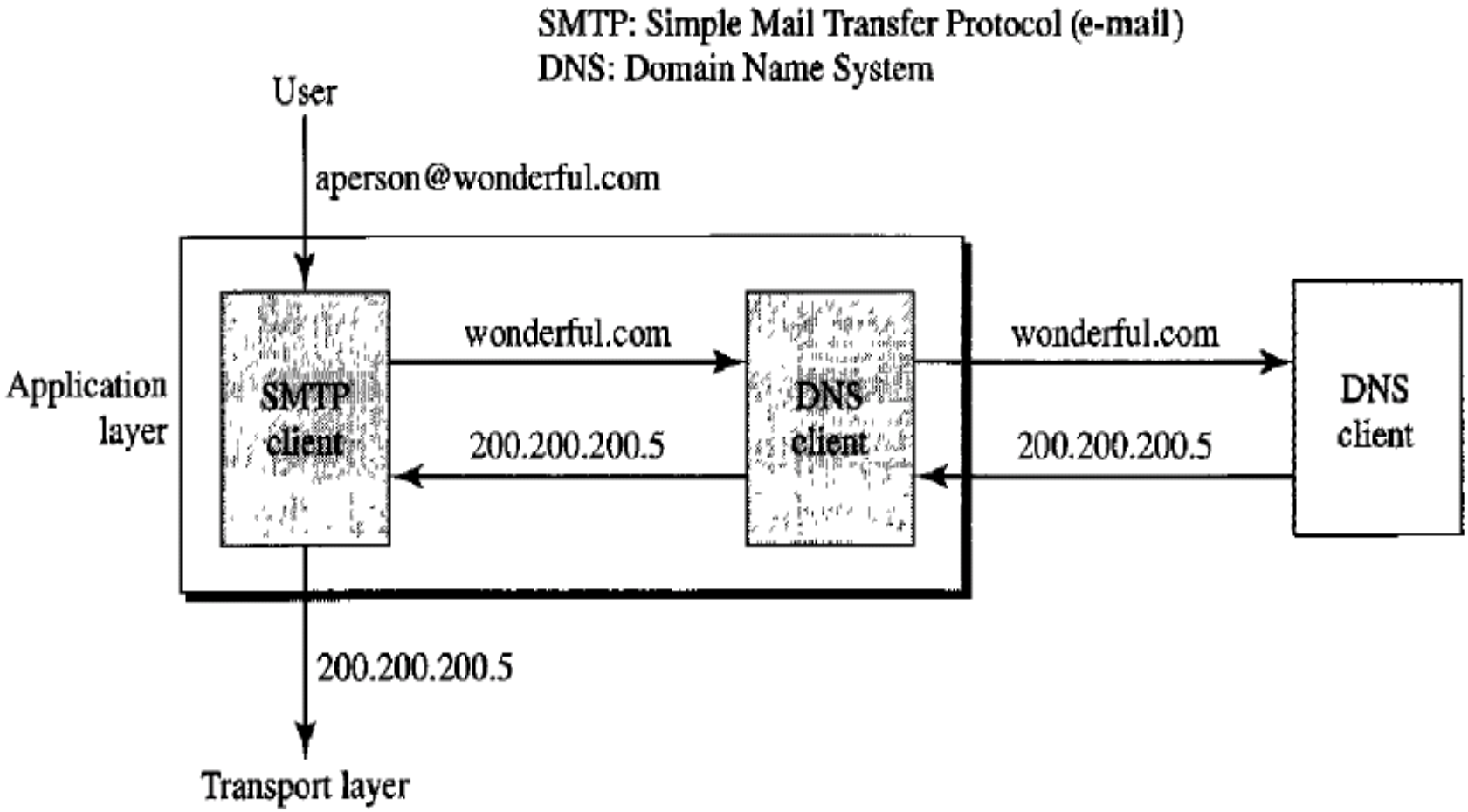
DNS(DOMAIN NAME SYSTEM)

Introduction

- The internet model that follow the client/server paradigm.
- The DNS is a supporting program that is used by other programs such as E-mail.
- A user of a e-mail program may know the e-mail address of the recipient; however, the IP protocol needs the IP address.
- The DNS client program sends a request to a DNS server to map the e-mail address to the corresponding IP address.
- To identify the remote system/user, TCP/IP protocols use the IP address, which uniquely identifies the connection of a host to the internet.
- However, people prefer to use names instead of numeric values.
- The DNS system that can map a name to an address (or) address to a name.

DNS service

gure 25.1 *Example of using the DNS service*



- When the internet was small, mapping was done by using a host file.[two columns-names and address-host store it-update periodic]
- Today it is impossible, bcoz the host file would be too large and updating problem.
- The solution is to maintain in one computer and allow centralized access[huge traffic]
- Huge information divided into small parts today and stored different computer.[host can contact the closest computer holding the needed information.[method used by DNS]

Name space

- It is unambiguous, the name assigned to machines must be unique.
- Name space map each address to a unique name in two ways.
  - Flat Name space
  - Hierarchical Name Space.

Flat Name Space:

- ✓ A name in this space is a sequence of characters without structure.
- ✓ A name may (or) may not have a common section.[it has no meaning].
- ✓ It cannot be used in internet.[duplication].

Flat Name space

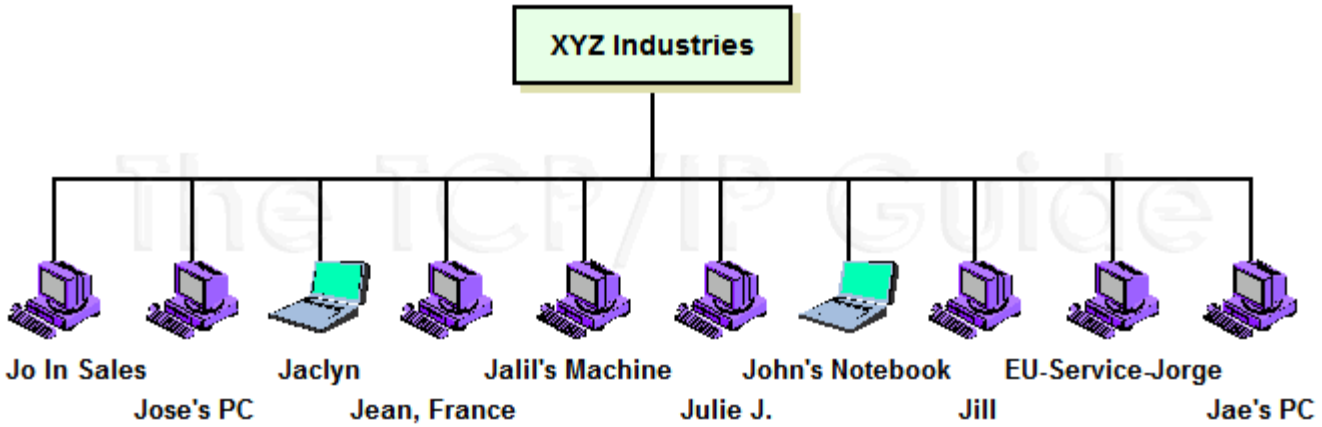


Figure 232: Flat Name Architecture (Flat Name Space)

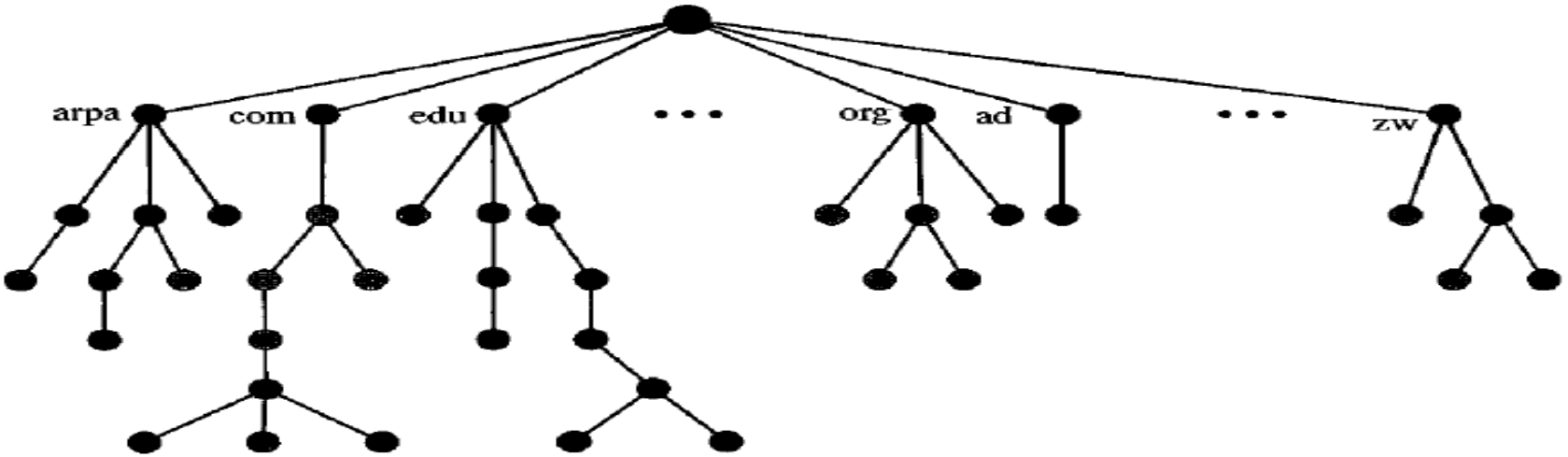
Hierarchical Name Space

- Each name has several parts.
- The first part define the nature of the organization.
- The second part can define name of an organization.
- The third part can define departments in the organization, and so on.
- The central authority assigned only the first two part the name space the rest of parts are assigned organization itself.
- The organization can add prefix(or) suffix to the name to define its host or resource.
- The organization need not worry about the same name chosen by the other management for their resource.

