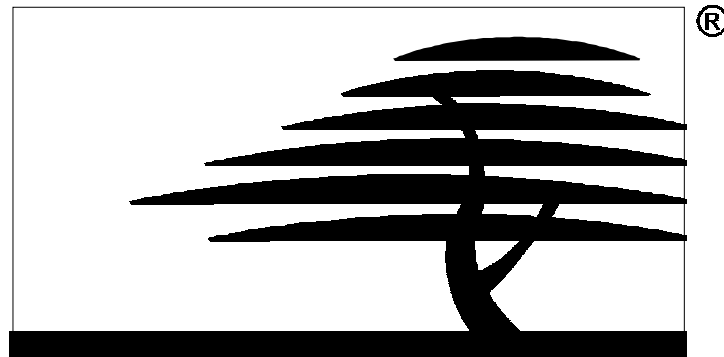




SCO

**SCO OpenServer™ Release 5
Network Administration**

Transparency Masters

Course Release: 2.0

For Software: SCO OpenServer™ Release 5

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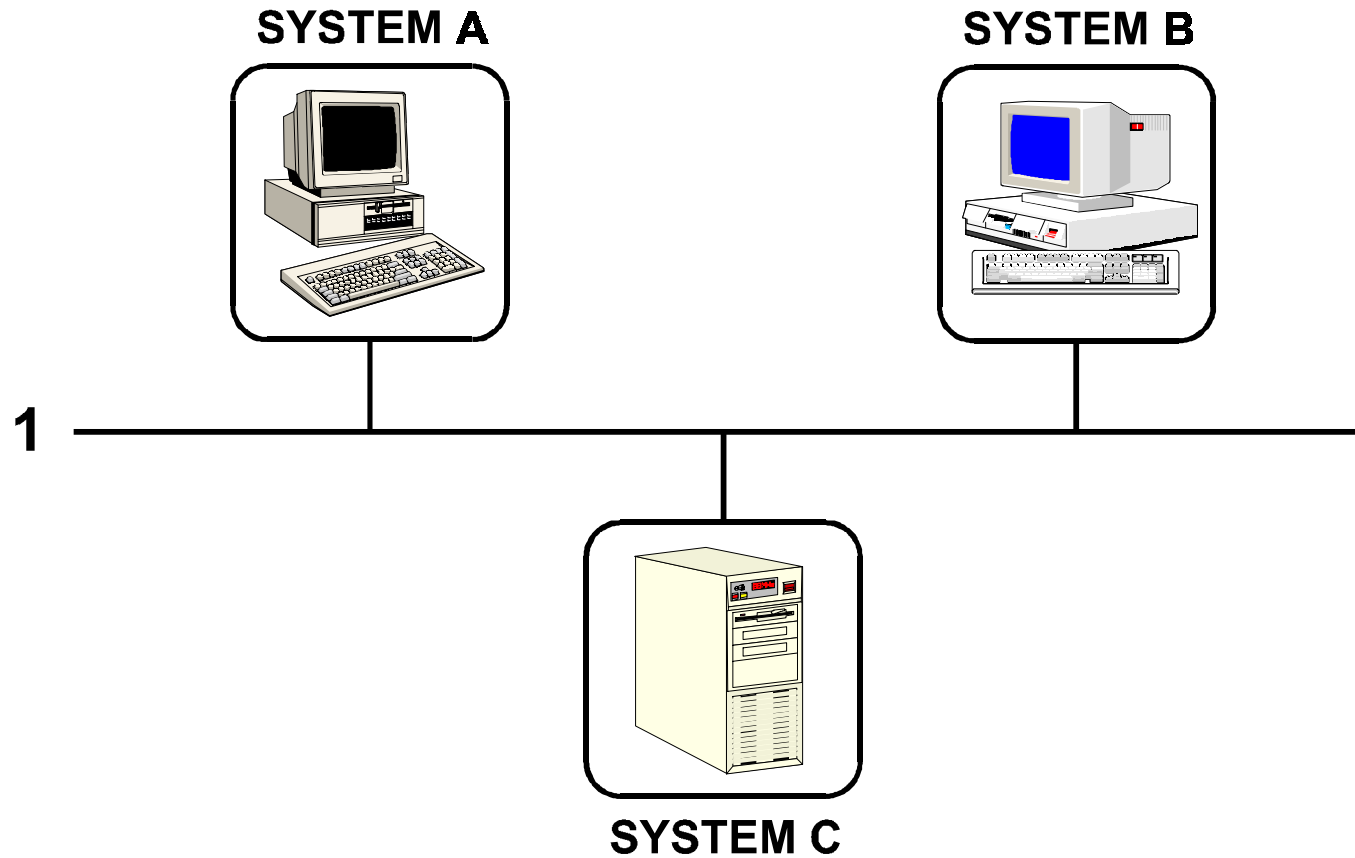
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30 January 1998

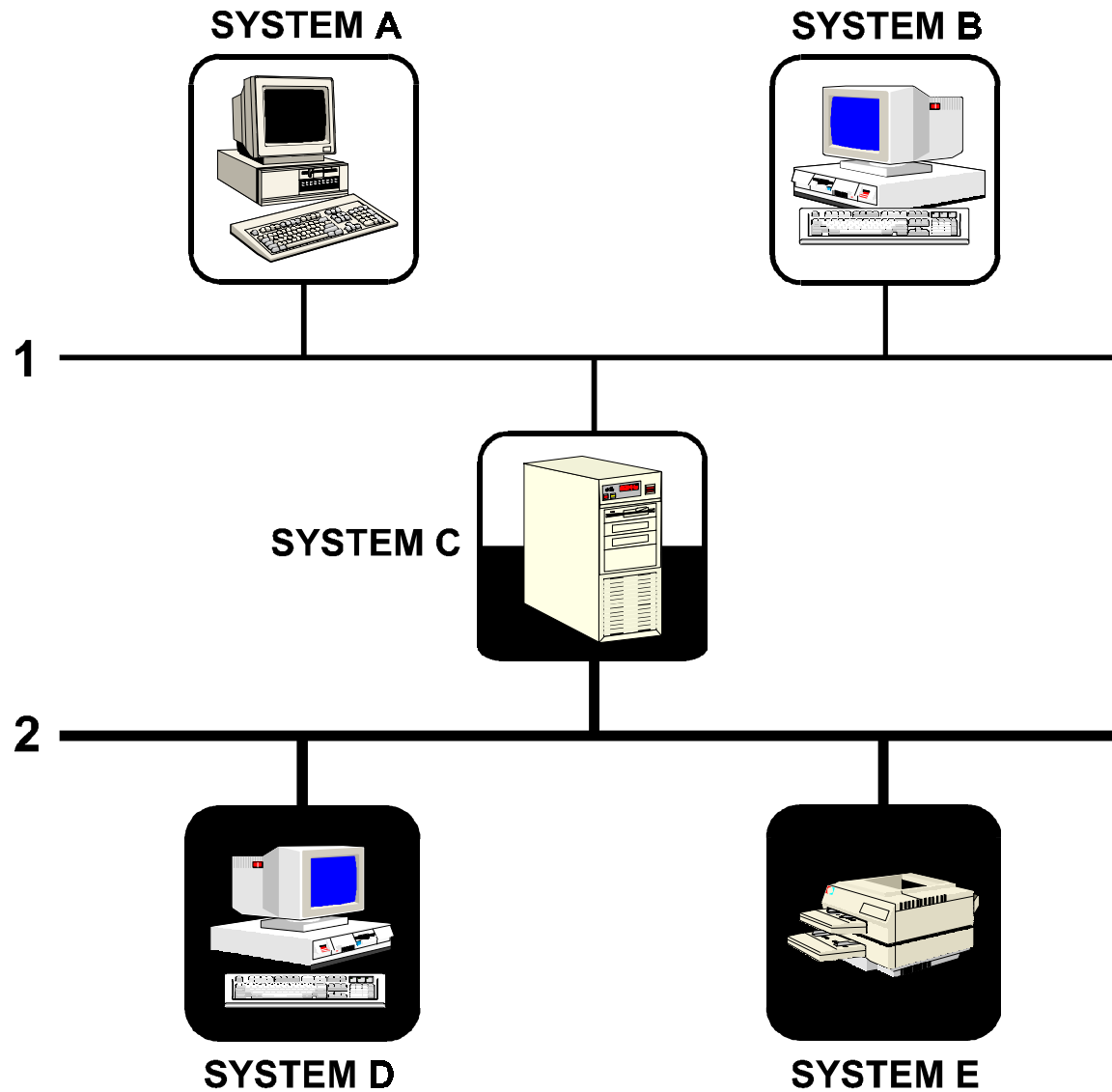
TCP/IP Concepts

- Ethernet hardware addresses
- Software addresses
- Host names and IP addresses
- Routers, bridges, and gateways
- IP addresses to hardware address translation
- Protocols and ports
- The TCP/IP protocol stack
- Other LAN hardware addresses

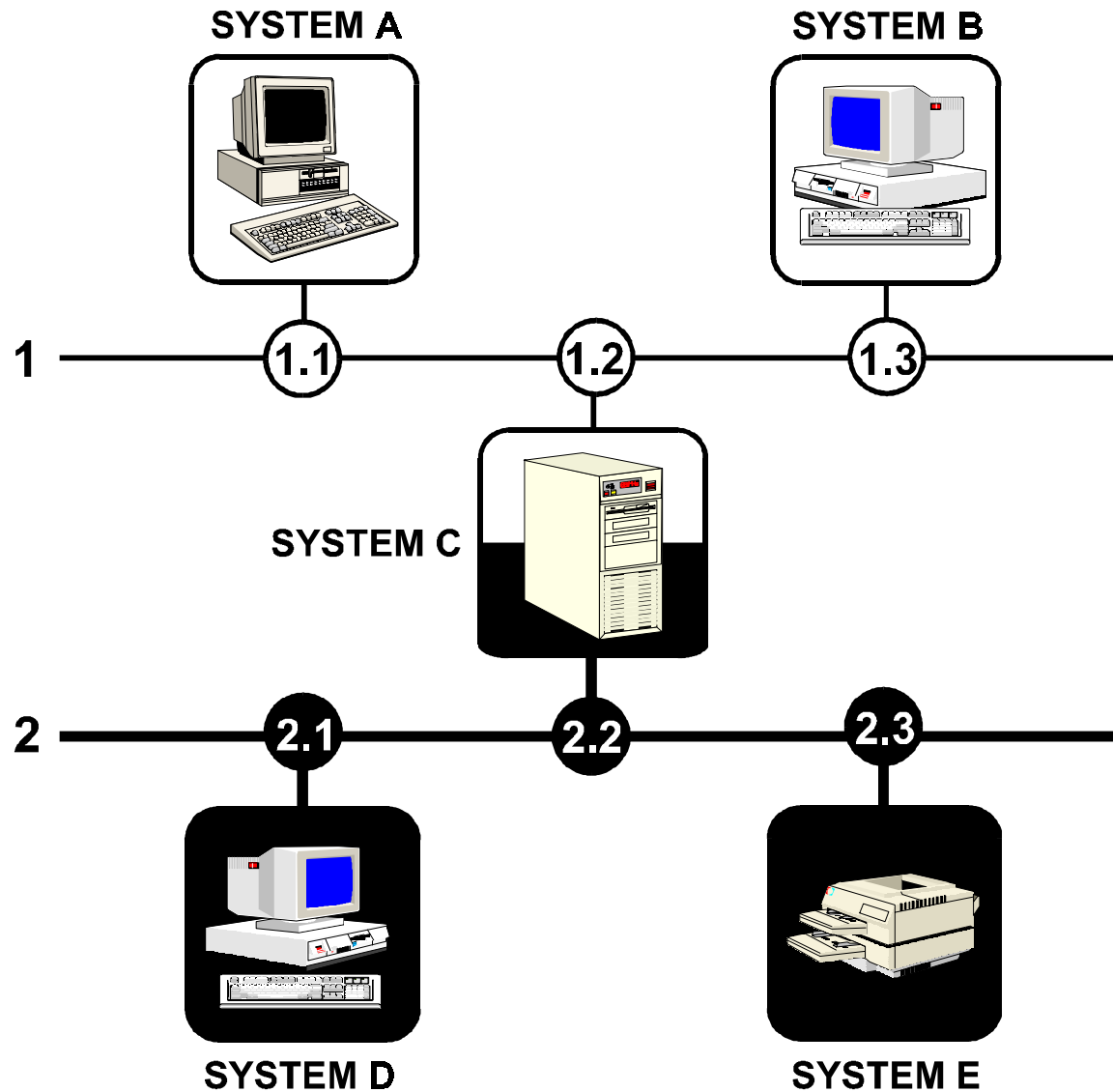
A Simple Single Segment Network



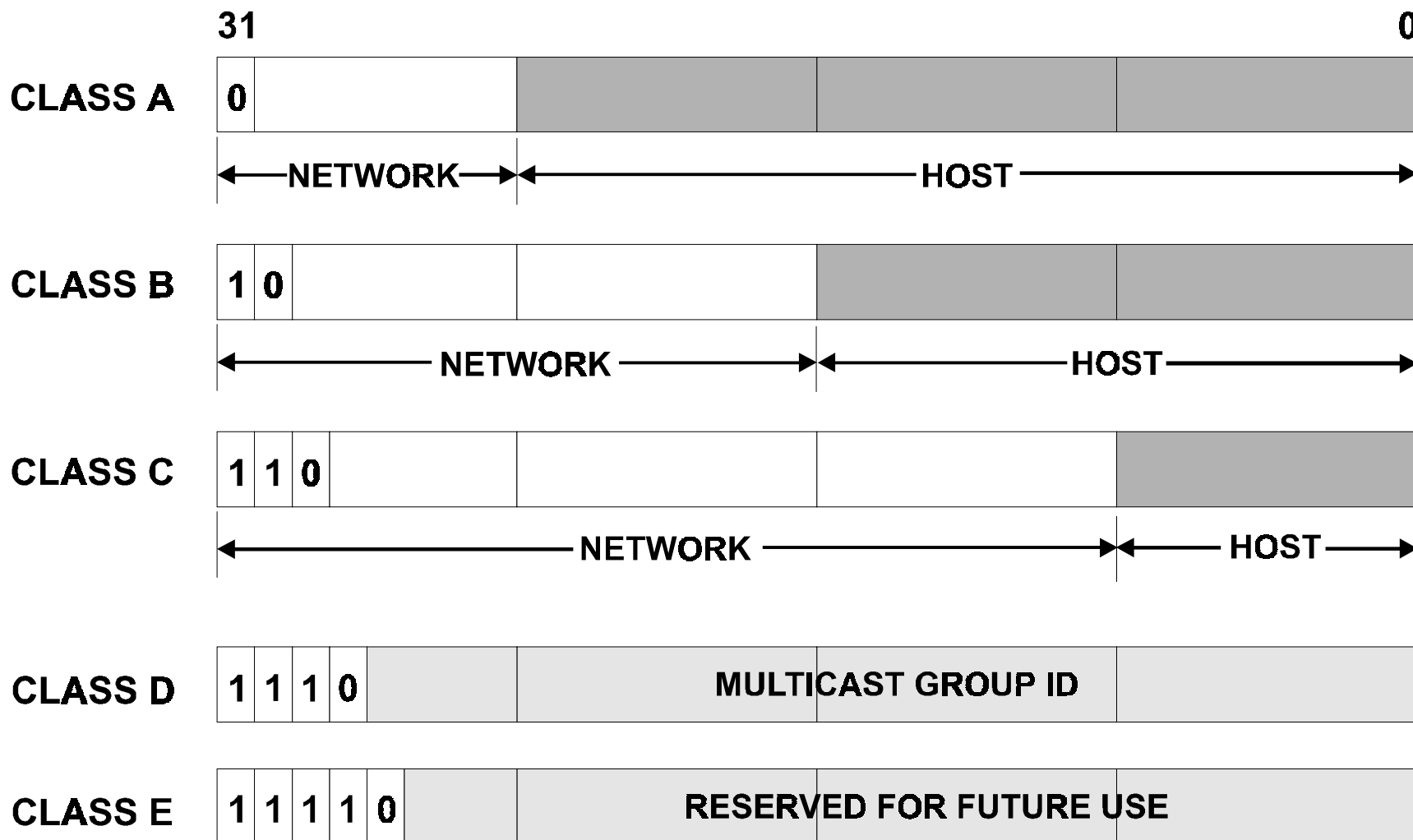
A Multi-segment Network



Network and Host Numbers



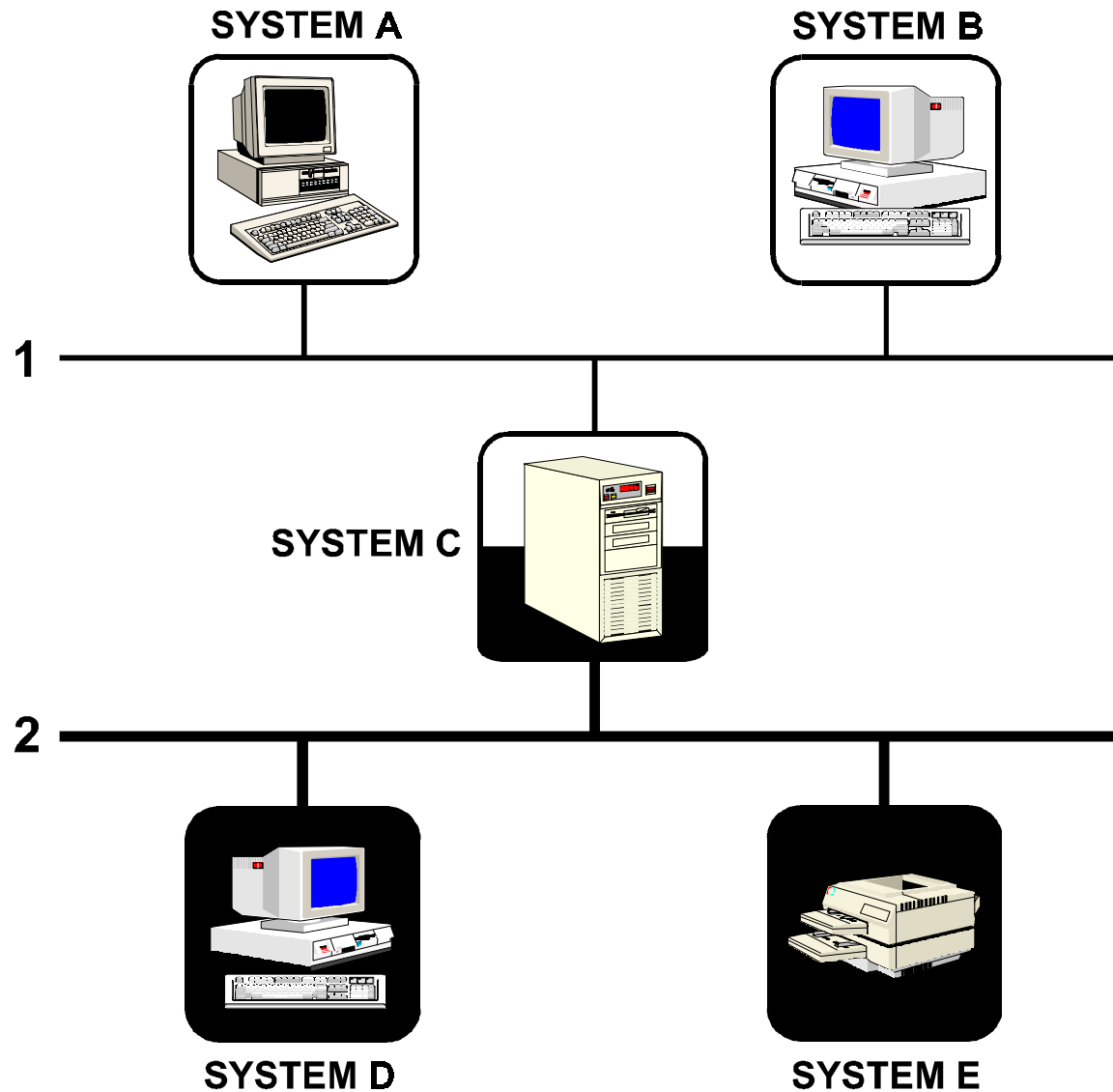
IP Address Classes



Netmasks

	← NETWORK →															← HOST →																
EXAMPLE ADDRESS	1	0	0	1	0	1	1	0	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1
	150								200							64							7									
NETMASK	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NETWORK ADDRESS	1	0	0	1	0	1	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	150								200							0							0									

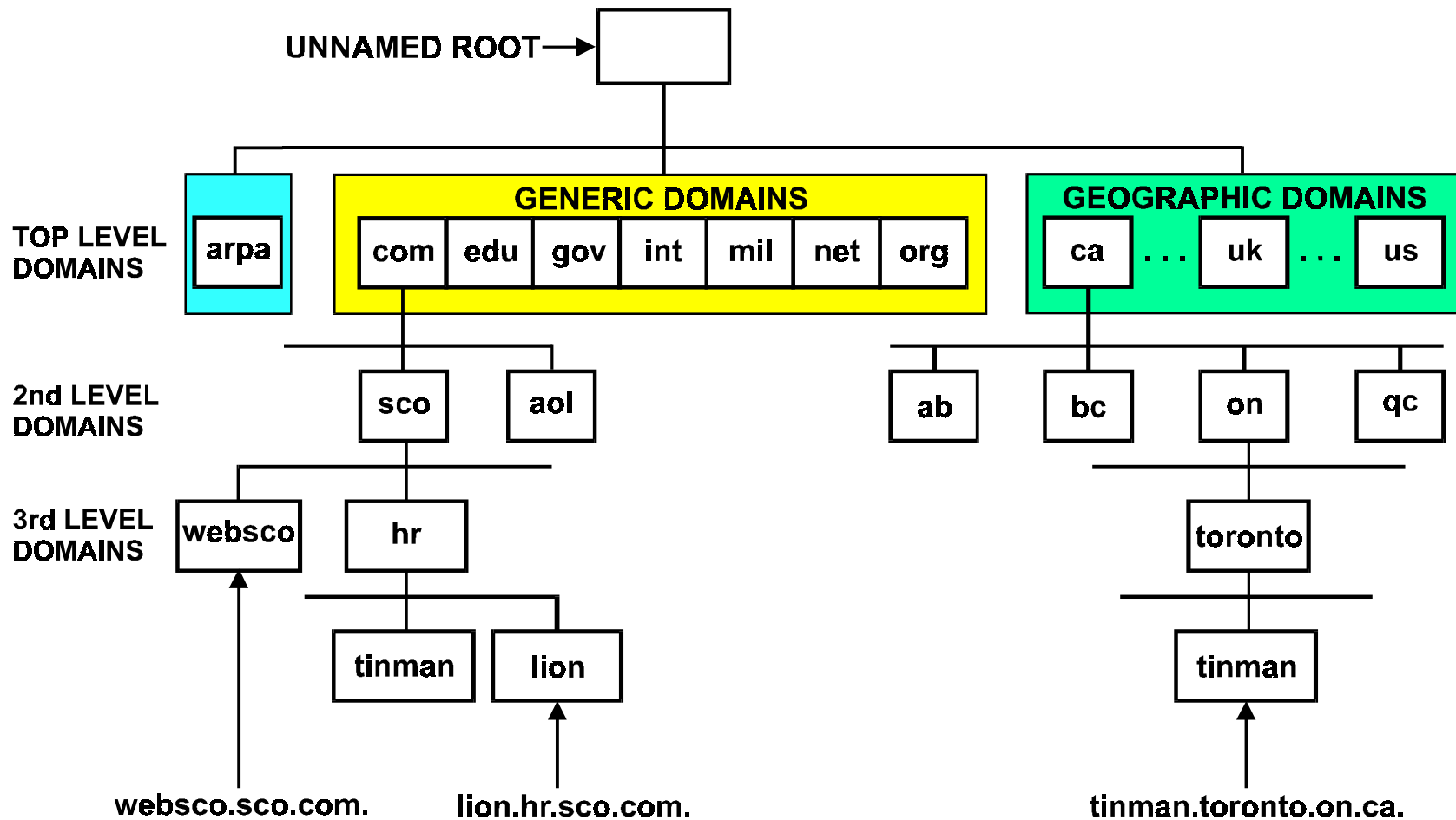
Networks and Routers



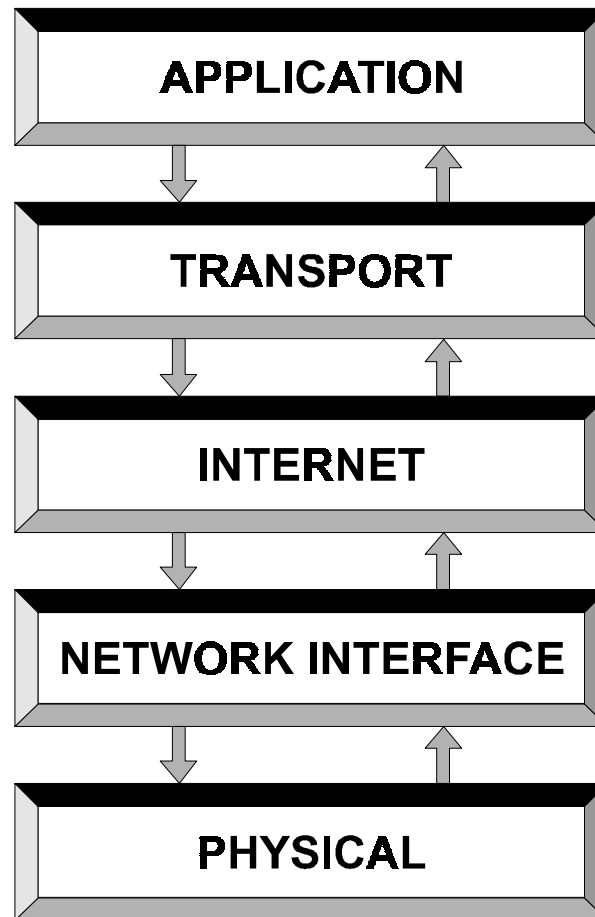
The `/etc/hosts` File

```
$ cat /etc/hosts
#      @(#)hosts          6.1 8/21/93 - STREAMware TCP/IP  source
#      SCCS IDENTIFICATION
127.0.0.1      localhost
132.147.193.67  cousin cousin.pdev.sco.com
132.147.65.216 cheydev cheydev.pdev.sco.com
132.147.210.9  websco websco.sco.com www.sco.com
```

