



Networks Design & Security Setup

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CHAPTER 1 : INTRODUCTION

Systems administration then allude for associating various PCs electrically for the rationale of partaking in design on and .course, for example, applications,files, printers and programming are regular in group on partook in a systems administration. Fundamentally, systems comprises of H/W Equipment part, for example, PC, switches, switches and different gadgets which will frame the systems building. These are the gadgets that having significant impact in information moved to 1 spot to an additional utilizing various advances, for example, remote and wire like Cat6/fiber optic link. Kinds of systems administration configuration are :

1.1 Types of Network

- □LAN

It is the gathering of systems devices which will permit the correspondence into associated gadgets. The private Dominion has the power over the neighborhood as opposed to different systems.

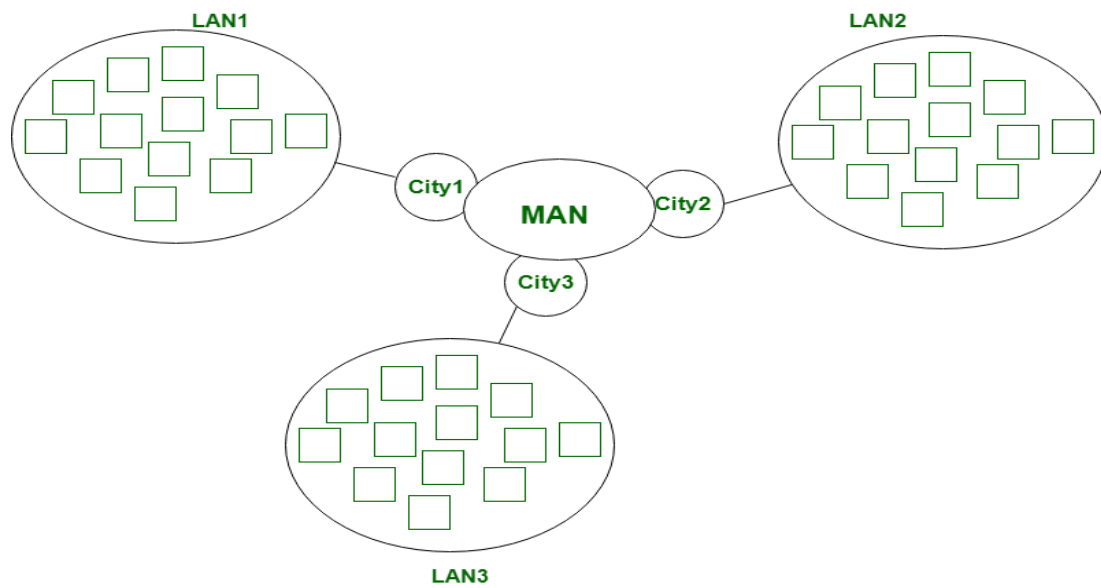
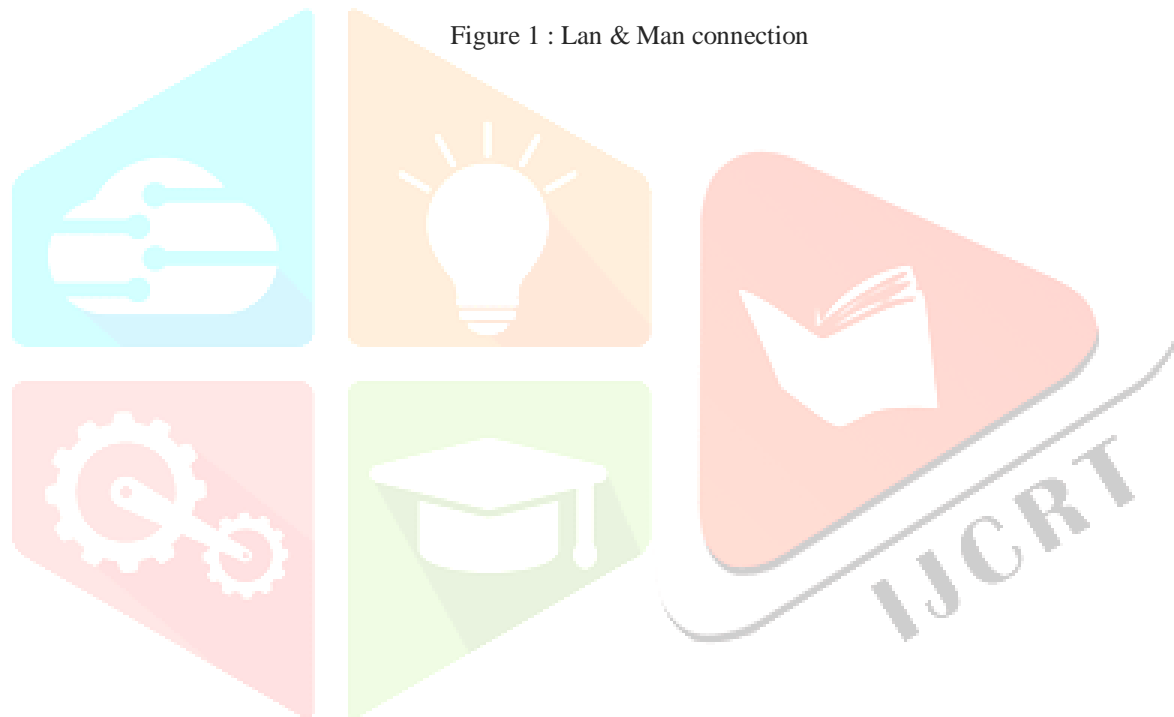


Figure 1 : Lan & Man connection



- □MAN

Man covers the greatest territory than LAN, for example, Small towns, City . Man interfaces 2 or a ton of PCs that territory unit anyway dwells with in the equivalent or totally unique cities.Mans use in brought together systems for sharing the information to various s Lans.

- WAN

Wan covers the immense zone than LAN just as Man, for example, Country/Continent more.. Wans costly and ought to or probably won't be possessed by 1 association. PSTN or Satellite medium are use for wide region systems.