Domain Name Space

- When we have hierarchical name space, a domain name space to be designed.
- In that tree names are defined in an inverted-tree with one root at the top.
- The tree can have only 128 levels.
- Level 0(root) to level127

25.2 *Domain name space*



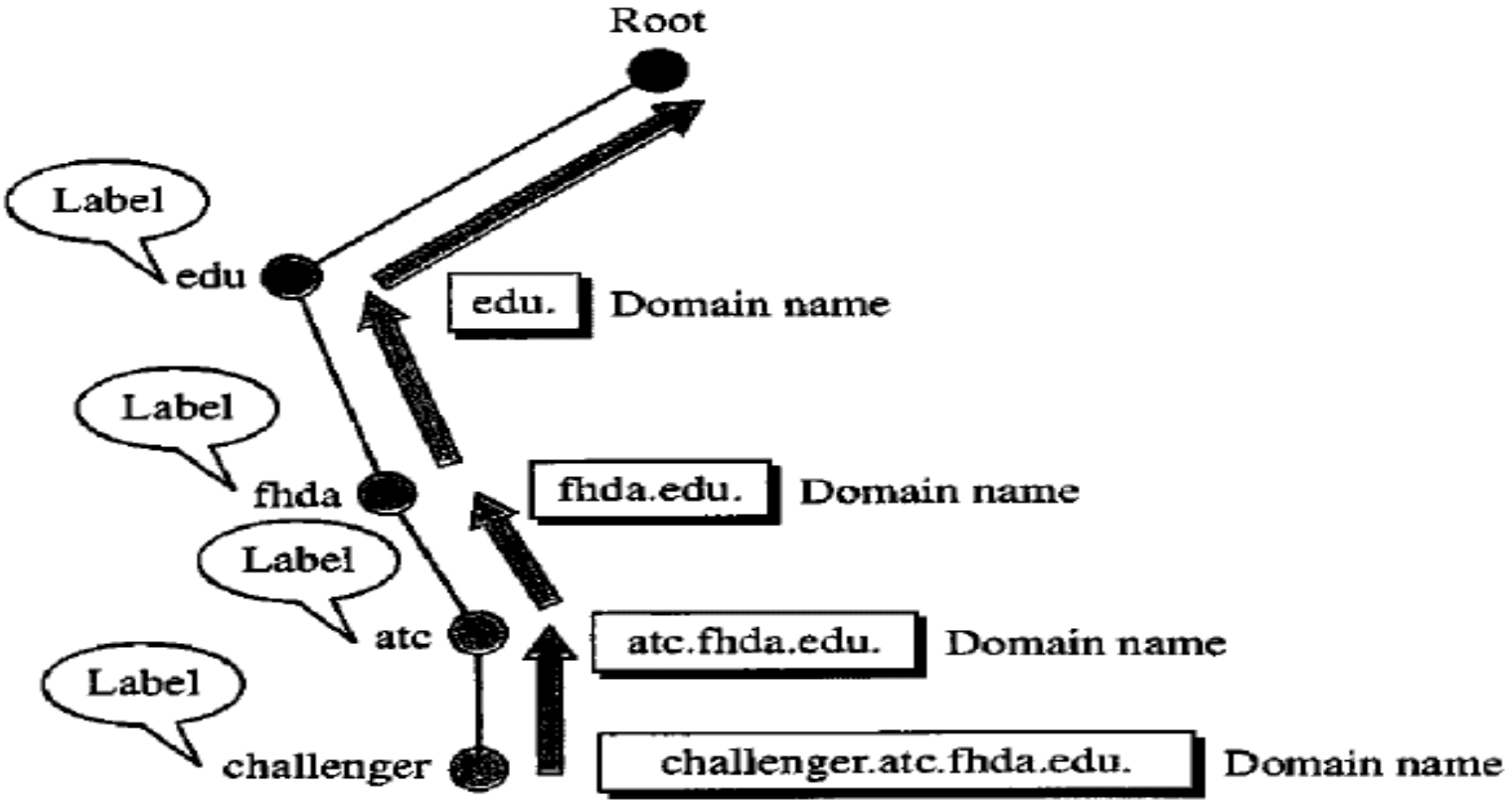
Label

- Each node in the tree has a label, which is a string with a maximum of 63 characters.
- The root label is a null string(empty).

Domain Name

- A full domain name is a sequence of labels separated by dots.
- The domain names are always read from the node up to the root.
- Finally, it end with null(root node)

Domain names and labels



Example:

http://en.wikipedia.org/wiki/DNS_root

http://www.icann.org/en/contact

https://www.facebook.com/appcenter/ipl_top_scorer?fb_source=search&fbsid=1101

Fully Qualified Domain Name

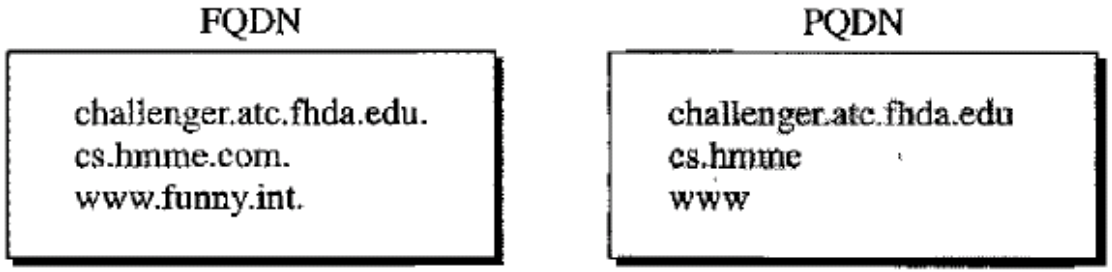
- A fully qualified domain name (FQDN) is the complete domain name for a specific computer, or host, on the Internet.
- The FQDN consists of two parts: the hostname and the domain name.
- If the label is terminated by a null string(.), it is called a FQDN
- For example, an FQDN for a hypothetical mail server might be mymail.somecollege.edu.
- The hostname is mymail, and the host is located within the domain somecollege.edu.

Partially Qualified Domain Name(PQDN)

- If a label is not terminated by a NULL string, it is called a PQDN.
- It starts from a node, but it does not reach the root.
- Here the resolver can supply the missing part, called the suffix, to create an FQDN.
- Example:

- Google
- Yahoo
- Annauniv
- Kct

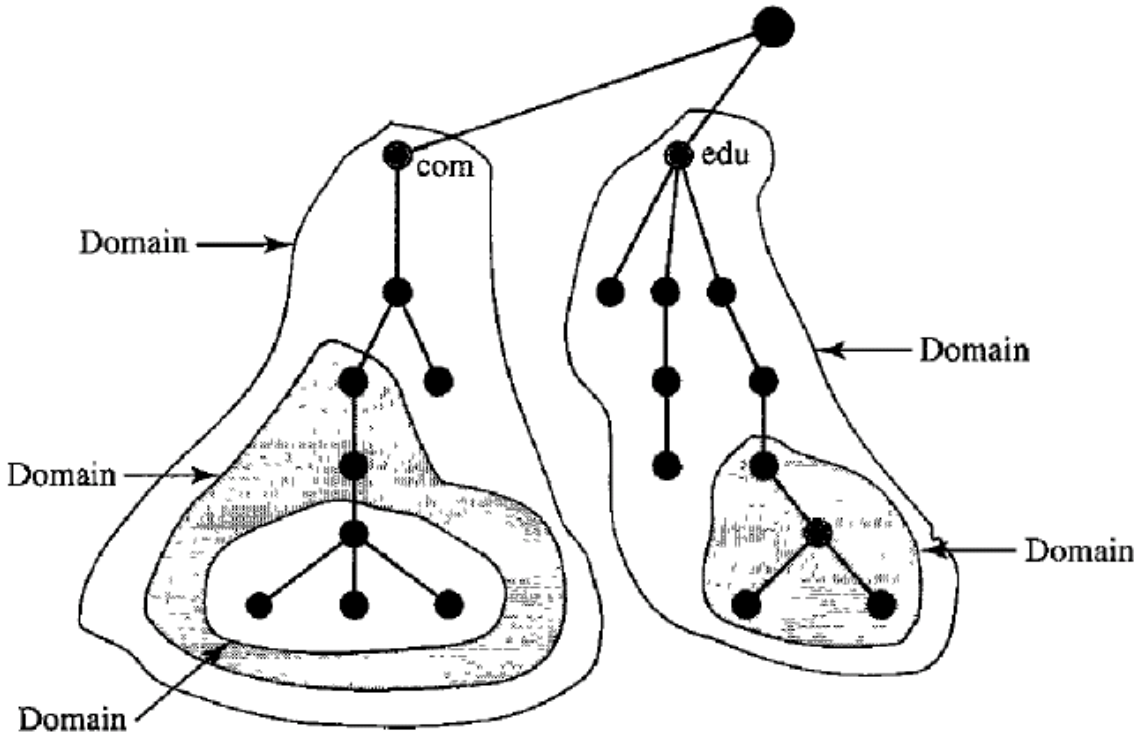
FQDN and PQDN



Domain

- A domain is a subtree of the domain name space.
- The name of the domain is the domain name of the node at the top of the subtree.