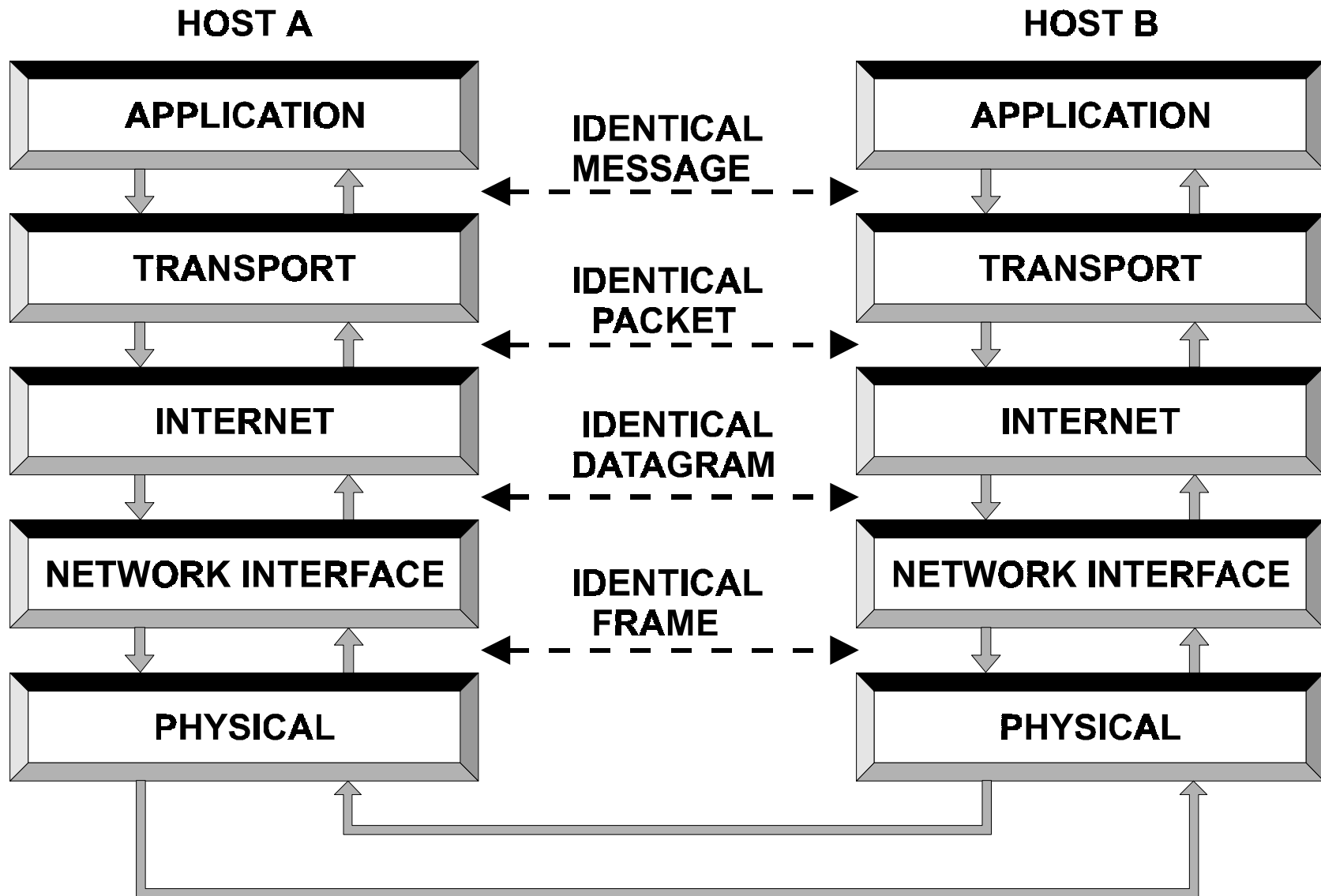
Domain Name Space



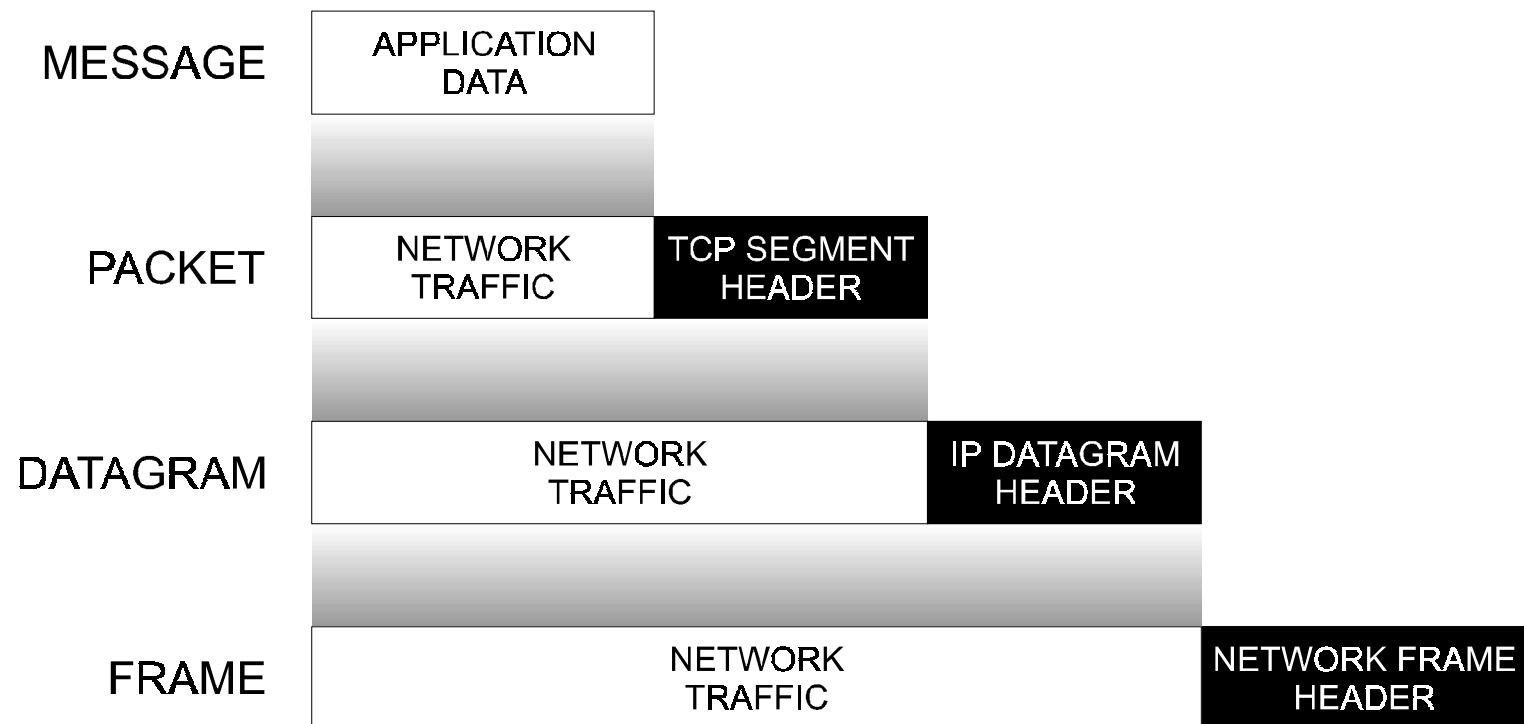
TCP/IP Model Layers



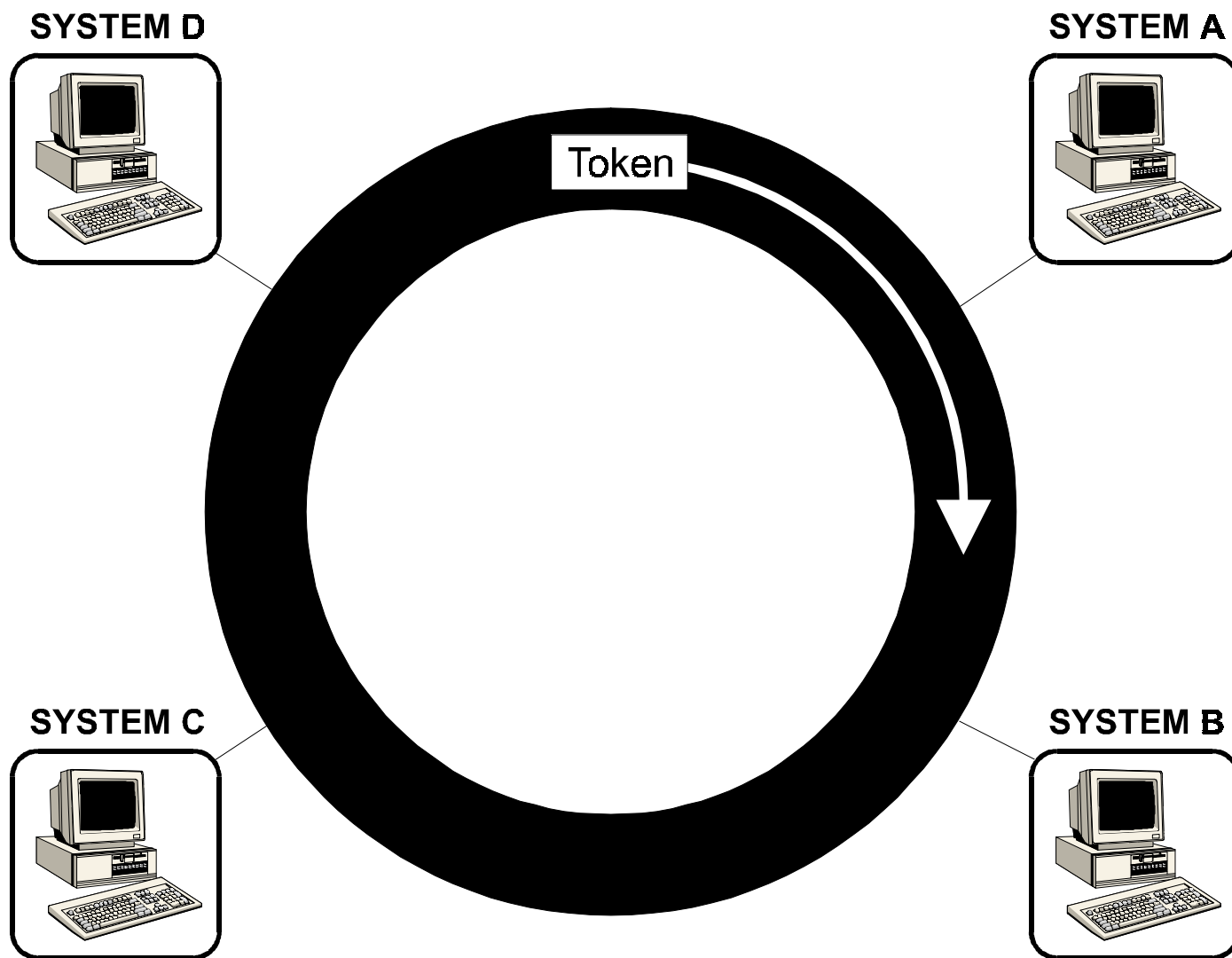
Transmission Between the Layers



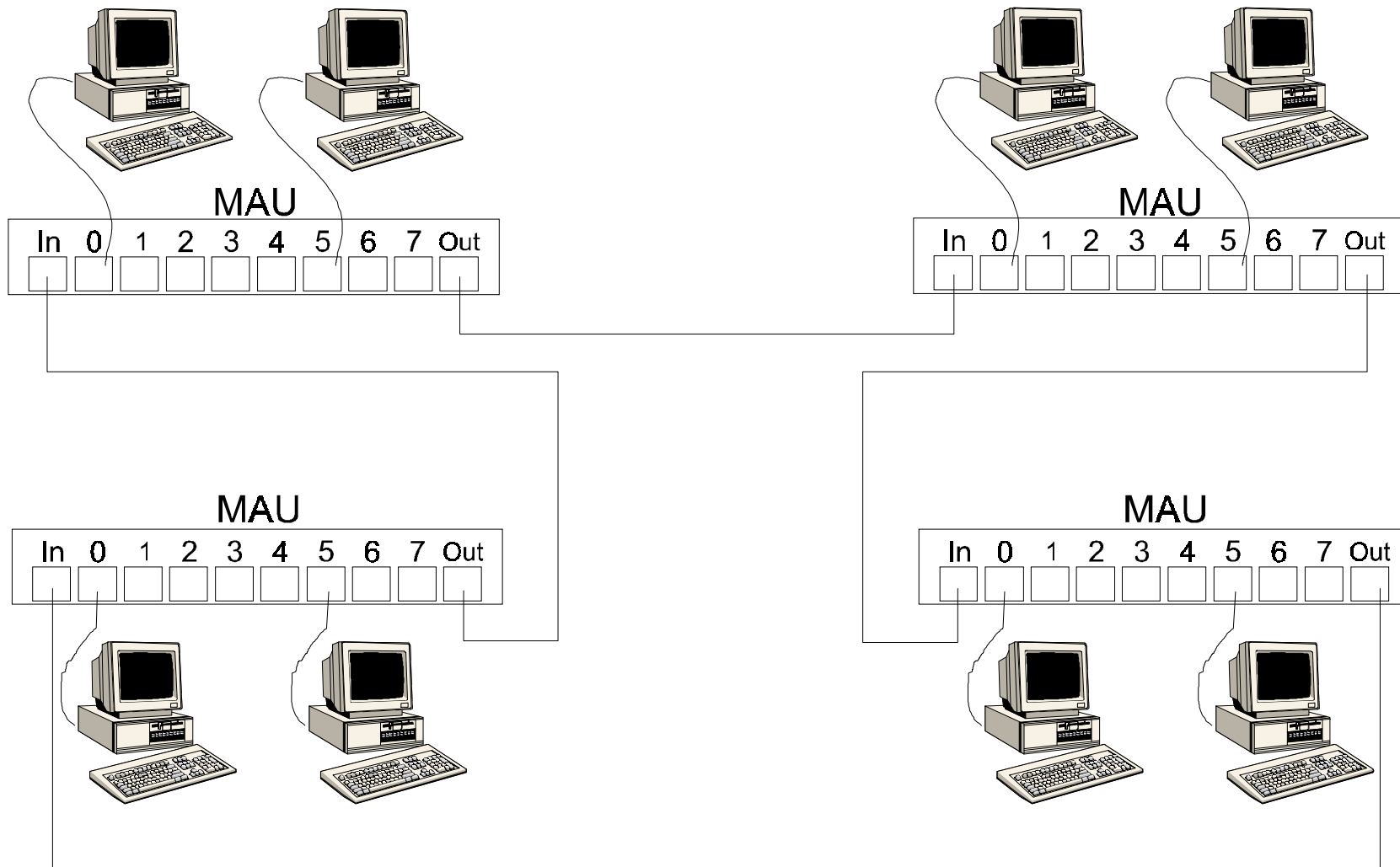
Data Encapsulation



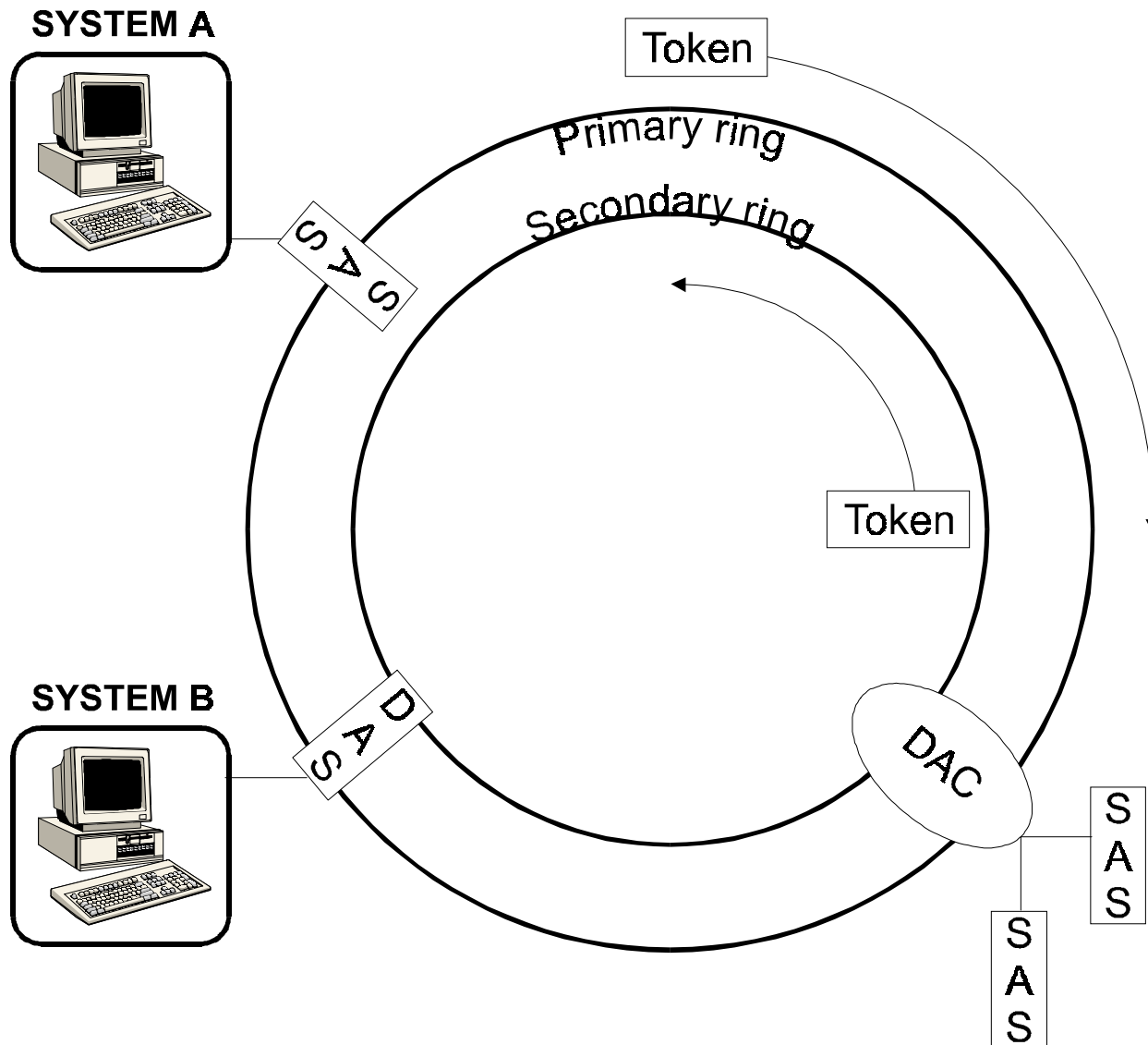
Token Ring Logical Topology



IBM Token Ring Physical Topology



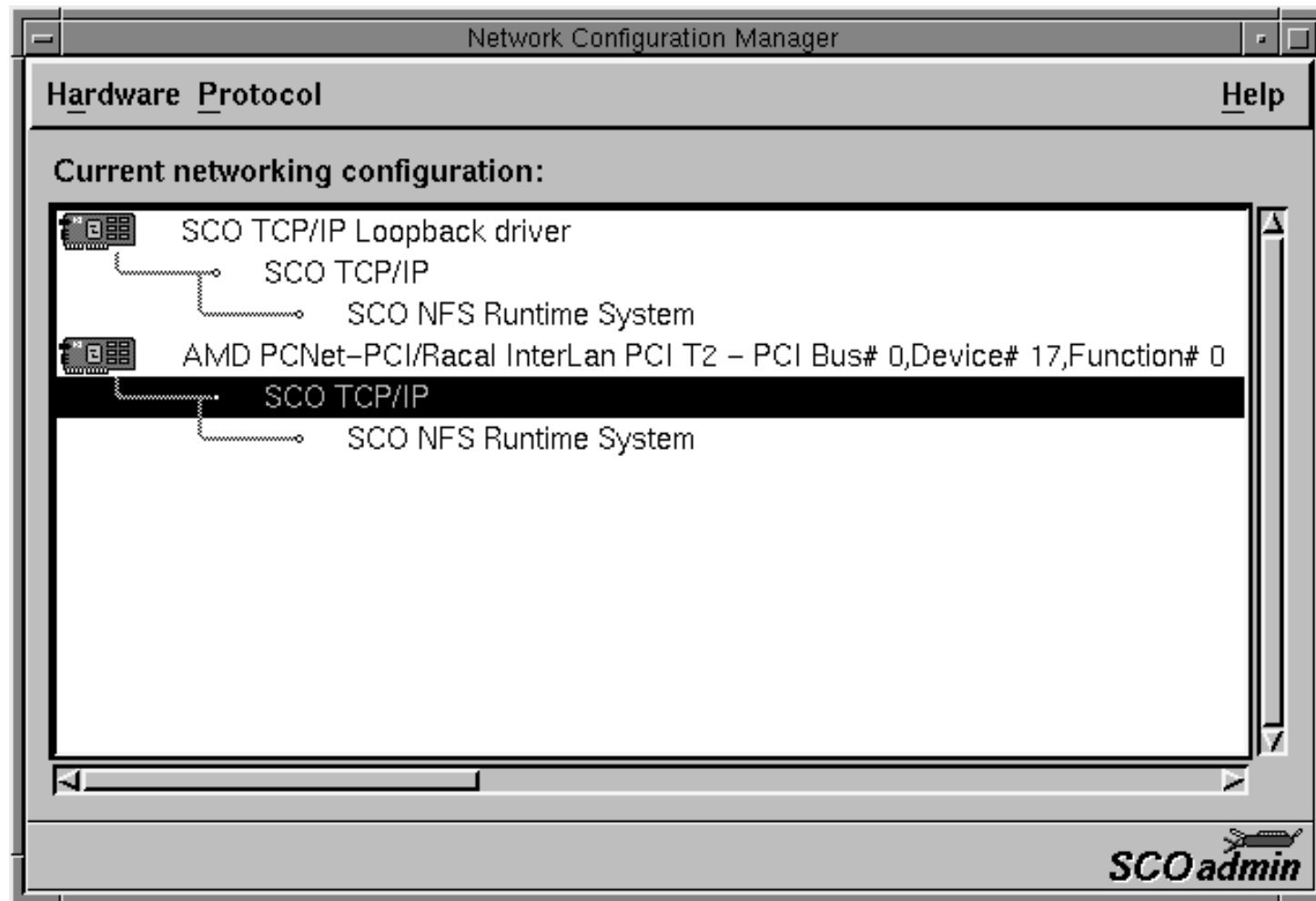
FDDI Topology and Components



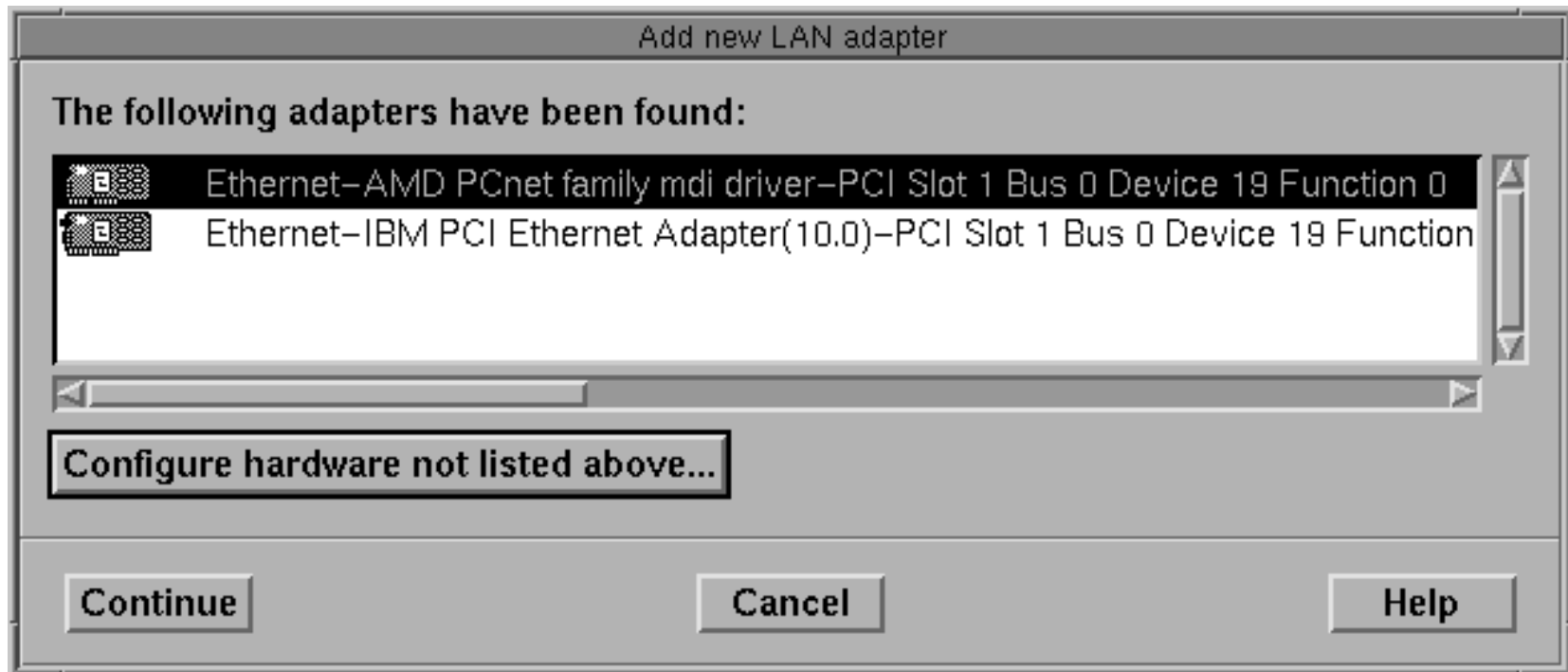
Configuring a Network Interface

- Using the **Network Configuration Manager**
- Testing the network configuration
- Modifying network interface components

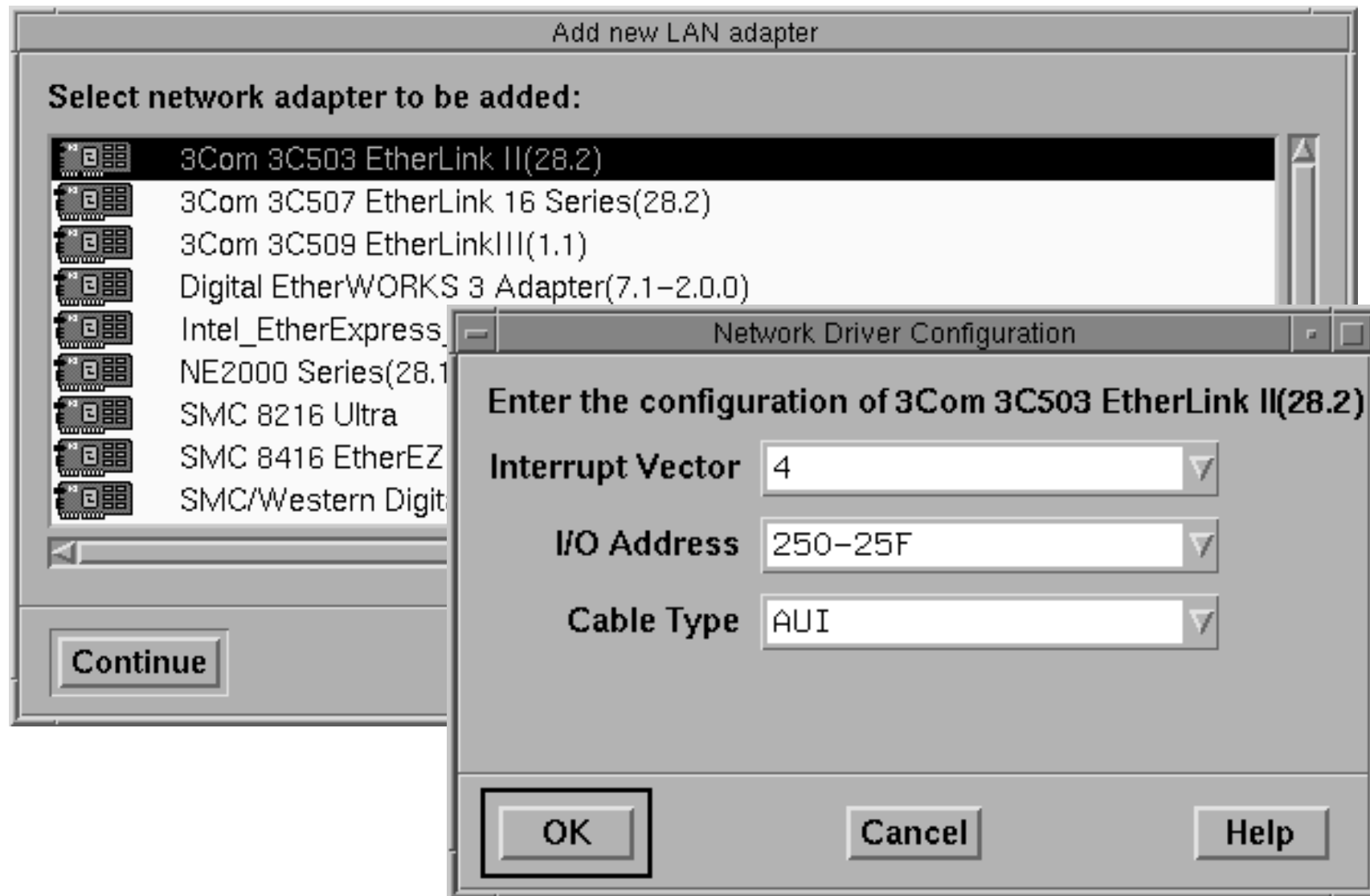
Network Configuration Manager



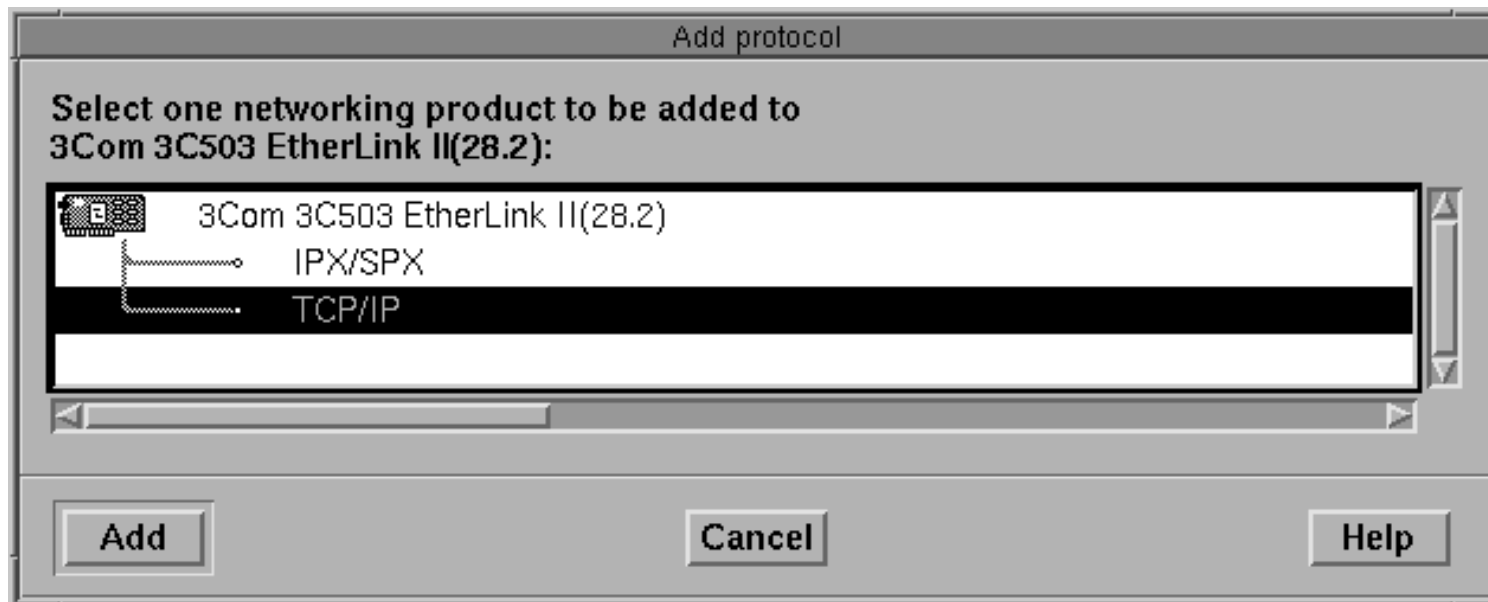
Adding an Autoconfigured Network Adapter



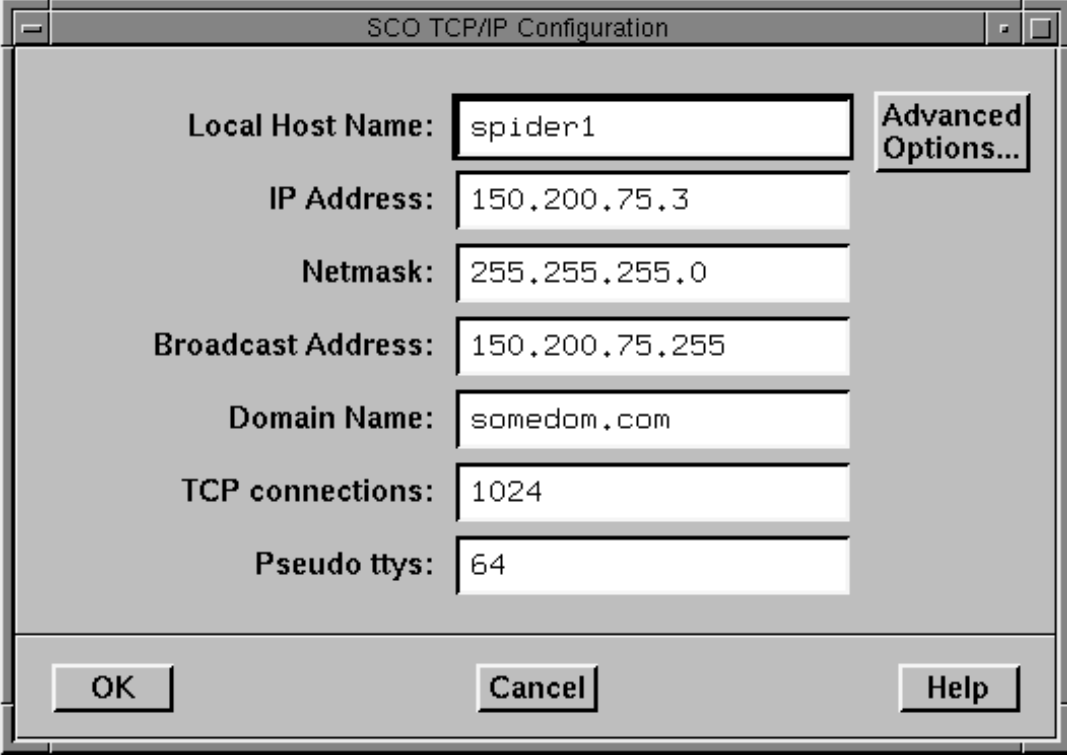
Manually Configuring a Network Adapter



Add Protocol



TCP/IP Configuration



The image shows a window titled "SCO TCP/IP Configuration". It contains several input fields for network settings. To the right of the first field is a button labeled "Advanced Options...". At the bottom of the window are three buttons: "OK", "Cancel", and "Help".

Field	Value
Local Host Name:	spider1
IP Address:	150.200.75.3
Netmask:	255.255.255.0
Broadcast Address:	150.200.75.255
Domain Name:	somedom.com
TCP connections:	1024
Pseudo ttys:	64

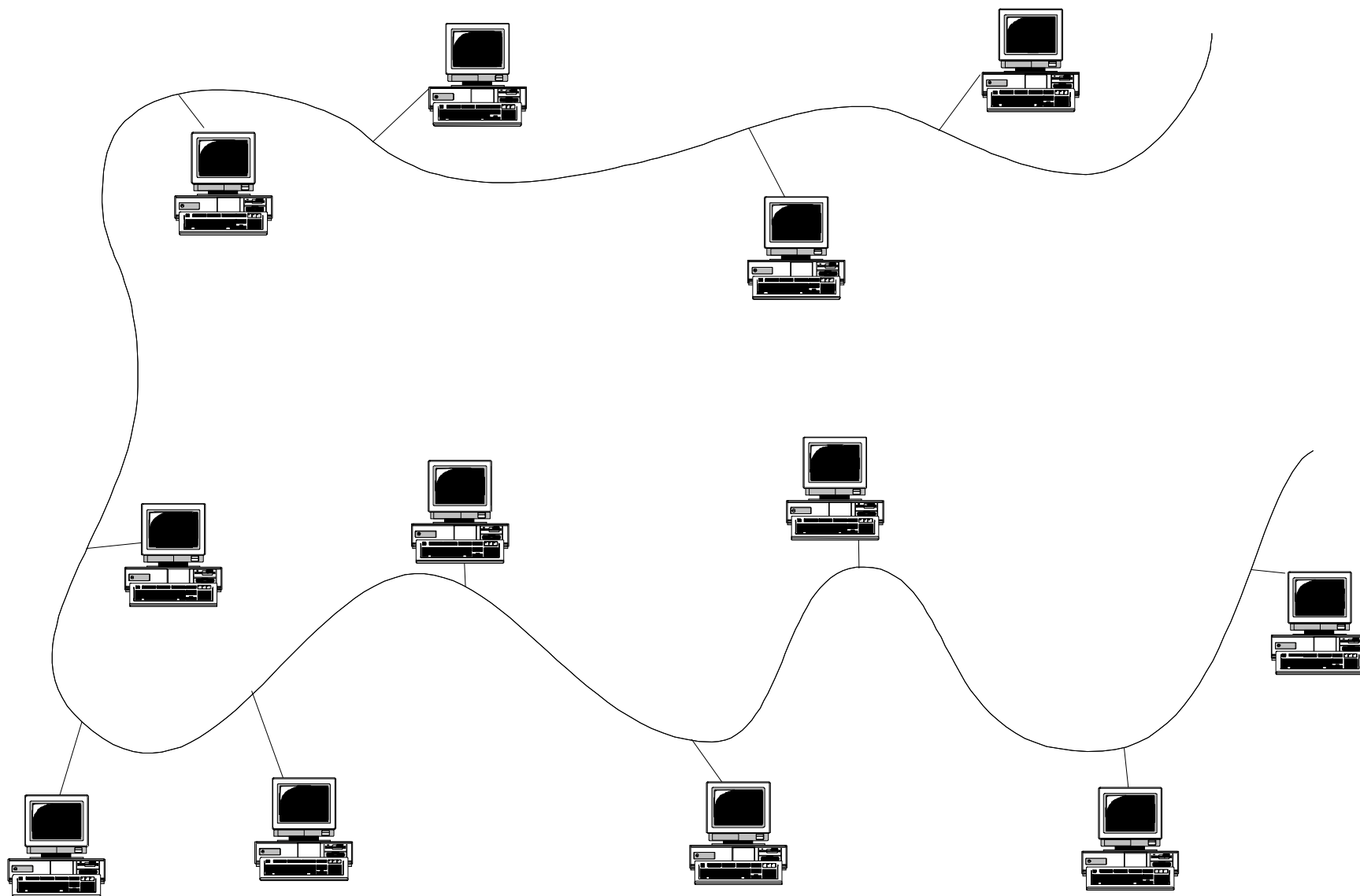
hwconfig(C)

device	address	vec	dma	comment
=====	=====	===	===	=====
kernel	-	-	-	rel=3.2v5.0.5 kid=98/07/02
cpu	-	-	-	unit=1 family=5 type=Pentium
cpuid	-	-	-	unit=1 vend=GenuineIntel step=xB1
fpu	-	13	-	unit=1 type=80387-compatible
pci	0xcf8-0xcff	-	-	am=1 sc=1 buses=1
PnP	-	-	-	nodes=2
serial	0x2f8-0x2ff	3	-	unit=1 type=Standard nports=1
fifo=yes				
console	-	-	-	unit=vga type=0 12 screens=68k
adapter	0x6000-0x60ff	10	-	type=alad ha=0 bus=0 id=7 fts=sto
floppy	0x3f2-0x3f7	6	2	unit=0 type=135ds18
kbmouse	0x60-0x64	12	-	type=Keyboard mouse
adapter	0x170-0x177	15	-	type=IDE ctrlr=secondary dvr=wd
pnt	0x6400-0x6412	9	-	pnt0 ver.3.0
addr=02:07:01:19:53:0f				
cd-rom	-	-	-	type=IDE ctrlr=sec cfg=mst
dvr=Srom->wd				
disk	0x1f0-0x1f7	14	-	type=W0 unit=0 cyls=781 hds=128
secs=63				