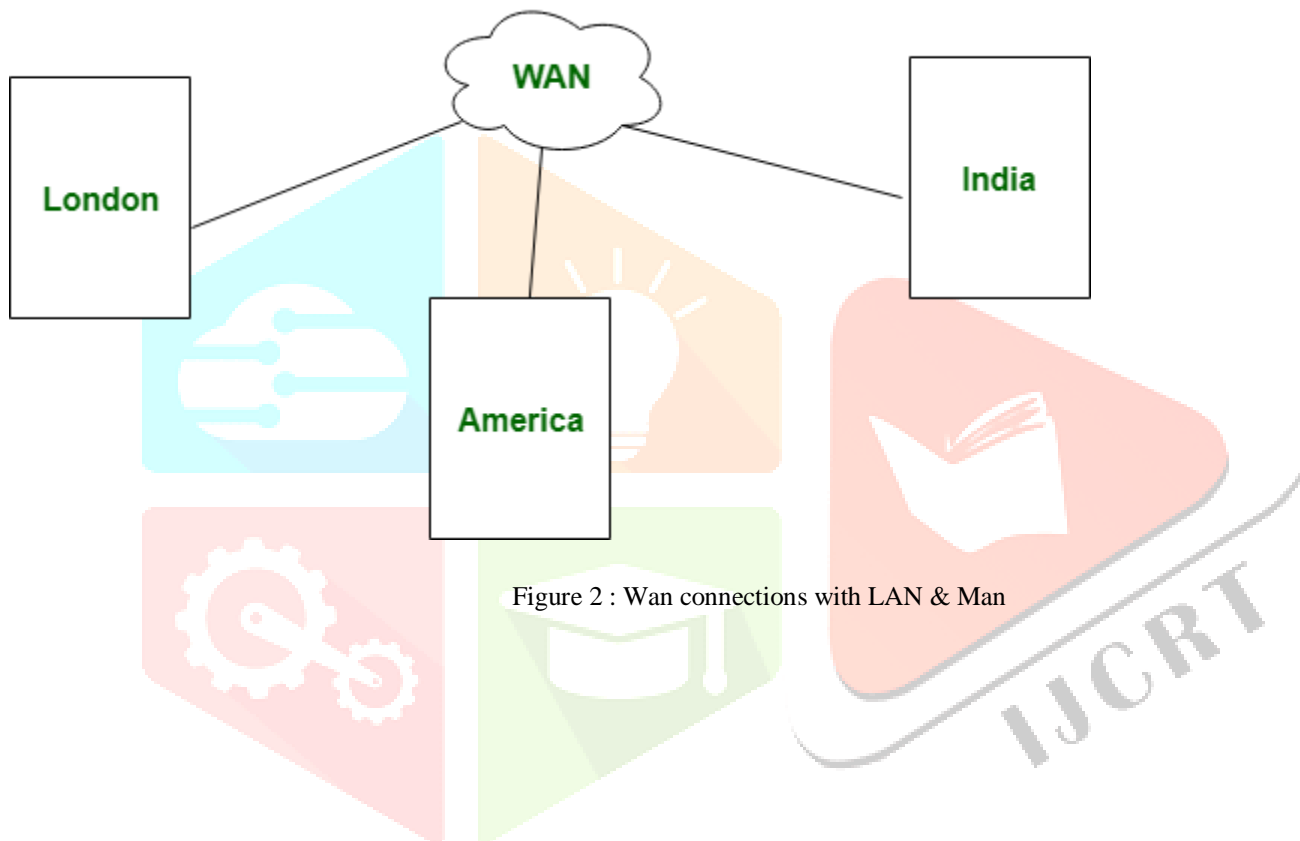


Figure 2 : Wan connections with LAN & Man

1.2 IP address classes

There are 4 millions IP addresses. Dealing with every one of these addresses with no plan are close to unimaginable. Let comprehend it with a straightforward model. On the off chance that you need to discover a word to a language word reference, to what extent will you take? Typically you should take under five minutes to discover that word. You can do this in light of the fact that the words in word reference are composed in alphabetic request .presently, you need to discover a similar word to the word reference which will doesn't utilize any grouping or request to sort out the words, to what extent will you take the time? It might take as long as multi week to discover that particular word to all the words.If a disorderly will generally contains 1 billion words can turn a 5 undertaking in a multi week task that guess how almost 4 billion tends to will make a pursuit task convoluted in the event that they are chaotic.

For simpler administration, IP addresses are composed in numeric request and partitioned in belowi5 classes

Class	Starting	Ending	Sub net mask
A	0.0.0.0	127.255.255.255	255.0.0.0
B	128.0.0.0	191.255.255.255	255.255.0.0
C	192.0.0.0	223.255.255.255	255.255.255.0
D	224.0.0.0	239.255.255.255	255.255.255.255
E	240.0.0.0	255.255.255.255	255.255.255.255

Private IP address & Public IP address

Based on accessibility, IP addresses are mainly divided in two categories;

Private IP addresses &

Public IP addresses.

Differences into private IP & public IP are below :

1.2.1 Private IP

Private IP addresses are the IP tends to which will are secured for neighborhood systems and can't be gotten to the open systems . Bad habit refrain an open systems can't be gotten to a private IP address.

Below IP rages are reserved for private IP:

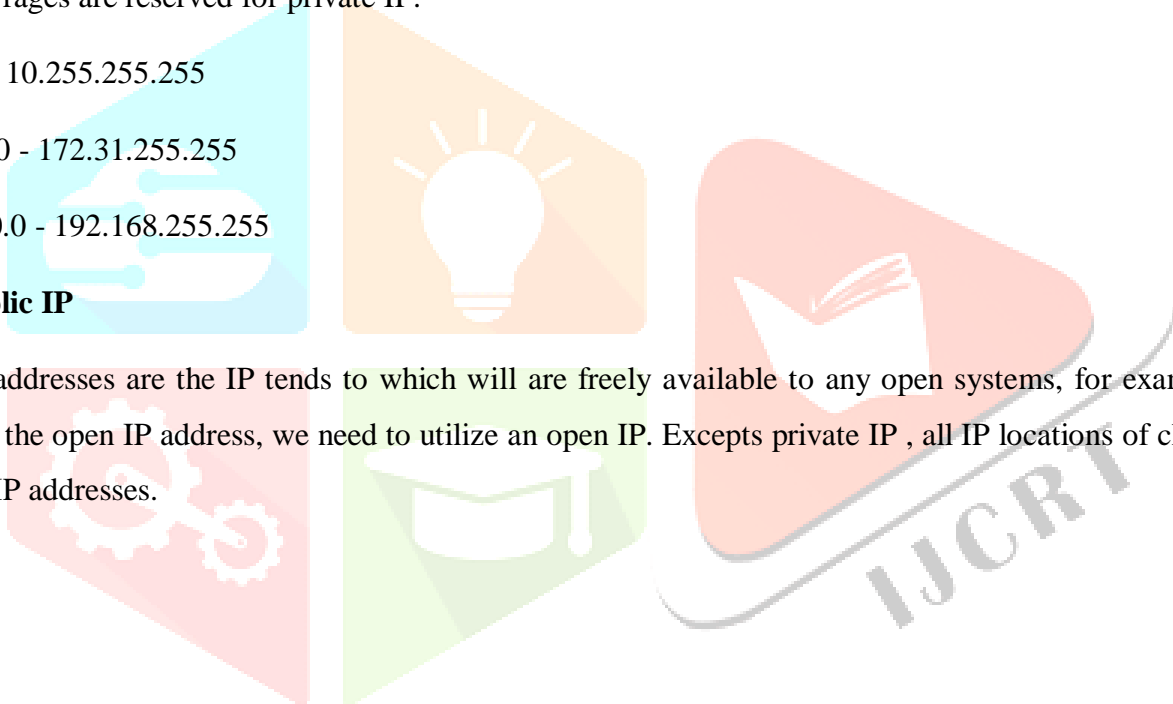
10.0.0.0 - 10.255.255.255

172.16.0.0 - 172.31.255.255

192.168.0.0 - 192.168.255.255

1.2.2 Public IP

Open IP addresses are the IP tends to which will are freely available to any open systems, for example, Web. For getting to the open IP address, we need to utilize an open IP. Excepts private IP , all IP locations of class A, B and C are open IP addresses.



1.3 Network Typologies

Systems topology is the design of a networks. It comprises of two sections; Physical & legitimate. The physical part depicts the physical design of a systems while the consistent part portrays how information streams in that systems. both, physical and legitimate parts are otherwise called the physical topology and the consistent topology.

1.3.1 Bus topology

Here, all PCs interface through a solitary consistent coaxial link. This is known as the backbone link. The two finishes on the spine link are ended through by the terminators. To interface a PC hubs to the spine link, drop cable is utilized.

The underneath picture shows the transport topology.

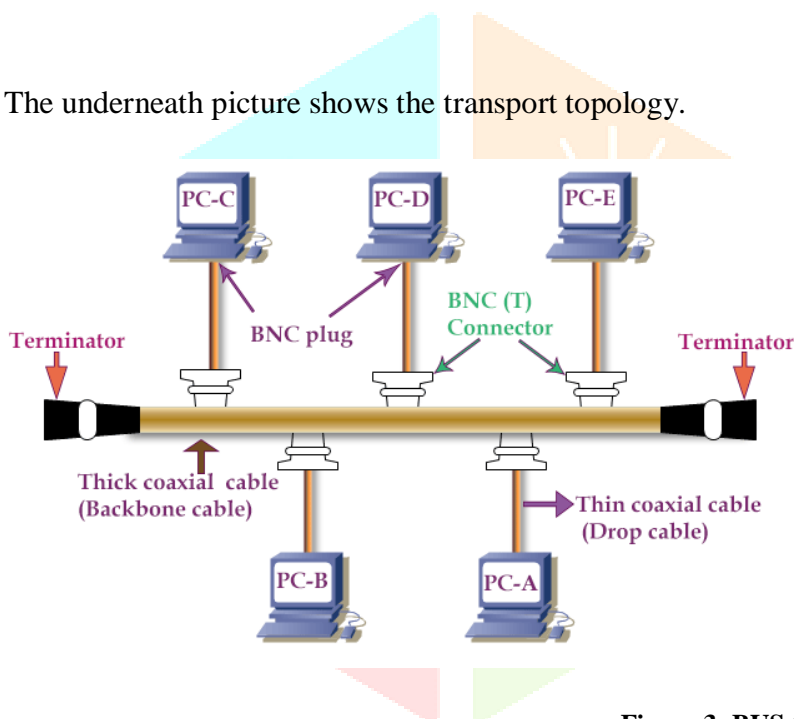


Figure 3: BUS topology

1.3.2 Star topology

All PCs hub are interface with a concentrated systems administration gadget. Generally, a systems administration switch/Center point is utilized as the concentrated gadget. Every PC hubs are in the system utilizes its own different turned pair link to associate with the switch. Contorted pair link uses RJ - 45 connectors on the two focuses.

