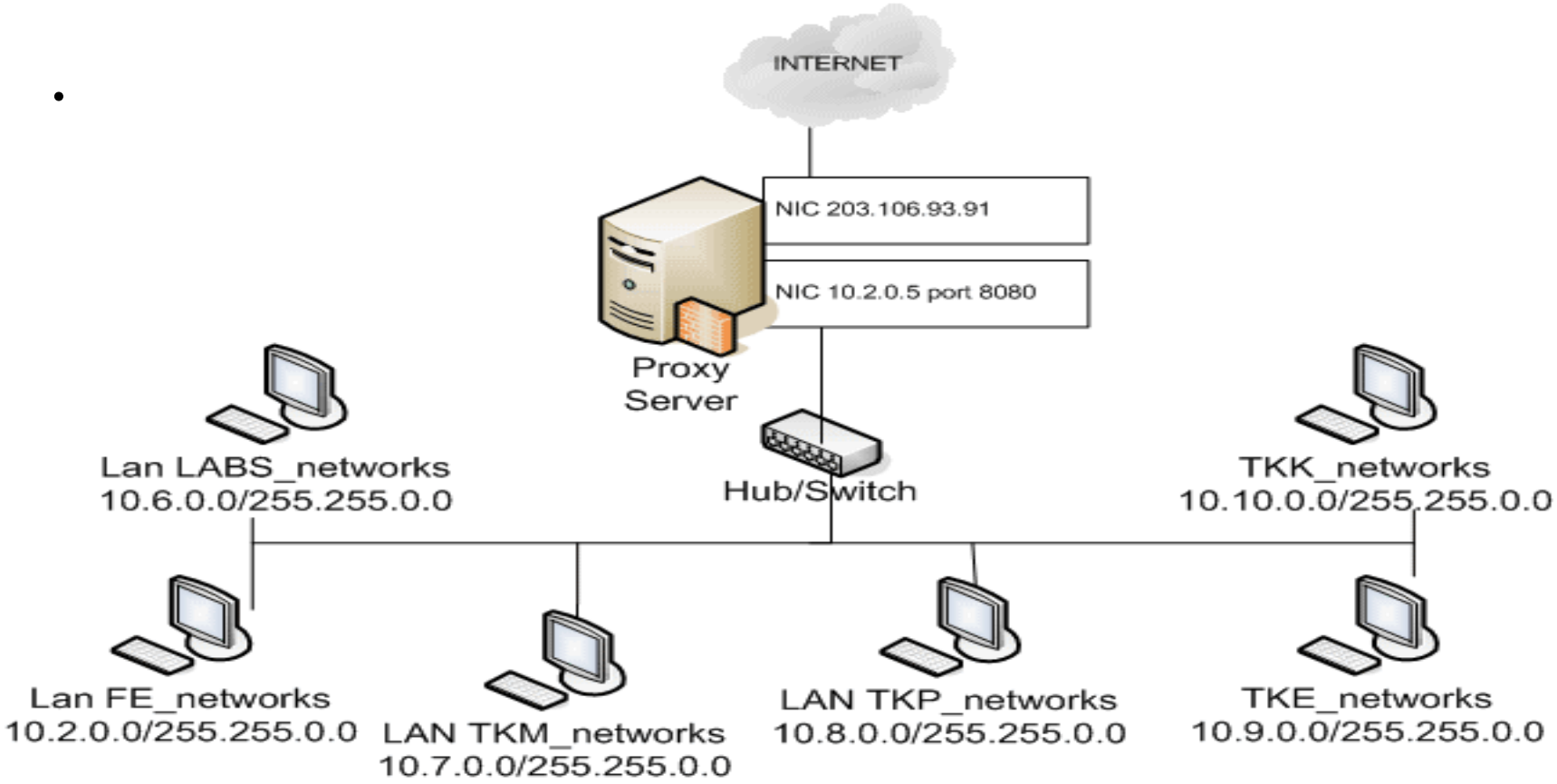
  The complex passwords are strong

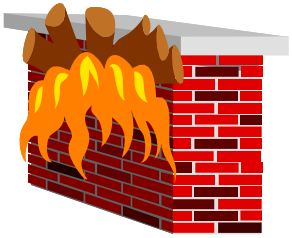
Password History

You need to change your password for several days

Proxy server: It is used to block unwanted sites and virus files entering organization through Internet

.