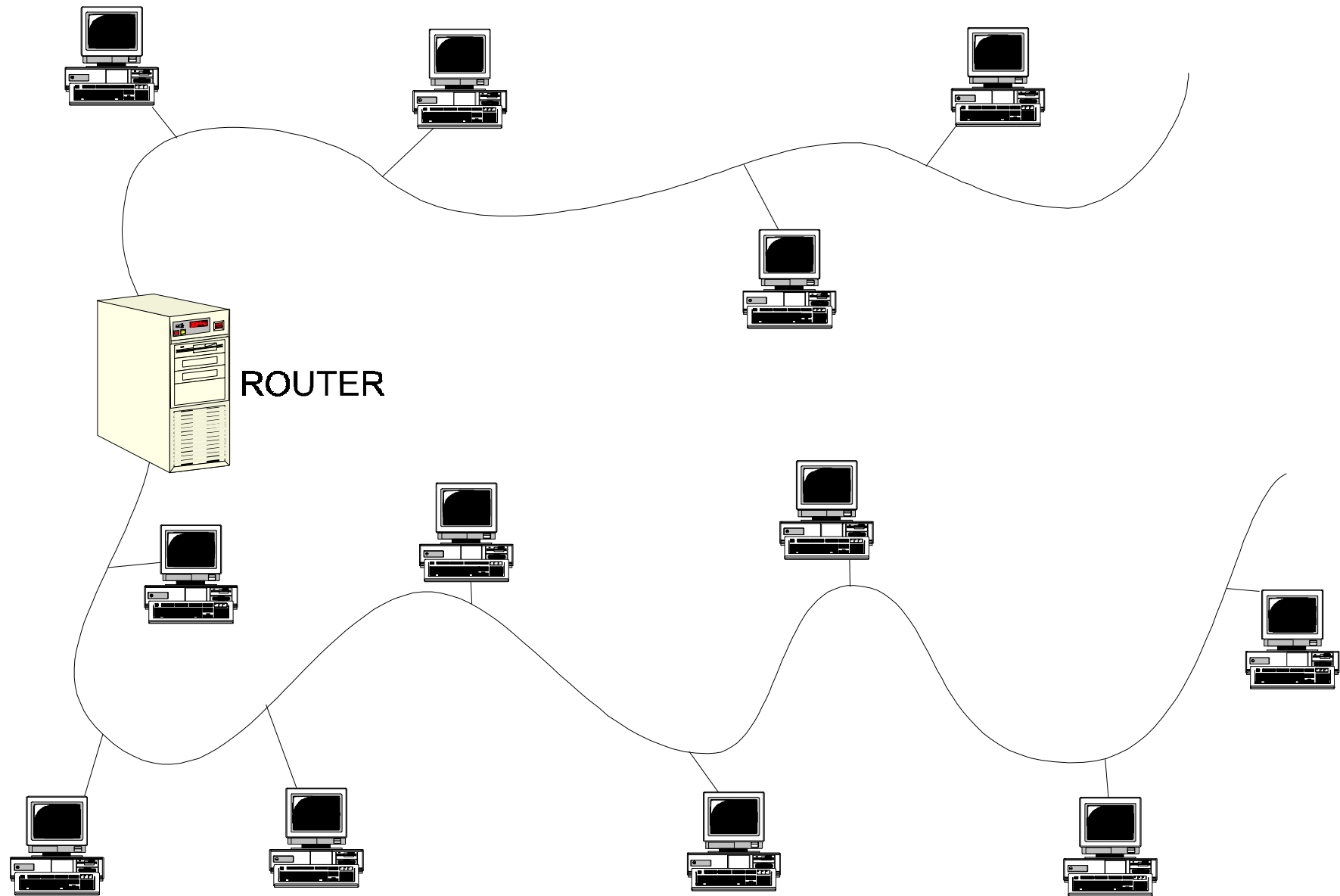
Subnetworks

- Plan the subnet topology
- Create subnets

A Single Overloaded Segment



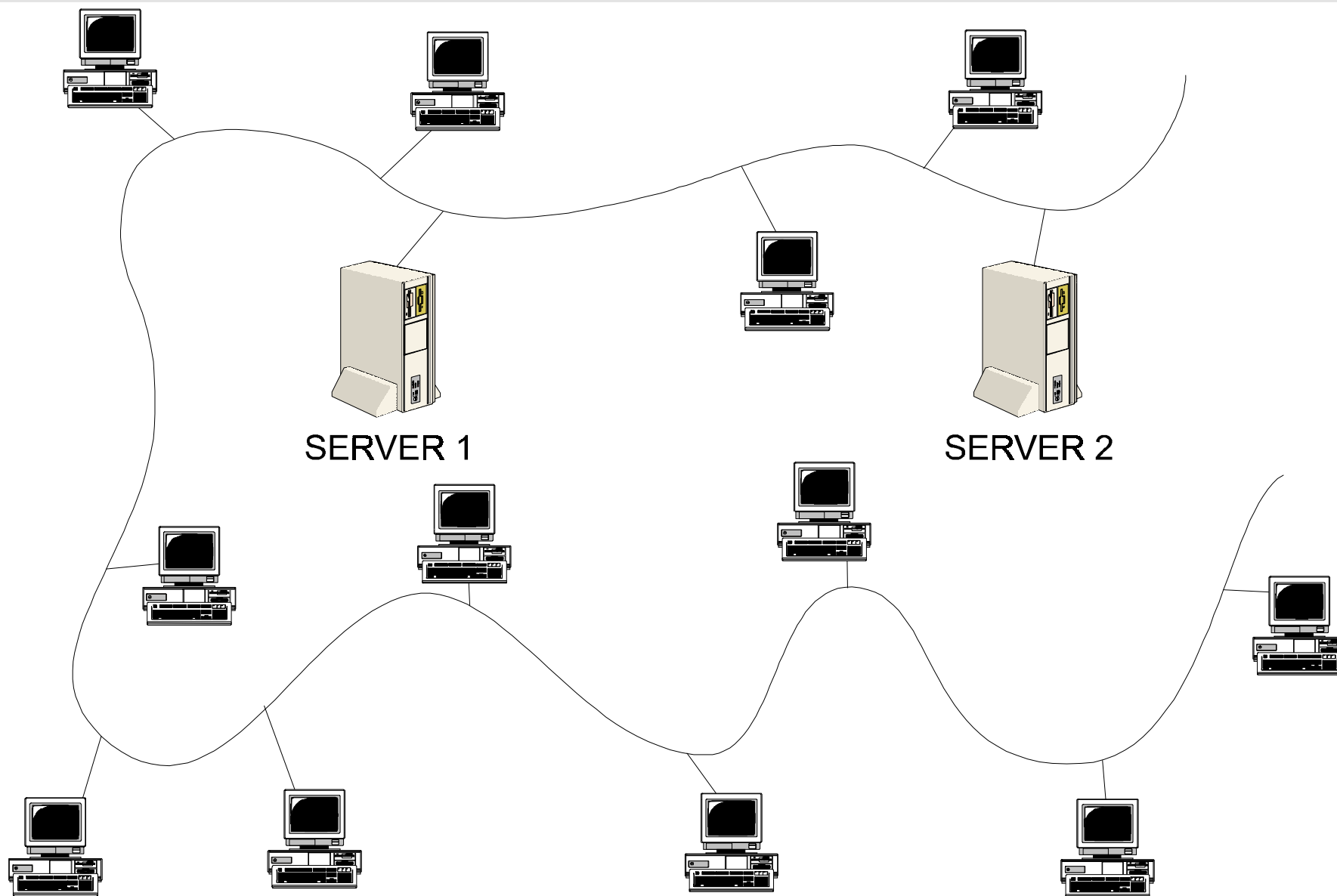
Reorganized Network



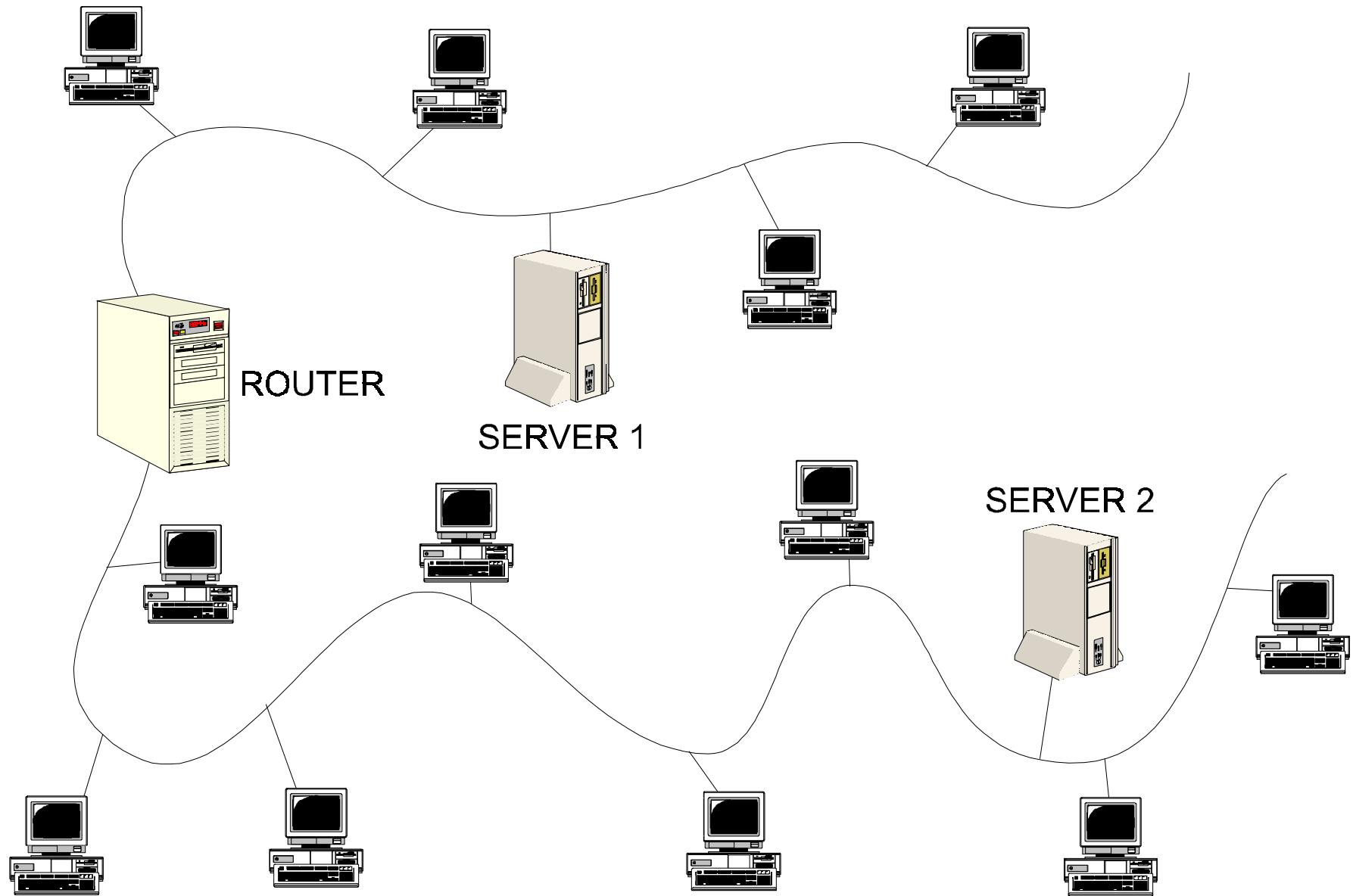
NADM0403

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A Single Overloaded Segment



Reorganized Network

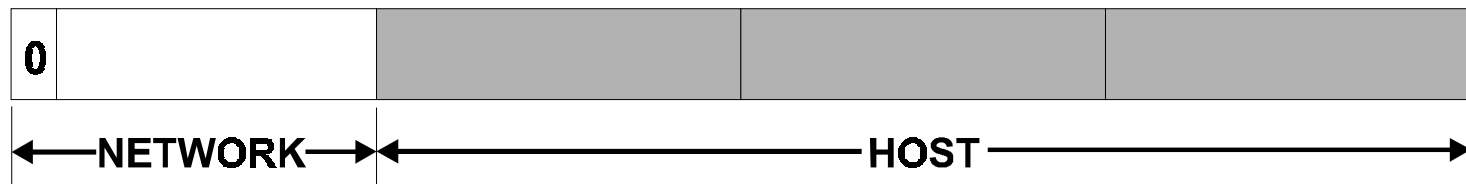


NADM0405

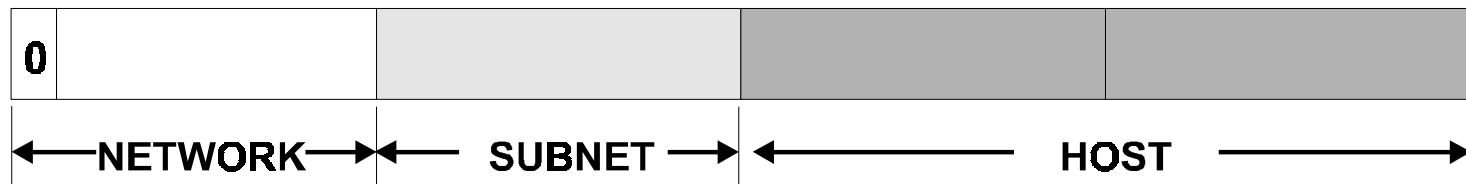
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Class A Network with 8-bit Subnet