The beneath picture shows a case of the star topology.

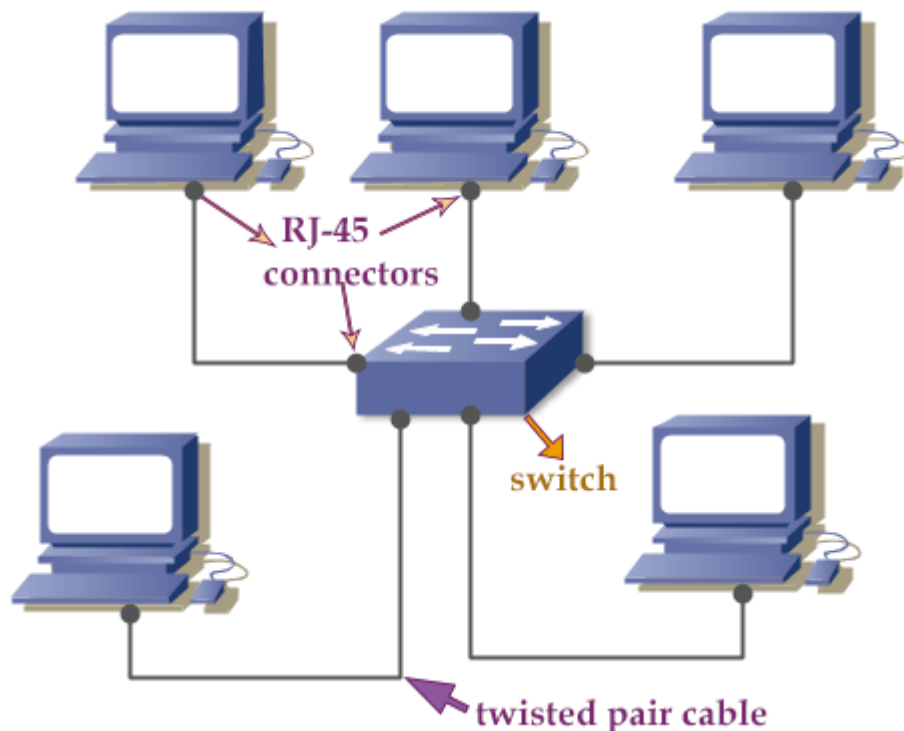


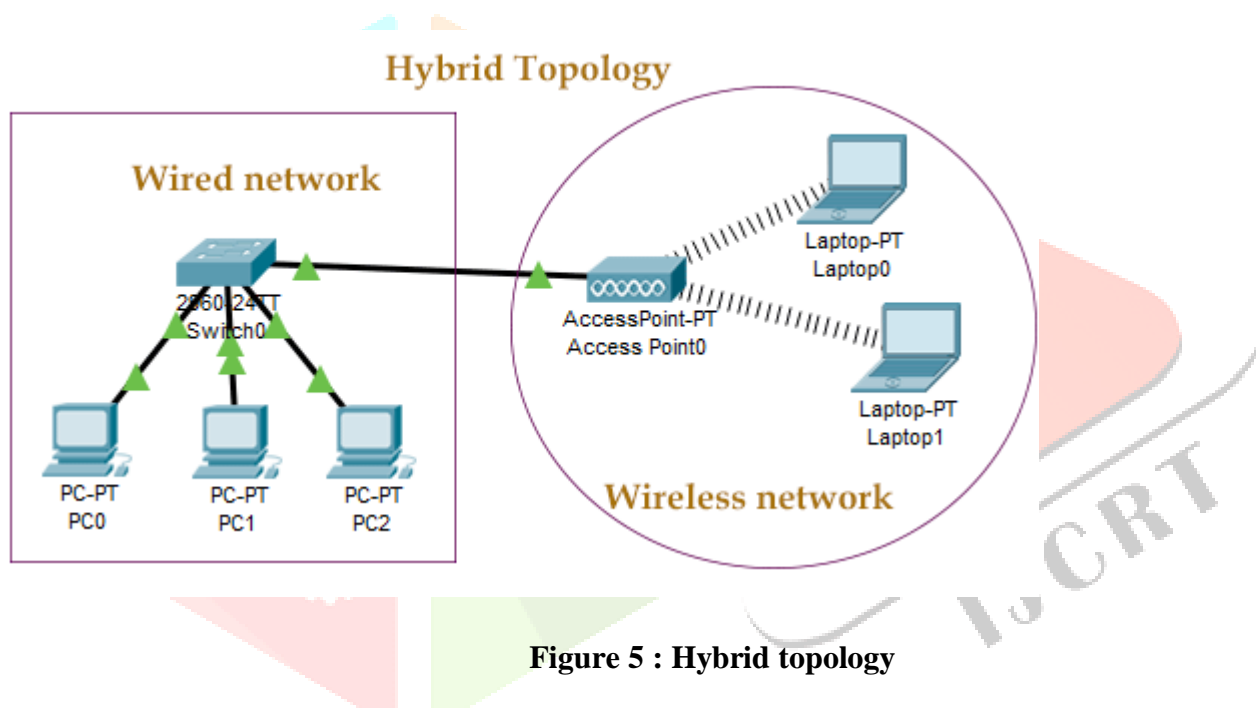
Figure 4 : Star topology

1.3.3 Hybrid Topology

This topology is a blend of at least 2 typologies. For instance, there are 2 kind of n/w ; 1 is worked from the star topology and other is worked from the transport topology. In the event that we interface both n/w to fabricate a solitary colossal system, the topology of the new system will be known as the half and half topology.

You are not limited to the transport and star typologies. join any topology with other topology. In present day arrange executions, the cross breed topology is generally used to blend the wired system in with the remote system.

The beneath picture shows the case of the mixture systems topology:



In contrast to a wired systems, remote systems doesn't utilize links to associate computers. The remote systems utilizes radio range to stream information.

1.3.4 Ring topology

Here topology, PCs are interface in a round structure. PC Hubs were legitimately associates with two different hubs in the system. Information descends a 1-route way from 1 hub to other. At the point when information signals go starting with one hub then onto the next, every PC hubs produces the signals.the signals are created on each passing PC, the nature of the signs stays consistent all through the ring.

The beneath picture shows a run of the mill ring topology:

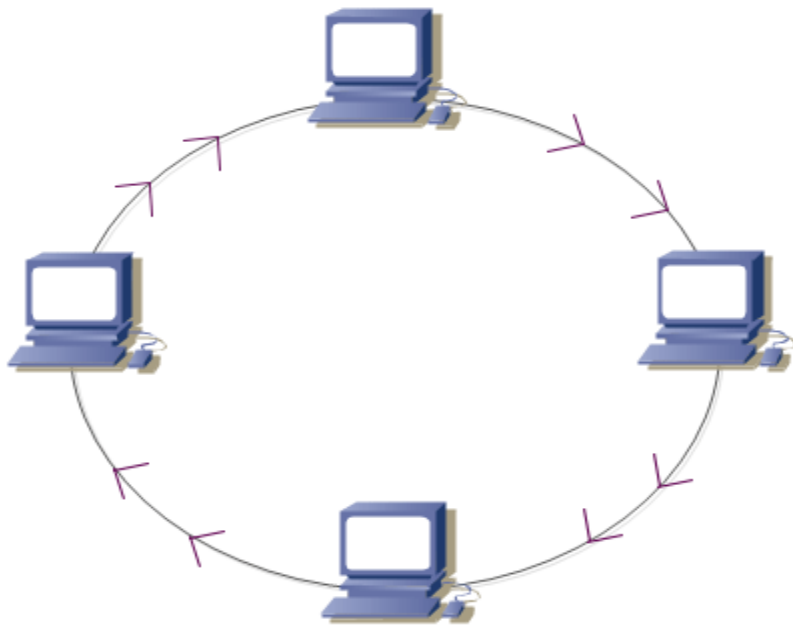


Figure 6 : Ring Topology

Like the transport topology, this topology is likewise not, at this point utilized in current systems. This topology was initially evolved by IBM to conquer the current weaknesses of the transport topology.