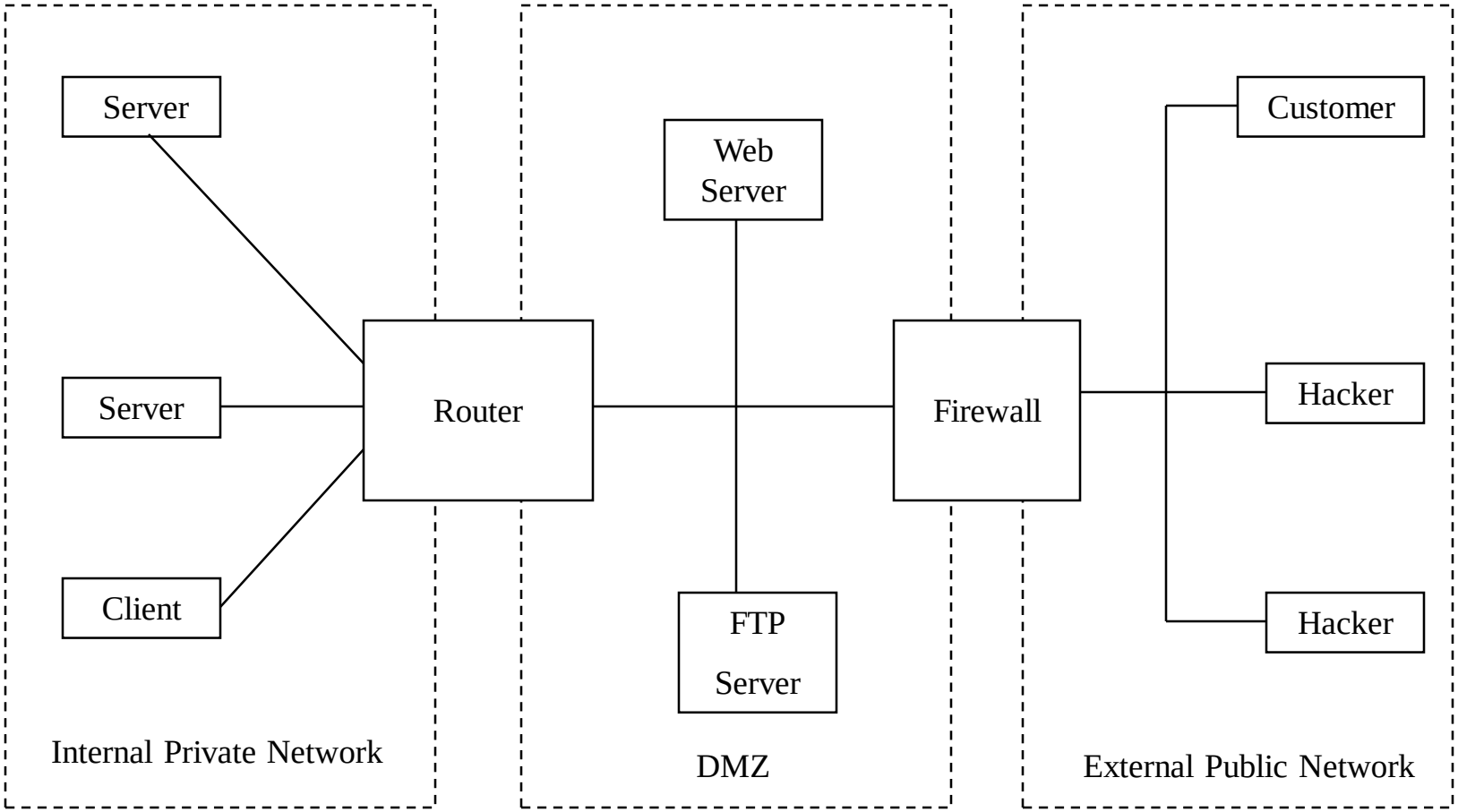


FIREWALL

- Basically the firewalls are like Fort walls
- The fort wall contains some ways to enter the fort
- Like that the firewall contains some ports to enter the computer
- Every computer network application contains the protocols
- Every protocols have ports

ROLE OF FIREWALL

- It controls incoming packets to corporate.