CLASS A

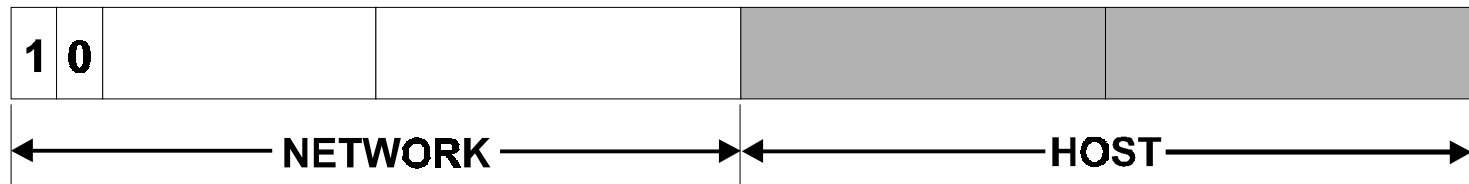


**CLASS A
with 8-bit
subnet**

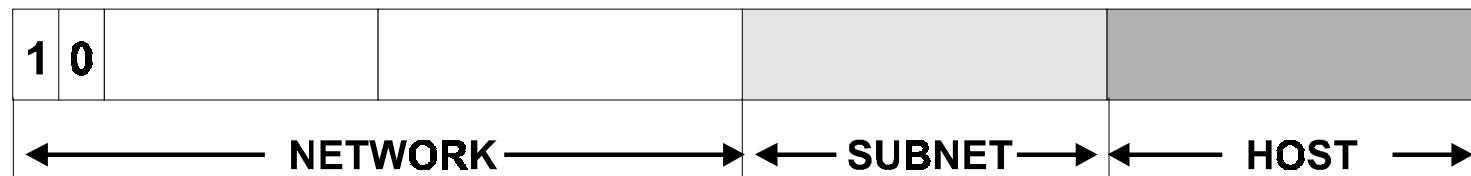


Class B Network with 8-bit Subnet

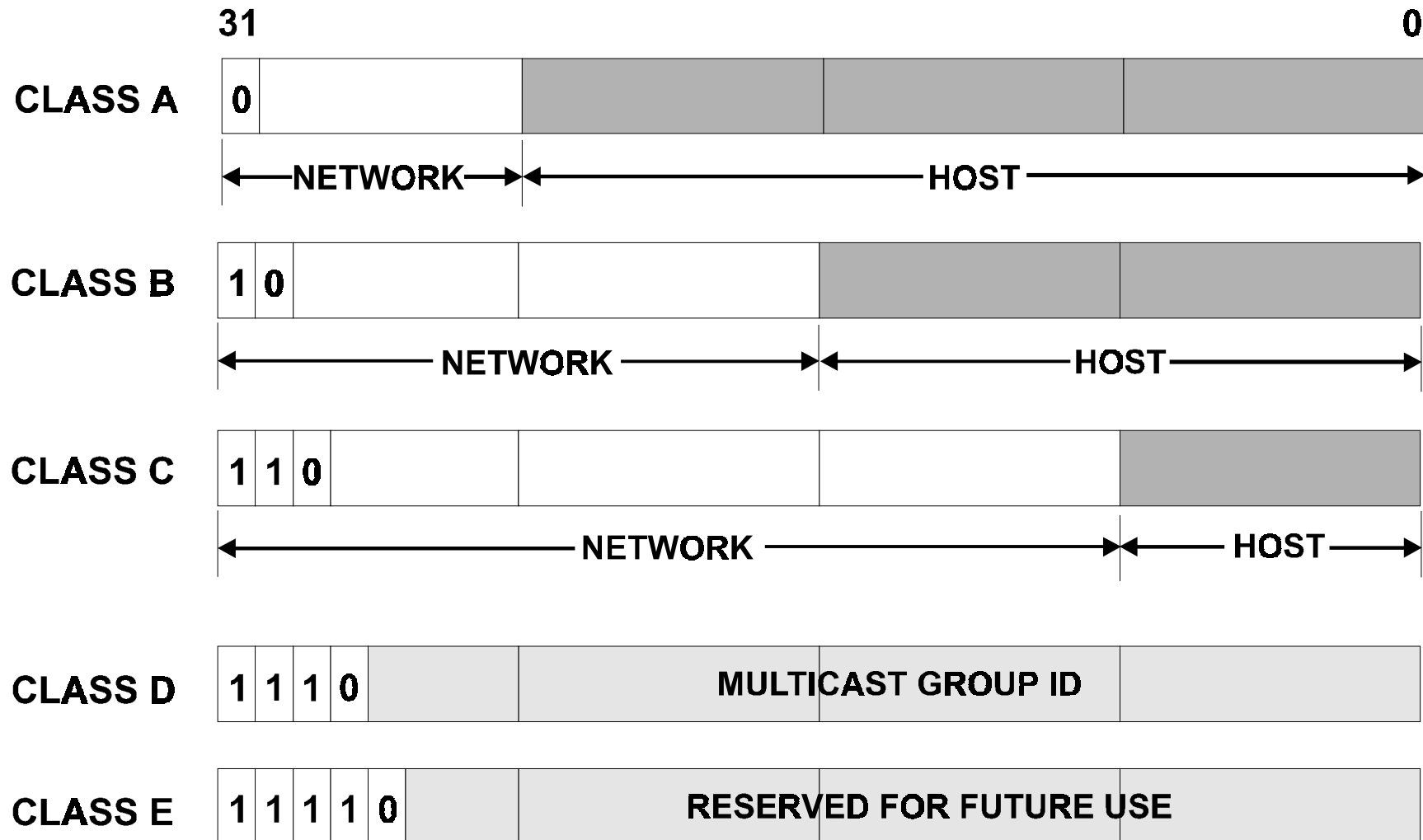
CLASS B



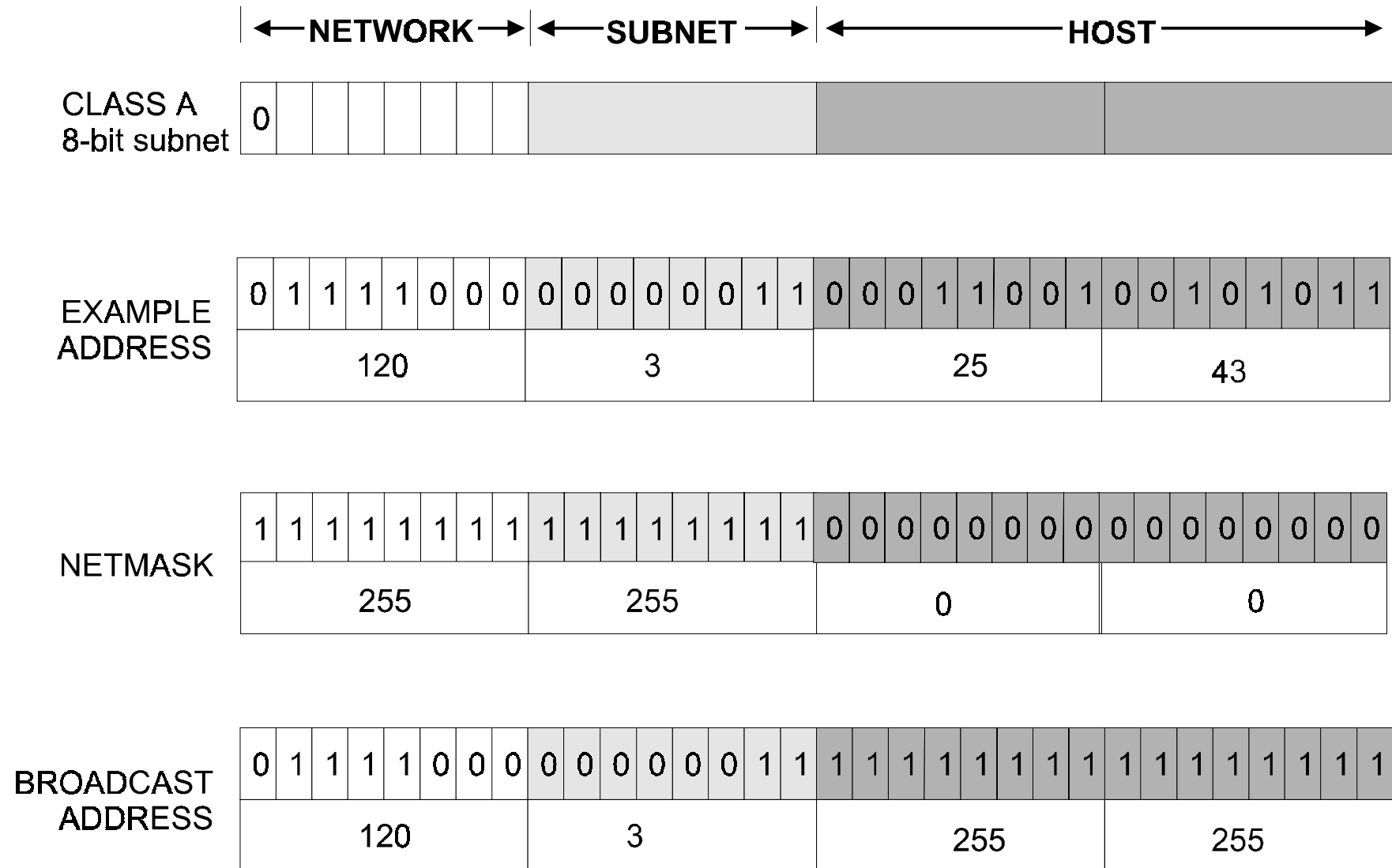
**CLASS B
with 8-bit
subnet**



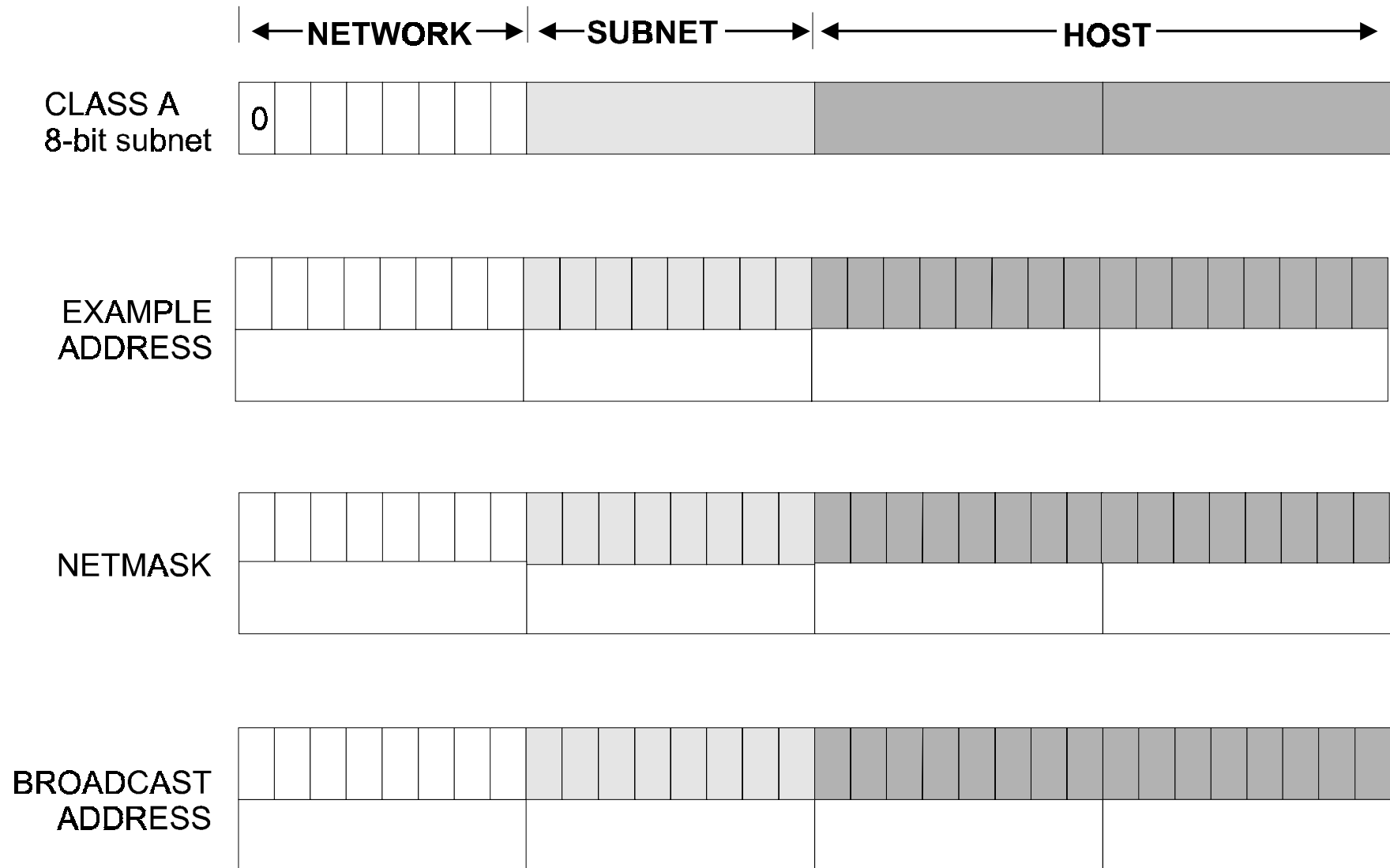
IP Address Classes



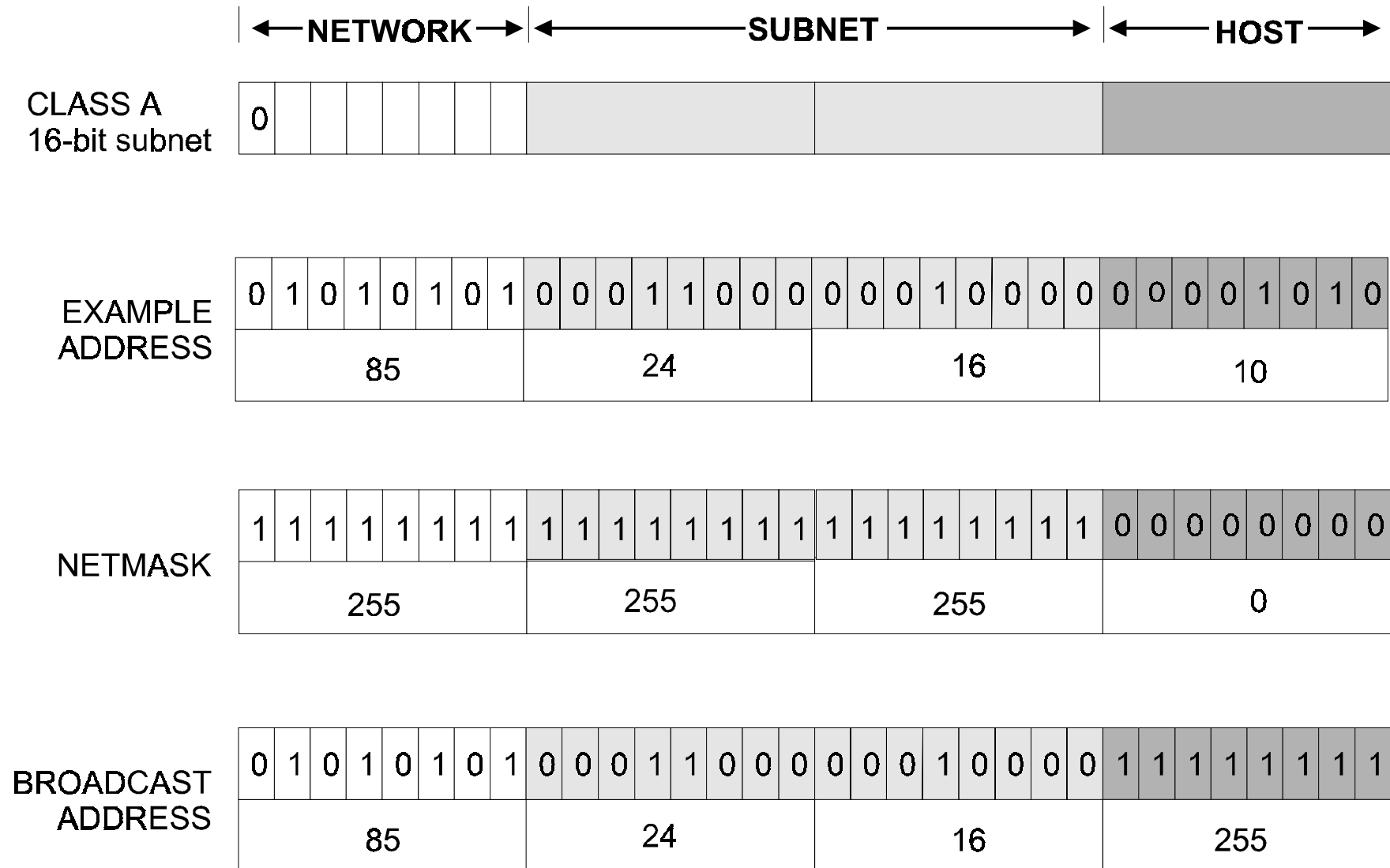
Class A Network with an 8-bit Subnet



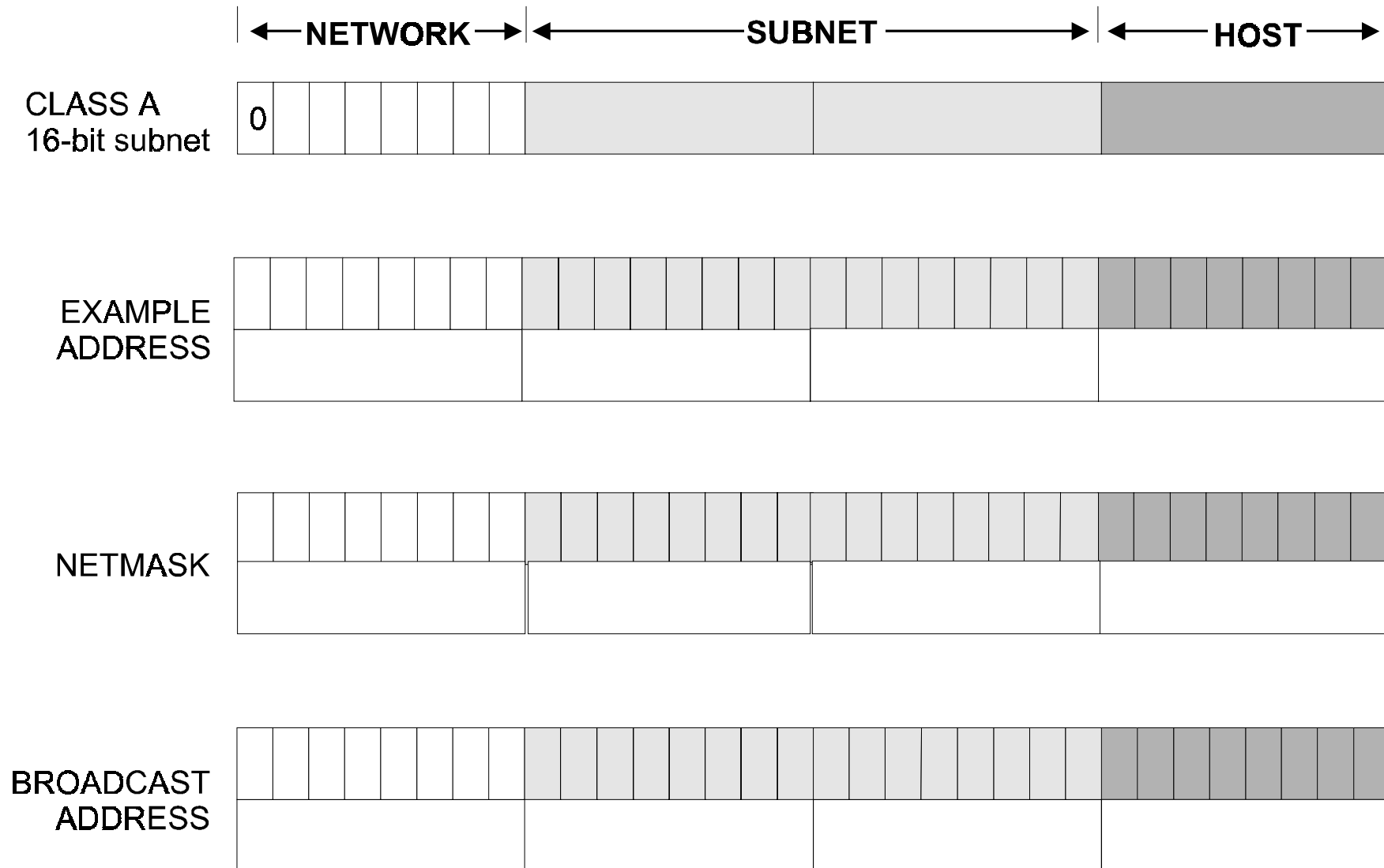
Class A Network with an 8-bit Subnet



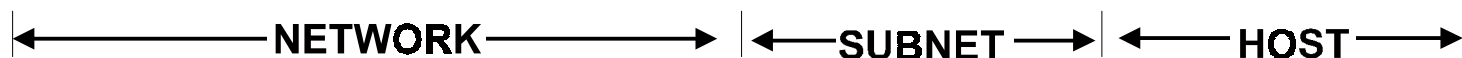
Class A Network with a 16-bit Subnet



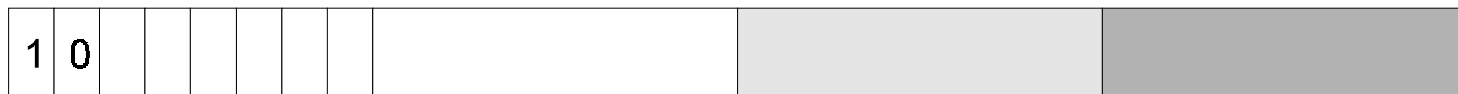
Class A Network with a 16-bit Subnet



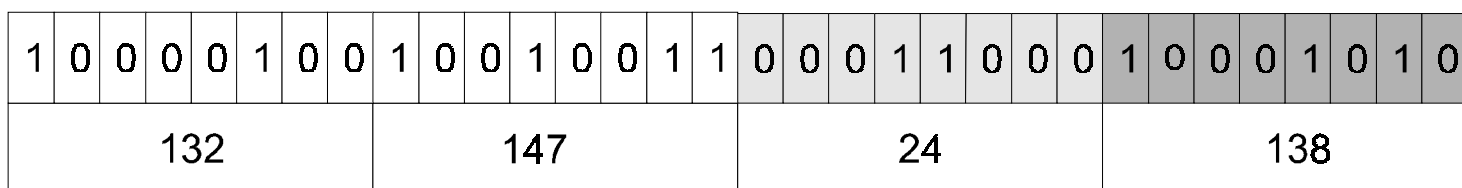
Class B Network with an 8-bit Subnet



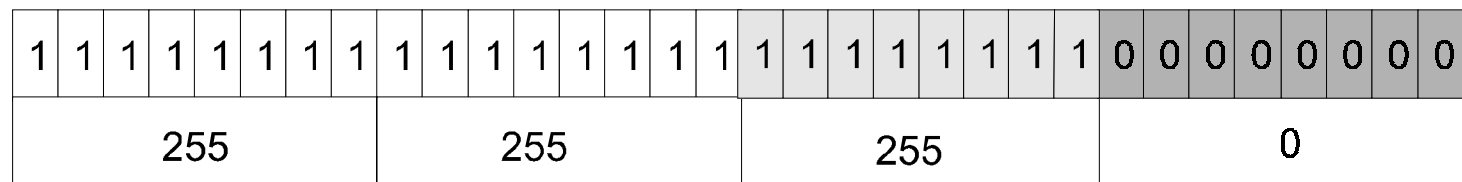
CLASS B
8-bit subnet



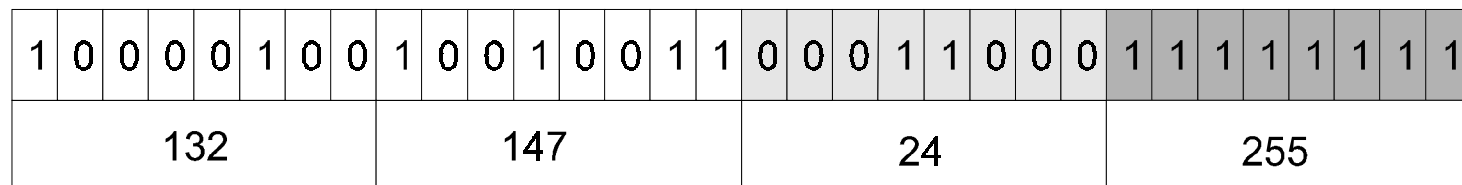
EXAMPLE
ADDRESS



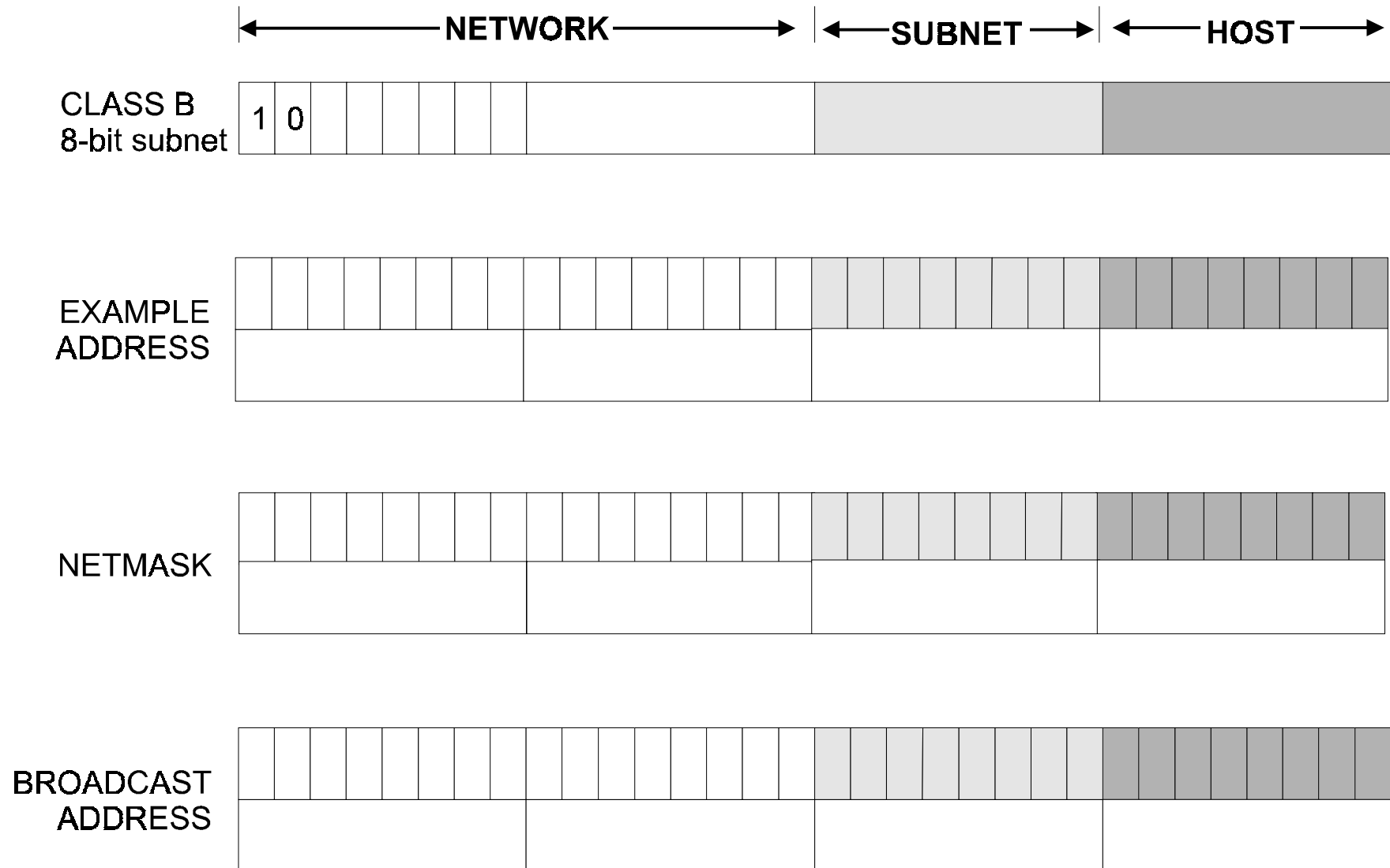
NETMASK



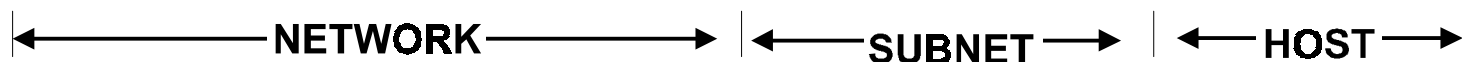
BROADCAST
ADDRESS



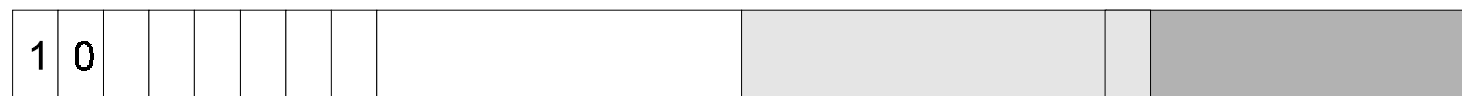
Class B Network with an 8-bit Subnet



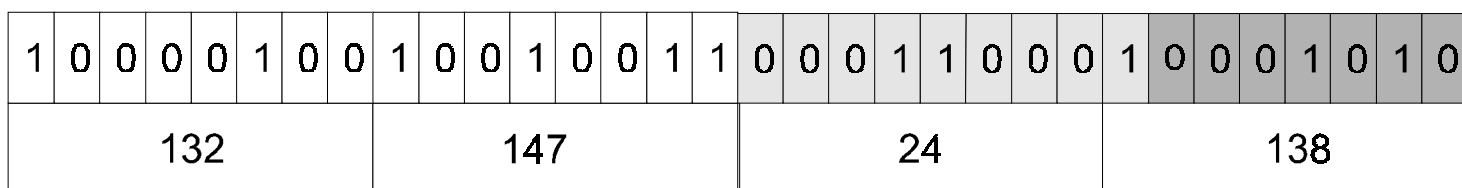
Class B Network with an 9-bit Subnet



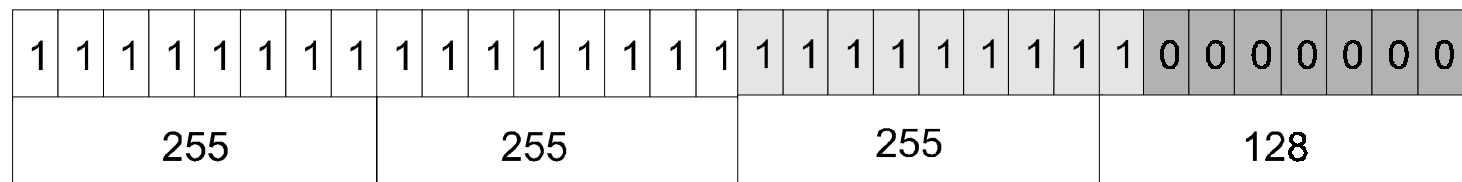
CLASS B
9-bit subnet



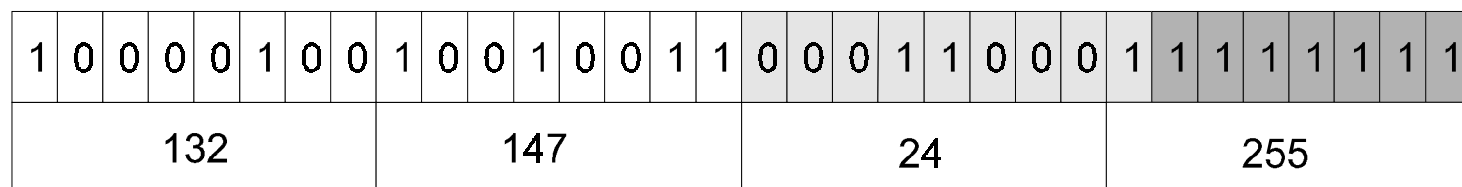
EXAMPLE
ADDRESS



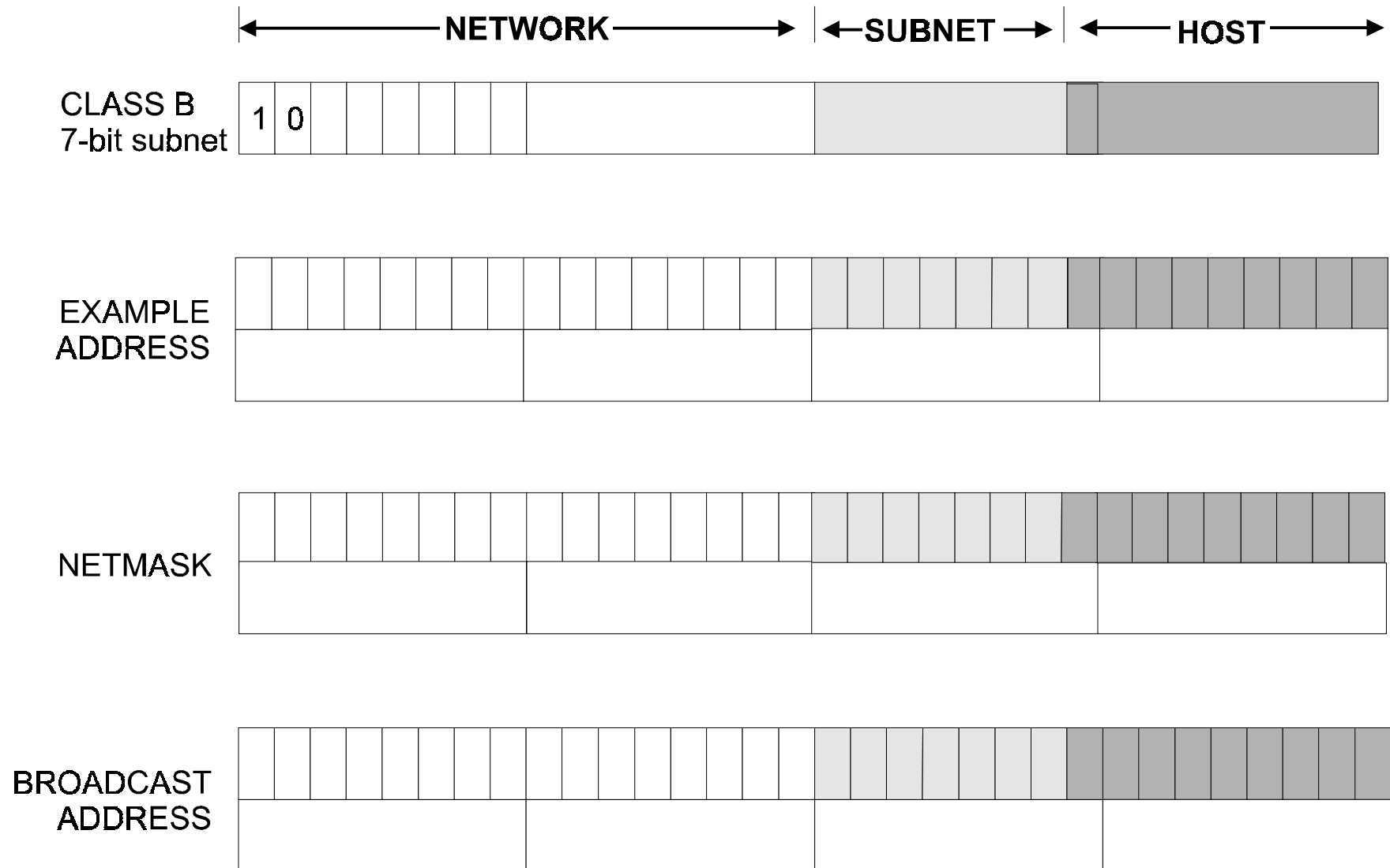
NETMASK



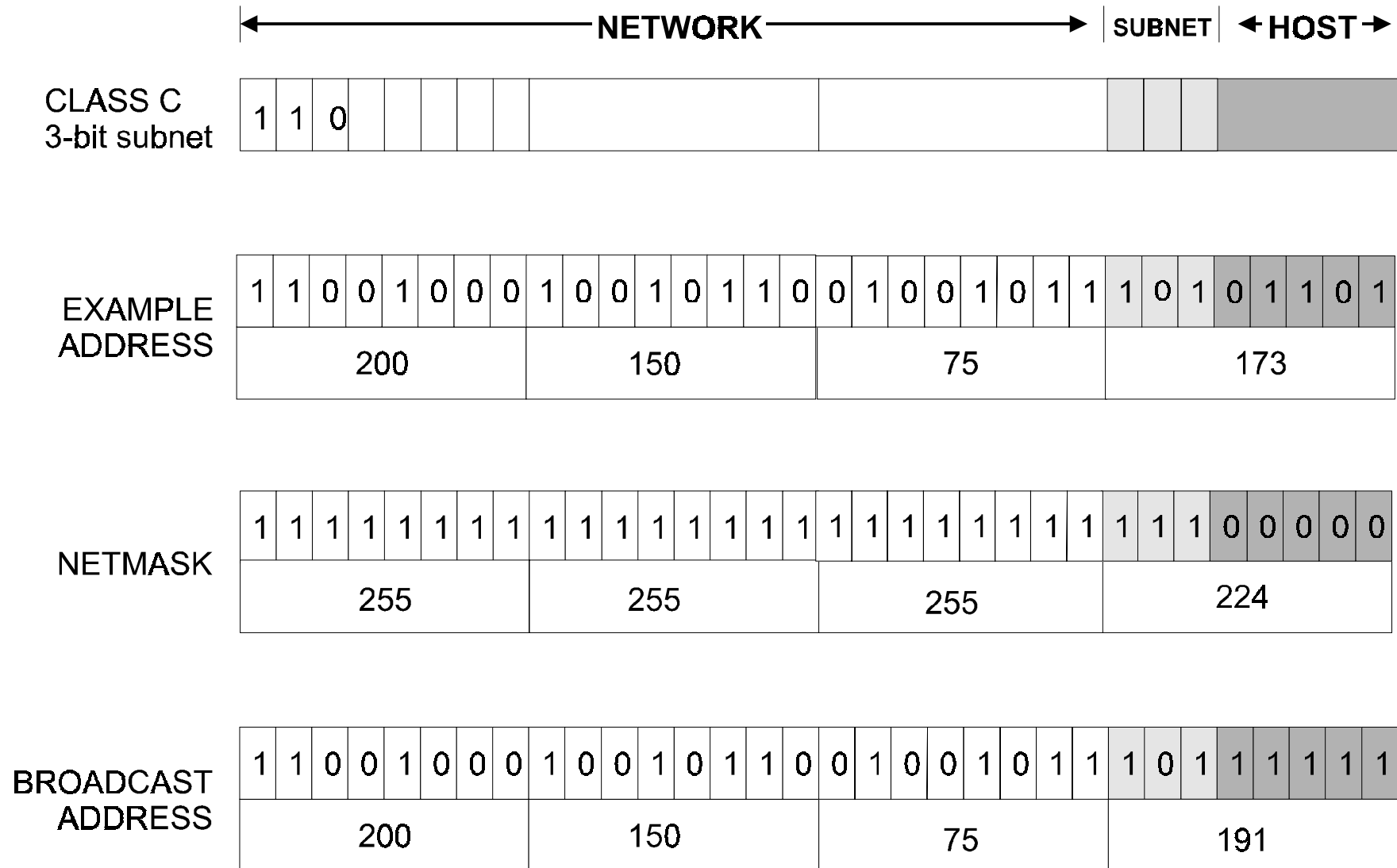
BROADCAST
ADDRESS



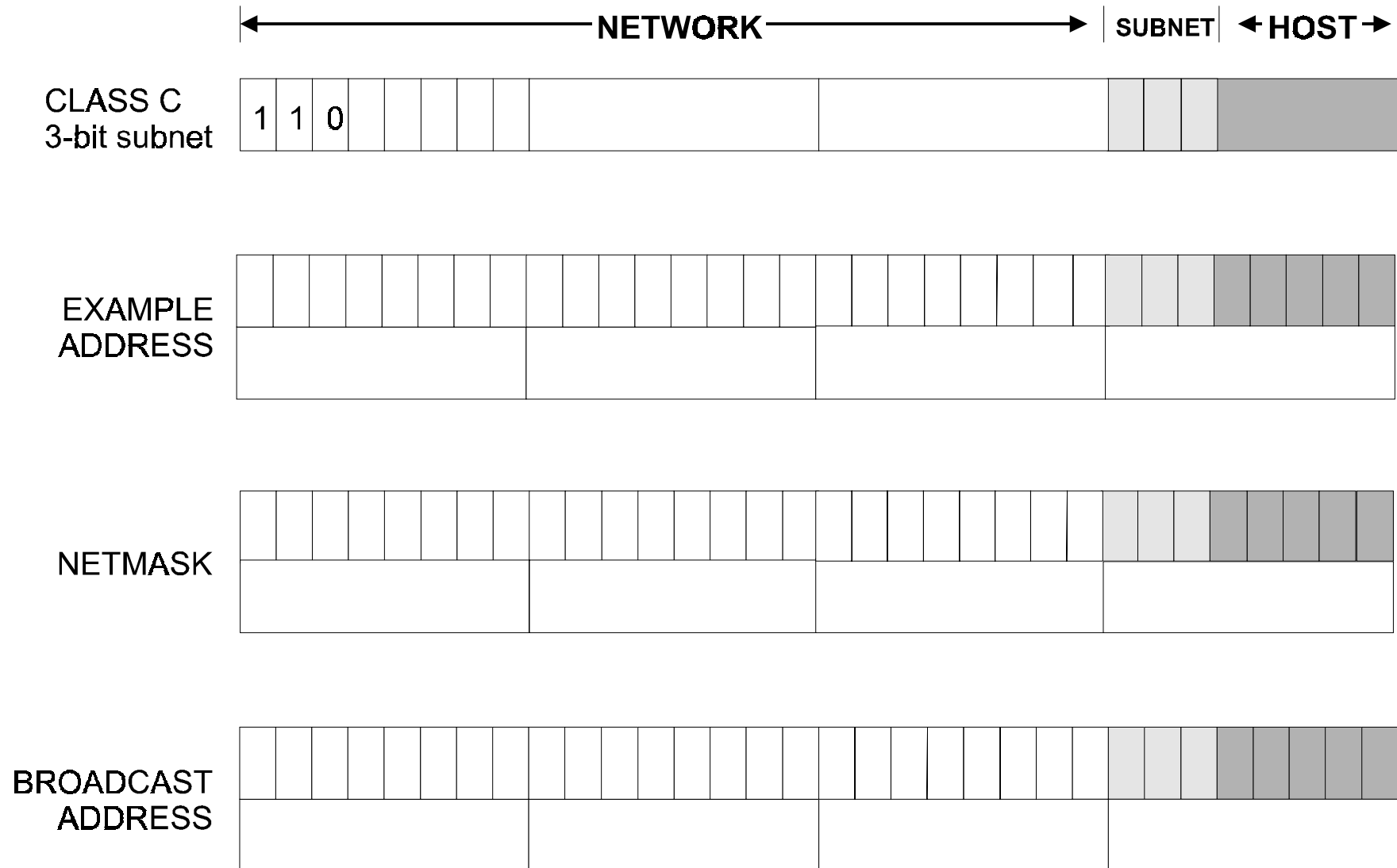
Class B Address with a 7-bit Subnet



Class C Network with a 3-bit Subnet



Class C Subnets



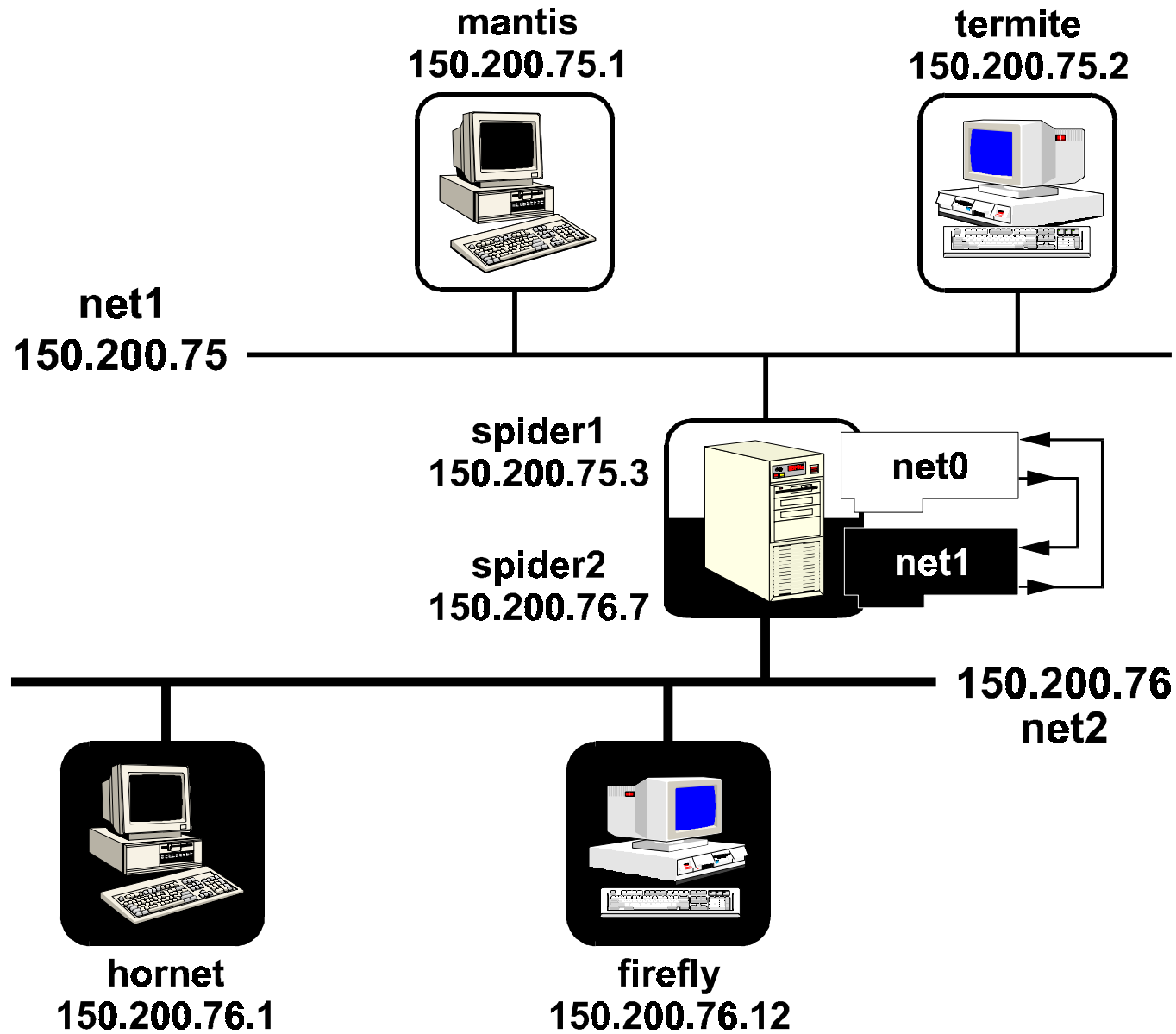
Unusual Subnet Masking

	CLASS B NETWORK														HOST		4-BIT SUB-NET				MORE HOST BITS											
IP ADDRESS	1	0	0	0	0	1	0	0	1	0	0	1	0	0	1	1	0	0	0	1	1	0	0	0	1	0	0	0	1	0	1	0
	132							147							24				138													
NETMASK	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0
	255							255							15				0													
BROADCAST	1	0	0	0	0	1	0	0	1	0	0	1	0	0	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1
	132							147							248				255													

Routing

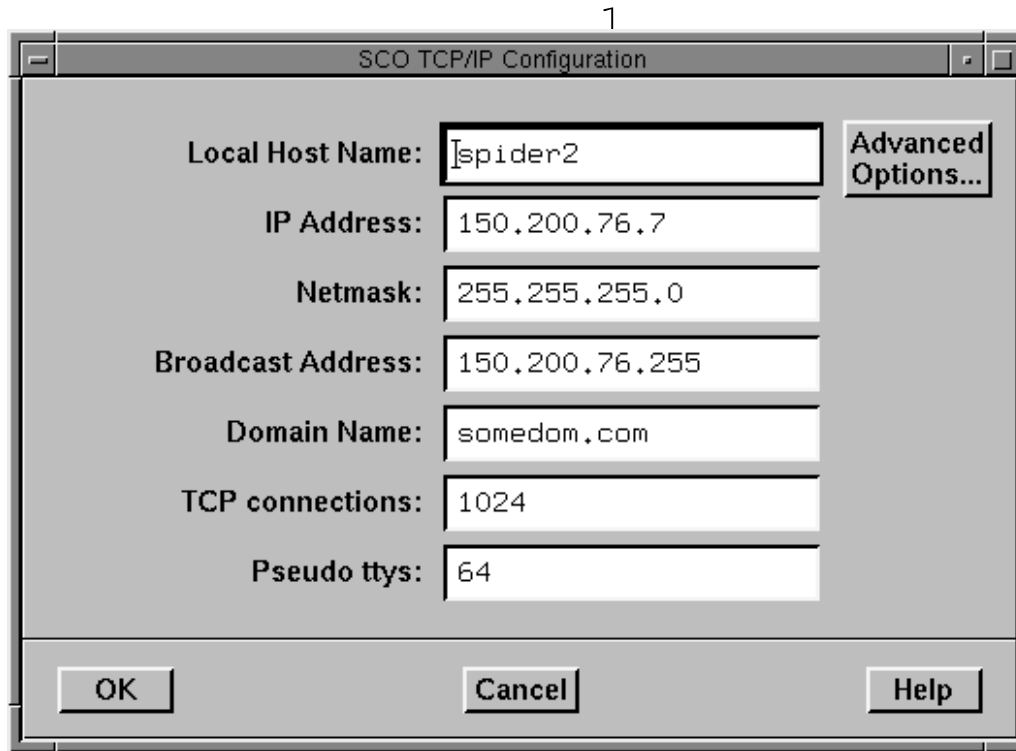
- Configuring a system as a router
- Configuring routes
- Routing daemons
- Troubleshooting routes

A Network Router



SCO TCP/IP Configuration

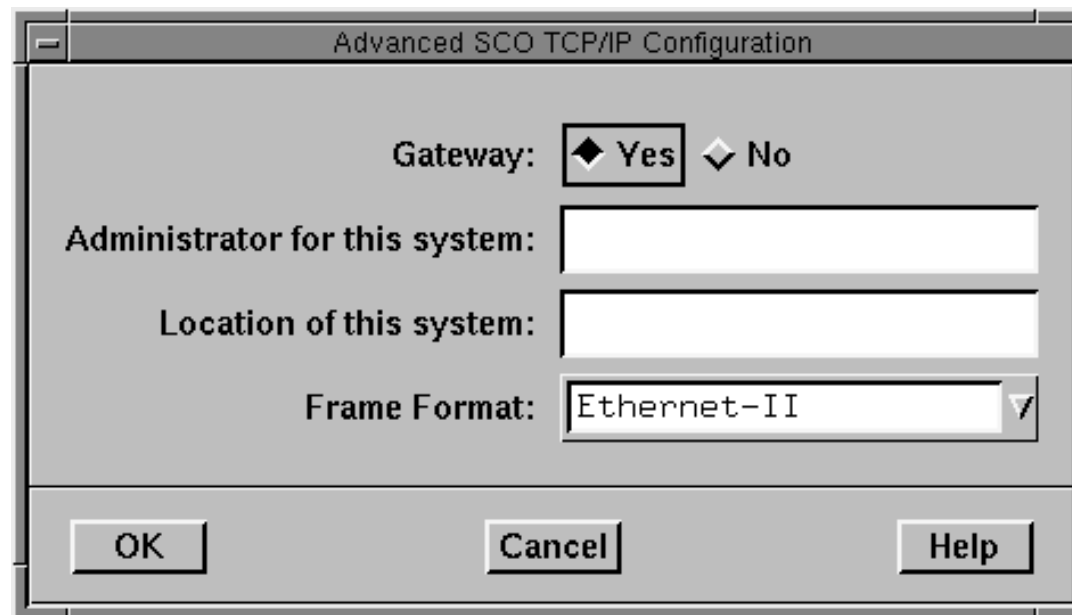
1



The image shows a screenshot of the 'SCO TCP/IP Configuration' dialog box. The dialog has a title bar with the text 'SCO TCP/IP Configuration'. Inside, there are several labeled text input fields: 'Local Host Name' with the value 'spider2', 'IP Address' with '150.200.76.7', 'Netmask' with '255.255.255.0', 'Broadcast Address' with '150.200.76.255', 'Domain Name' with 'somedom.com', 'TCP connections' with '1024', and 'Pseudo ttys' with '64'. To the right of these fields is a button labeled 'Advanced Options...'. At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'.

Local Host Name:	spider2	Advanced Options...
IP Address:	150.200.76.7	
Netmask:	255.255.255.0	
Broadcast Address:	150.200.76.255	
Domain Name:	somedom.com	
TCP connections:	1024	
Pseudo ttys:	64	
OK Cancel Help		

Advanced SCO TCP/IP Configuration



A screenshot of a Windows-style dialog box titled "Advanced SCO TCP/IP Configuration". The dialog box has a gray background and a standard window border with a title bar. Inside, there are four labels on the left and their corresponding input controls on the right. The "Gateway:" label is followed by two radio buttons, "Yes" (which is selected) and "No". The "Administrator for this system:" label is followed by a text input field. The "Location of this system:" label is followed by another text input field. The "Frame Format:" label is followed by a dropdown menu showing "Ethernet-II" with a small arrow icon on the right. At the bottom of the dialog box, there are three buttons: "OK", "Cancel", and "Help".