1.3.5 Mesh Topology

In the topology, numerous ways exist between end gadgets. On the off chance that an immediate way exist from each end hub gadget to each opposite end hub gadgets in the system, it's a completely coincided topology. On the off chance that various ways exist between the end gadgets in the system, it's a somewhat fit topology.

The beneath picture shows a case of work topology :

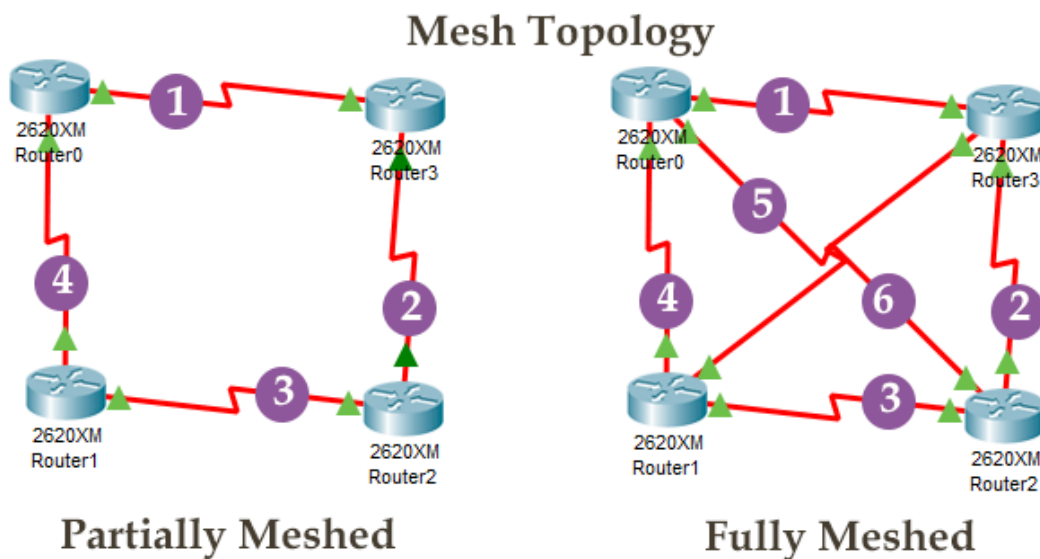


Figure 3 : Mesh Topology



1.4 Networks Cable Types

To interface at least two PCs or systems administration gadgets in a system, arrange links are utilized.

1.4.1 coaxial cable

This link contains a conductor, separator, twisting, and sheath. The sheath covers the plaiting, interlacing spreads the protection, and the protection covers the conductor.

The underneath picture shows these parts :

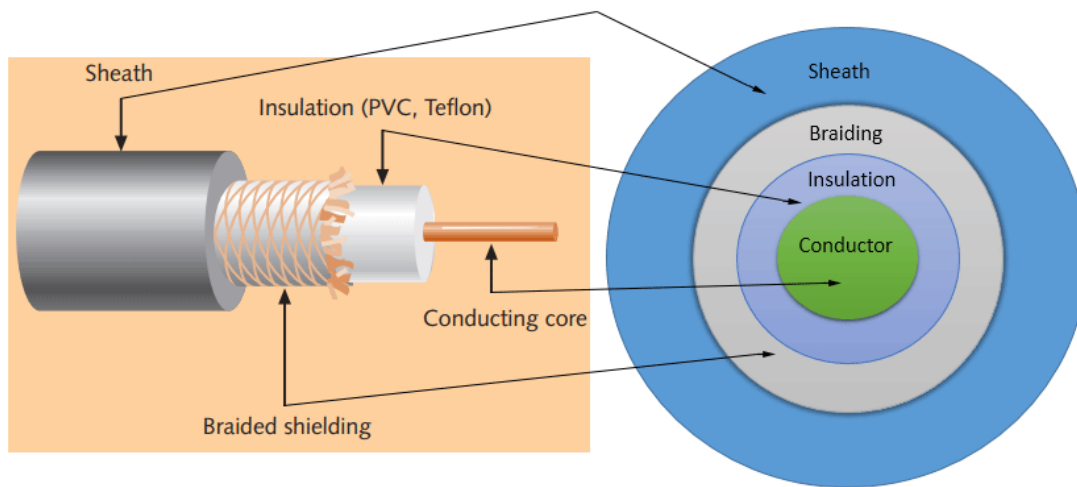


Figure 4 : Coxial Cable

- **Sheath**

This is the external layer of the coaxial link. It ensures the link through harm.

- **Braided shield**

This shield shields signals from outer obstruction and clamor. This shield is worked from a similar metal that is utilized to fabricate the center.

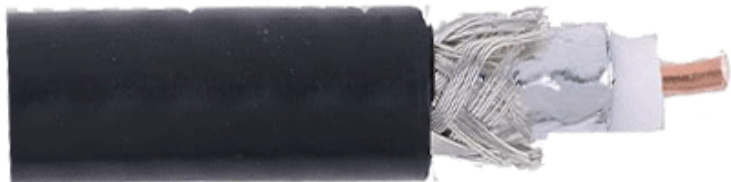
- **Insulation**

Protection ensures the center and additionally keeps the center separate from the plaited shield. Since both the center and the twisted shield utilize the comparative metal, without this layer, they contact each other and make a short out in wire.

- **Conductor**

The conductor conveys electromagnetic signs. In light of conductor coaxial link has sorted onto two sorts;

- Single - center coaxial link and
- muti - center coaxial link.



Single core coaxial cable



Multi-core coaxial cable

Figure 5 : types of coaxial cable

1.4.2 Twisted-pair cables

These were essentially concocted for the PC systems. It is additionally known as Ethernet link. Practically all cutting edge LAN PC systems utilize this sort link.

This link has the shading coded sets of protected copper wires. Each 2 wires are wound around one another to form a pair. Normally, there are 4 sets. Each pair has 1 strong shading and 1 stripped shading wire. Strong hues are blue, green, earthy colored, earthy colored and orange. In stripped shading, the strong shading are blended in with the white shading.