Domains



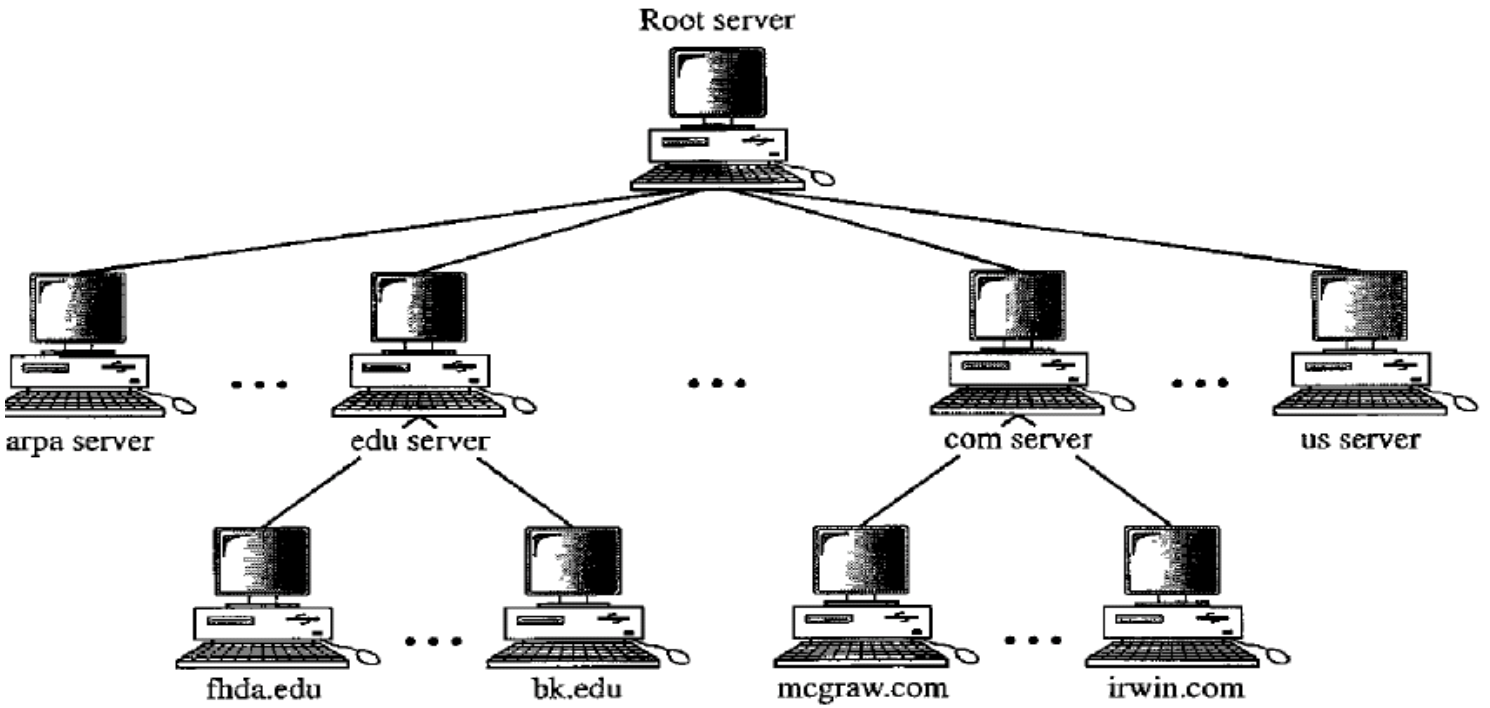
Distribution of Name Servers

- The information contained in the domain name space must be stored.
- It is inefficient also unreliable[one computer store huge information.]

Hierarchy of Name Servers

- The solution to these problems is to distribute the information among many computers called DNS servers.
- We create many sub DNS server based on the requirement[each divided into sub domain]

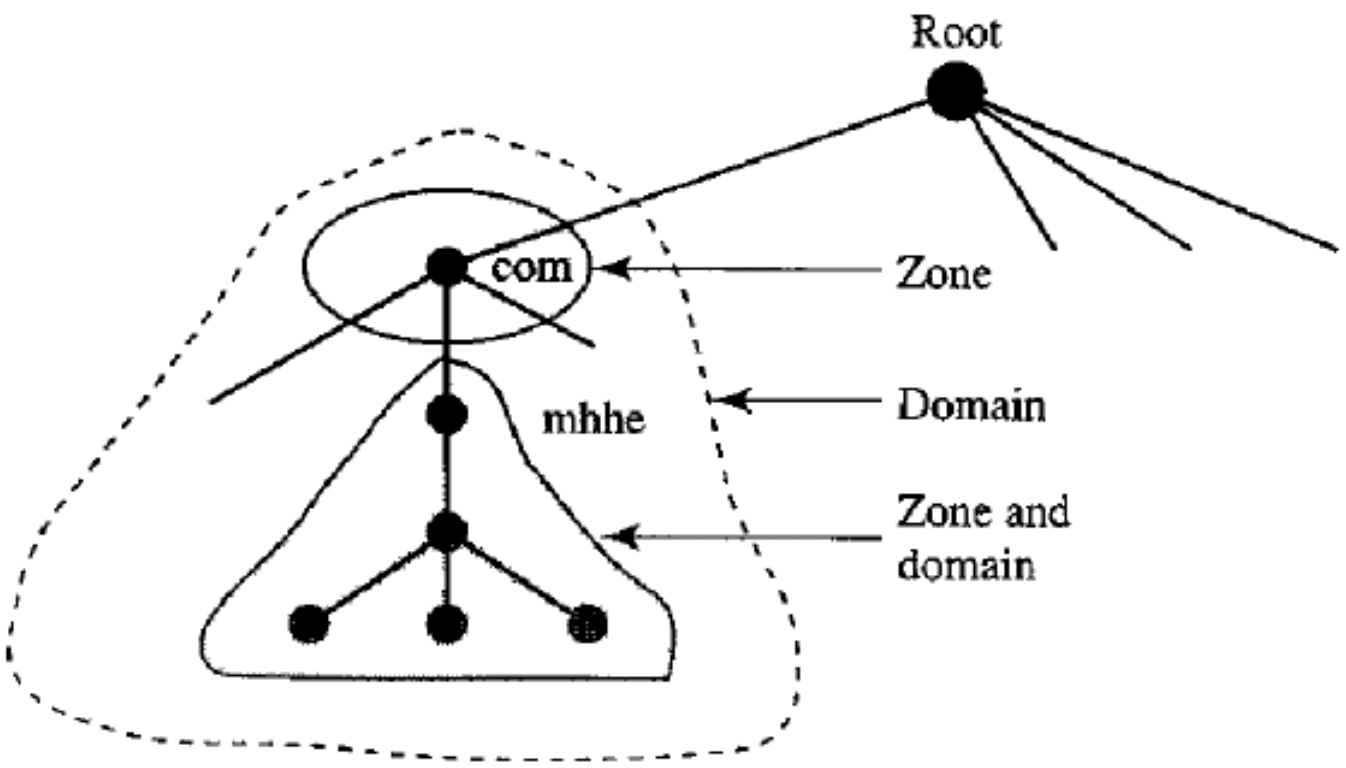
e 25.6 *Hierarchy of name servers*



Zone and domain

- When a server dedicated for (responsible) over is called a zone.

Zones and domains



Root server

- A root server is a server, whose zone consists of the whole tree.
- A root server usually does not store any information but authority to other servers.

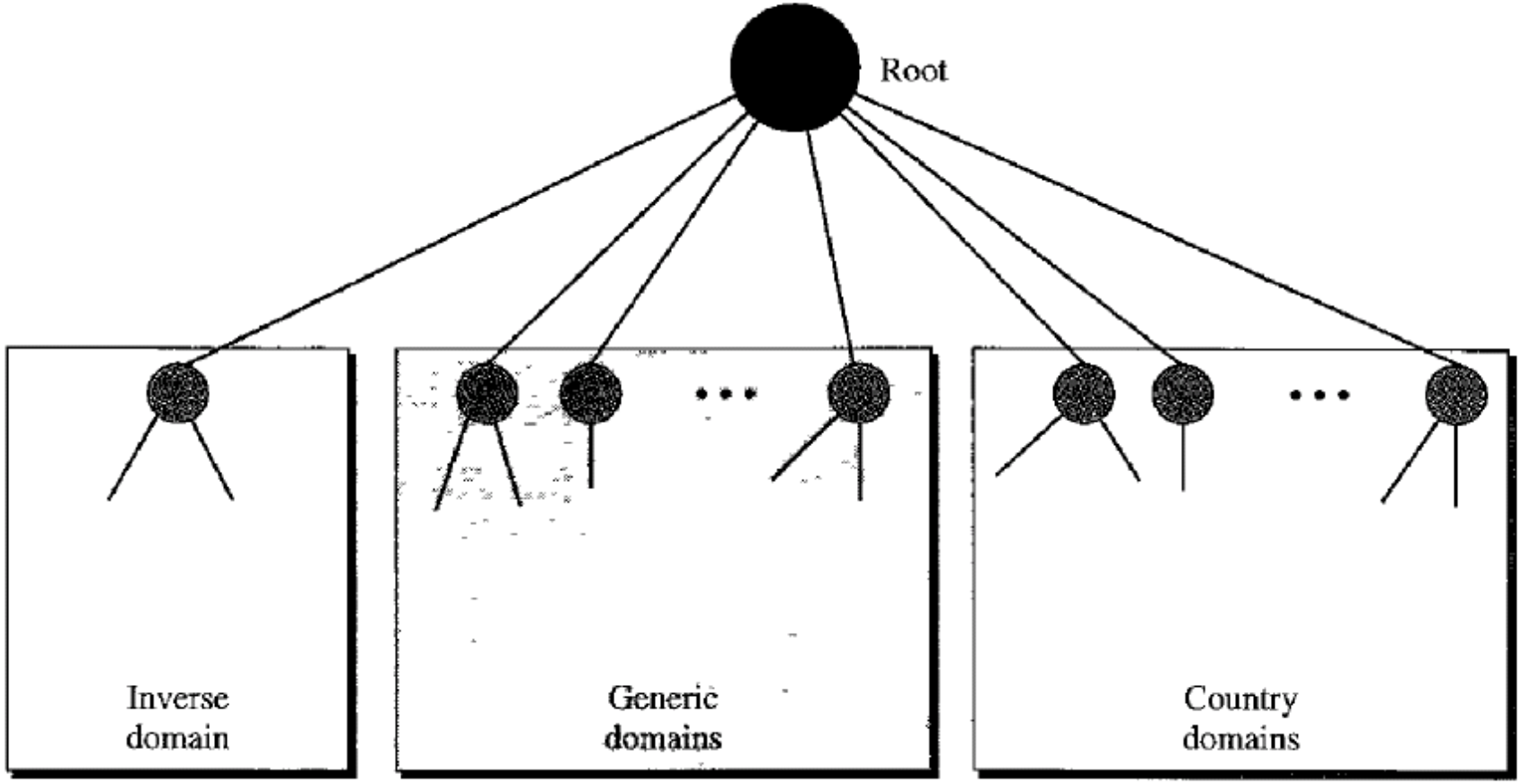
Primary server and secondary servers

- DNS defines two types of servers:
- **A primary server** -stores a file about the zone, responsible for creating , maintaining, and updating the zone file.
- **A secondary server –** that transfers the complete information about a zone from another server and store the file on its local disk.