Advanced SCO TCP/IP Configuration

Gateway: ☒ Yes ☐ No

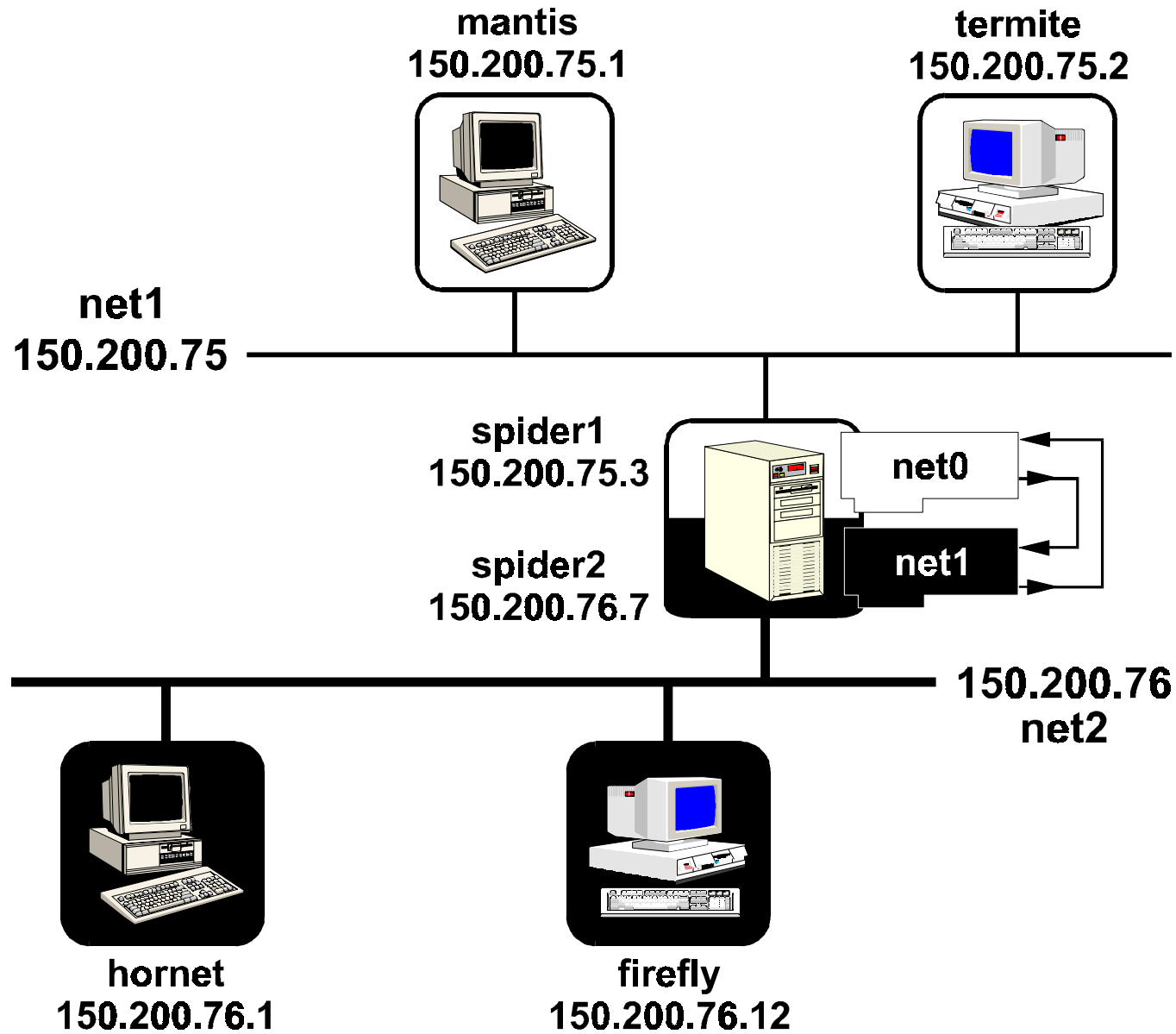
Administrator for this system:

Location of this system:

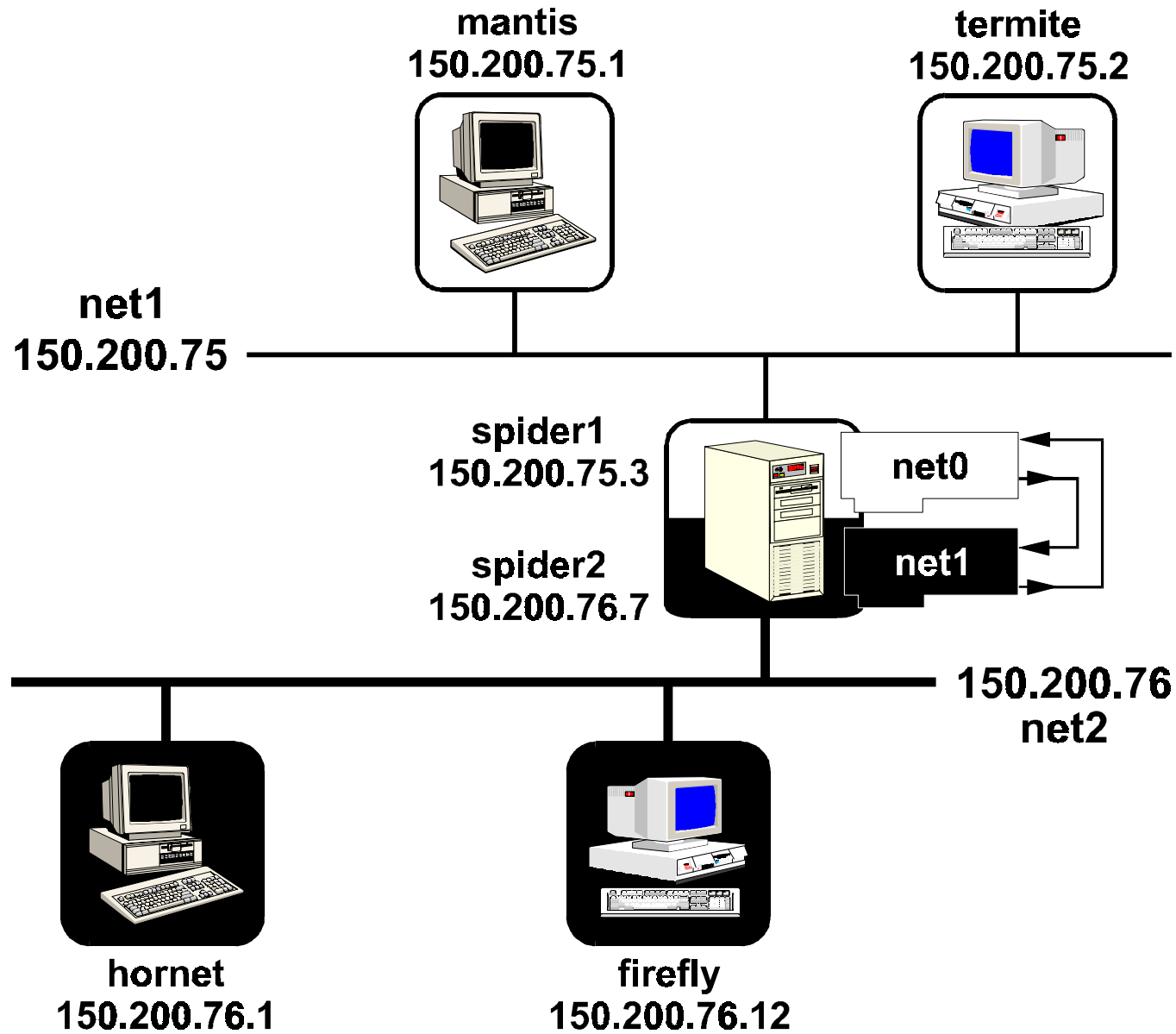
Frame Format: Ethernet-II ▾

OK Cancel Help

A Network Router



A Network Router



Kernel Routing Table on *mantis*

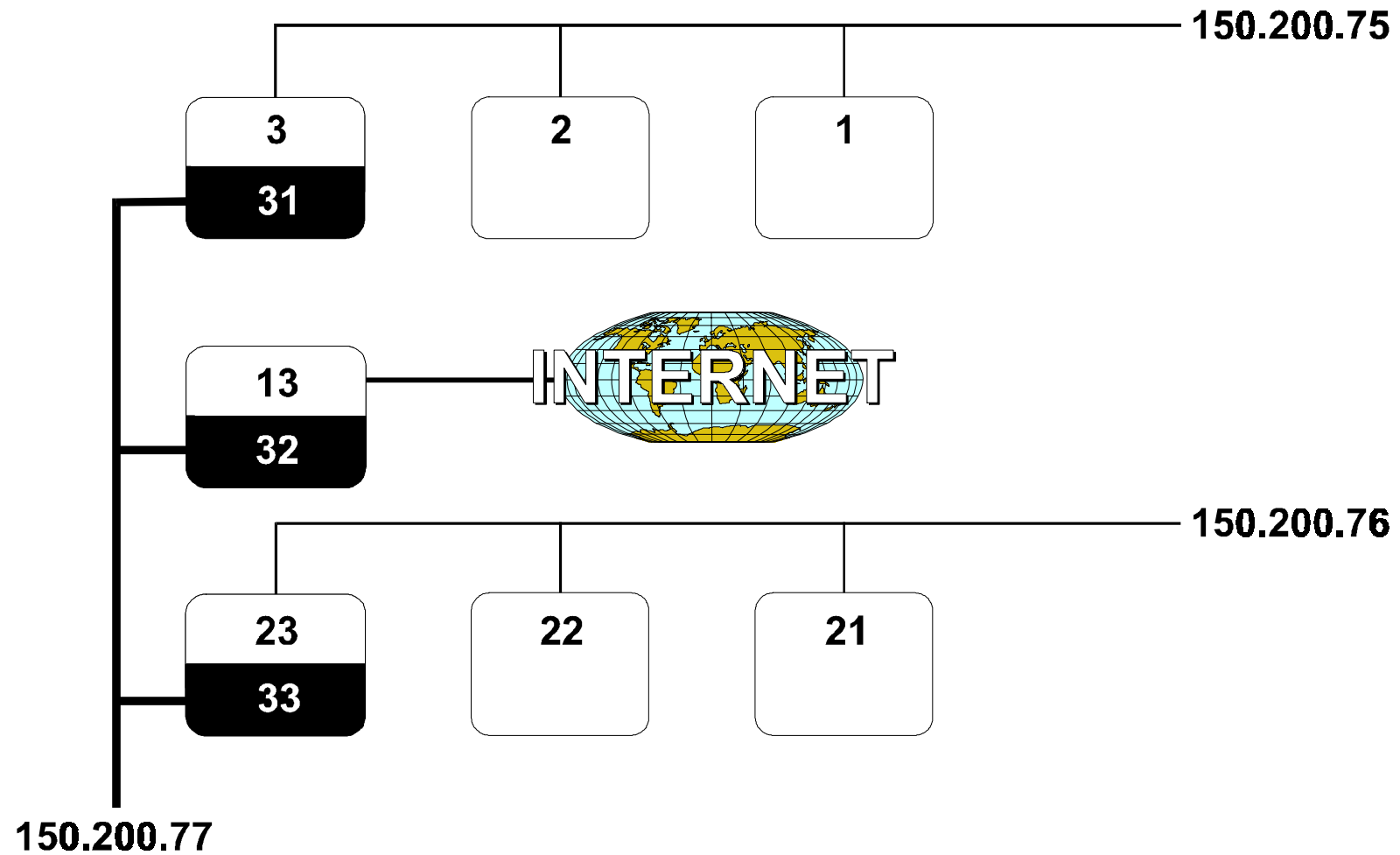
<u>Destination</u>	<u>Netmask</u>	<u>Gateway</u>	<u>Interface</u>
127.0.0.1	255.0.0.0	127.0.0.1	lo0
150.200.75.1	255.255.255.0	127.0.0.1	lo0
150.200.75	255.255.255.0	150.200.75.1	net0
150.200.76	255.255.255.0	150.200.75.3	net0
224	255.0.0.0	150.200.75.1	net0
default	N/A	150.200.75.3	net0

Routing table on *mantis*

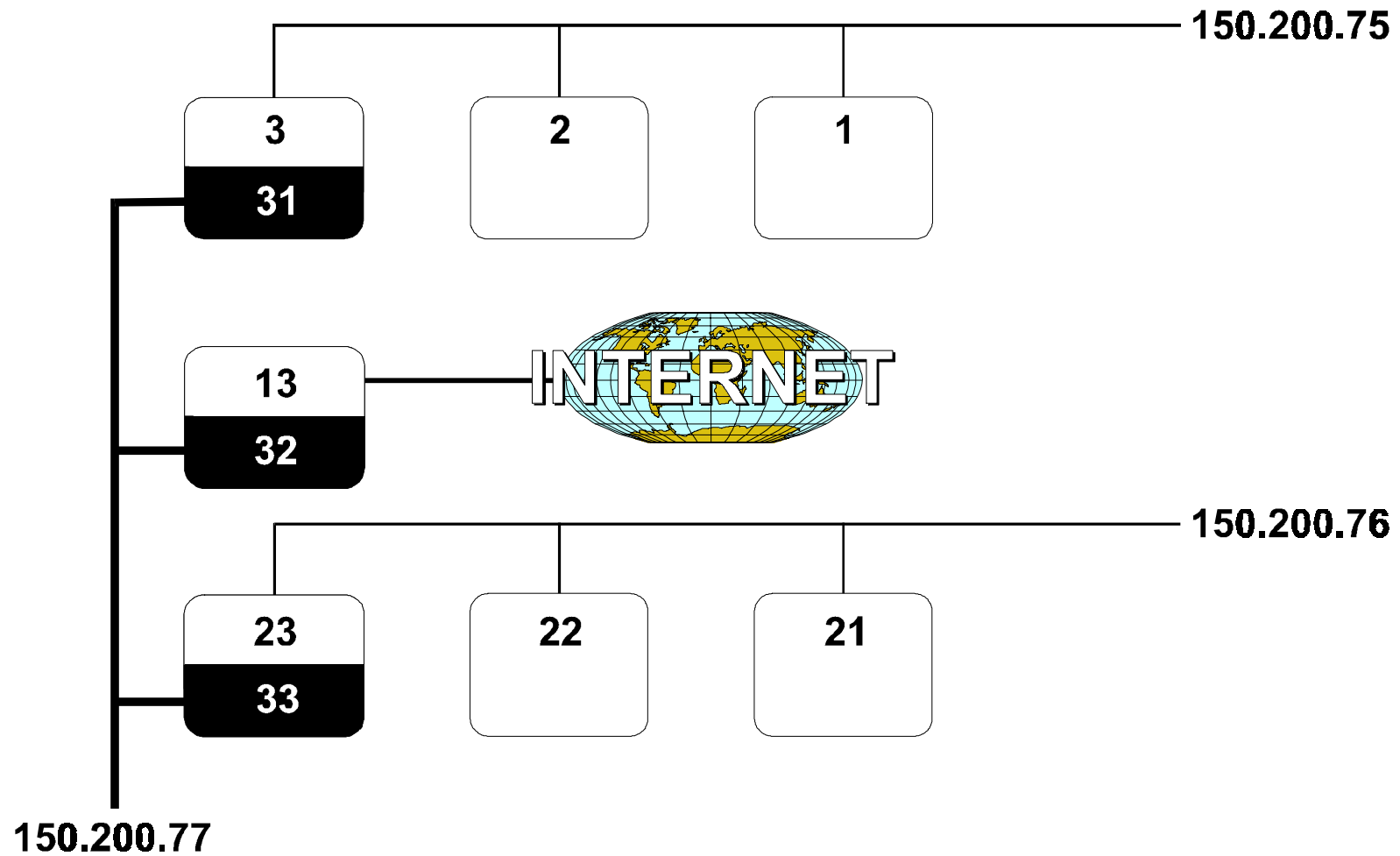
Routing tables

Destination	Gateway	Flags	Refs	Use	Interface
default	150.200.75.3	UGS	1	8443	net0
127.0.0.1	127.0.0.1	UH	2	351	lo0
150.200.75	150.200.75.1	UC	1	392	net0
150.200.76	150.200.75.3	UGS	0	0	net0
150.200.75.1	127.0.0.1	UGHS	4	1097	lo0
224	150.200.75.1	UGS	1	0	net0

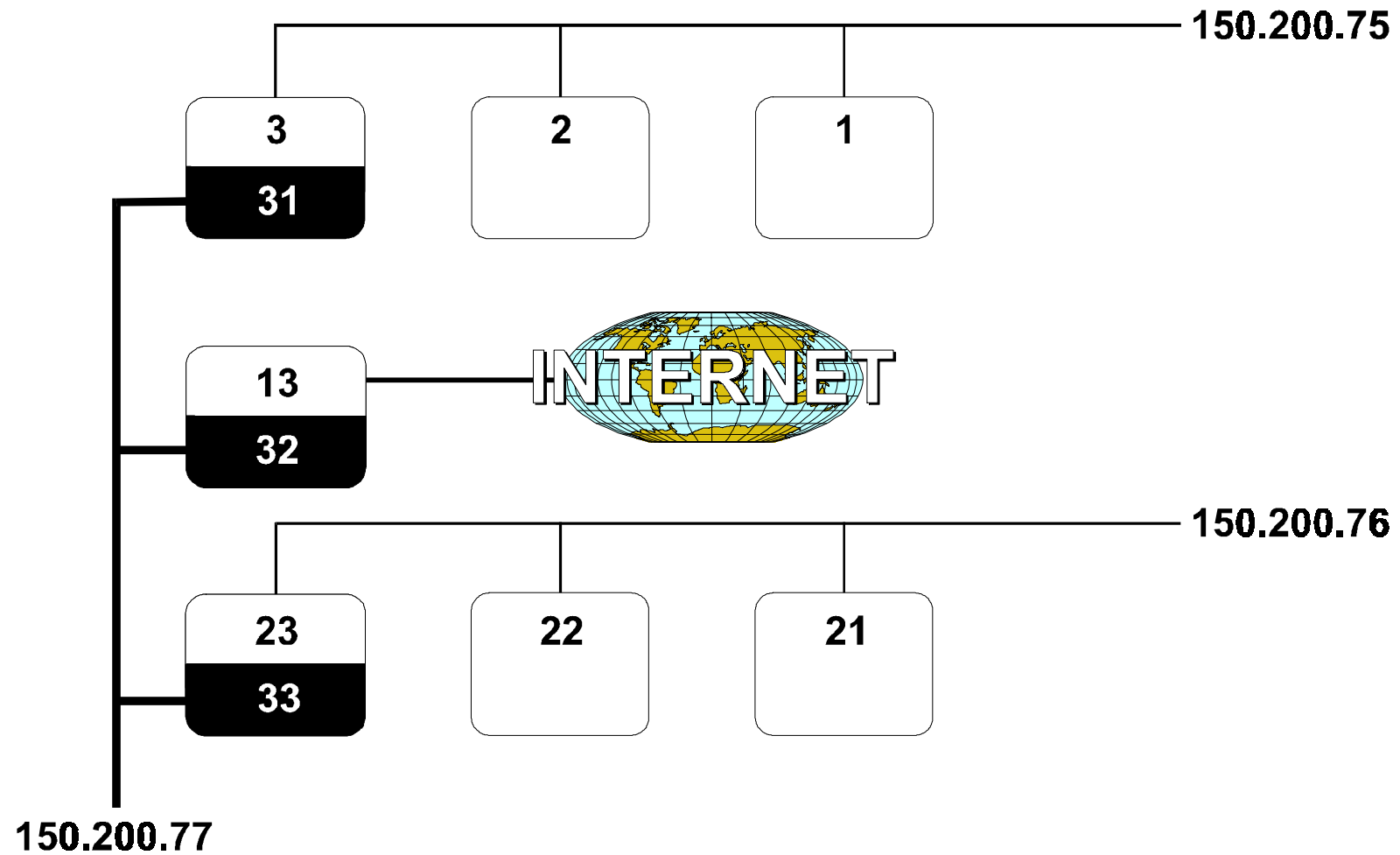
A Routing Backbone



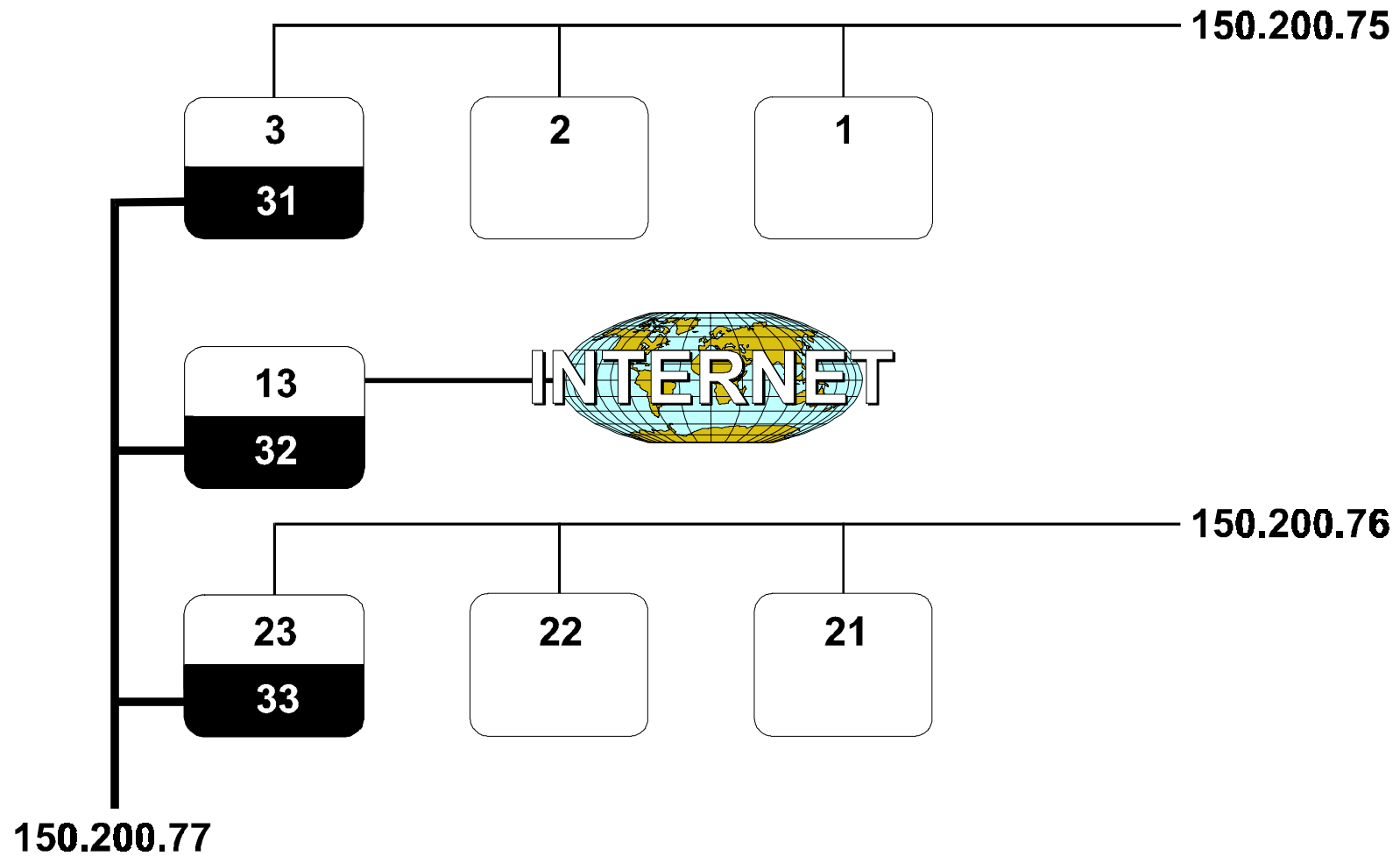
A Routing Backbone



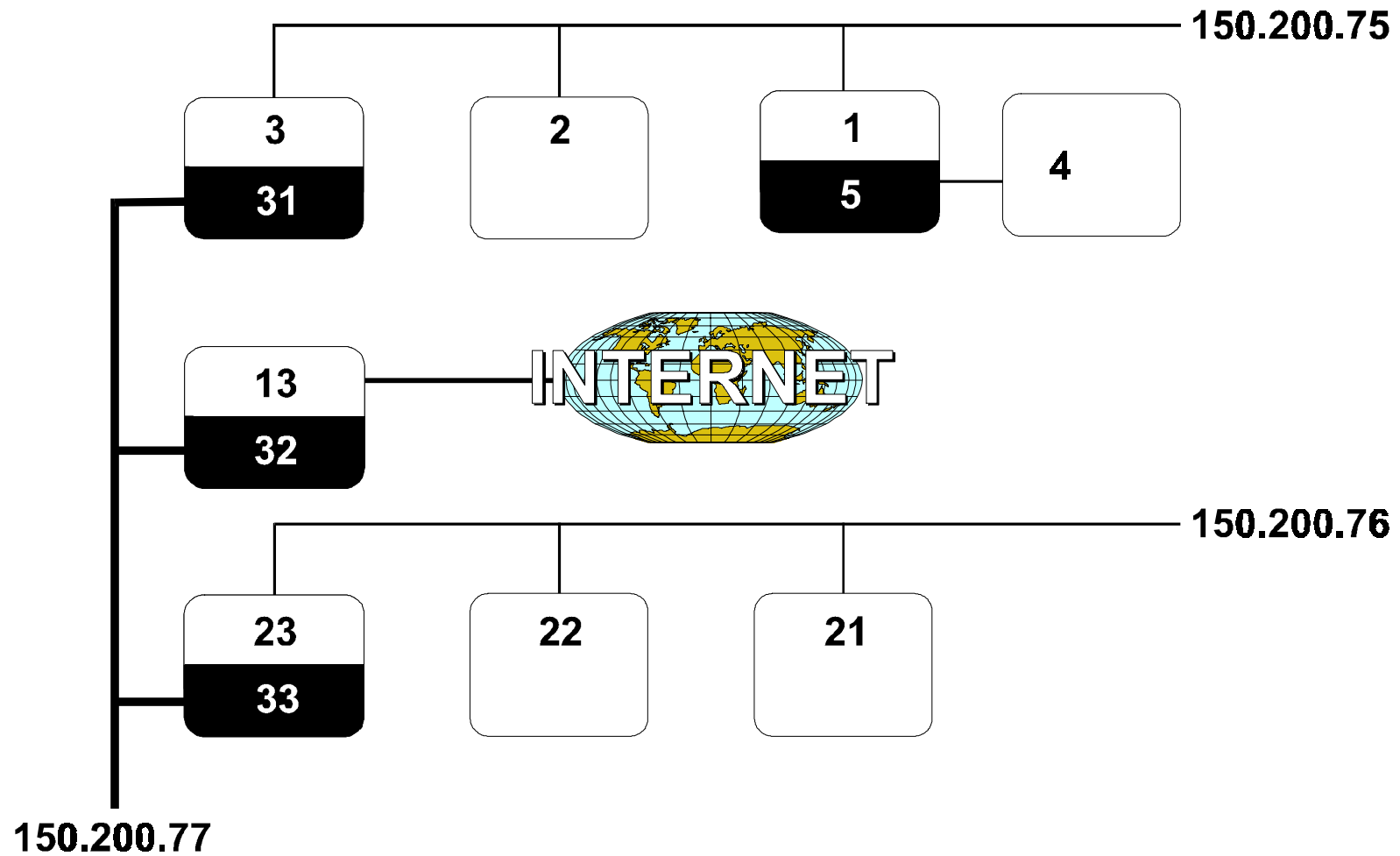
A Routing Backbone



A Routing Backbone



A Routing Backbone with PPP



The `/etc/gateways` File on Host 3/31

```
# cat /etc/gateways
net 0.0.0.0      gateway host32 metric 1 passive
host 150.200.75.4 gateway host1  metric 1 passive
```

The `/etc/gateways` File on host 3/31

```
# cat /etc/gateways
net 0.0.0.0      gateway host32 metric 1 passive
host 150.200.75.4 gateway host1  metric 1 passive
```

Configuring WAN Connections

- WAN interface types
- WAN protocols
- Configure the Point-to-Point Protocol (PPP)
- Configure SCO PPP
- Configure PPP from Morning Star
- Troubleshoot PPP

Modem Modulation Standards

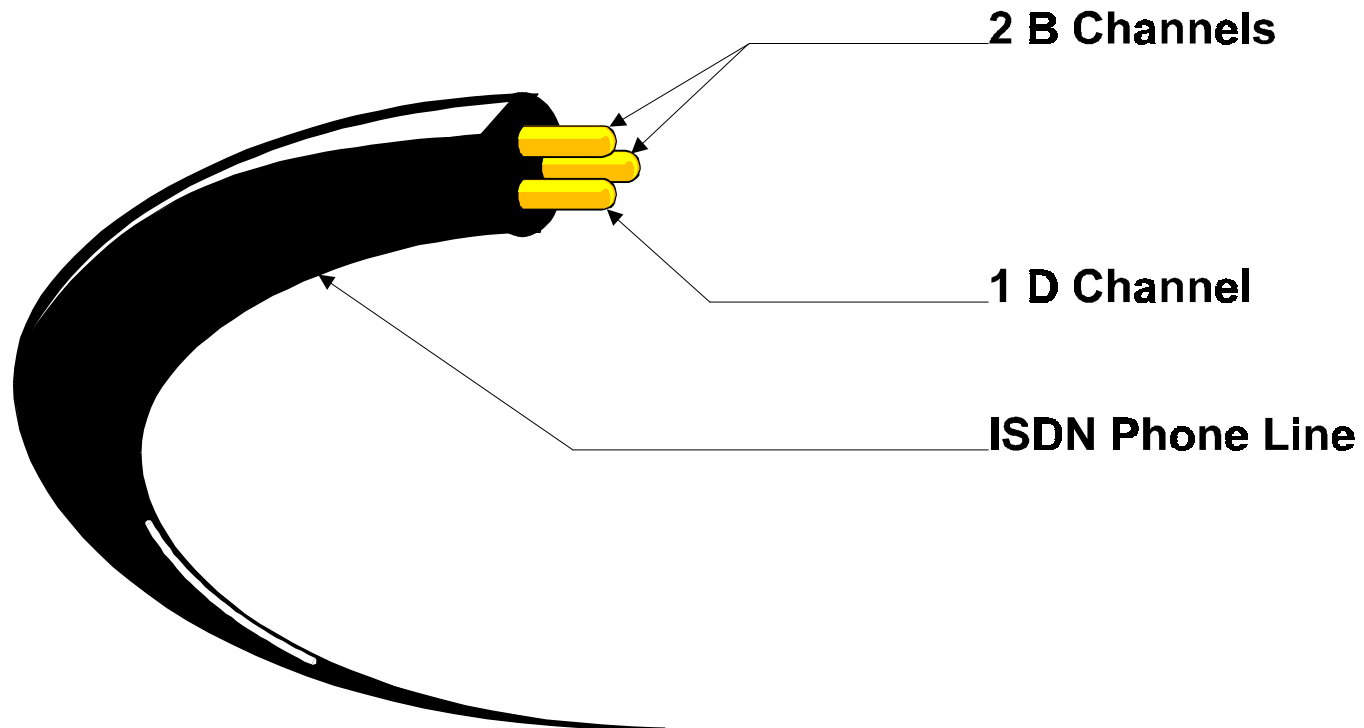
Modulation	Data Rate (bits/second)	Comments
Bell 103	300	
Bell 212A	1,200	
V.22	1,200	
V.22bis	2,400	
V.32	9,600	
V.32bis	14,400	
V.terbo	19,200	Pre-V.34 modulation with fewer features.
V.FC	28,800	
V.34	28,800	
V.34bis	33,600	
K56	56,000*	Proprietary modulation used by Rockwell & Lucent
X2	56,000*	Proprietary modulation used by 3COM
V.90	56,000*	New ITU Standard. Previously referred to as V.pcm.

(*) Achieve 56,000 bps only on downloads from specially configured providers, otherwise rate is 33,600 bps. The different modulations are incompatible.

Other Modem Standards

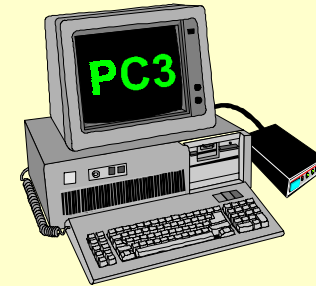
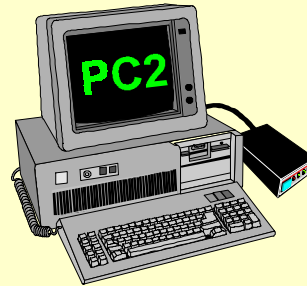
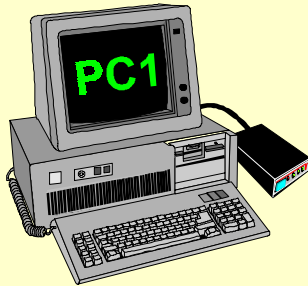
Standard	Comments
V.42 error detection and correction	Specifies LAPM error correction and can fall back to MNP 4 for compatibility.
V.42bis data compression	A ITU-T data compression standard. Most modems with V.42bis can fall back to MNP Class
V.17 fax modulation	Sends and receives faxes at 14,400 bps or slower if necessary.