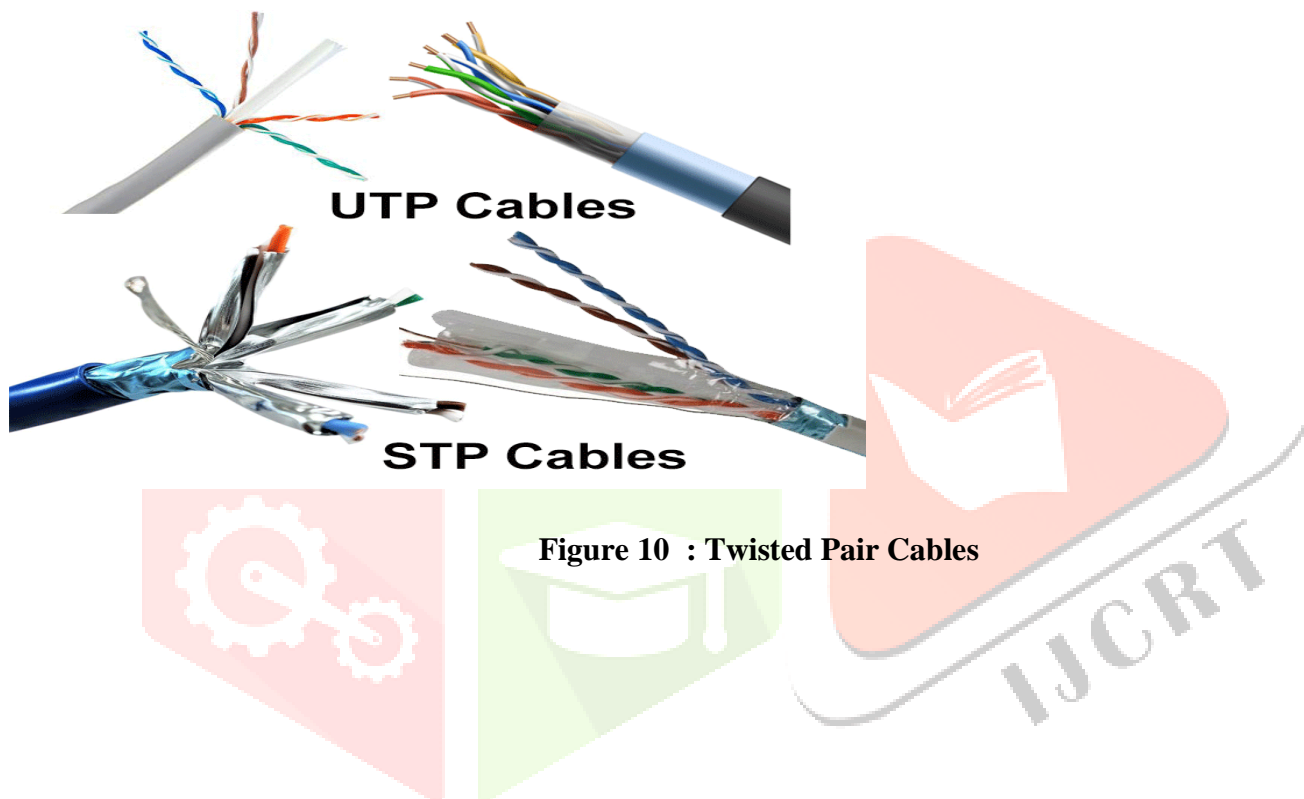


Figure 10 : Twisted Pair Cables

1.4.3 Fiber optic cable

This link contains : center, cladding, cushion, and coat. The center is produced using the slim strands of glass or plastic that can convey information and Data over the significant distance . The center is enveloped by the cladding ; the cladding are enclosed by cradle, and the cushion are enveloped by coat.

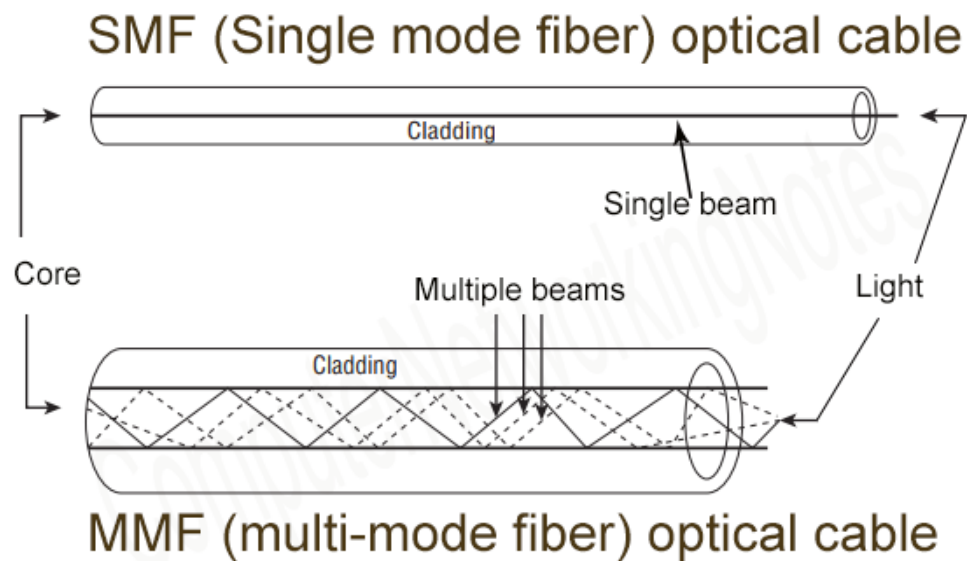


Figure 11 : Fiber Optical

SMF (Single mode fiber) optical cable

It conveys just a solitary light emission through the glass. This is all the more sure and supports a lot of grand transfer speed and longer separations than the MMF link. This link utilizes a laser as the light source and transmits 1550 or 1300 nano meter frequencies of light.

MMF(muti mode fiber) optical cable

It conveys different light emissions. In view of numerous shafts, it conveys significantly more information than the SMF link . This link utilizes a Drove as the light source and transmits 1300 or 850 nano meter frequencies of light.

CHAPTER 2 : REQUIREMENT & ANALYSIS

2.1 Problem Definition

In the undertaking the web was arrangement by the ISP and it was not structured and Introduce well CAT6 link are not overseen well and Utilizing the web and give access to all .

This undertaking there are more issue in the web that they Hand introduced previously.OSPF convention is us to deal with the full systems.

2.2 Requirements Specification

Above all else there ought to be legitimate administration of the cabling and need to do appropriate upkeep of the of PC and systems gadgets. Here we need to check the prerequisites and utilizing the OSPF Conventions and deal with the dynamic DHCP.

2.3 Planing & Scheduling for installation

The arrangement is to deal with the cabling and arrangement the gadgets appropriately

The plans are:

- buy the New systems gadgets and its frill
- buy CAT6 link
- deal with the electrical cabling
- keep up the server room
- Introduce the fundamental programming
- keep up the systems regular
- incorporate the great connection with the workplace staff

2.4 Software & Hardware Requirements

2.4.1 Software Requirements

- Cisco Packet Tracer
- Linux or windows OS

2.4.2 Hardware Requirements

-For networking tools & equipment :

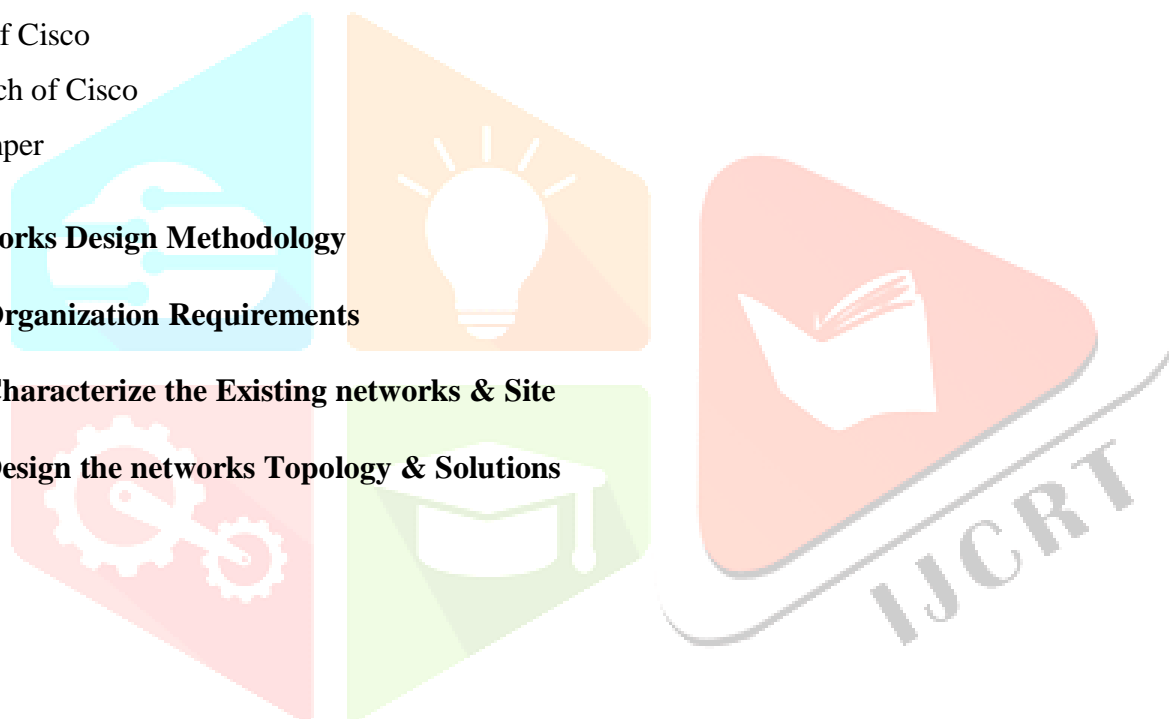
- RJ-45
- CAT6 Cable
- AP of Cisco
- Switch of Cisco
- Clamper