TYPES OF FIREWALL

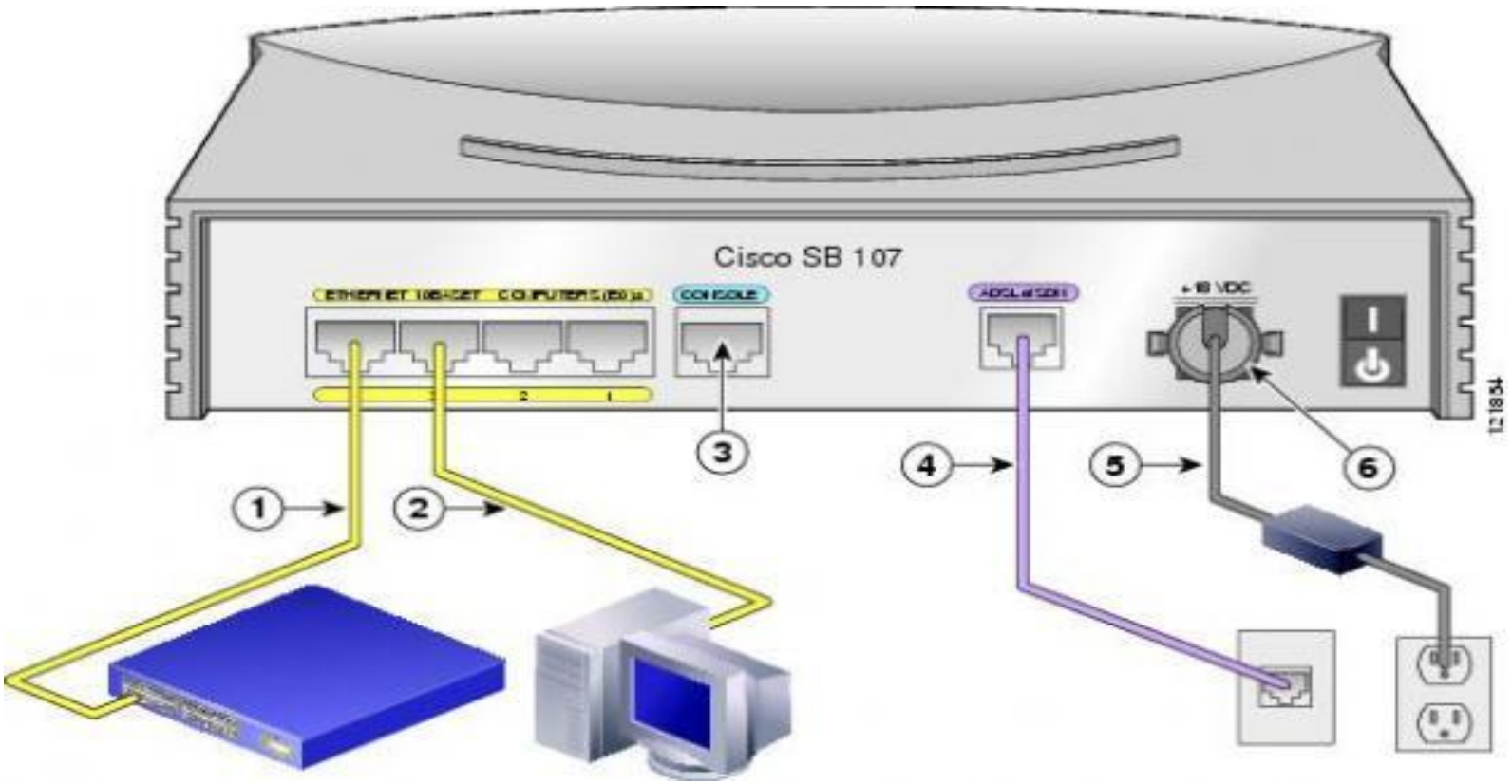
HARDWARE FIREWALL

- CISCO PIX
- SONIC WALL
- CYBER ROAM

SOFTWARE FIREWALL

- CHECK POINT
- MICROSOFT ISA

BACK PANEL OF CISCO PIX FIREWALL



Category and generation of firewall

- Packet filtering
- Application layer gateway
- State full inspection

Packet filtering:

- It depends on the TCP and UDP packets
- We can control the Network flow by blocking the network
- Like disconnecting the network cable

Application layer gateway:

- It scans the content of the packet and block
- The packet if it was anonymous to the rule