ISDN Channels

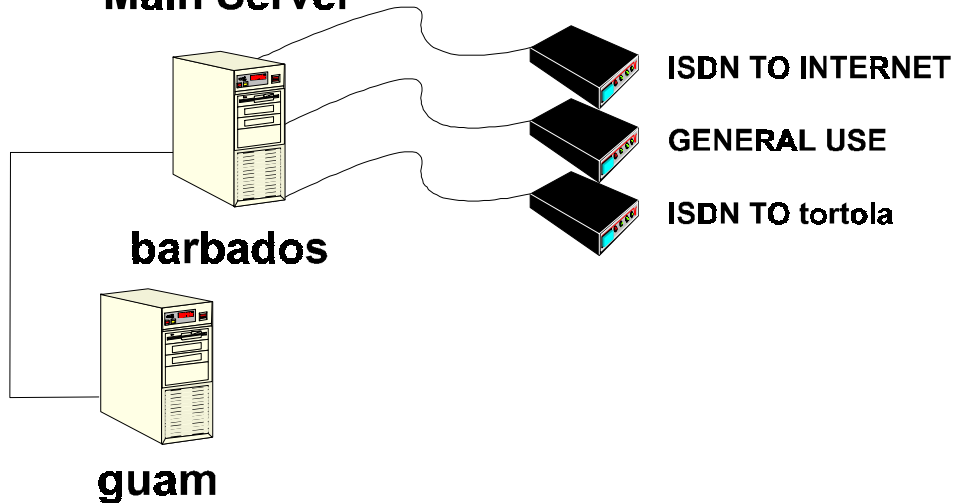


ISDN Topology

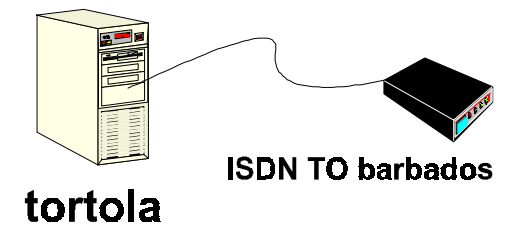
Remote Windows Workstations



SCO OpenServer Main Server



SCO OpenServer Remote Server



Leased Line Speeds in North America and Japan

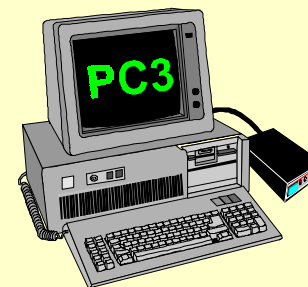
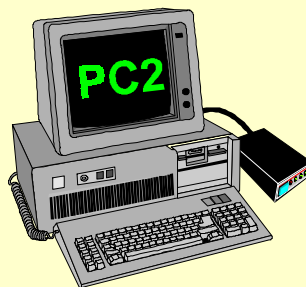
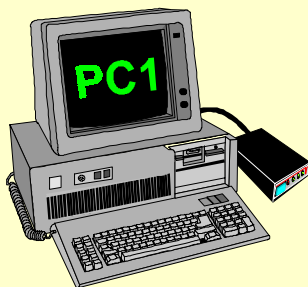
Common Name	Official Name	Description	Throughput
T1	DS1	24 64Kbps voice lines multiplexed together	1.5Mbps
T2	DS2	4 T1 lines multiplexed together	6.3Mbps
T3	DS3	7 T2 lines multiplexed together	45Mbps
T4	DS4	6 T3 lines multiplexed together	274Mbps
Fractional T1	FT1	Any integer multiple, up to 23, of 64Kbps voice lines multiplexed together	64Kbs * the number of lines
Fractional T2	FT3	Any integer multiple, up to 27, of 1.5Mbps T1 lines multiplexed together	1.5Mbs * the number of lines

Leased Line Speeds Elsewhere in the World

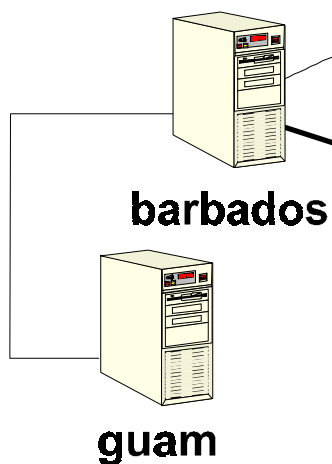
Official Name	Description	Throughput
E1	30 64Kbps voice lines multiplexed together	2.048Mbps
E2	4 E1 lines multiplexed together	8.448Mbps
E3	4 E2 lines multiplexed together	34.368Mbps
E4	4 E3 lines multiplexed together	139.264Mbps
E5	4 E4 lines multiplexed together	565.148Mbps
Fractional E1	Any integer multiple, up to 29, of 64Kbps voice lines multiplexed together	64Kbs * the number of lines
Fractional E2	Any integer multiple, up to 3, of E1 lines multiplexed together	2.048Mbs * the number of lines

Frame Relay Topology

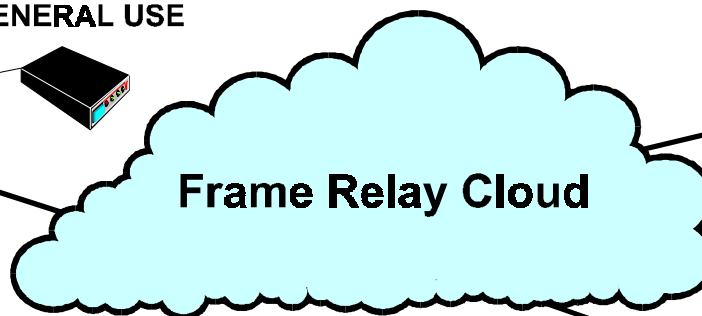
Remote Windows Workstations



SCO OpenServer Main Server



GENERAL USE

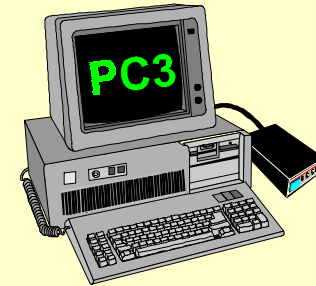
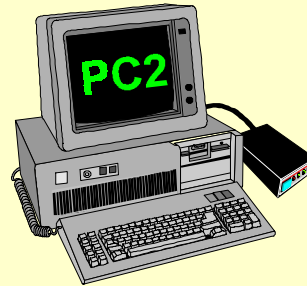
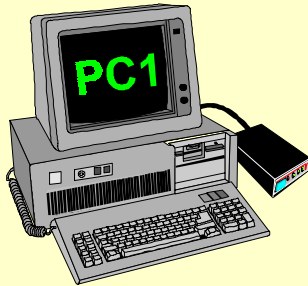


SCO OpenServer Remote Server

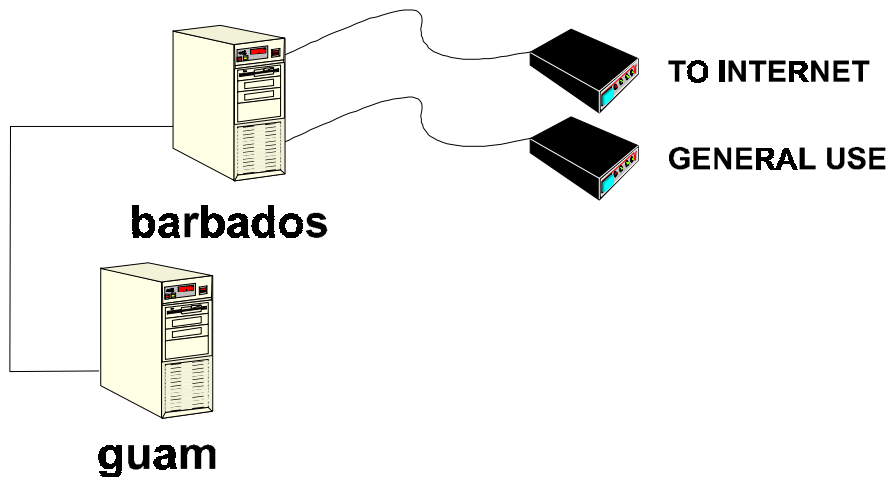


Example PPP Topology

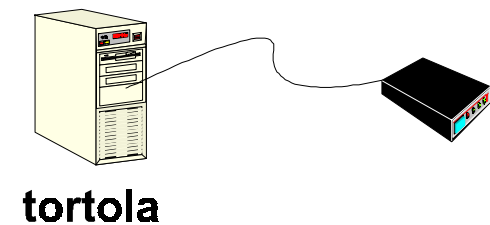
Remote Windows Workstations



SCO OpenServer Main Server



SCO OpenServer Remote Server



PPP File Usage

Outgoing PPP request detected



pppd contacted to make connection



**pppd looks in the *ppphostsfile*
gets remote systems UUCP name**



/etc/ppphosts



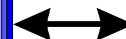
**UUCP subsystem invoked, looks in
Systems file, gets phone number, ...**



/usr/lib/uucp/Systems

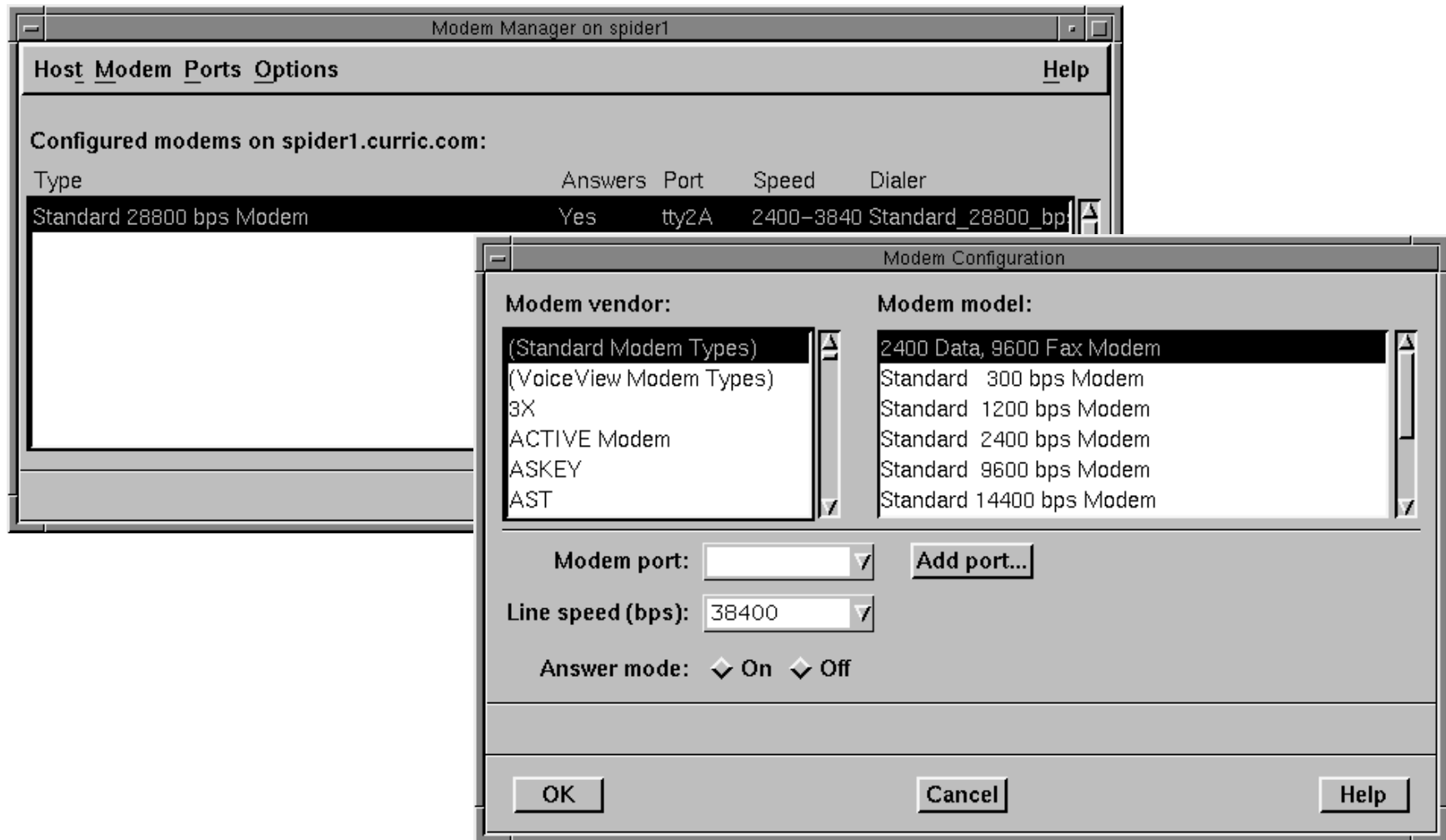


**UUCP looks in *Devices* file to select
tty line and invoke Dialer**



/usr/lib/uucp/Devices

Modem Manager

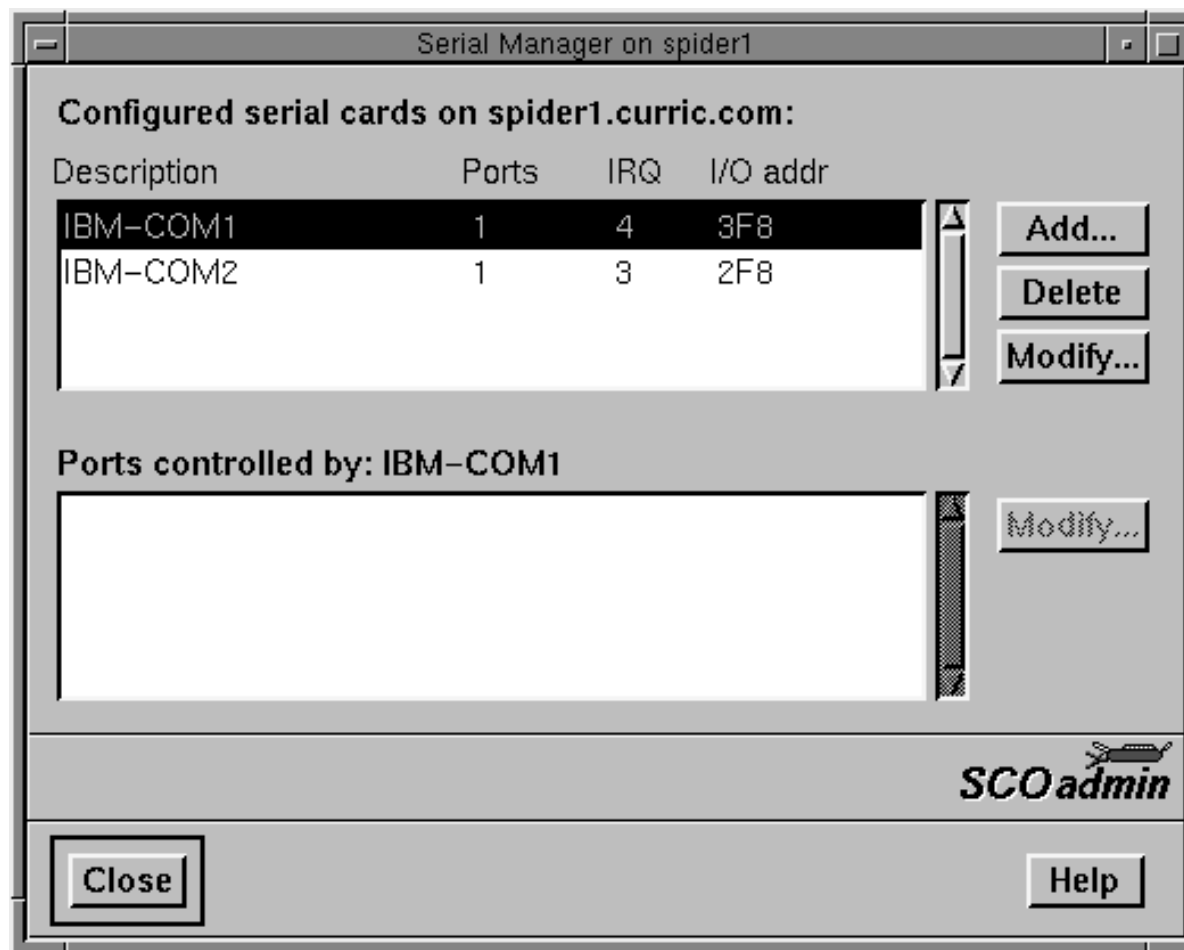


Modem Manager

Host Modem Ports Options					Help
Configured modems on spider1.curric.com:					
Type	Answers	Port	Speed	Dialer	
Standard 28800 bps Modem	Yes	tty2A	2400-3840	Standard_28800_bp	

SCOadmin

Serial Manager



/etc/inittab Entries

Modem on COM1 configured to answer incoming calls:

```
Se1a:234:off:/etc/getty tty1a m  
Se1A:234:respawn:/etc/getty -t60 tty1A o
```

Modem on COM2 configured for outgoing calls only:

```
Se2a:234:off:/etc/getty tty1a m  
Se2A:234:off:/etc/getty -t60 tty1A o
```

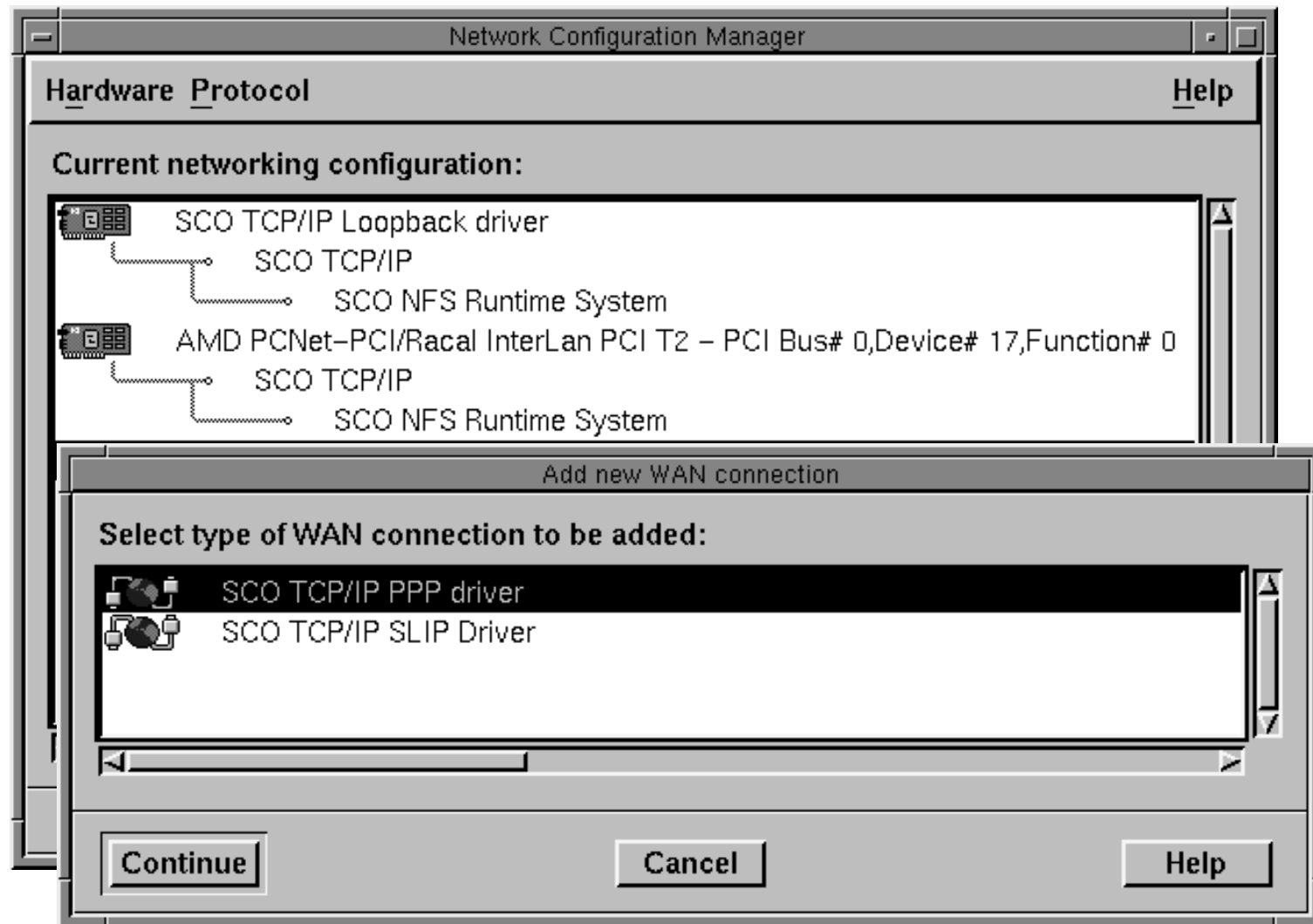
The */usr/lib/uucp/Devices* File

```
#  @(#) Devices 25.2 93/06/30
#
#...
ACU tty2A - 38400 Standard_28800_bps_Modem
```

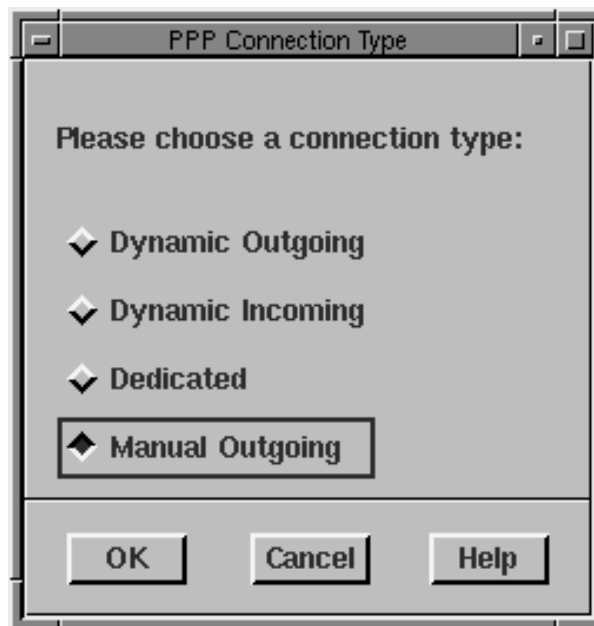
The */usr/lib/uucp/Systems* File

```
#  @(#) Systems 73.1 98/06/30
#
#...
isp Any ACU 38400 19015551234  ogin: nppp sword:Ka9Qyes!
```

The Network Configuration Manager



PPP Connection Type



Manual Outgoing Link Configuration

PPP Link Reconfiguration

Attach name: [Advanced Options...](#)

Local host name:

Host IP address:

Destination name:

Destination IP address:

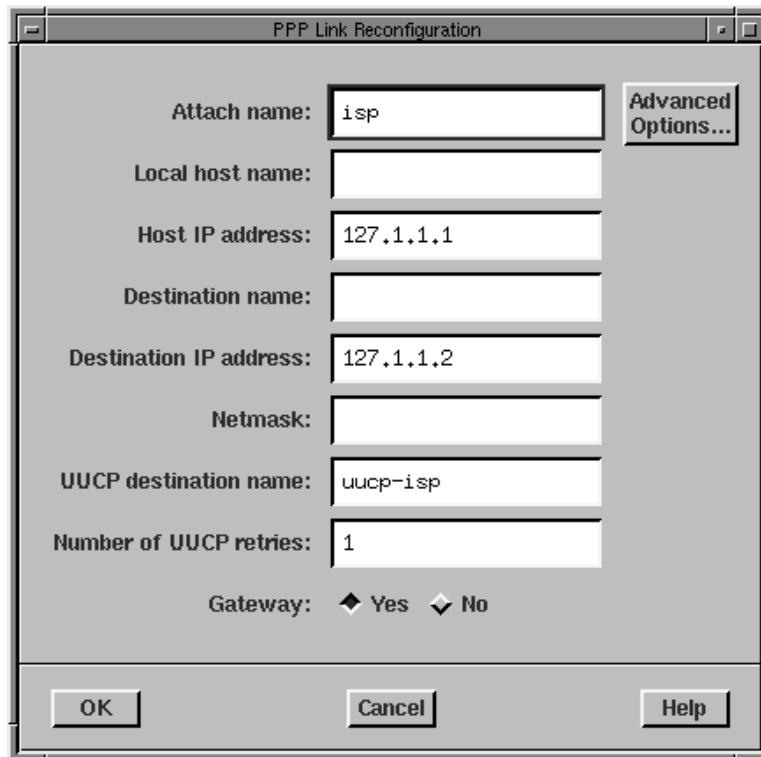
Netmask:

UUCP destination name:

Number of UUCP retries:

Gateway: ☒ Yes ☐ No

Manual Outgoing Link



The image shows a 'PPP Link Reconfiguration' dialog box. It contains several input fields and a 'Gateway' section. The fields are: 'Attach name' (isp), 'Local host name' (empty), 'Host IP address' (127.1.1.1), 'Destination name' (empty), 'Destination IP address' (127.1.1.2), 'Netmask' (empty), 'UUCP destination name' (uucp-isp), and 'Number of UUCP retries' (1). There is an 'Advanced Options...' button to the right of the 'Attach name' field. The 'Gateway' section has two radio buttons: 'Yes' (selected) and 'No'. At the bottom are 'OK', 'Cancel', and 'Help' buttons.

Attach name:	isp	Advanced Options...
Local host name:		
Host IP address:	127.1.1.1	
Destination name:		
Destination IP address:	127.1.1.2	
Netmask:		
UUCP destination name:	uucp-isp	
Number of UUCP retries:	1	
Gateway:	☒ Yes ☐ No	
OK Cancel Help		

/etc/ppphosts

```
127.1.1.1:127.1.1.2 attach=isp uucp=uucp-isp retry=2
```

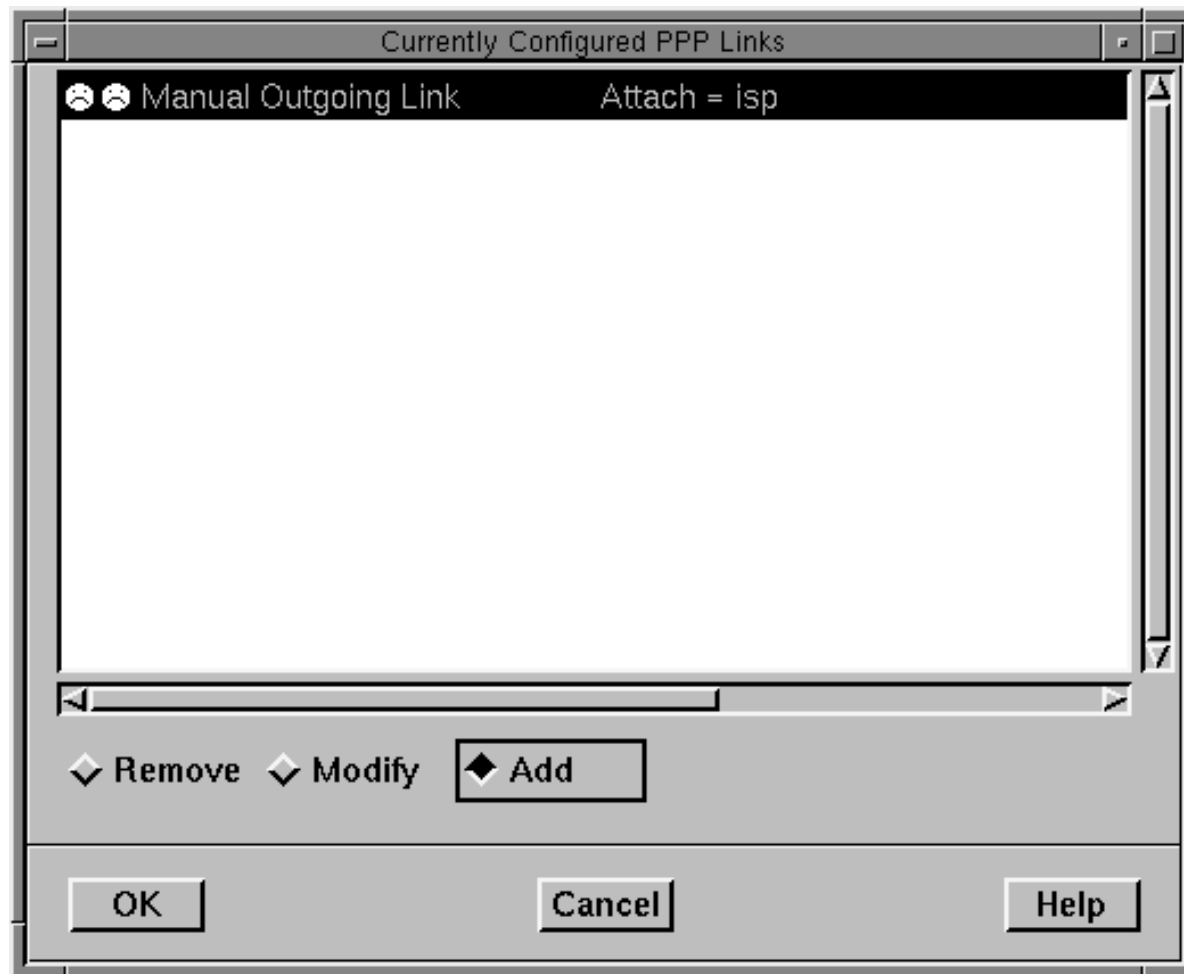
/usr/lib/uucp/Systems

```
uucp-isp Any ACU 38400 nnnnnnn login:nppp sword:Ka9yes!
```

/usr/lib/uucp/Devices

```
ACU tty1A - 38400 Standard_28800_bps_Modem
```

Add PPP Links

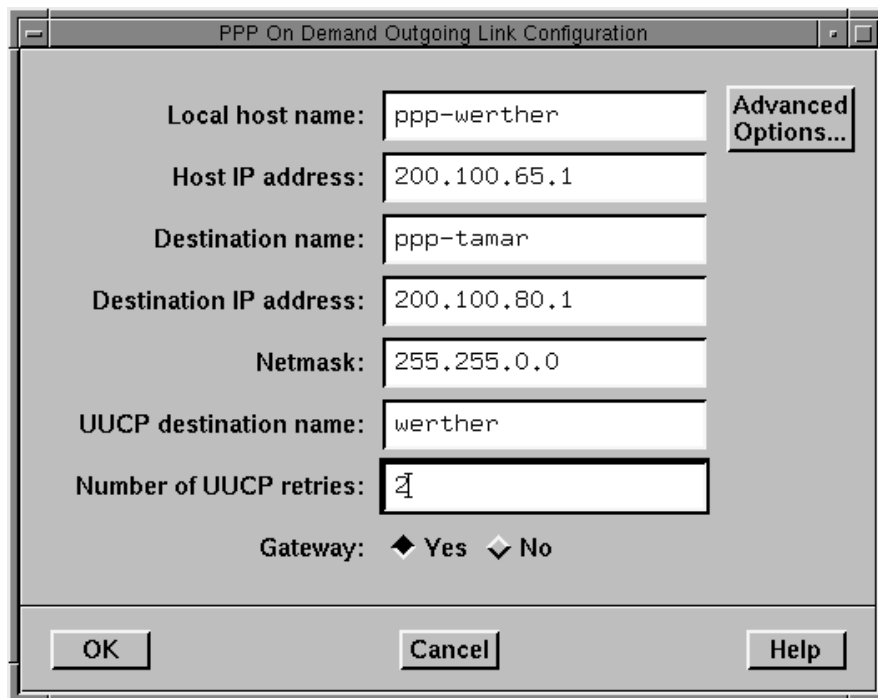


Dynamic Outgoing Link Configuration

PPP On Demand Outgoing Link Configuration

Local host name:	ppp-werther	Advanced Options...
Host IP address:	200.100.65.1	
Destination name:	ppp-tamar	
Destination IP address:	200.100.80.1	
Netmask:	255.255.0.0	
UUCP destination name:	werther	
Number of UUCP retries:	4	
Gateway:	☒ Yes ☐ No	

Dynamic Outgoing Link



The image shows a window titled "PPP On Demand Outgoing Link Configuration". It contains several input fields and a button. The fields are: "Local host name:" with "ppp-werther", "Host IP address:" with "200.100.65.1", "Destination name:" with "ppp-tamar", "Destination IP address:" with "200.100.80.1", "Netmask:" with "255.255.0.0", "UUCP destination name:" with "werther", and "Number of UUCP retries:" with "2". There is an "Advanced Options..." button to the right of the first three fields. At the bottom, there is a "Gateway:" section with radio buttons for "Yes" (selected) and "No". At the very bottom are "OK", "Cancel", and "Help" buttons.

Local host name:	ppp-werther	Advanced Options...
Host IP address:	200.100.65.1	
Destination name:	ppp-tamar	
Destination IP address:	200.100.80.1	
Netmask:	255.255.0.0	
UUCP destination name:	werther	
Number of UUCP retries:	2	
Gateway: ☒ Yes ☐ No		
OK Cancel Help		

/etc/ppphosts

```
ppp-tamar:ppp-werther uucp=werther retry=2 mask=255.255.0.0
```

/etc/hosts

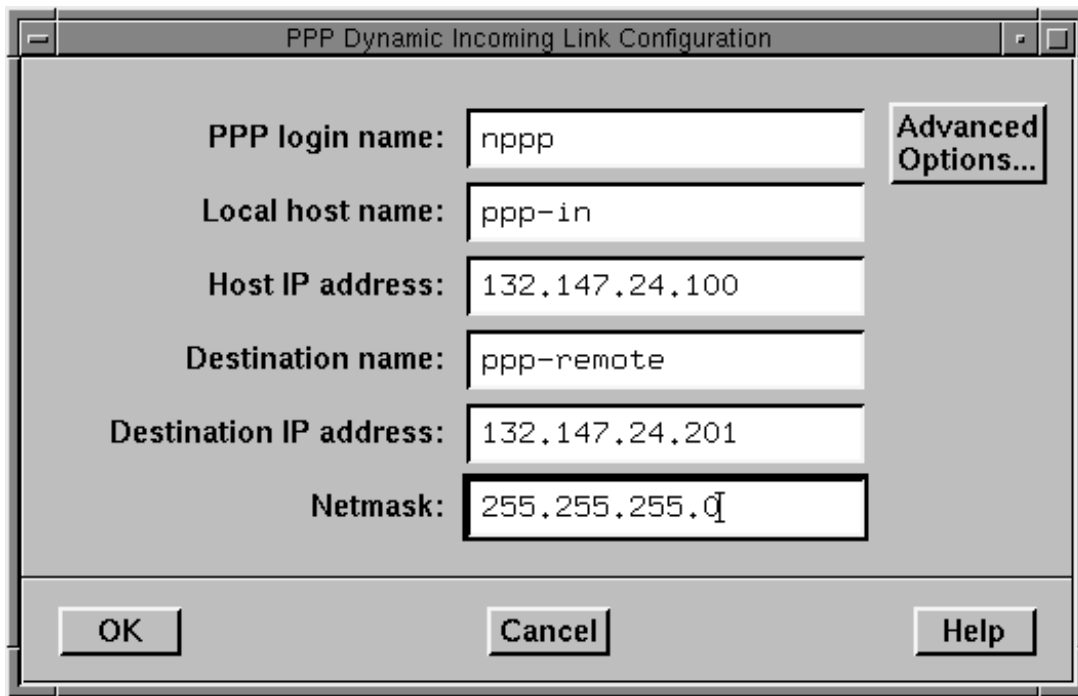
```
200.100.65.1    ppp-werther
200.100.65.2    ppp-tamar
```

Dynamic Incoming Link Configuration

PPP Dynamic Incoming Link Configuration

PPP login name:	nppp	Advanced Options...
Local host name:	ppp-in	
Host IP address:	132.147.24.100	
Destination name:	ppp-remote	
Destination IP address:	132.147.24.201	
Netmask:	255.255.255.0	

Dynamic Incoming Link



The image shows a window titled "PPP Dynamic Incoming Link Configuration". It contains several text input fields with labels to their left: "PPP login name:" with the value "nppp", "Local host name:" with "ppp-in", "Host IP address:" with "132.147.24.100", "Destination name:" with "ppp-remote", "Destination IP address:" with "132.147.24.201", and "Netmask:" with "255.255.255.0". To the right of these fields is a button labeled "Advanced Options...". At the bottom of the window are three buttons: "OK", "Cancel", and "Help".

PPP login name:	nppp
Local host name:	ppp-in
Host IP address:	132.147.24.100
Destination name:	ppp-remote
Destination IP address:	132.147.24.201
Netmask:	255.255.255.0

Advanced Options...