2.5 Networks Design Methodology

Step 1. Organization Requirements

Step 2. Characterize the Existing networks & Site

Step 3. Design the networks Topology & Solutions

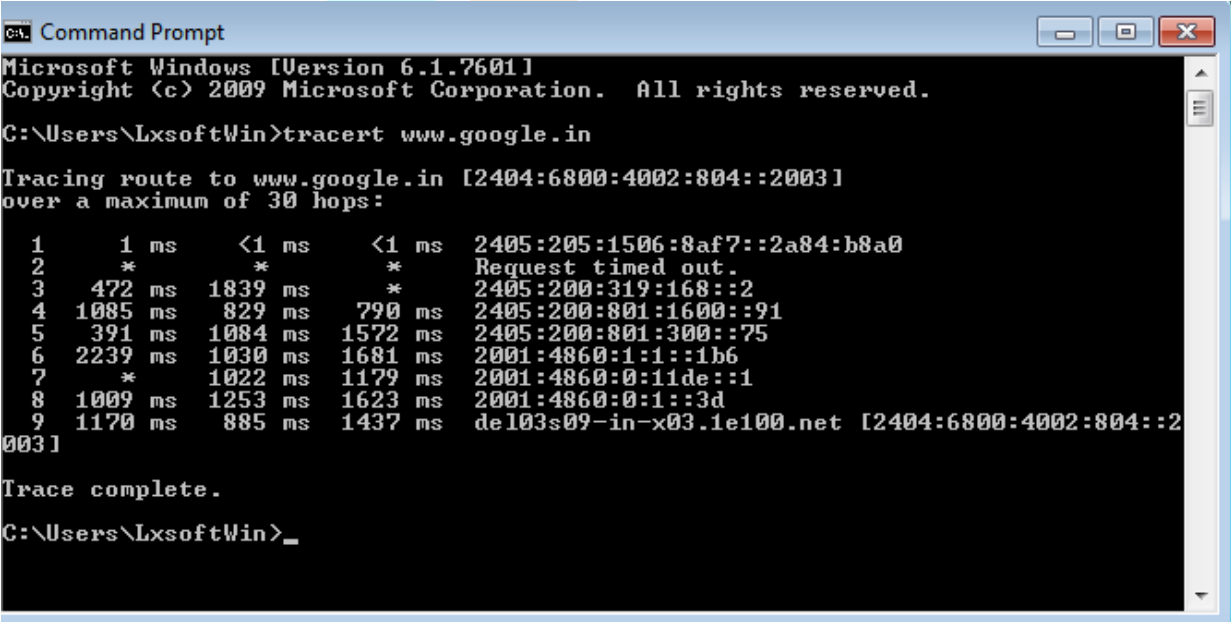


CHAPTER 3 : NETWORKING CMDS

Systems administration orders, (for example, tracert, traceroute, ipconfig, ping ,arp, netstat, nbstat, NetBIOS, winipcfg , nslookup) and their arguments,options and boundaries in subtleties including how they are use to investigate the systems.

3.1 Tracert

Tracert : Determines the footway taken to a goal by post ICMP Echo Request messages to the goal with gradually expanding TTL field esteems. The way showed is the rundown of close side switch connection of the switches in the way between a source have and a goal. The nearside connect is the interface of the switch that is nearest to the sending host in the way. Utilized without boundaries, its presentations help.



```

C:\Users\LxsoftWin>tracert www.google.in

Tracing route to www.google.in [2404:6800:4002:804::2003]
over a maximum of 30 hops:

  0  1 ms  <1 ms  <1 ms  2405:205:1506:8af7::2a84:b8a0
  1  *      *      *      Request timed out.
  2  472 ms 1839 ms *      2405:200:319:168::2
  3 1085 ms 829 ms 790 ms 2405:200:801:1600::91
  4 391 ms 1084 ms 1572 ms 2405:200:801:300::75
  5 2239 ms 1030 ms 1681 ms 2001:4860:1:1::1b6
  6 *      1022 ms 1179 ms 2001:4860:0:11de::1
  7 1009 ms 1253 ms 1623 ms 2001:4860:0:1::3d
  8 1170 ms 885 ms 1437 ms del03s09-in-x03.1e100.net [2404:6800:4002:804::2003]

Trace complete.

C:\Users\LxsoftWin>_

```

Figure 12: tracert

Syntax

```
tracert [-d] [-h MaximumHops] [-j HostList] [-w Timeout] [TargetName]
```

3.2 Ping

Confirms IP-level network to other TCP/IP PCs , forward Internet Control Message Protocol (ICMP) Echo Request messages. The receipt of comparing Echo Reply messages are show, alongside full circle times. It is an essential TCP/IP cmds used to investigate.

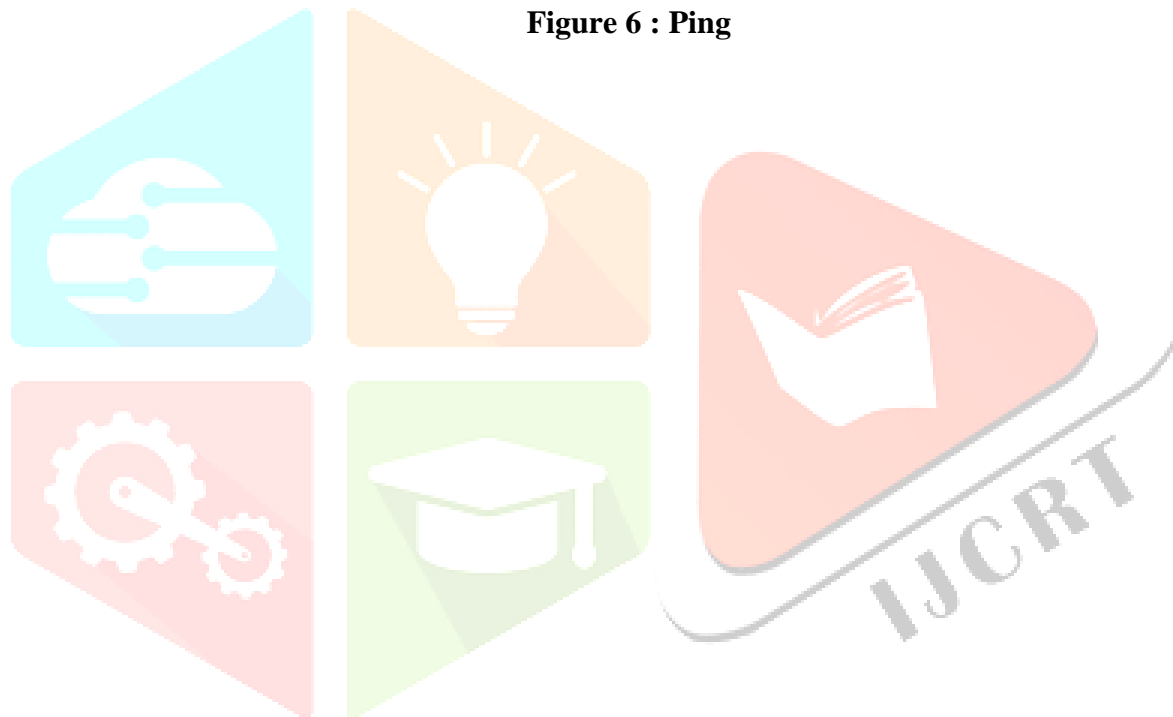
```
ca. Command Prompt
C:\Users\LxsoftWin>ping google.com

Pinging google.com [172.217.24.238] with 32 bytes of data:
Reply from 172.217.24.238: bytes=32 time=1451ms TTL=53
Reply from 172.217.24.238: bytes=32 time=599ms TTL=53
Reply from 172.217.24.238: bytes=32 time=1438ms TTL=53
Reply from 172.217.24.238: bytes=32 time=1656ms TTL=53

Ping statistics for 172.217.24.238:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 599ms, Maximum = 1656ms, Average = 1286ms

C:\Users\LxsoftWin>
```

Figure 6 : Ping

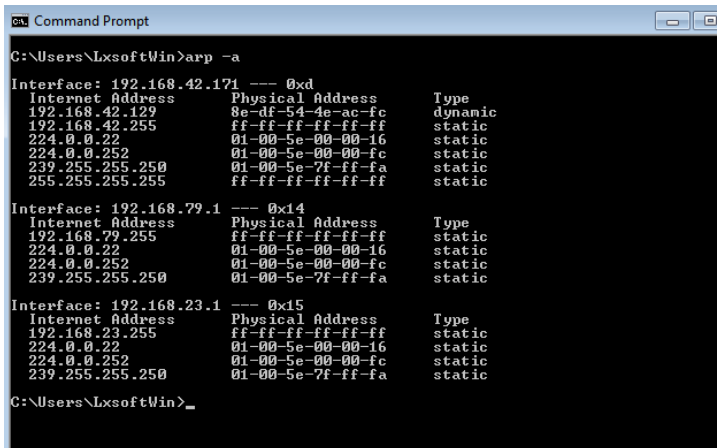


3.3 Arp

Showcases and alters passages in the Address Resolution Protocol (ARP) reserve, which contains one/additional tables that are utilized to store IP addresses and their settled Ethernet/Token Ring physical locations. There's a different table for each Ethernet/Token Ring n/w connector introduced on PC.