DNS in the Internet

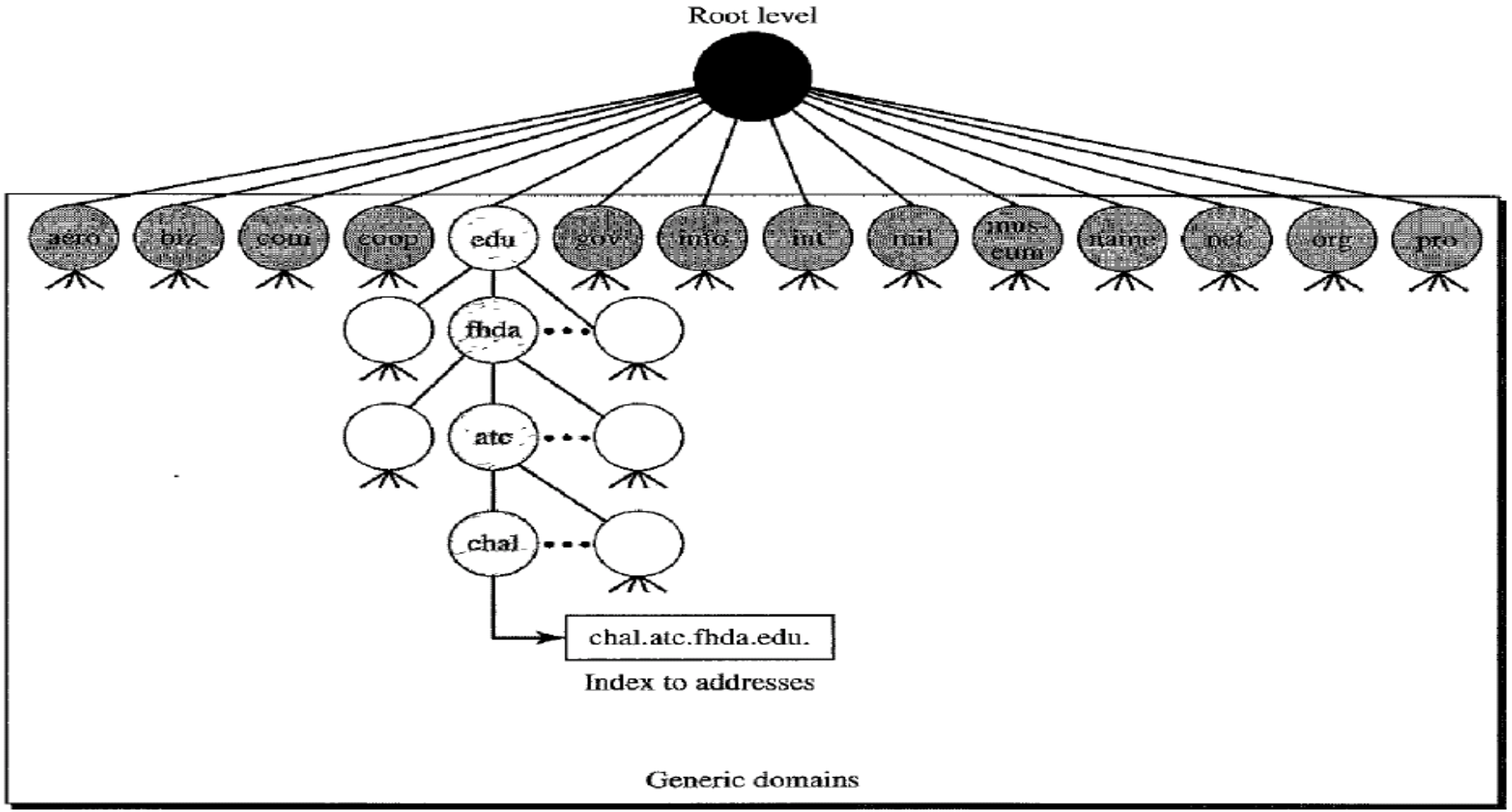
- In the internet, the domain space(tree) is divided into three different section:
  - » Generic domains
  - » Country domains
  - » Inverse domains

Figure 25.8 *DNS used in the Internet*



Generic domains

- It define registered hosts according to their generic behaviour.



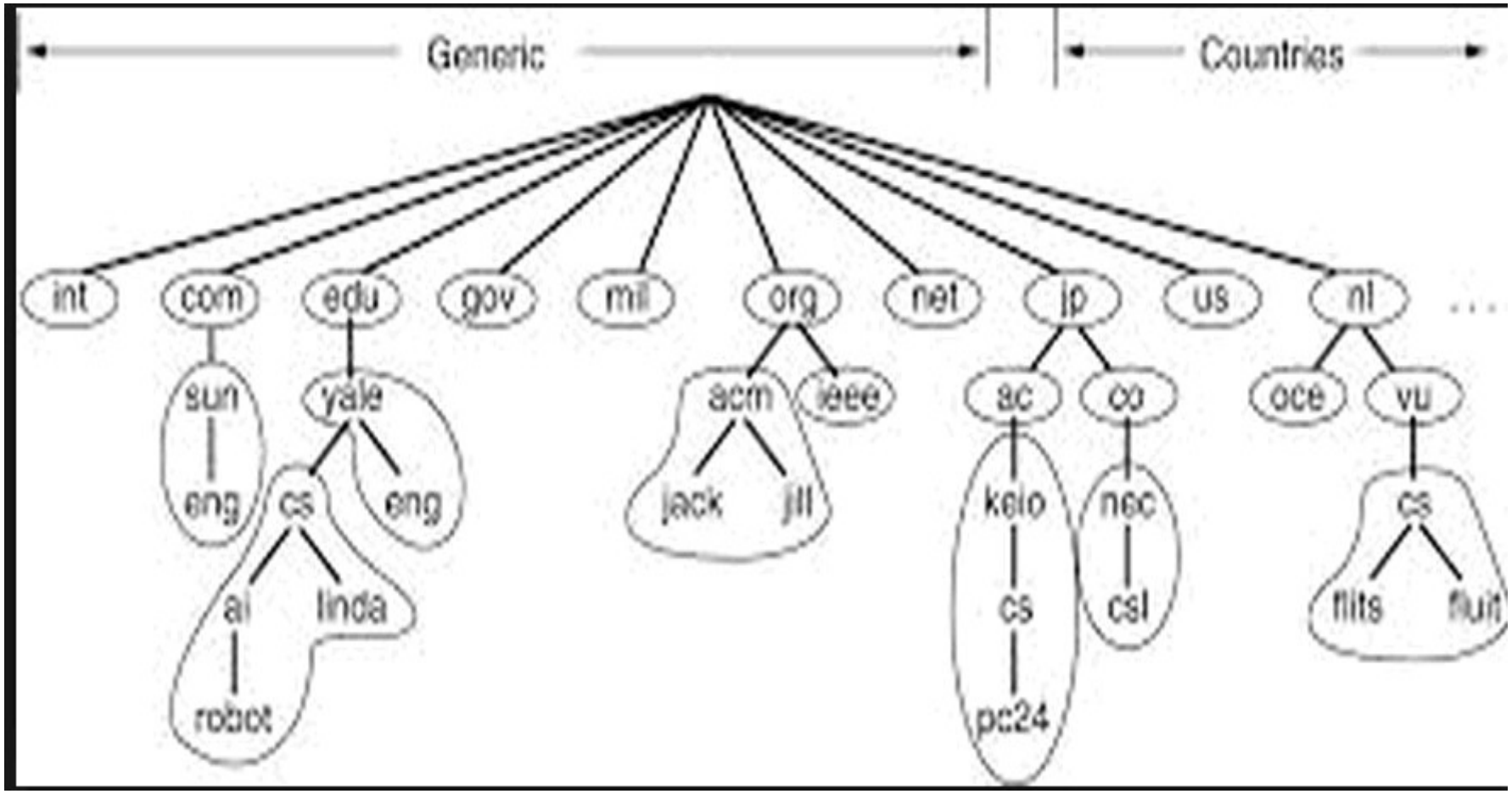

Generic
Countries
int
com
edu
gov
mil
org
net
jp
us
nl
...
sun
eng
yale
cs
eng
ai
linda
robot
acm
ieee
jack
jill
ac
co
keio
cs
pc24
nec
csl
oce
vu
cs
flits
flur

Table 25.1 *Generic domain labels*

Label	*Description*
aero	Airlines and aerospace companies
biz	Businesses or firms (similar to "com")
com	Commercial organizations
coop	Cooperative business organizations
edu	Educational institutions
gov	Government institutions
info	Information service providers
int	International organizations
mil	Military groups
museum	Museums and other nonprofit organizations
name	Personal names (individuals)
net	Network support centers
org	Nonprofit organizations
pro	Professional individual organizations