OK Cancel Help

/etc/ppphosts

```
*nppp local=ppp-in remote=ppp-remote
```

/etc/hosts

```
132.147.24.100    ppp-in
132.147.24.201    ppp-remote
```

Dedicated Link Configuration

PPP Static Link Configuration

Tty line for PPP: [Advanced Options...](#)

Baud rate for /dev/tty1a:

Local host name:

Host IP address:

Destination name:

Destination IP address:

Netmask:

Gateway: ☒ Yes ☐ No

Advanced Options

Advanced PPP Static Link Configuration

Debug level: ☒ 0 ☐ 1 ☐ 2

Tag for */etc/pppfilter*:

Inactivity timeout (minutes):

Async. control character map (hex.):

Line flow control: ☒ none ☐ xonxoff ☐ rtscts

Protocol field compression: ☒ Yes ☐ No

Address-control field compression: ☒ Yes ☐ No

IP address negotiation: ☒ Yes ☐ No

Old IP address negotiation: ☐ Yes ☒ No

Van Jacobson TCP header compression: ☒ Yes ☐ No

Old PPP compatibility: ☐ Yes ☒ No

Authentication protocol: ☒ none ☐ PAP ☐ CHAP

Authentication timeout (minutes):

Local host ID:

Local host password:

OK Cancel Help

Dedicated Link Configuration Files

/etc/ppphosts

```
ppp-paris:ppp-rome staticdev=/dev/tty1a speed=38400  
mask=255.255.0.0 auth=pap name=rome
```

/etc/pppauth

```
*rome 135zyx
```

/etc/hosts

```
132.147.246.77    ppp-rome  
132.147.118.55   ppp-paris
```

Advanced Options

Advanced PPP Static Link Configuration

Debug level: ☒ 0 ☐ 1 ☐ 2

Tag for /etc/pppfilter:

Inactivity timeout (minutes):

Async. control character map (hex.):

Line flow control: ☒ none ☐ xonxoff ☐ rtcts

Protocol field compression: ☒ Yes ☐ No

Address-control field compression: ☒ Yes ☐ No

IP address negotiation: ☒ Yes ☐ No

Old IP address negotiation: ☐ Yes ☒ No

Van Jacobson TCP header compression: ☒ Yes ☐ No

Old PPP compatibility: ☐ Yes ☒ No

Authentication protocol: ☒ none ☐ PAP ☐ CHAP

Authentication timeout (minutes):

Local host ID:

Local host password:

OK Cancel Help

The Internet Manager



Outbound PPP Connection - Morning Star

Netscape: SCO Internet Manager: ADD NEW PPP DIAL-OUT

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

Bookmarks Location:

Members WebMail Connections BizJournal SmartUpdate Mktplace

Internet Manager 

Create new PPP dial-out connection:

Local PPP IP address: ☒ Dynamic

Remote PPP IP address: ☒ Dynamic

Remote PPP account login name:

Remote PPP account password:

Remote PPP account password (again):

Remote phone number:

Modem and connection type:

Connect via: ☒ Direct serial line ☒ Modem

Connection times out in: seconds

Dial at boot time and maintain link? ☒ Yes ☒ No



Outbound PPP Connection - Morning Star (Continued)

Netscape: SCO Internet Manager: ADD NEW PPP DIAL-OUT

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

Bookmarks Location: <http://localhost:615/mana/mana>

Members WebMail Connections BizJournal SmartUpdate Mktplace

Modem type:

- Generic Hayes 2400
- Generic US Robotics
- Hayes ISDN Adapter, 56Kbps
- Hayes ISDN Adapter, 64Kbps
- Hayes Smartmodem 9600V

Optional security information:
Chat scripts are modified on the Advanced PPP connections page.

PAP/CHAP name:

PAP/CHAP secret:

PAP/CHAP secret (again):

Address parsing information:

Netmask for PPP connection:

Connection information:

Debugging level:

Outgoing PPP Connection - Morning Star Configuration Files

/usr/lib/mstppp/Autostart

```
/usr/lib/mstppp/dialout 127.0.0.2~:127.0.0.3~ auto exec  
/usr/lib/mstppp/exec.dialout netmask 255.255.0.0 idle 60
```

/usr/lib/mstppp/Systems

```
hayes2400 tty1A 38400
```

/usr/lib/mstppp/Autostart

```
127.0.0.3 Any;5 ACU 38400 18005556666 "" "" ogin:--login:  
\ppp-paris1 word: \q1Q8kyes!
```

Inbound PPP Connection - Morning Star

Netscape: SCO Internet Manager: ADD NEW PPP DIAL-IN

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

Bookmarks Location:

Members WebMail Connections BizJournal SmartUpdate Mktplace

Internet Manager 

Create new PPP dial-in connection:

Local PPP account login name:

Local PPP account password:

Enter password again:

Local PPP IP address:

Remote PPP IP address: ☐ Dynamic

Seconds until connection times out:

Optional security information:

PAP/CHAP name:

PAP/CHAP secret:

100% 

Inbound PPP Connection - Morning Star Configuration Files

/usr/lib/mstppp/Accounts

```
pppshan 200.100.50.10:200.100.50.100~ exec  
/usr/lib/mstppp/exec.dialin netmask 255.255.255.0
```

TCP/IP Administration Topics

- TCP/IP startup
- Daemon startup
- Configuring trusted access

Overview of */etc/tcp*

- Initializes STREAMS and sockets
- Configures network interfaces
- Sets the host name
- Starts network daemons
- Reverses initialization process during shutdown

Example ifconfig(ADMN) Commands

Configuring Interfaces:

```
# /etc/ifconfig lo0 127.0.0.1 perf 57344 57344 1
# /etc/ifconfig -p net0 200.100.50.1 netmask 255.255.255.0 \
> broadcast 200.100.50.255 perf 24576 24576 1
```

Listing Interfaces:

```
# /etc/ifconfig -a
net1: flags=4043<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 200.100.50.2 netmask ffffffff broadcast 200.100.50.255
    perf. params: recv size: 24576; send size: 24576; full-size frames: 1
    ether 00:00:c0:83:47:8f
lo0: flags=4049<UP,LOOPBACK,RUNNING,MULTICAST> mtu 8232
    inet 127.0.0.1 netmask ff000000
    perf. params: recv size: 57344; send size: 57344; full-size frames: 1
ppp0: flags=4071<UP,POINTOPOINT,WANTIOCTLS,RUNNING,MULTICAST> mtu 1500
    inet 200.100.50.3 --> 200.100.50.200 netmask ffffffff
    perf. params: recv size: 4096; send size: 8192; full-size frames: 1
```

Bringing interfaces down and back up:

```
# /etc/ifconfig ppp0 down
# /etc/ifconfig ppp0 up
```

Multiuser Daemons

Always started:

- **inetd**

Started if configuration file is present:

- **pppd**
- **snmpd**
- **named**
- **gated**
- **xntpd**
- **lpd**

Started if configuration file for alternative is not present:

- **routed**

Started if uncommented and configuration file is present:

- **irdd**
- **timed**
- **rwhod**
- **rarpd**

The *inetd.conf* File

```
# service sock_type proto nowait user  program      program_args

ftp      stream  tcp    nowait root    /etc/ftpd    ftpd
telnet   stream  tcp    nowait NOLUID  /etc/telnetd telnetd
shell    stream  tcp    nowait NOLUID  /etc/rshd    rshd
#tftp    dgram   udp    wait   nouser  /etc/tftpd    tftpd
#tftp    dgram   udp    wait   nouser  /etc/tftpd    tftpd -s /tftpboot
pop3     stream  tcp    nowait root    /etc/popper  popper -M
bootps   dgram   ucp    wait   root    /etc/bootpd   bootpd
```

TCP/IP Utilities and r-Commands

- rlogin** Allows users to log into a remote host. If trusted access is set up, no password is needed, otherwise a password is needed.
- rcp** Allows users to copy files from one host to another. Requires trusted access.
- rcmd** Allows users to execute commands on remote hosts. Requires trusted access.
- telnet** Similar to rlogin, only a user name and password are almost always required, and trusted access is not consulted
- ftp** Similar to rcp, only a user name and password is always required and trusted access is not consulted

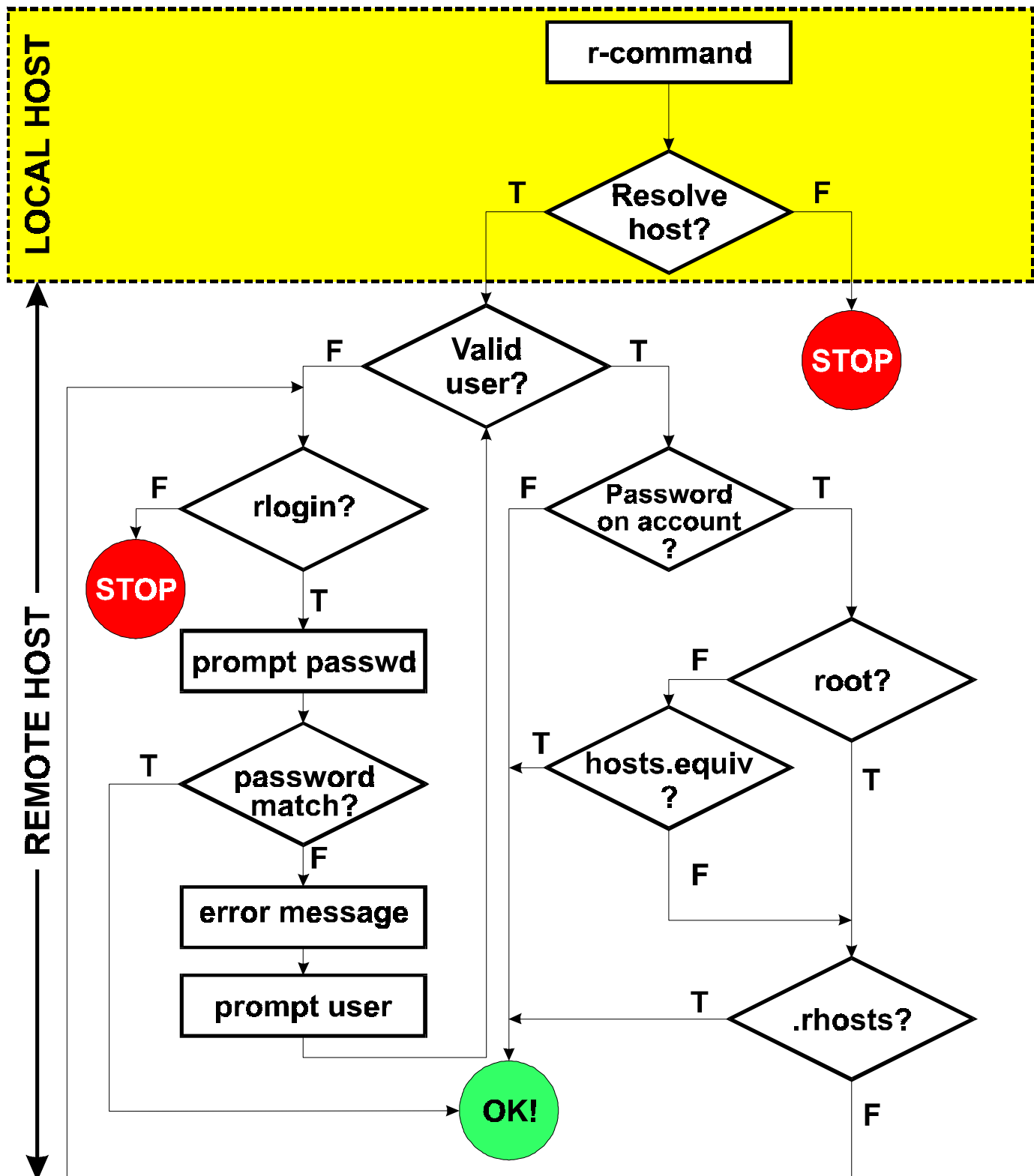
Example */etc/hosts.equiv* File on *corfu*

```
barbados  
tortola  bob  
guam
```

Example `.rhosts` File For User **jane** On Host *corfu*

```
barbados  
tortola  bob  
guam
```

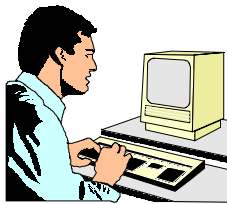
Trusted Access Sequence



Network Administrator's Account Log

LOGIN	REAL NAME	UID	<i>tortola</i>	<i>guam</i>	<i>barbados</i>	<i>name...</i>
bobb	Bob Byte	990	✓	✓	✓	✓
daven	Dave Network	10057	✓	✓		
ellene	Ellen Ethernet	7431	✓		✓	
karenc	Karen Config	13116	✓		✓	
ricko	Rick Octet	4429	✓	✓		

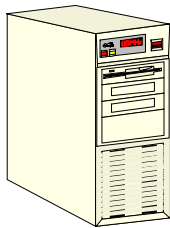
Two Users with Same Login Name



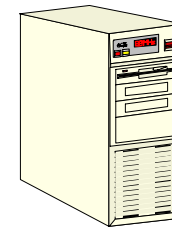
Bob Barker
login: bbarker



Barbara Barker
login: bbarker



kilgore



trout

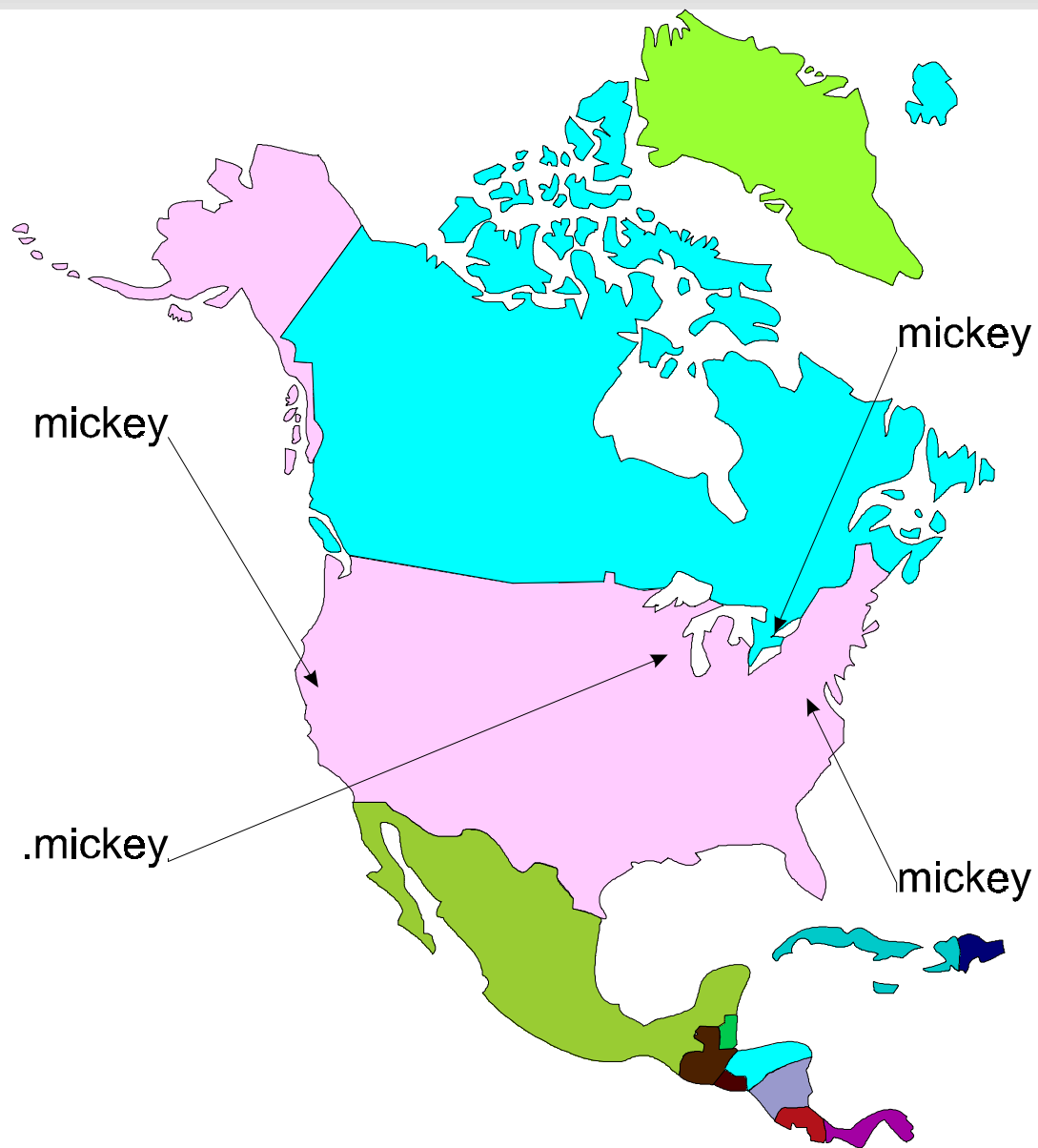
/etc/hosts.equiv

```
trout  
smelt  
tarpin
```

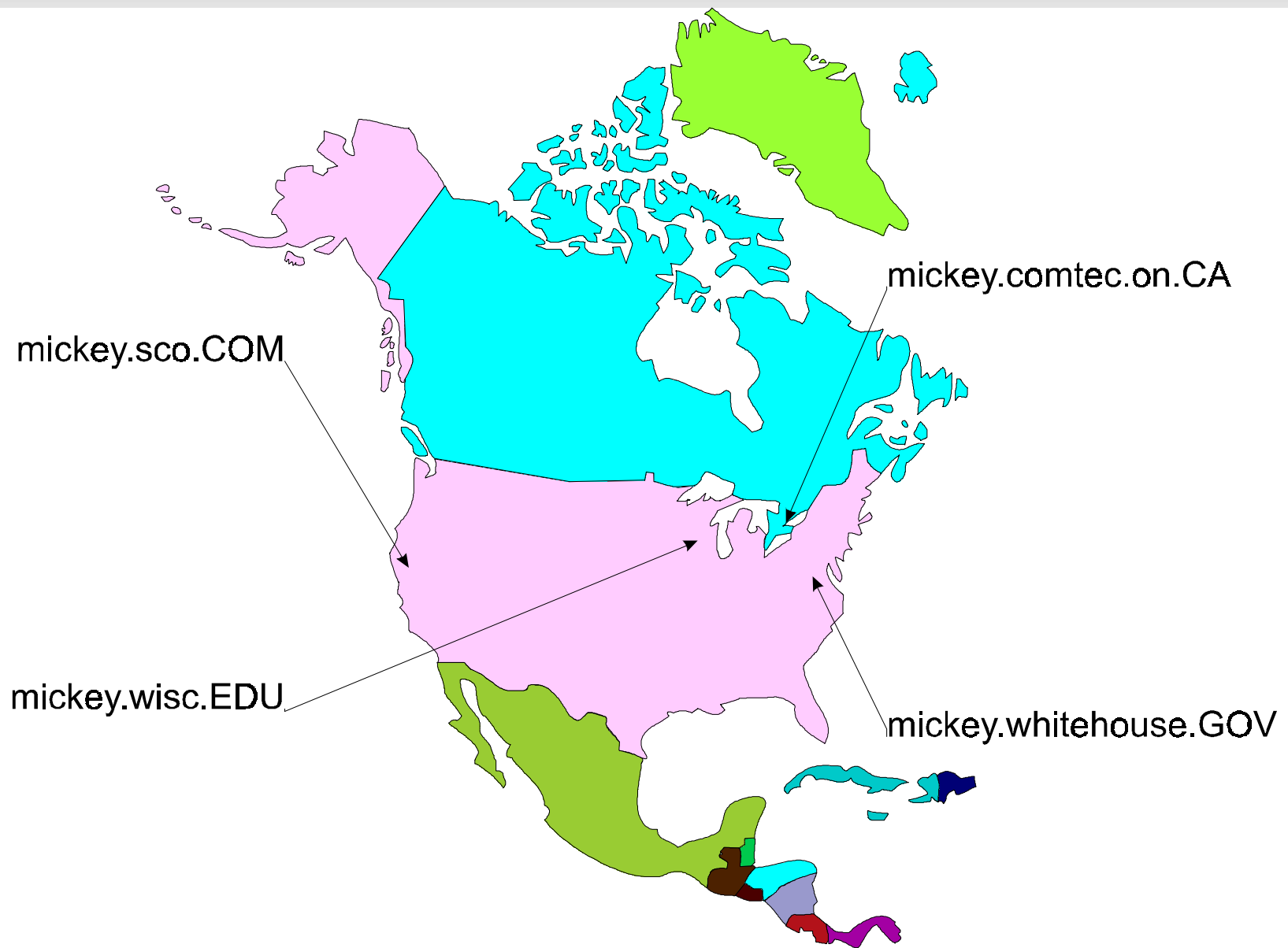
Domain Name System (DNS) Configuration

- DNS operation
- Configuring name servers
- Querying a name server
- Configuring DNS clients

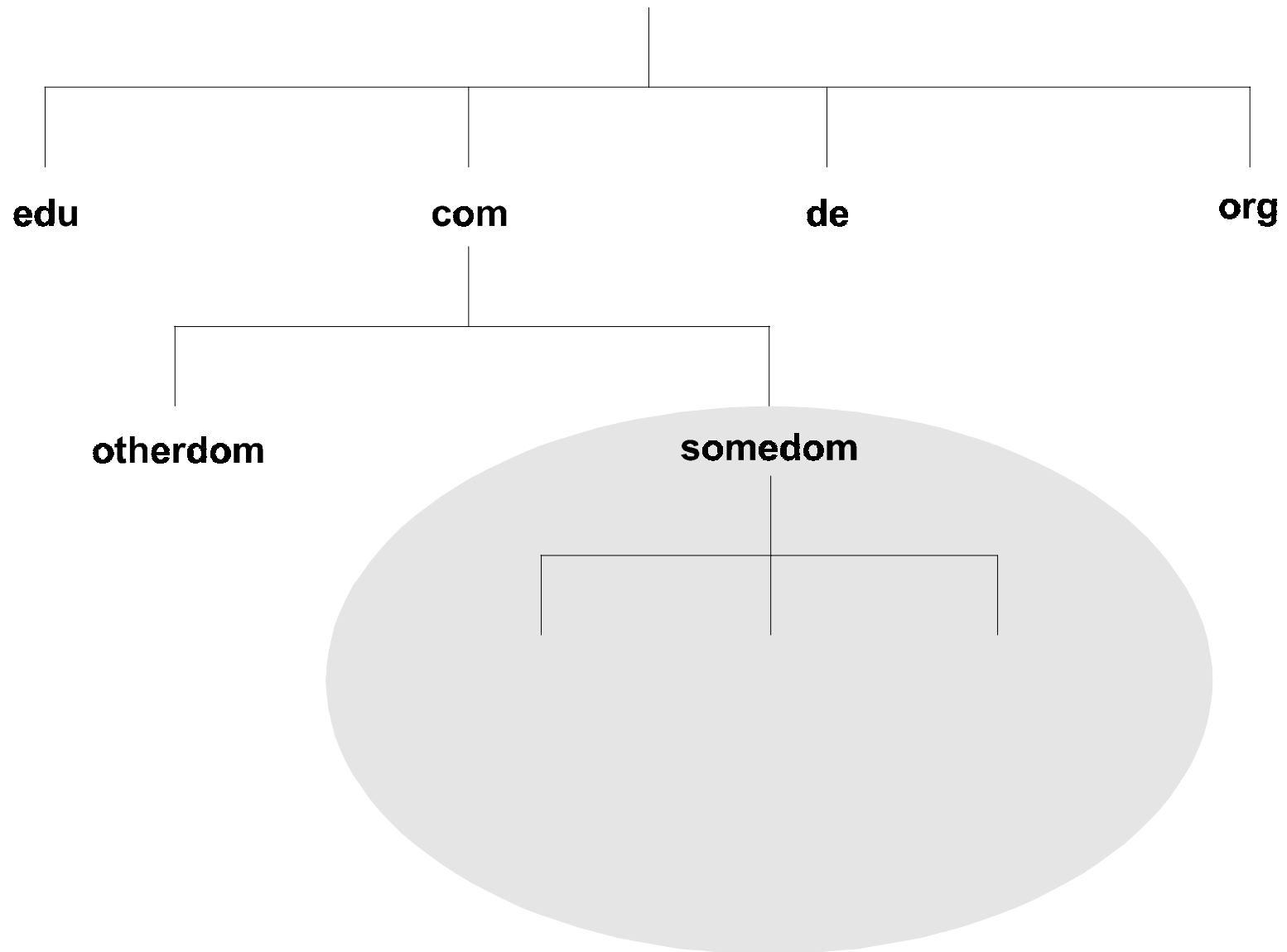
Naming Collisions on the Early Internet



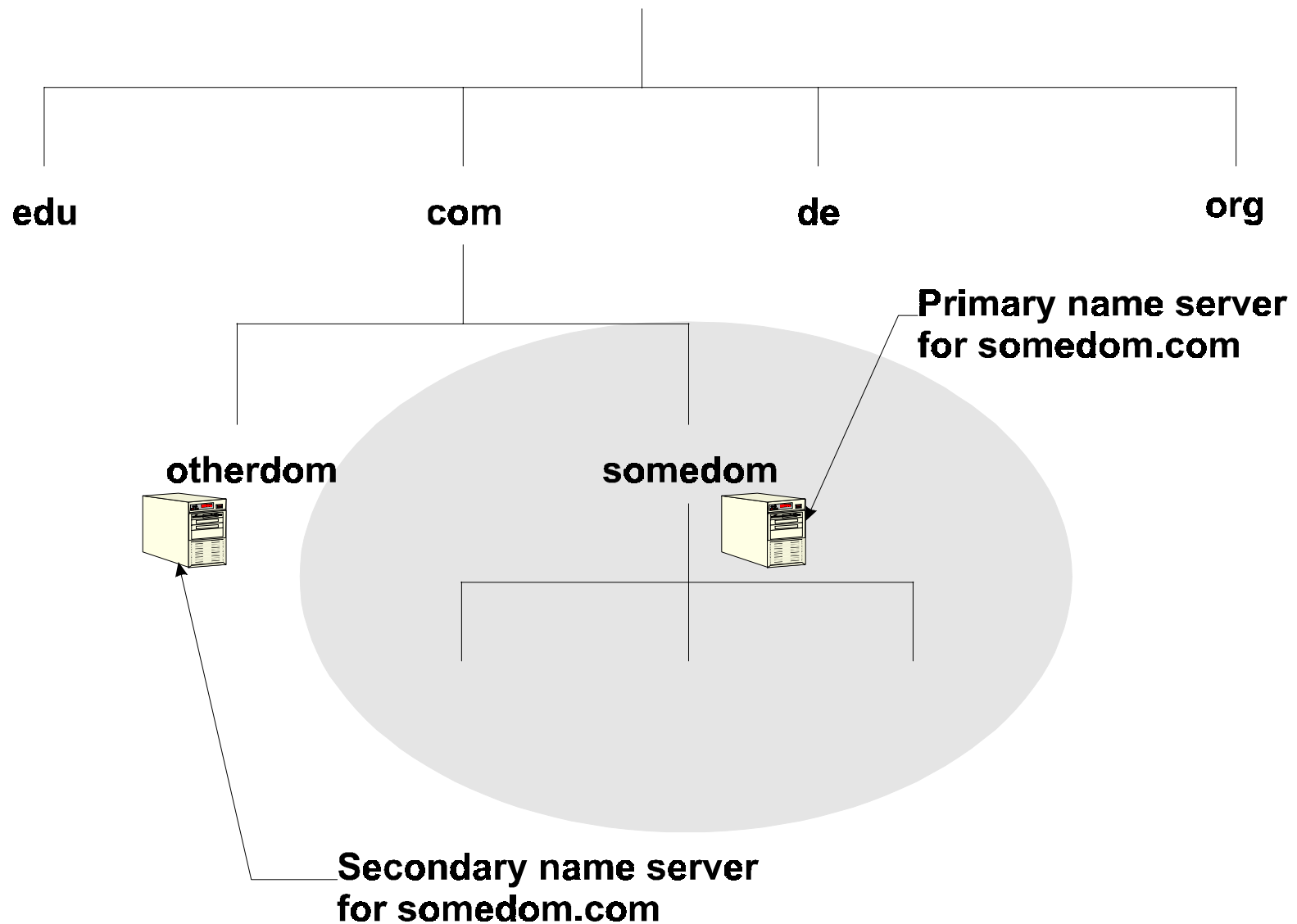
Collisions Resolved with Domains



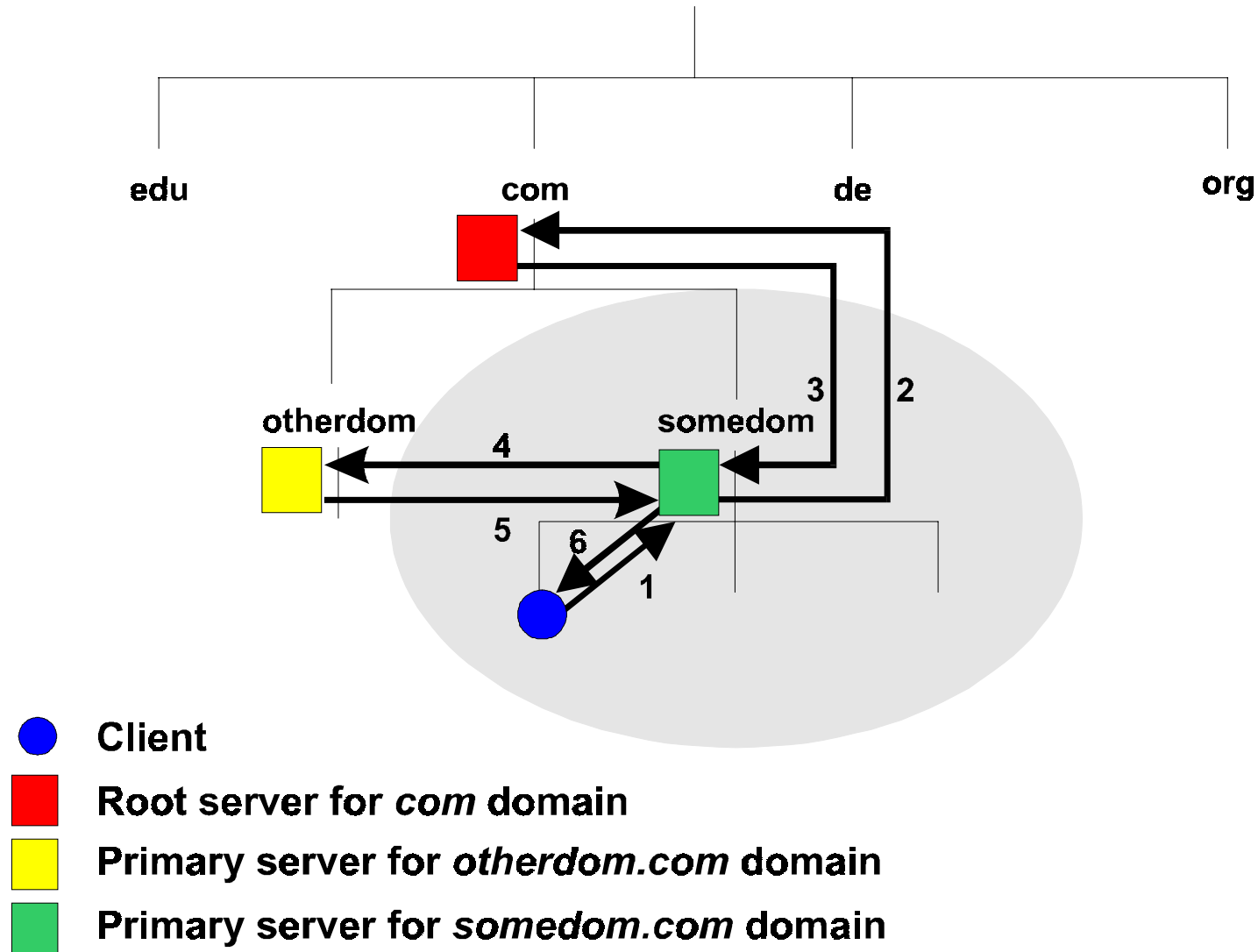
Primary Domain Only



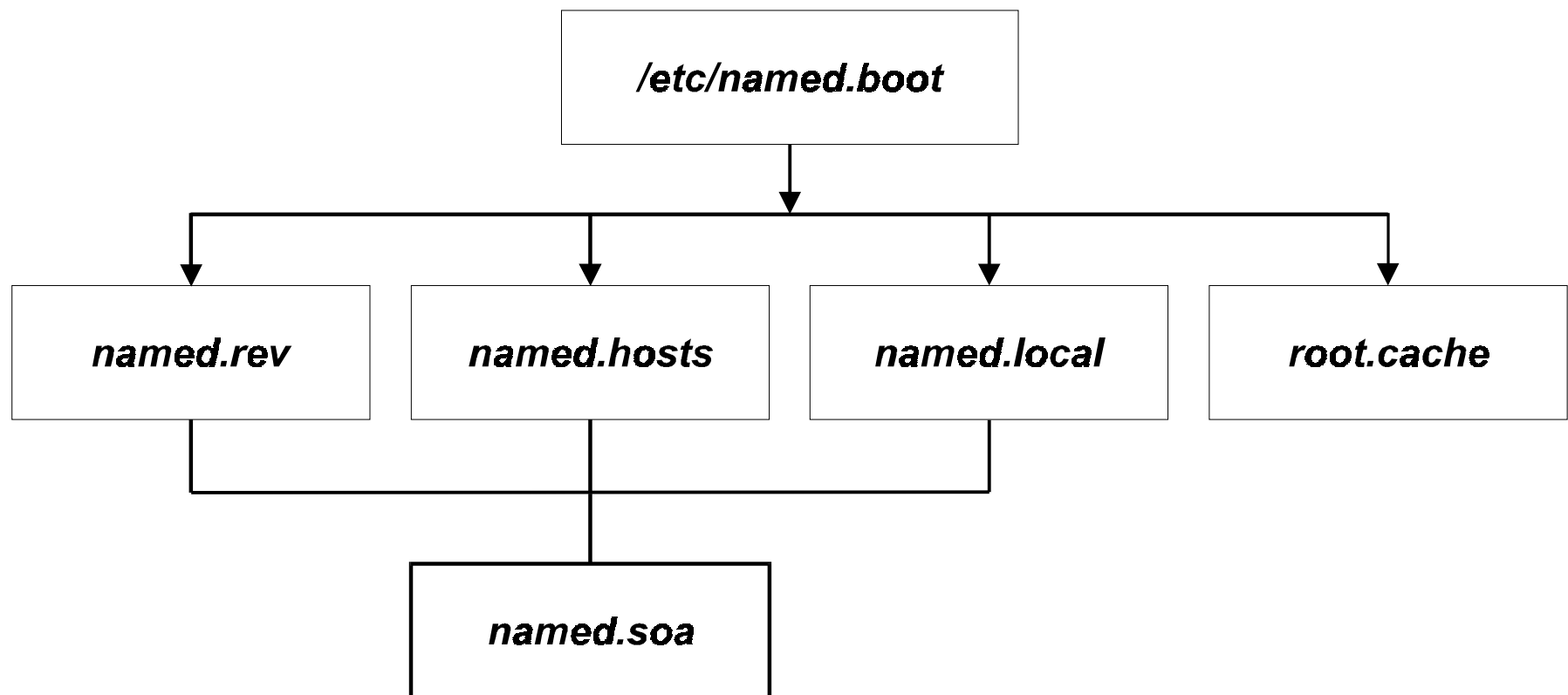
Primary and Secondary Name Servers



Query Fulfillment Sequence



File Relationships



Example *named.boot*

```
; Boot file: Primary for somedom.com and
;             secondary for otherdom.com
;
; type      domain                      source file or host

directory /etc/named.d

primary    somedom.com                  named.hosts
primary    50.100.200.in-addr.arpa      named.rev
primary    0.0.127.in-addr.arpa         named.local
secondary  otherdom.com                 200.150.75.1    backup.hosts
secondary  75.150.200.in-addr.arpa      200.150.75.1    backup.rev
stub       london.somedom.com           200.200.50.1    london.somedom.stub
cache      .                            root.cache
```