Syntax

```
arp -a
```



```
Command Prompt
C:\Users\LxsoftWin>arp -a

Interface: 192.168.42.171 --- 0xd
Internet Address      Physical Address      Type
192.168.42.129       8e-df-54-4e-ac-fc    dynamic
192.168.42.255       ff-ff-ff-ff-ff-ff    static
224.0.0.22           01-00-5e-00-00-16    static
224.0.0.252          01-00-5e-00-00-fc    static
239.255.255.250      01-00-5e-7f-ff-fa    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static

Interface: 192.168.79.1 --- 0x14
Internet Address      Physical Address      Type
192.168.79.255       ff-ff-ff-ff-ff-ff    static
224.0.0.22           01-00-5e-00-00-16    static
224.0.0.252          01-00-5e-00-00-fc    static
239.255.255.250      01-00-5e-7f-ff-fa    static

Interface: 192.168.23.1 --- 0x15
Internet Address      Physical Address      Type
192.168.23.255       ff-ff-ff-ff-ff-ff    static
224.0.0.22           01-00-5e-00-00-16    static
224.0.0.252          01-00-5e-00-00-fc    static
239.255.255.250      01-00-5e-7f-ff-fa    static

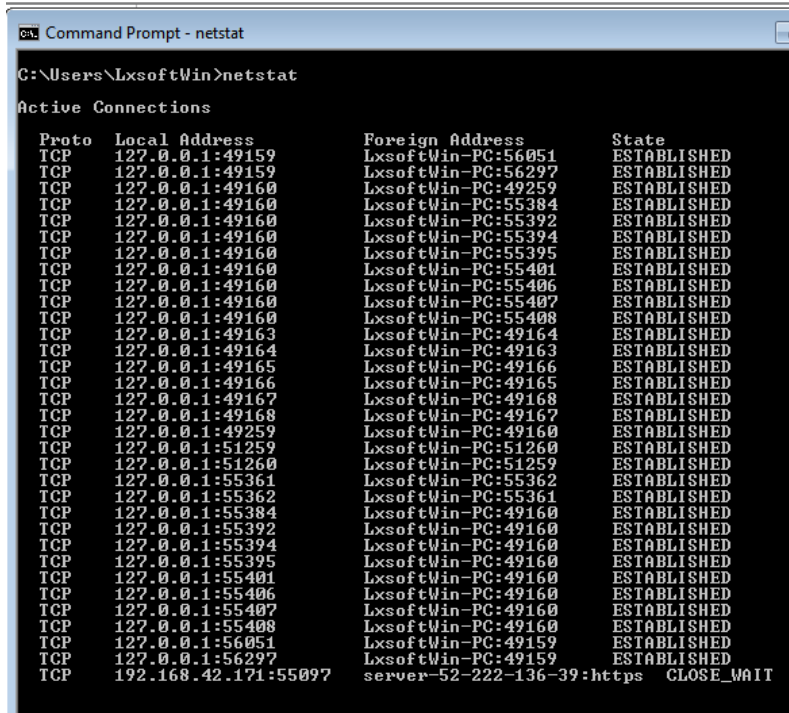
C:\Users\LxsoftWin>
```

Figure 7 : ARP



3.4 Netstat

Displays lively TCP connections, ports on which the computer is listening, Ethernet data, the IP desk, IPv4 information & IPv6 statistics (for the IPv6, ICMPv6, TCP over IPv6, and UDP over IPv6 protocols).



```

ca Command Prompt - netstat
C:\Users\LxsoftWin>netstat
Active Connections
Proto Local Address          Foreign Address        State
TCP    127.0.0.1:49159         LxsoftWin-PC:56051    ESTABLISHED
TCP    127.0.0.1:49159         LxsoftWin-PC:56297    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:49259    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55384    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55392    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55394    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55395    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55401    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55406    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55407    ESTABLISHED
TCP    127.0.0.1:49160         LxsoftWin-PC:55408    ESTABLISHED
TCP    127.0.0.1:49163         LxsoftWin-PC:49164    ESTABLISHED
TCP    127.0.0.1:49164         LxsoftWin-PC:49163    ESTABLISHED
TCP    127.0.0.1:49165         LxsoftWin-PC:49166    ESTABLISHED
TCP    127.0.0.1:49166         LxsoftWin-PC:49165    ESTABLISHED
TCP    127.0.0.1:49167         LxsoftWin-PC:49168    ESTABLISHED
TCP    127.0.0.1:49168         LxsoftWin-PC:49167    ESTABLISHED
TCP    127.0.0.1:49259         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:51259         LxsoftWin-PC:51260    ESTABLISHED
TCP    127.0.0.1:51260         LxsoftWin-PC:51259    ESTABLISHED
TCP    127.0.0.1:55361         LxsoftWin-PC:55362    ESTABLISHED
TCP    127.0.0.1:55362         LxsoftWin-PC:55361    ESTABLISHED
TCP    127.0.0.1:55384         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:55392         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:55394         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:55395         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:55401         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:55406         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:55407         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:55408         LxsoftWin-PC:49160    ESTABLISHED
TCP    127.0.0.1:56051         LxsoftWin-PC:49159    ESTABLISHED
TCP    127.0.0.1:56297         LxsoftWin-PC:49159    ESTABLISHED
TCP    192.168.42.171:55097    server-52-222-136-39:https CLOSE_WAIT

```

Figure 8 :Net stat

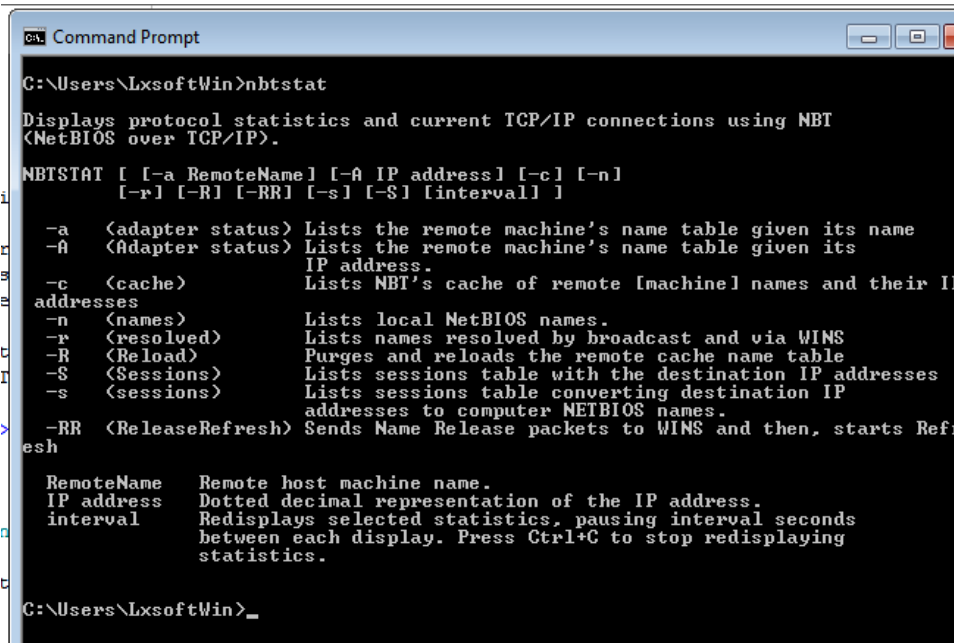
net stat offers the facts for the following :

- Proto - it's miles the call of the protocol (TCP/UDP).
- Local Address -In the cmd the IP address of all computer and the port number need to used.(*) has be proven at the same time as the port doesnt installed the connections

Foreign Address - The IP address and port range of the remote pc to which the socket is attached. The names that corresponds to the IP cope with and the port are shown unless the -n parameter distinct. Although the port isn't but installed, the port variety is shown as an asterisk (*).