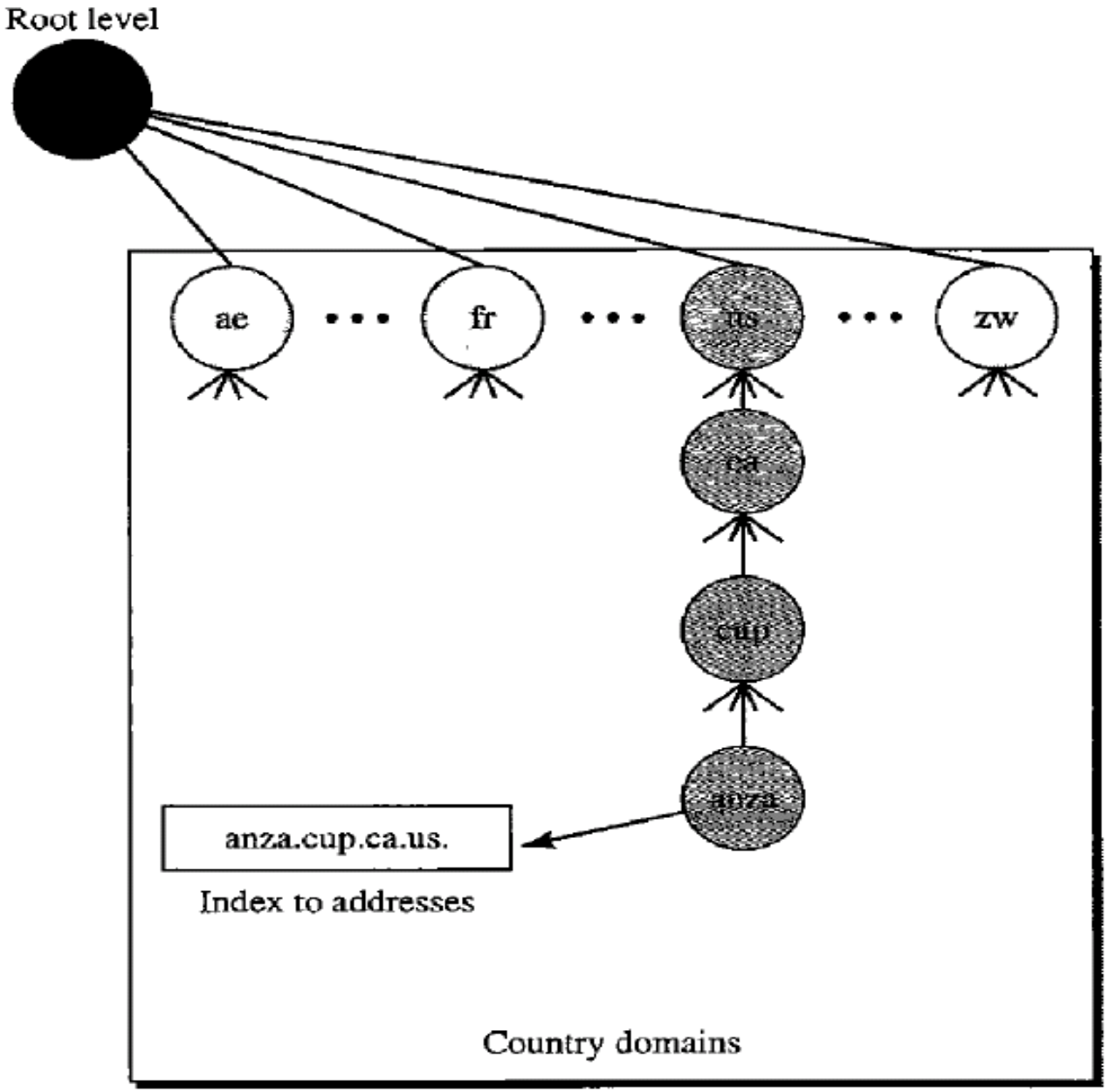
Country Domains

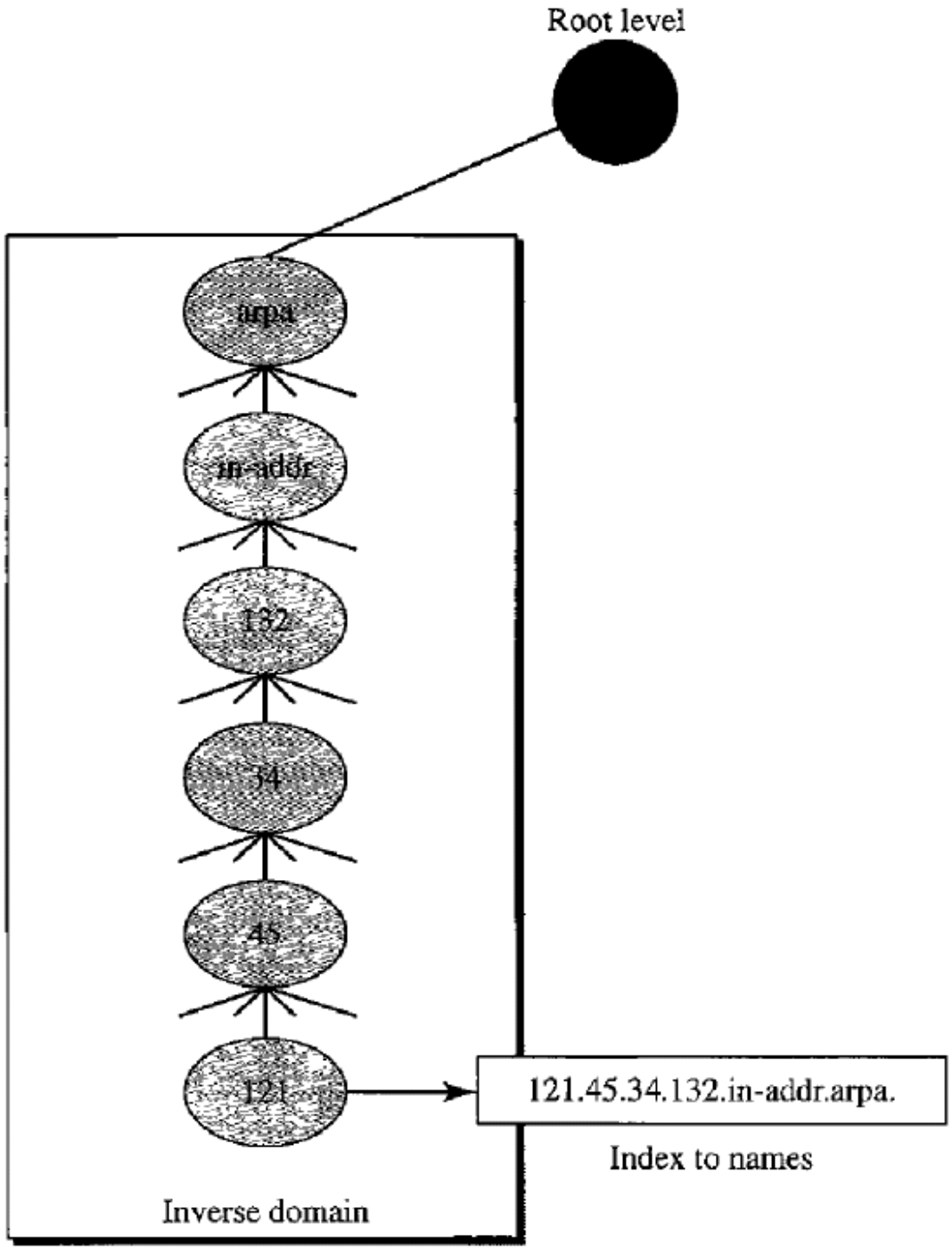
The **country domains** section uses two-character country abbreviations (e.g., us for United States). Second labels can be organizational, or they can be more specific, national designations. The United States, for example, uses state abbreviations as a subdivision of us (e.g., ca.us.).

Figure 25.10 shows the country domains section. The address *anza.cup.ca.us* can be translated to De Anza College in Cupertino, California, in the United States.

Inverse Domain

The **inverse domain** is used to map an address to a name. This may happen, for example, when a server has received a request from a client to do a task. Although the server has a file that contains a list of authorized clients, only the IP address of the client (extracted from the received IP packet) is listed. The server asks its resolver to send a query to the DNS server to map an address to a name to determine if the client is on the


Root level
ae
fr
us
zw
ca
cup
anza
anza.cup.ca.us.
Index to addresses
Country domains


Root level
arpa
in-addr
132
34
45
121
121.45.34.132.in-addr.arpa.
Index to names
Inverse domain

- http://www.labnol.org/internet/tools/opendsn-what-is-opendns-why-required-2/2587/

Resolver

DNS is designed as a client/server application. A host that needs to map an address to a name or a name to an address calls a DNS client called a **resolver.** The resolver accesses the closest DNS server with a mapping request. If the server has the information, it satisfies the resolver; otherwise, it either refers the resolver to other servers or asks other servers to provide the information.

After the resolver receives the mapping, it interprets the response to see if it is a real resolution or an error, and finally delivers the result to the process that requested it.