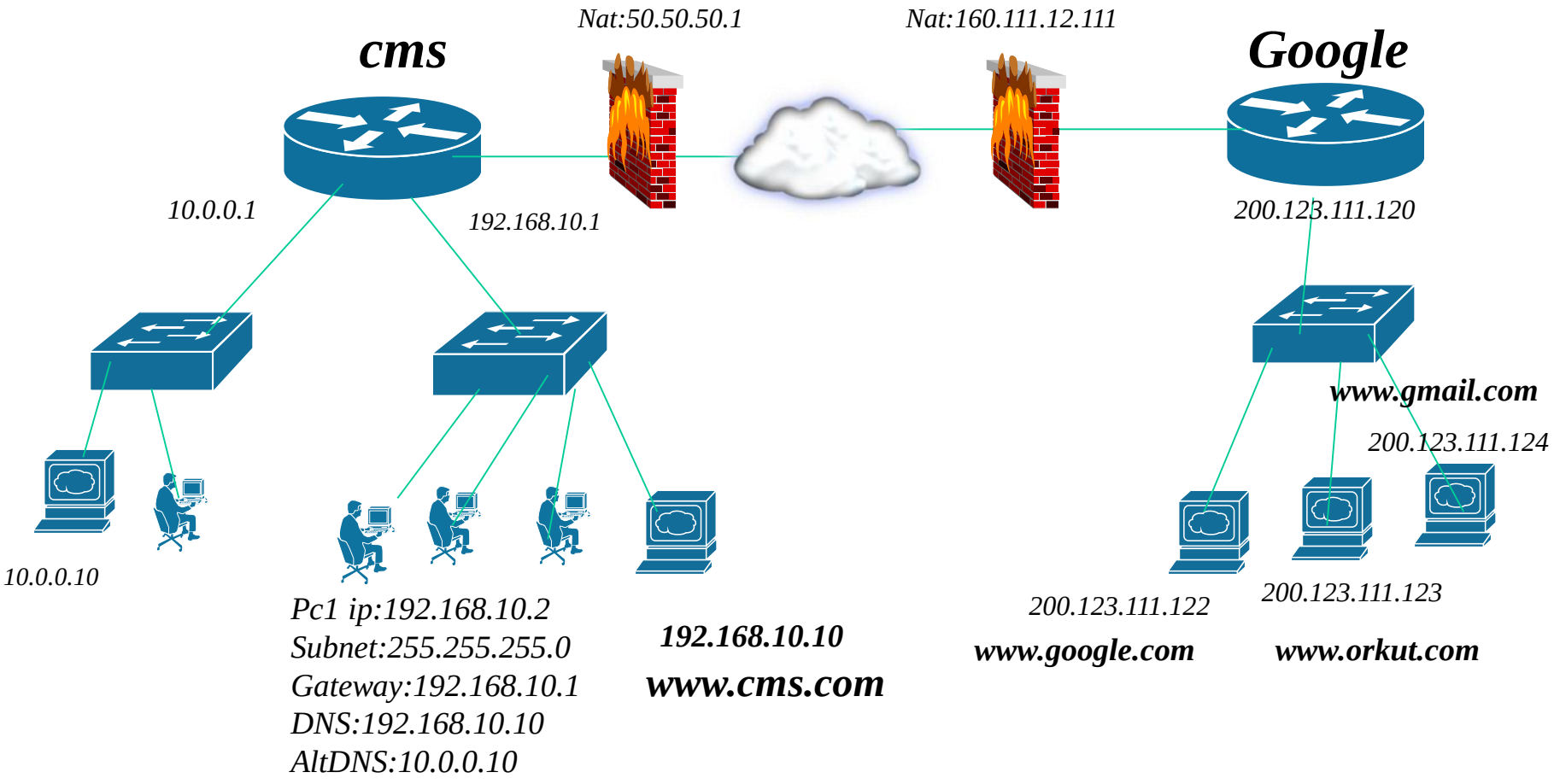
State full inspection:

- This is the new generation of firewall.
- In-depth scan of packets for the vulnerabilities
- And network level, computer level and
- user level inspection has made

RULES IN FIREWALL

No.	Source	Destination	Service	Action	Track	Install On
1	Any	monk	Any	reject	Long	Gateways
2	Any	mailsrv	smtp	accept	Short	Gateways
3	localnet	Any	Any	accept	Short	Gateways
4	Any	DMZ	http ftp	accept	Short	Gateways
5	All Users@Any	Any	telnet	User Auth	Long	Gateways
6	Any	Any	Any	reject	Long	Gateways

Secure internet process



THANK YOU FOR LISTENING

ANY QUESTIONS