3.5 Nbtstat

Displays NetBIOS beneath TCP/IP (NetBT) protocol information. NetBIOS the name tables in each computers (neighborhood & Remote) & the NetBIOS call cache. Nbtstat allows a refresh of the NetBIOS call cache and the names registered with Windows Internet Name Service (WINS).



```
Command Prompt
C:\Users\LxsoftWin>nbtstat
Displays protocol statistics and current TCP/IP connections using NBT
(NetBIOS over TCP/IP).
NBTSTAT [ [-a RemoteName] [-A IP address] [-c] [-n]
          [-r] [-R] [-RR] [-s] [-S] [interval] ]
-a <adapter status> Lists the remote machine's name table given its
-A <Adapter status> Lists the remote machine's name table given its
                    IP address.
-c <cache>          Lists NBT's cache of remote [machine] names and their IP
addresses
-n <names>          Lists local NetBIOS names.
-r <resolved>       Lists names resolved by broadcast and via WINS
-R <Reload>         Purges and reloads the remote cache name table
-S <Sessions>       Lists sessions table with the destination IP addresses
-s <sessions>       Lists sessions table converting destination IP
                    addresses to computer NETBIOS names.
-RR <ReleaseRefresh> Sends Name Release packets to WINS and then, starts Refresh
RemoteName  Remote host machine name.
IP address  Dotted decimal representation of the IP address.
interval    Redisplays selected statistics, pausing interval seconds
            between each display. Press Ctrl+C to stop redisplaying
            statistics.
C:\Users\LxsoftWin>_
```

Figure 9 : Nbtstat



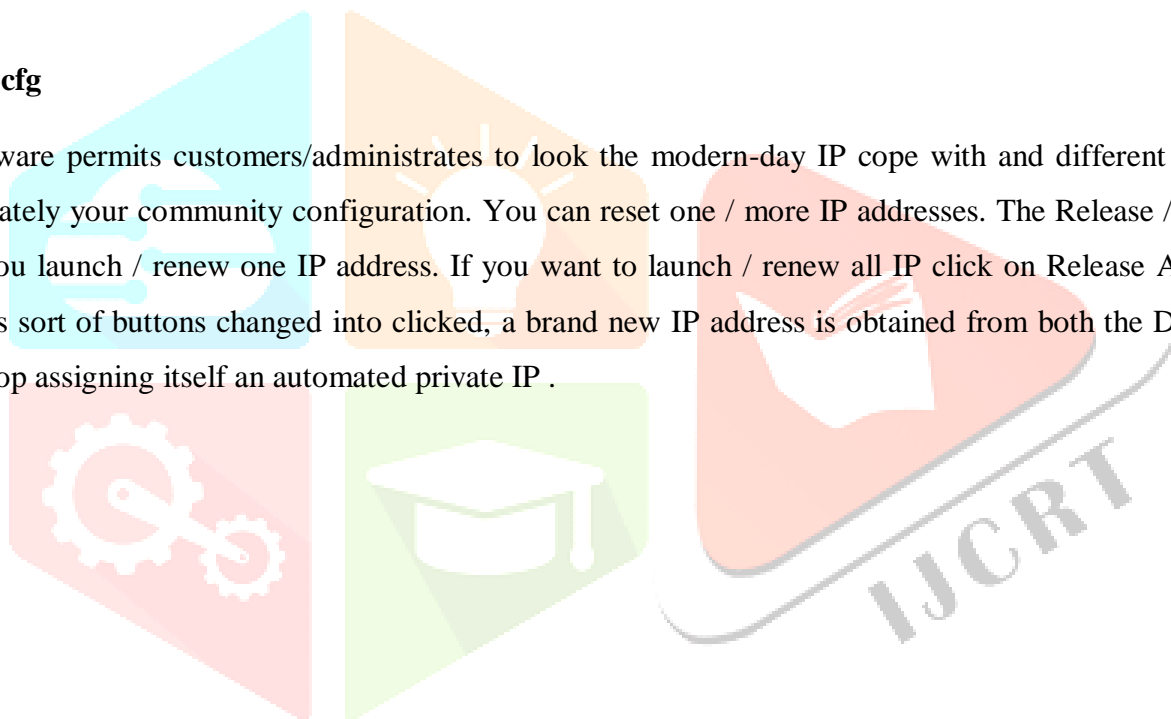
3.6 Ipconfig

Displays all cutting-edge TCP/IP community configuration values and refreshes Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) settings. This command is most beneficial on computers which can be configured to attain an IP cope with robotically. This enables all of us for determine which TCP/IP configuration price has been configure in DHCP, Automatic Private IP Addressing (APIPA) / an exchange configuration.

- If the Adapter name carries any spaces, use quotation marks around the adapter call (this is, "Adapter Name").
- For adapter names, ipconfig supports the usage of the asterisk (*) wild card character to specify either adapters with names that start with a specific string /adapters with names that comprise a precise string.

3.7 winipcfg

This software permits customers/administrates to look the modern-day IP cope with and different beneficial facts approximately your community configuration. You can reset one / more IP addresses. The Release / Renew buttons will let you launch / renew one IP address. If you want to launch / renew all IP click on Release All / Renew All. When this sort of buttons changed into clicked, a brand new IP address is obtained from both the DHCP provider / from laptop assigning itself an automated private IP .



3.8 Nslookup

It is a type of UNIX shell command for the question Internet domain call servers.

```

C:\WINDOWS\system32\cmd.exe
Microsoft Windows XP (Version 5.1.2600)
(C) Copyright 1985-2001 Microsoft Corp.

C:\Documents and Settings\TARUN HUMAR>nslookup
Default Server: triband-del-59.179.243.78.bol.net.in
Address: 59.179.243.78

> set type=mx
> gmail.com
Server: triband-del-59.179.243.78.bol.net.in
Address: 59.179.243.78

Non-authoritative answer:
gmail.com      MX preference = 10, mail exchanger = alt1.gmail-smtp-in.l.google
.com
gmail.com      MX preference = 10, mail exchanger = alt2.gmail-smtp-in.l.google
.com
gmail.com      MX preference = 50, mail exchanger = gsntp147.google.com
gmail.com      MX preference = 50, mail exchanger = gsntp183.google.com
gmail.com      MX preference = 5, mail exchanger = gmail-smtp-in.l.google.com

gmail.com      nameserver = ns4.google.com
gmail.com      nameserver = ns1.google.com
gmail.com      nameserver = ns2.google.com
gmail.com      nameserver = ns3.google.com
gmail-smtp-in.l.google.com internet address = 209.85.143.27
gmail-smtp-in.l.google.com internet address = 209.85.143.114
alt1.gmail-smtp-in.l.google.com internet address = 209.85.133.114
alt1.gmail-smtp-in.l.google.com internet address = 209.85.133.27
alt2.gmail-smtp-in.l.google.com internet address = 209.85.135.27
alt2.gmail-smtp-in.l.google.com internet address = 209.85.135.114
gsntp147.google.com internet address = 209.85.147.27
gsntp183.google.com internet address = 64.233.183.27
ns1.google.com internet address = 216.239.32.10
ns2.google.com internet address = 216.239.34.10
ns3.google.com internet address = 216.239.36.10
ns4.google.com internet address = 216.239.38.10
>

```

Definitions

- Name server :These are the servers that net uses to discover more about the domain. Usually they may be a ISP computer systems.
- Mail server: Where email are dispatched.
- Web server:for all area web sites of anybody.
- Ftp server: report transfer protocol, the server is where record are can be saved and used.
- Host call: A call of the host as given via area.

- Real-Host name: the host call which you get by using opposite fixing the IP, may be distinctive to the given host-name.
- IP cope with: Unique four numbered identifier that received with the aid of resolving the host name



CONCLUSION

At last the conclusion of doing the project is that build the managed networks with all kind of security need to have a company & built different design & use the protocols & create the DHCP pools. Security tools use in networking & basics commands.



Bibliography/ References

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