Default DNS in my system

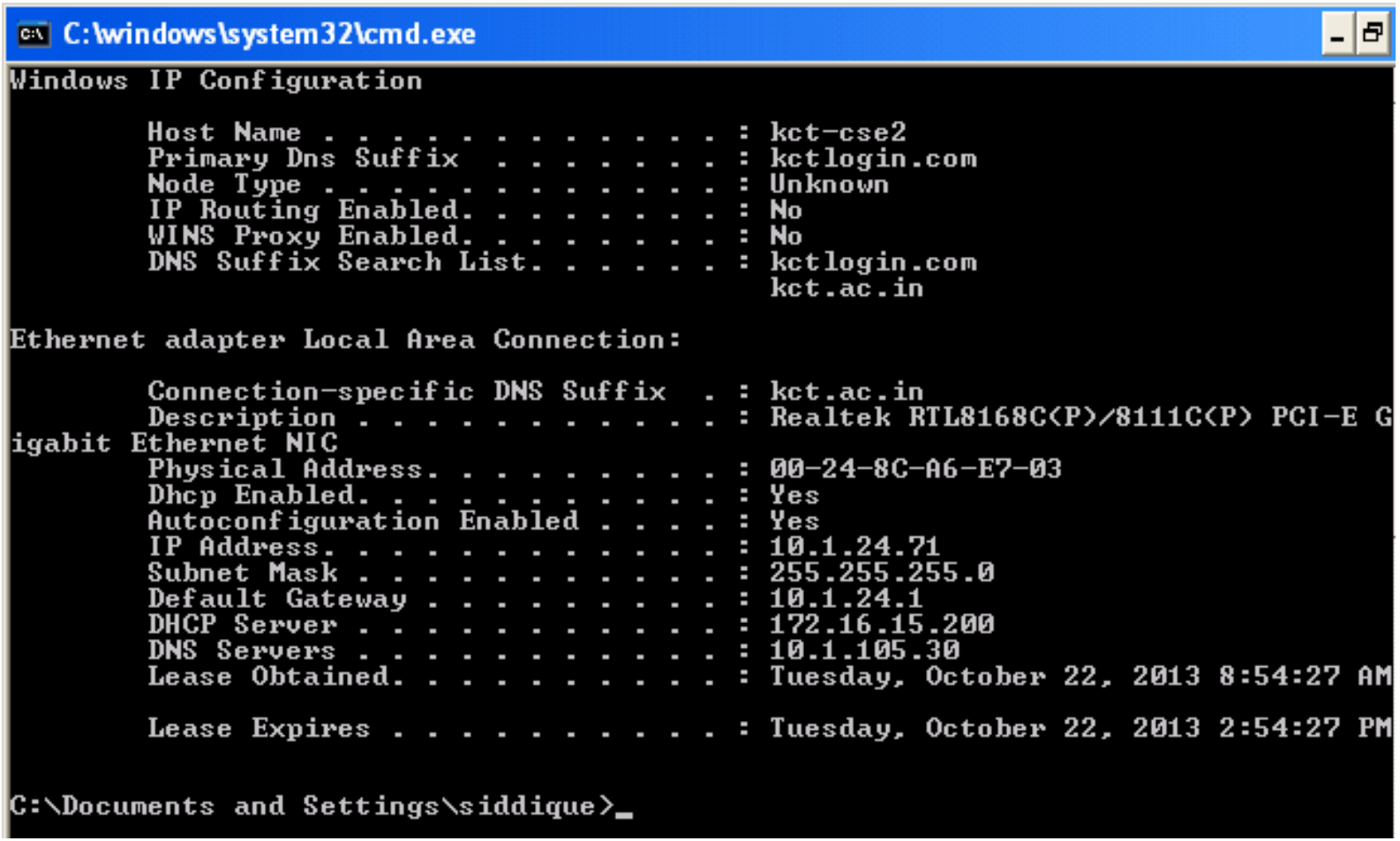
- 10.1.105.30

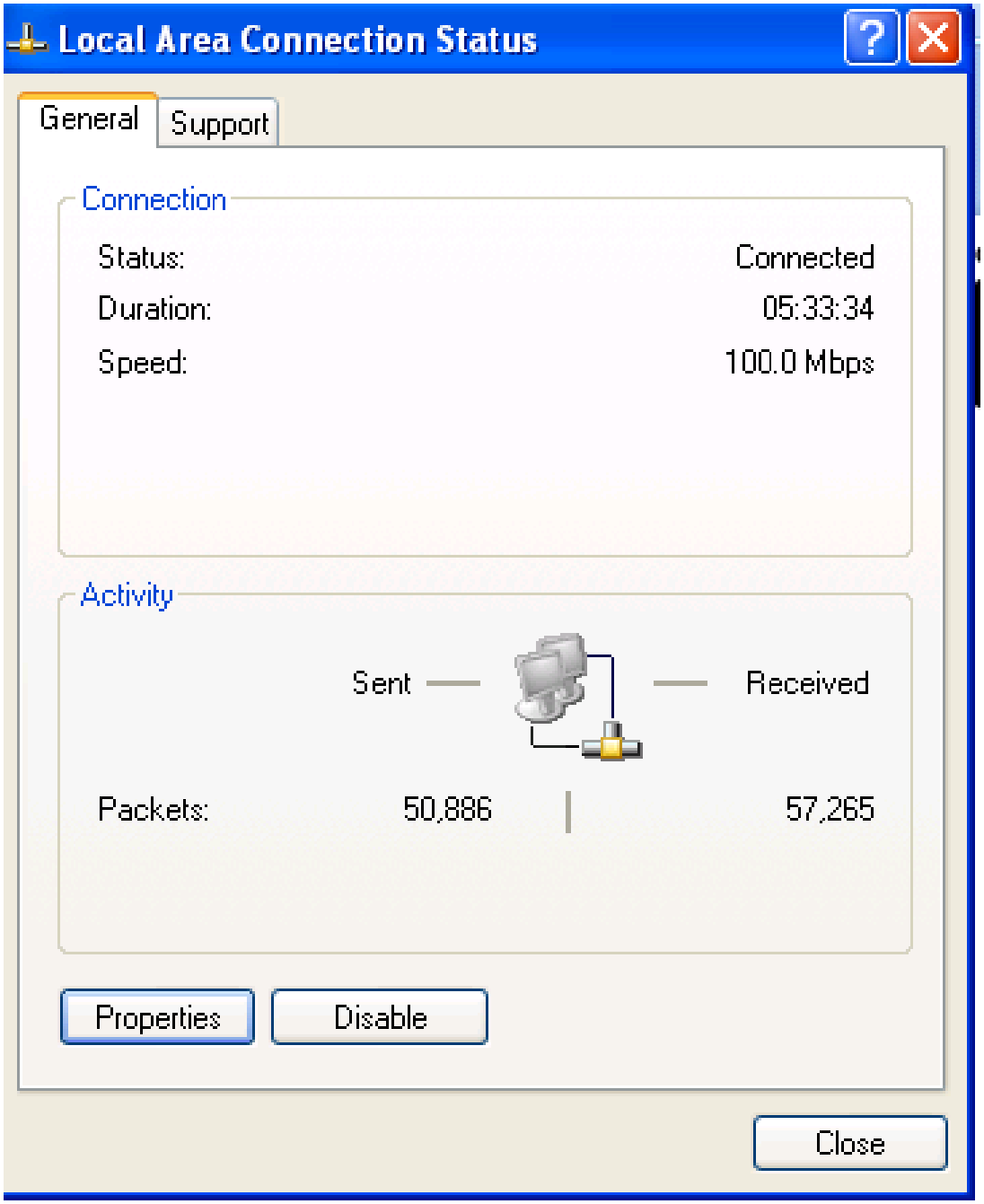
- Google DNS:8.8.8.8
- 8.8.4.4

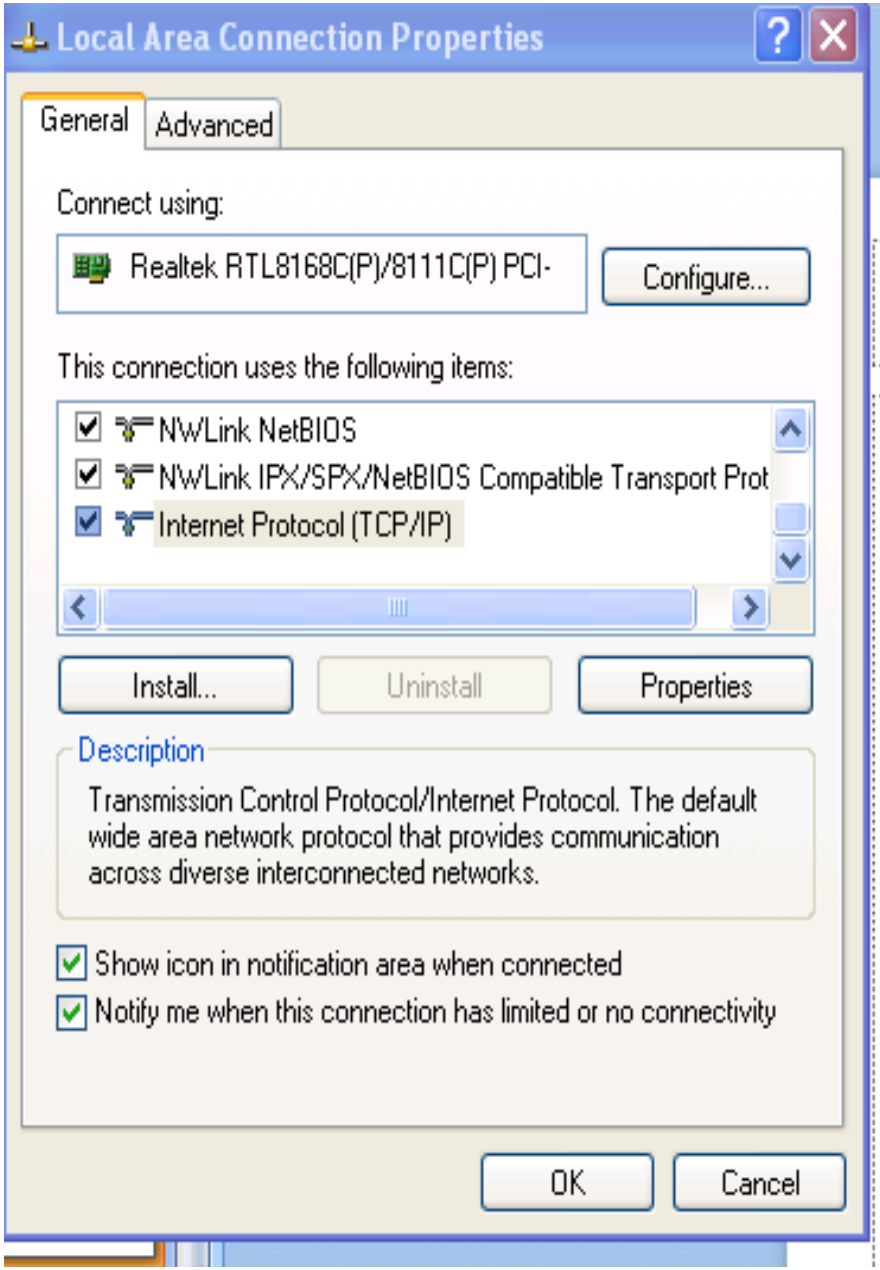
- Open DNS:208.69.38.205
- 208.67.222.222
- 208.67.220.220

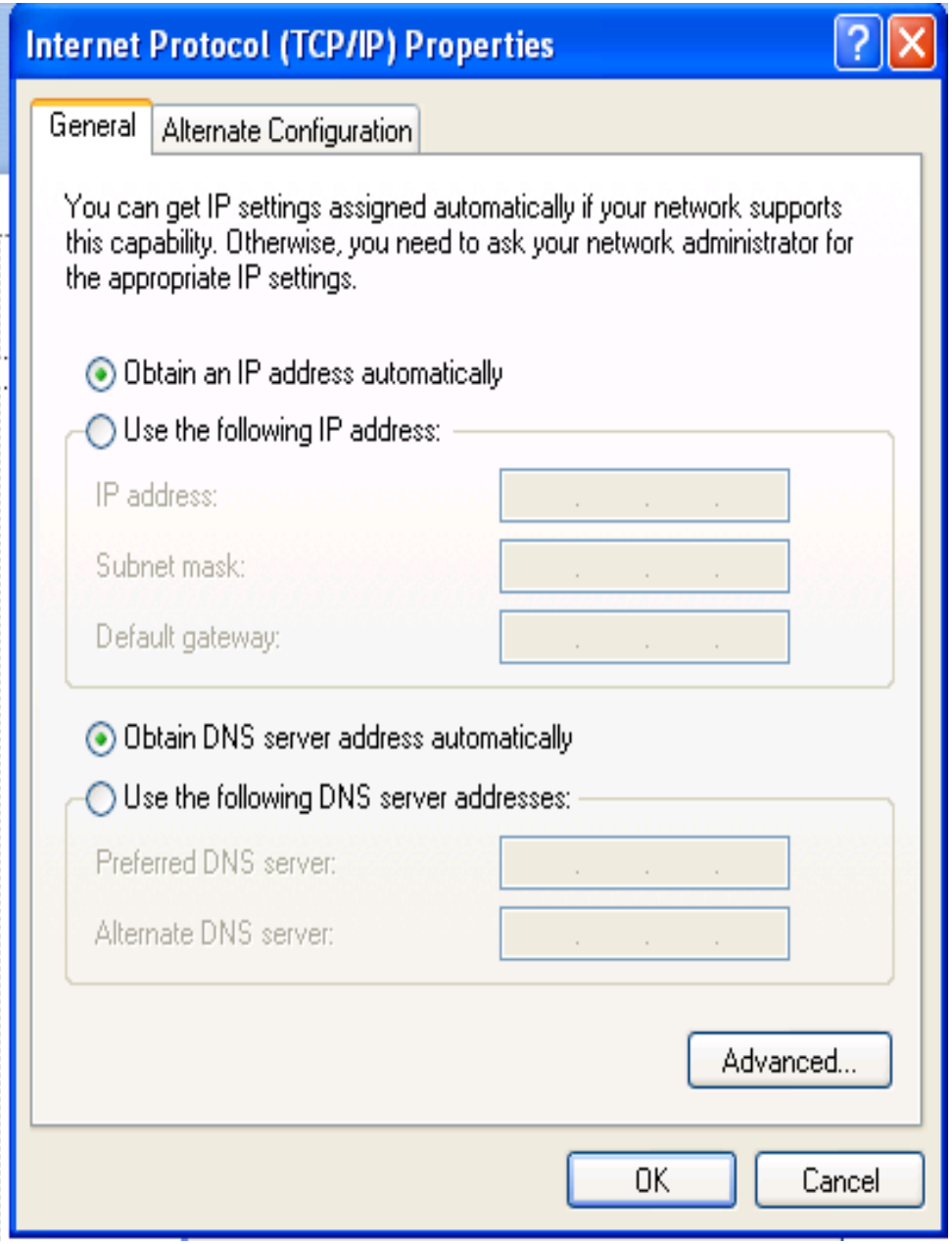
DNS in Real world

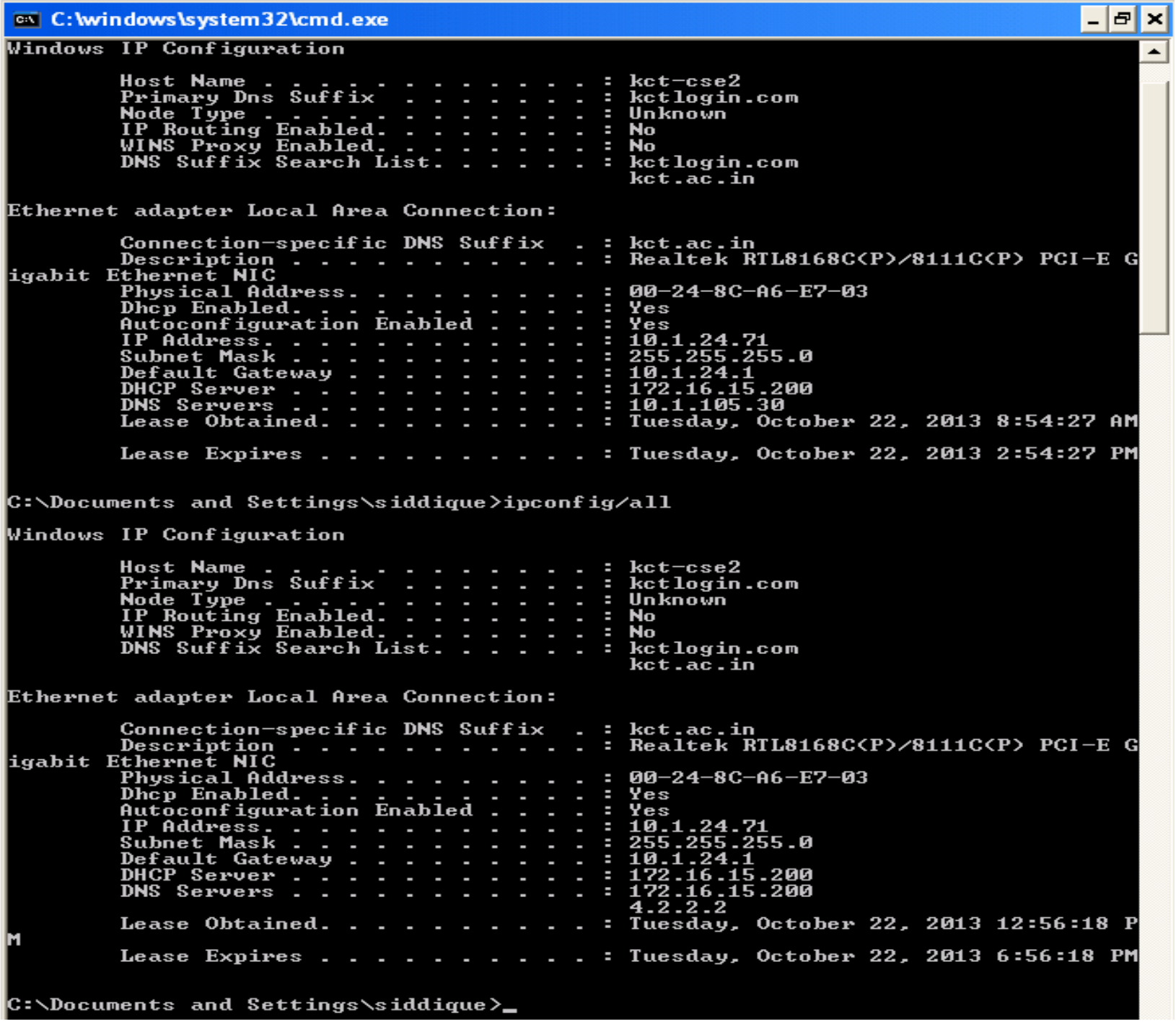
- Run->cmd->ipconfig/all

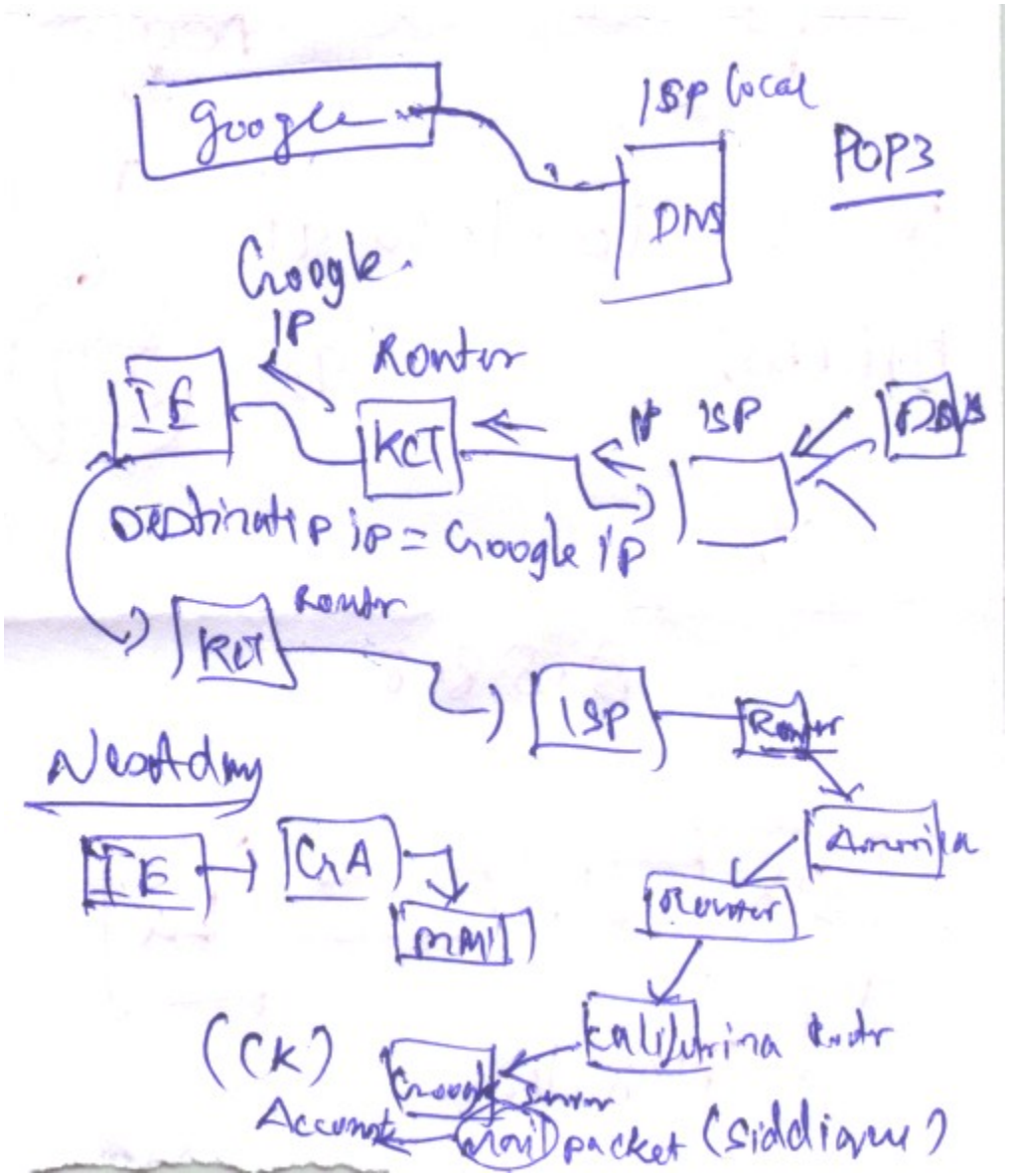


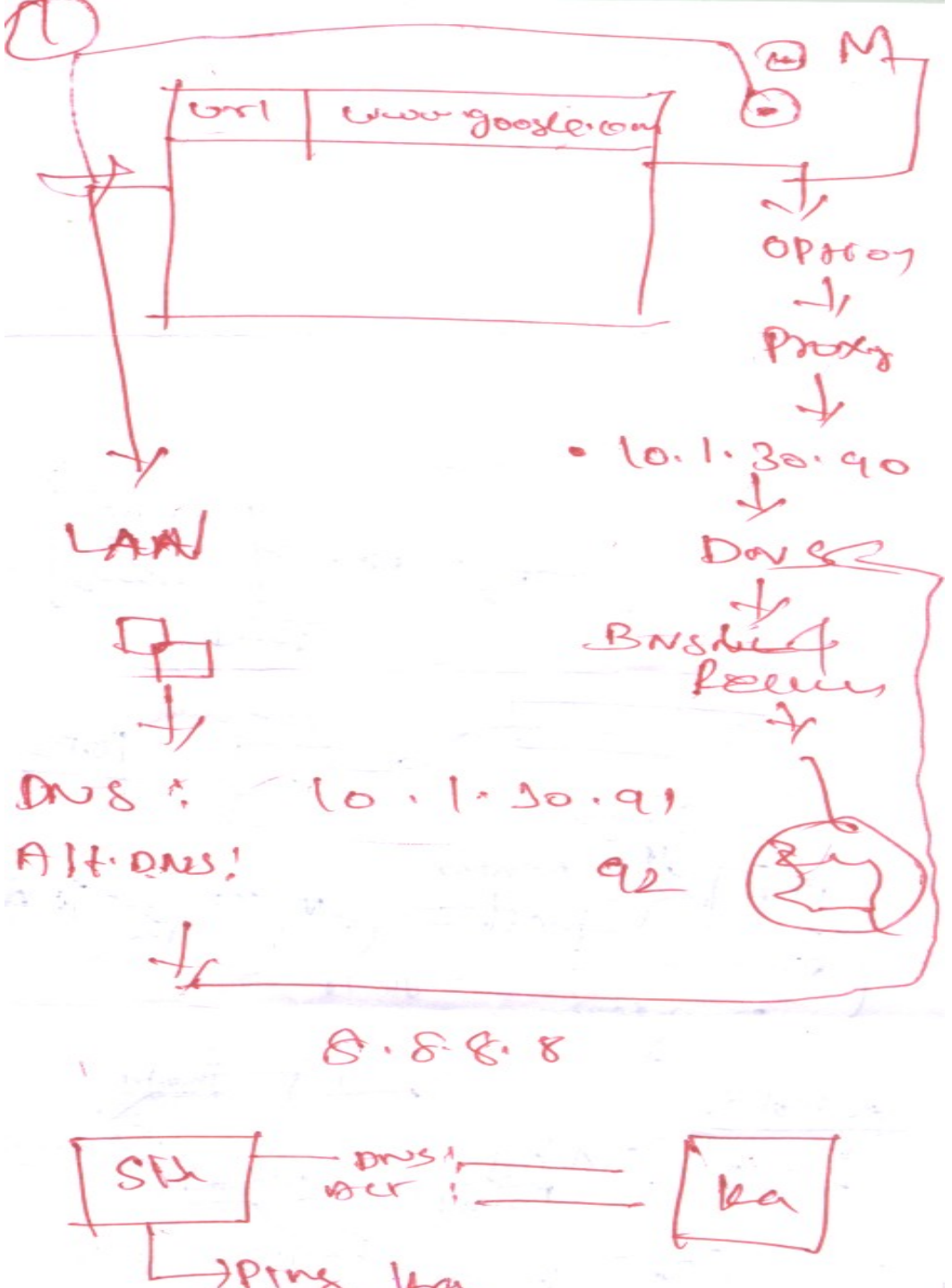

Local Area Connection Status
General
Support
Connection
Status:
Connected
Duration:
05:33:34
Speed:
100.0 Mbps
Activity
Sent
Received
Packets:
50,886
57,265
Properties
Disable
Close


Local Area Connection Properties
General
Advanced
Connect using:
Realtek RTL8168C(P)/8111C(P) PCI-
Configure...
This connection uses the following items:
NWLink NetBIOS
NWLink IPX/SPX/NetBIOS Compatible Transport Prot
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in notification area when connected
Notify me when this connection has limited or no connectivity
OK
Cancel

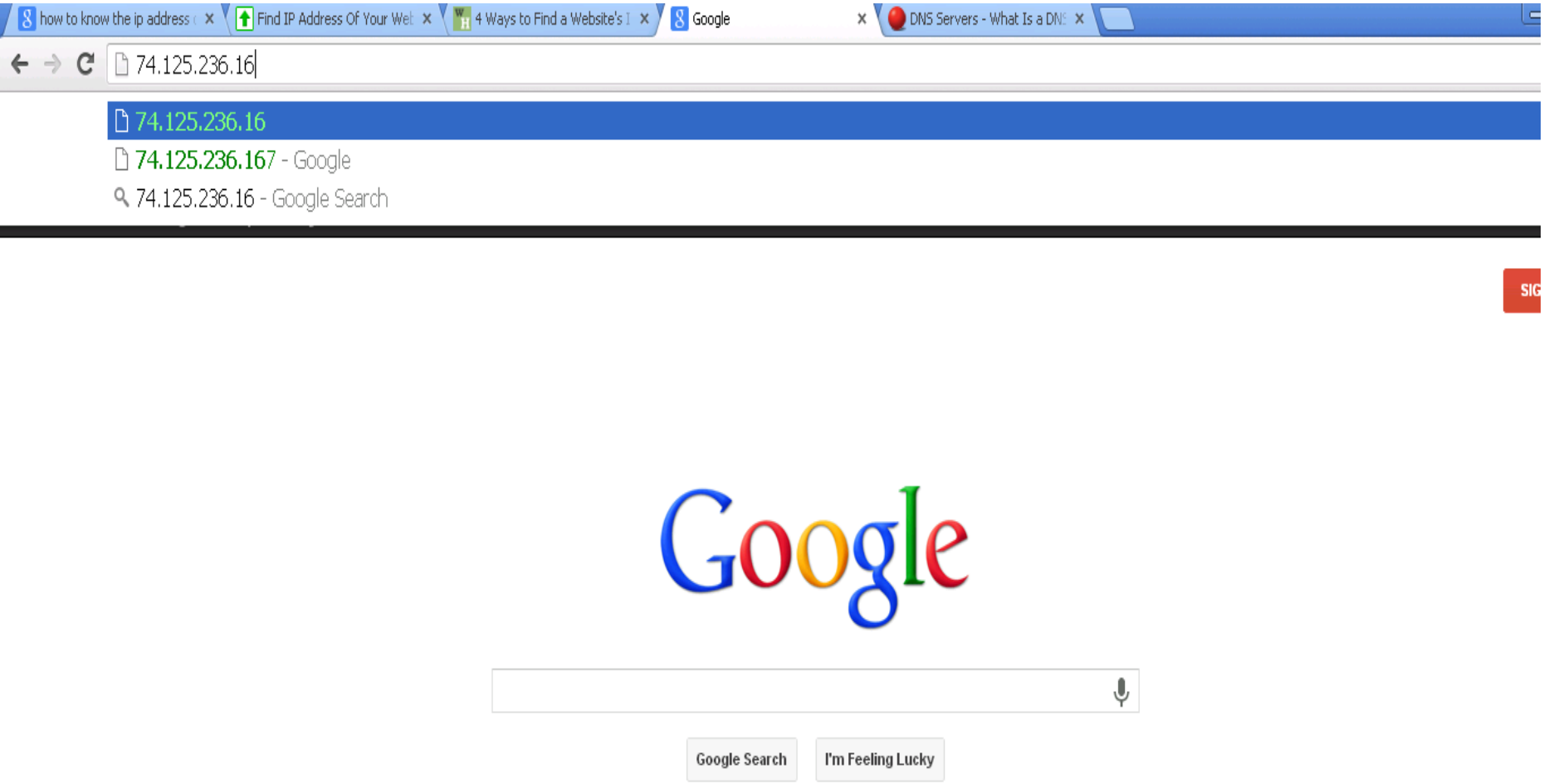

Internet Protocol (TCP/IP) Properties
General
Alternate Configuration
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Subnet mask:
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel


C:\windows\system32\cmd.exe
Windows IP Configuration
Host Name . . . . . : kct-cse2
Primary Dns Suffix . . . . . : kctlogin.com
Node Type . . . . . : Unknown
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : kctlogin.com
kct.ac.in
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . : kct.ac.in
Description . . . . . : Realtek RTL8168C(P)/8111C(P) PCI-E G
igabit Ethernet NIC
Physical Address. . . . . : 00-24-8C-A6-E7-03
Dhcp Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IP Address. . . . . : 10.1.24.71
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 10.1.24.1
DHCP Server . . . . . : 172.16.15.200
DNS Servers . . . . . : 10.1.105.30
Lease Obtained. . . . . : Tuesday, October 22, 2013 8:54:27 AM
Lease Expires . . . . . : Tuesday, October 22, 2013 2:54:27 PM
C:\Documents and Settings\siddique>ipconfig/all
Windows IP Configuration
Host Name . . . . . : kct-cse2
Primary Dns Suffix . . . . . : kctlogin.com
Node Type . . . . . : Unknown
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : kctlogin.com
kct.ac.in
Ethernet adapter Local Area Connection:
Connection-specific DNS Suffix . : kct.ac.in
Description . . . . . : Realtek RTL8168C(P)/8111C(P) PCI-E G
igabit Ethernet NIC
Physical Address. . . . . : 00-24-8C-A6-E7-03
Dhcp Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . : Yes
IP Address. . . . . : 10.1.24.71
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 10.1.24.1
DHCP Server . . . . . : 172.16.15.200
DNS Servers . . . . . : 172.16.15.200
4.2.2.2
Lease Obtained. . . . . : Tuesday, October 22, 2013 12:56:18 P
M
Lease Expires . . . . . : Tuesday, October 22, 2013 6:56:18 PM
C:\Documents and Settings\siddique>_


Google
ISP Local
POP3
DNS
Google IP
Router
IE
KCT
ISP
Destination IP = Google IP
KCT
Router
ISP
Microsoft
IE
CrA
mail
(CK)
Accounts
mail
packet (Siddiqui)


M
Url
www.google.com
Option
Proxy
10.1.30.90
LAN
DNS
BNSL
DNS : 10.1.30.91
Alt.DNS:
8.8.8.8
SEA
DNS:
DCT:
Ka
Ping Ka

```
C:\Documents and Settings\siddique>ping google.com

Pinging google.com [74.125.236.167] with 32 bytes of data:

Reply from 74.125.236.167: bytes=32 time=35ms TTL=51
Reply from 74.125.236.167: bytes=32 time=43ms TTL=51
Reply from 74.125.236.167: bytes=32 time=36ms TTL=51
Reply from 74.125.236.167: bytes=32 time=32ms TTL=51

Ping statistics for 74.125.236.167:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 32ms, Maximum = 43ms, Average = 36ms

C:\Documents and Settings\siddique>ping 8.8.8.8

Pinging 8.8.8.8 with 32 bytes of data:

Request timed out.
Reply from 8.8.8.8: bytes=32 time=63ms TTL=52
Reply from 8.8.8.8: bytes=32 time=29ms TTL=52
Reply from 8.8.8.8: bytes=32 time=25ms TTL=52

Ping statistics for 8.8.8.8:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 25ms, Maximum = 63ms, Average = 39ms

C:\Documents and Settings\siddique>ping 8.8.4.4.

Pinging 8.8.4.4. [8.8.4.4] with 32 bytes of data:

Reply from 8.8.4.4: bytes=32 time=33ms TTL=52
Reply from 8.8.4.4: bytes=32 time=26ms TTL=52
Reply from 8.8.4.4: bytes=32 time=33ms TTL=52
Reply from 8.8.4.4: bytes=32 time=28ms TTL=52

Ping statistics for 8.8.4.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 26ms, Maximum = 33ms, Average = 30ms

C:\Documents and Settings\siddique>_
```


how to know the ip address
Find IP Address Of Your Wel
4 Ways to Find a Website's I
Google
DNS Servers - What Is a DN
74.125.236.16
74.125.236.16
74.125.236.167 - Google
74.125.236.16 - Google Search
SIG
Google
Google Search
I'm Feeling Lucky