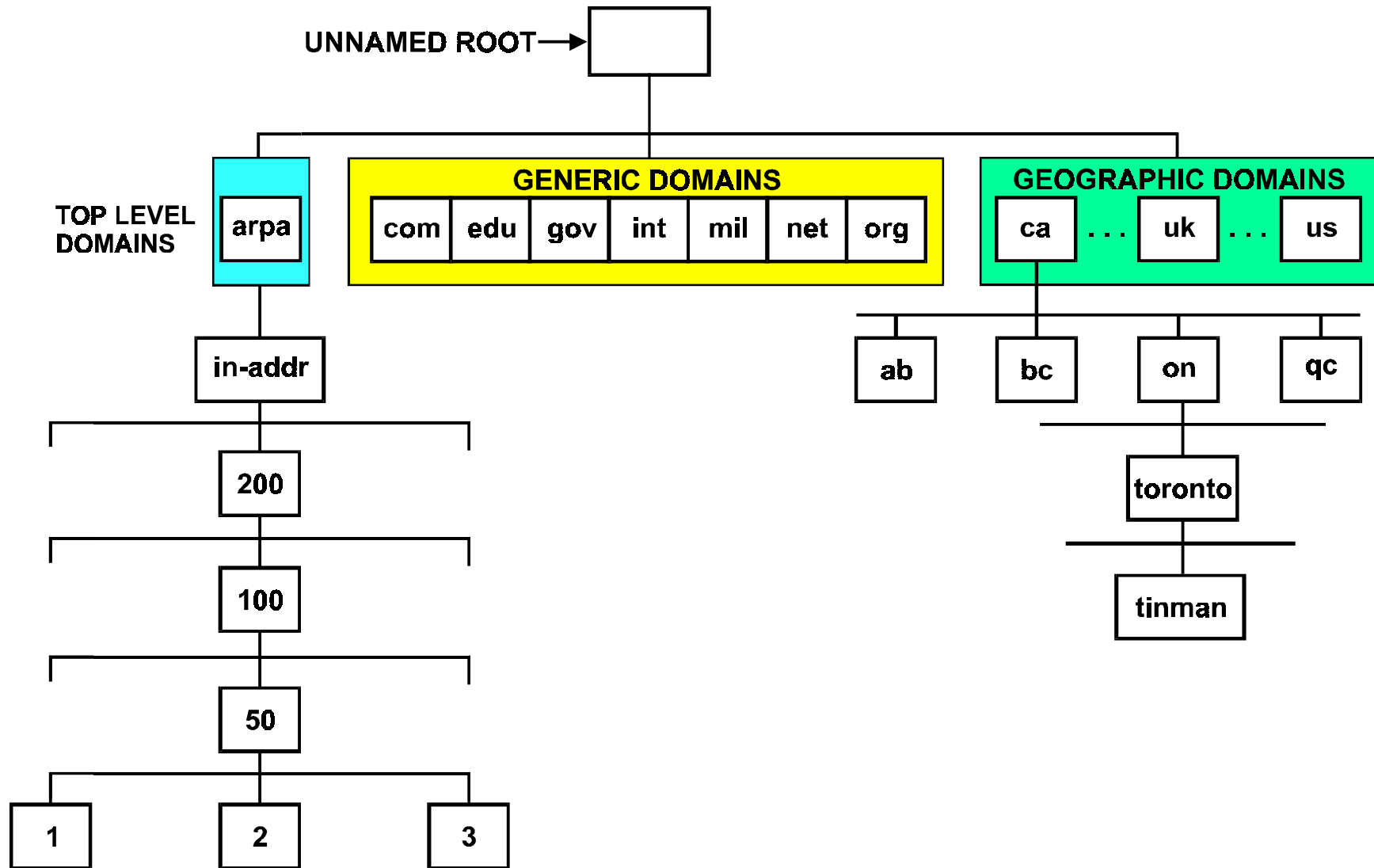
Example *named.boot*

```
; Boot file: Primary for somedom.com and
;             secondary for otherdom.com
;
; type      domain                source file or host

directory /etc/named.d

primary    somedom.com            named.hosts
primary    50.100.200.in-addr.arpa named.rev
primary    0.0.127.in-addr.arpa   named.local
secondary  otherdom.com           200.150.75.1 backup.hosts
secondary  75.150.200.in-addr.arpa 200.150.75.1 backup.rev
stub       london.somedom.com      200.200.50.1 london.somedom.stub
cache      .                       root.cache
```

Domain Name Space



Example *named.boot*

```
; Boot file: Primary for somedom.com and
;             secondary for otherdom.com
;
; type      domain                      source file or host

directory /etc/named.d

primary    somedom.com                  named.hosts
primary    50.100.200.in-addr.arpa      named.rev
primary    0.0.127.in-addr.arpa         named.local
secondary  otherdom.com                 200.150.75.1    backup.hosts
secondary  75.150.200.in-addr.arpa      200.150.75.1    backup.rev
stub       london.somedom.com           200.200.50.1    london.somedom.stub
cache      .                            root.cache
```

Example *named.boot*

```
; Boot file: Primary for somedom.com and
;             secondary for otherdom.com
;
; type      domain                      source file or host

directory /etc/named.d

primary    somedom.com                  named.hosts
primary    50.100.200.in-addr.arpa      named.rev
primary    0.0.127.in-addr.arpa         named.local
secondary  otherdom.com                 200.150.75.1    backup.hosts
secondary  75.150.200.in-addr.arpa      200.150.75.1    backup.rev
stub       london.somedom.com           200.200.50.1    london.somedom.stub
cache      .                            root.cache
```

Example *named.boot*

```
; Boot file: Primary for somedom.com and
;             secondary for otherdom.com
;
; type      domain                      source file or host

directory /etc/named.d

primary    somedom.com                  named.hosts
primary    50.100.200.in-addr.arpa      named.rev
primary    0.0.127.in-addr.arpa         named.local
secondary  otherdom.com                 200.150.75.1    backup.hosts
secondary  75.150.200.in-addr.arpa      200.150.75.1    backup.rev
stub       london.somedom.com           200.200.50.1    london.somedom.stub
cache      .                            root.cache
```

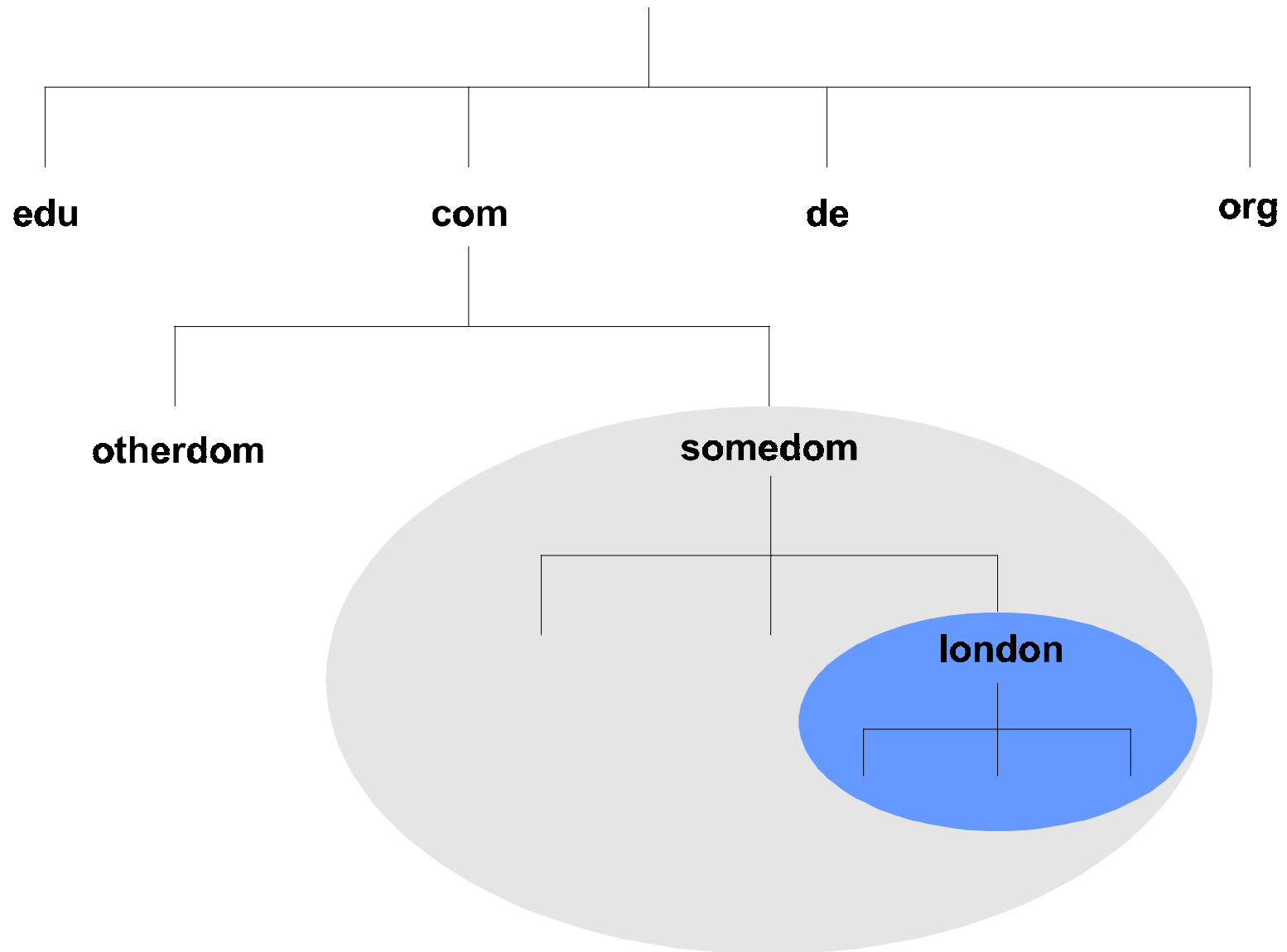
Example *named.boot*

```
; Boot file: Primary for somedom.com and
;             secondary for otherdom.com
;
; type      domain                      source file or host

directory /etc/named.d

primary    somedom.com                  named.hosts
primary    50.100.200.in-addr.arpa      named.rev
primary    0.0.127.in-addr.arpa         named.local
secondary  otherdom.com                 200.150.75.1    backup.hosts
secondary  75.150.200.in-addr.arpa      200.150.75.1    backup.rev
stub       london.somedom.com           200.200.50.1    london.somedom.stub
cache      .                            root.cache
```

Primary and Sub-Domain



Example *named.hosts*

```
; name [ttl] class type data
```

```
$include named.soa
```

```
thatch          IN      A      200.100.50.1
```

```
www             IN      CNAME  thatch
```

```
guam            IN      A      200.100.50.2
```

```
ftp             IN      CNAME  guam
```

```
atlantis        IN      A      200.100.50.3
```

```
gateway         IN      A      200.100.50.4
```

Example *named.rev*

```
; name [ttl] class type data  
$include named.soa  
  
1          IN      PTR    thatch.somedom.com.  
  
2          IN      PTR    guam.somedom.com.  
  
3          IN      PTR    atlantis.somedom.com.  
  
4          IN      PTR    gateway.somedom.com.
```

Example *named.local*

```
; name [ttl] class type data  
$include named.soa  
  
1          IN      PTR  localhost.
```

Example *root.cache*

```
; name          ttl      class type  data
; initial cache data for root domain servers.  Note no SOA included
.                999999   IN      NS    terp.umd.edu.
.                999999   IN      NS    ns.nasa.gov.
.                999999   IN      NS    kava.nisc.sri.com.

; Prep (hardwire) the address cache.  Order does not matter.

terp.umd.edu.    999999   IN      A     128.8.10.90
ns.nasa.gov.     999999   IN      A     128.102.16.10
ns.nasa.gov.     999999   IN      A     128.52.195.10
kava.nisc.sri.com. 999999   IN      A     192.33.33.24
```

Example *named.soa*

```
; name [ttl] class type data
```

```
@          IN      SOA  thatch.somedom.com.  steve.somedom.com.  (  
          96031108; Serial  
          10800;      Refresh  
          1800;      Retry  
          3600000;    Expire  
          86400 );    Minimum (default ttl)  
  
          IN      NS   thatch.somedom.com.  
          IN      NS   ahost.otherdom.com.
```

Example DNS Records

```
; name  [ttl] class type  data
thatch                IN    A    200.100.50.1
ftp                   IN    CNAME guam.somedom.com.
1                     IN    PTR   thatch.somedom.com.
somedom.com.          IN    NS    thatch.somedom.com.
@                     IN    SOA   thatch.somedom.com. steve.somedom.com.
                        9603110830; serial
                        10800;    refresh
                        1800;    retry
                        3600000;  expire
                        86400 );  minimum (default ttl)
```

Example *named.hosts*

```
; name [ttl] class type data
```

```
$include named.soa
```

```
thatch          IN      A      200.100.50.1
```

```
www             IN      CNAME  thatch
```

```
guam            IN      A      200.100.50.2
```

```
ftp             IN      CNAME  guam
```

```
atlantis        IN      A      200.100.50.3
```

```
gateway         IN      A      200.100.50.4
```

Example *named.rev*

```
; name [ttl] class type data
```

```
$include named.soa
```

```
1          IN      PTR    thatch.somedom.com.
```

```
2          IN      PTR    guam.somedom.com.
```

```
3          IN      PTR    atlantis.somedom.com.
```

```
4          IN      PTR    gateway.somedom.com.
```

Example *named.local*

```
; name [ttl] class type data  
$include named.soa  
  
1          IN      PTR  localhost.
```

Example *named.soa*

```
; name [ttl] class type data

@           IN      SOA  thatch.somedom.com.  steve.somedom.com.  (
                                96031108; Serial
                                10800;      Refresh
                                1800;      Retry
                                3600000;    Expire
                                86400 );    Minimum (default ttl)

           IN      NS   thatch.somedom.com.
           IN      NS   ahost.otherdom.com.
```

Example *named.soa*

```
; name [ttl] class type data
```

```
@          IN      SOA  thatch.somedom.com.  steve.somedom.com.  (  
          96031108; Serial  
          10800;      Refresh  
          1800;      Retry  
          3600000;    Expire  
          86400 );    Minimum (default ttl)  
  
          IN      NS   thatch.somedom.com.  
          IN      NS   ahost.otherdom.com.
```

Example *named.hosts*

```
; name [ttl] class type data
```

```
$include named.soa
```

```
thatch          IN      A      200.100.50.1
```

```
www             IN      CNAME  thatch
```

```
guam            IN      A      200.100.50.2
```

```
ftp             IN      CNAME  guam
```

```
atlantis        IN      A      200.100.50.3
```

```
gateway         IN      A      200.100.50.4
```

Example nslookup Session

```
Default Server:  thatch.somedom.com  
Address:  200.100.50.1
```

```
> gateway  
Server:  thatch.somedom.com  
Address:  200.100.50.1
```

```
Name:      gateway.somedom.com  
Address:  200.100.50.4
```

```
> unknown  
Server:  thatch.somedom.com  
Address:  200.100.50.1
```

```
*** thatch.somedom.com can't find unknown: Non-existent host/domain
```

```
> set type=PTR  
> 4.50.100.200.in-addr.arpa  
Server:  thatch.somedom.com  
Address:  200.100.50.1
```

```
4.50.100.200.in-addr.arpa      name = gateway.somedom.com  
>
```

The **dig**(ADMN) Command

```
dig -x 200.100.50.1
```

```
; <<>> DiG 8.1 <<>> -x
```

```
;; res options: init recurs defnam dnsrch
```

```
;; got answer:
```

```
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 6
```

```
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1
```

```
;; QUERY SECTION:
```

```
;; 1.50.100.200.in-addr.arpa, type = ANY, class = IN
```

```
;; ANSWER SECTION:
```

```
1.50.100.200.in-addr.arpa. 1D IN PTR thatch.somedom.com.
```

```
;; AUTHORITY SECTION:
```

```
50.100.200.in-addr.arpa. 1D IN NS thatch.somedom.com.
```

```
;; ADDITIONAL SECTION:
```

```
thatch.somedom.com. 1D IN A 200.100.50.1
```

```
;; Total query time: 10 msec
```

```
;; FROM: thatch.somedom.com to SERVER: default -- 0.0.0.0
```

```
;; WHEN: Tue Sep 22 13:53:24 1998
```

```
;; MSG SIZE sent: 46 rcvd: 132
```

The **host**(ADMN) Command

```
host -a www.sco.com
```

```
Trying null domain
```

```
rcode = 0 (Success), ancourt=1
```

```
The following answer is not authoritative:
```

```
www.sco.com 3578 IN CNAME www.external.sco.COM
```

```
For authoritative answers, see:
```

```
sco.COM 41978 IN NS SCONIGMA.sco.COM
```

```
sco.COM 41978 IN NS NS2.EXODUS.NET
```

```
Additional information:
```

```
SCONIGMA.sco.COM 41978 IN A 132.147.210.10
```

```
NS2.EXODUS.NET 172698 IN A 207.82.198.150
```

```
rcode = 0 (Success), ancourt=1
```

```
The following answer is not authoritative:
```

```
www.external.sco.COM 940 IN A 209.1.8.14
```

```
For authoritative answers, see:
```

```
external.sco.com 3578 IN NS dd-scca.sco.com
```

```
external.sco.com 3578 IN NS dd-jcnj.sco.com
```

```
external.sco.com 3578 IN NS dd-lnuk.sco.com
```

```
Additional information:
```

```
dd-scca.sco.com 3578 IN A 207.82.198.237
```

```
dd-jcnj.sco.com 3578 IN A 209.67.27.230
```

Example */etc/resolv.conf*

```
domain somedom.com

; query local server first, then secondary

nameserver 200.100.50.1
nameserver 200.100.50.5

; query the /etc/hosts file, then dns

hostresorder local bind
```

Example */etc/resolv.conf*

```
domain somedom.com

; query local server first, then secondary

nameserver 200.100.50.1
nameserver 200.100.50.5

; query the /etc/hosts file, then dns

hostresorder local bind
```

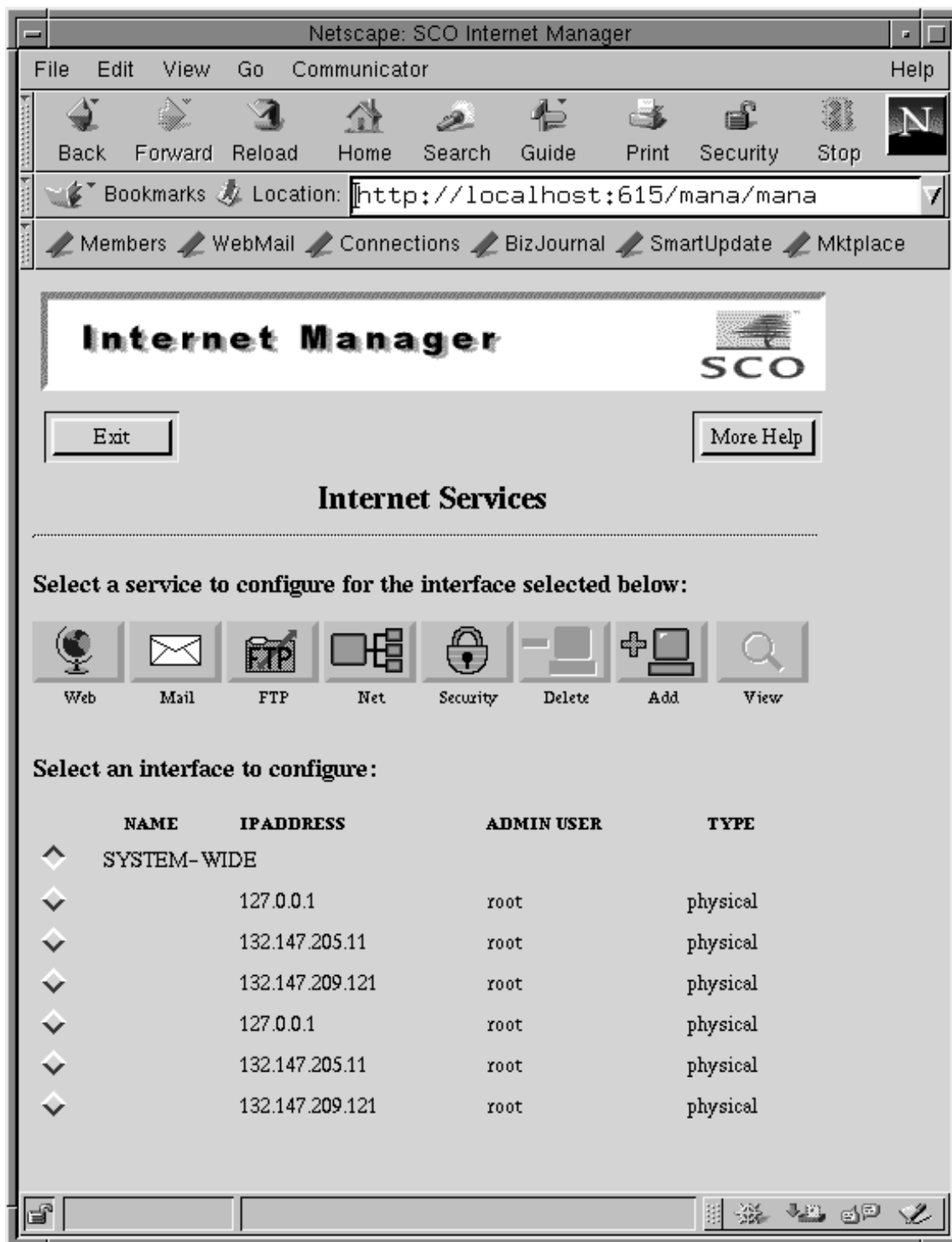
Configuring Internet Services

- Configuring virtual domains
- Configuring the Netscape HTTP server
- Configuring an FTP server
- Configuring the Network Time Protocol service

Enabling Virtual Domains



Binding Internet Services



Adding a Virtual Domain

Netscape: SCO Internet Manager: ADD NEW VIRTUAL DOMAIN

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

Bookmarks Location:

Members WebMail Connections BizJournal SmartUpdate Mktplace

Internet Manager 

Specify a name, address, and administrative user
for the new virtual domain:

Name:

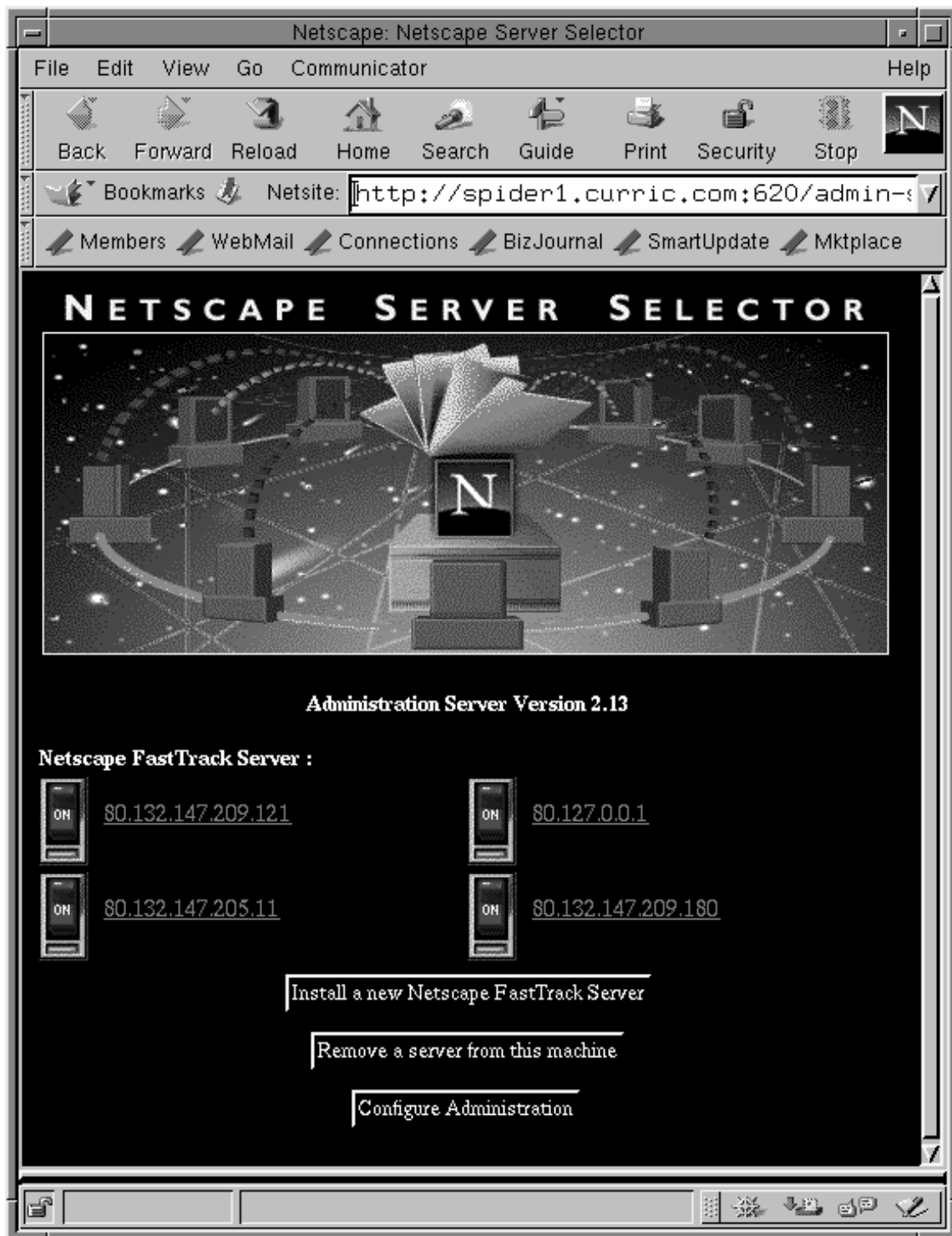
IP address:

Administrative user:

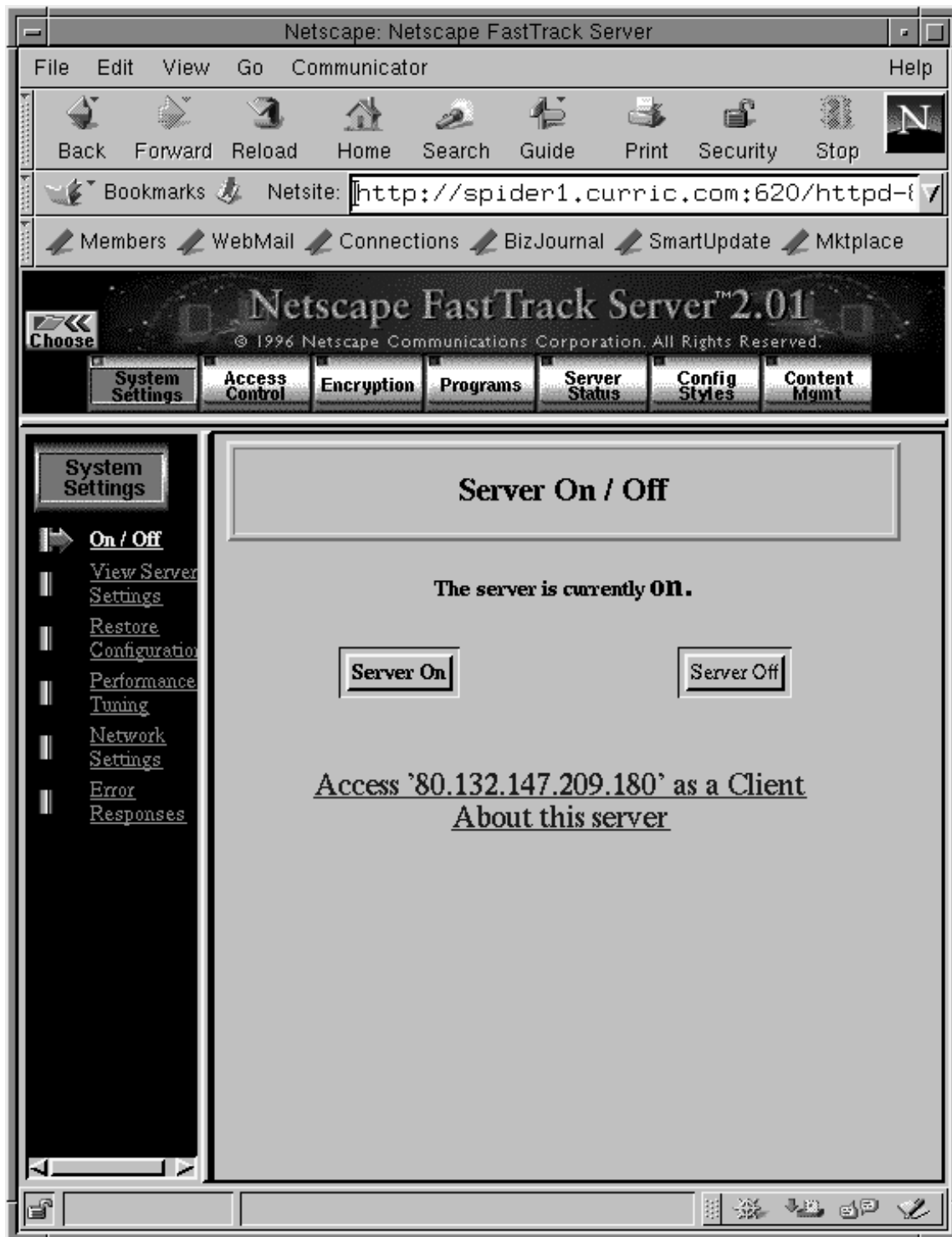
Admin User Password:

Re-enter Password:

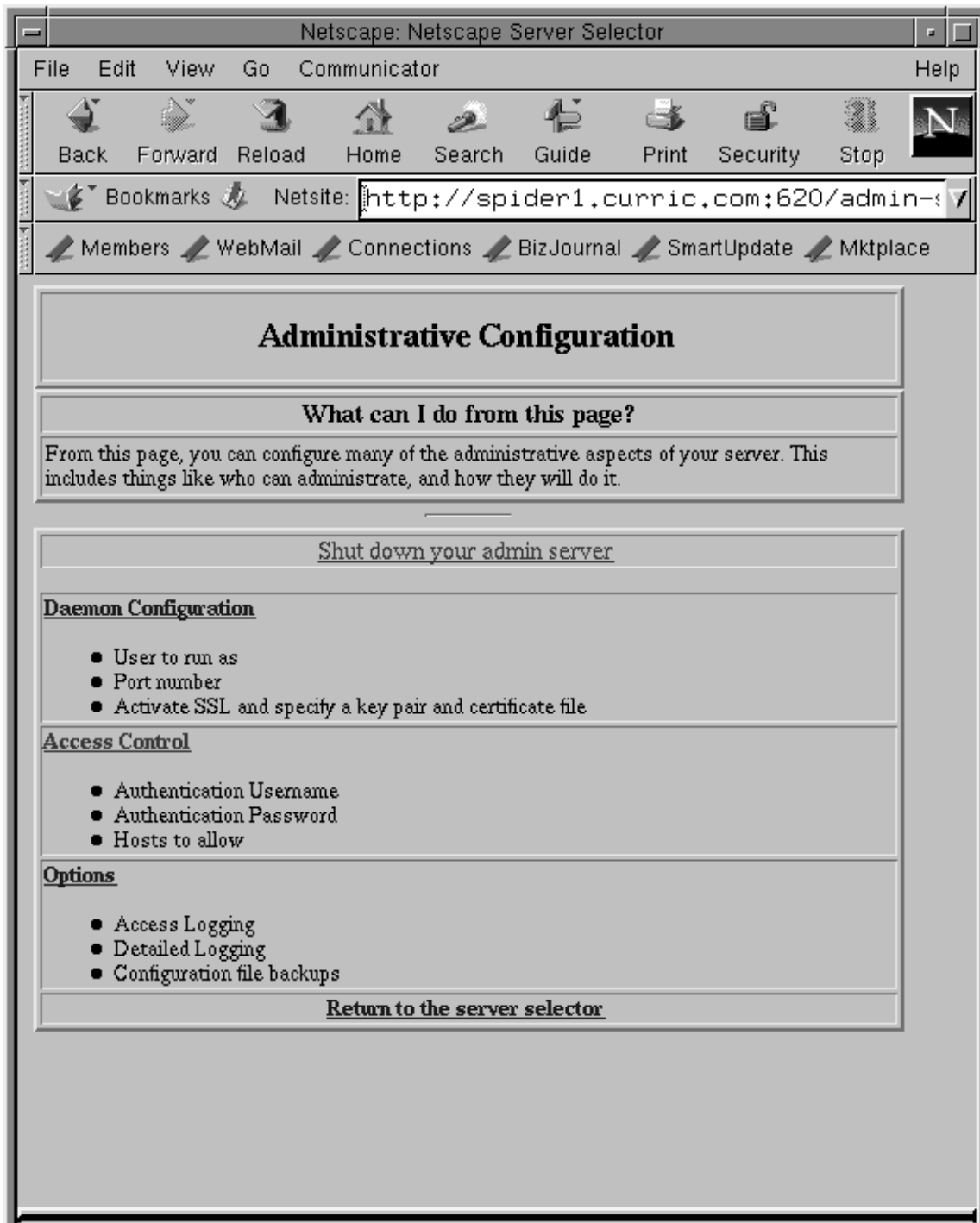
Netscape Administration Server Selector



Configuring the FastTrack Server



Netscape Server Selector-Configuring Administration



Configuring Administration-Access Control

Netscape: Netscape Server Selector

File Edit View Go Communicator Help

Back Forward Reload Home Search Guide Print Security Stop

Bookmarks Netsite:

Members WebMail Connections BizJournal SmartUpdate Mktplace

**Administration Server
Access Control**

Hostnames to allow:

IP addresses to allow:

Authentication user name:

Authentication Password:

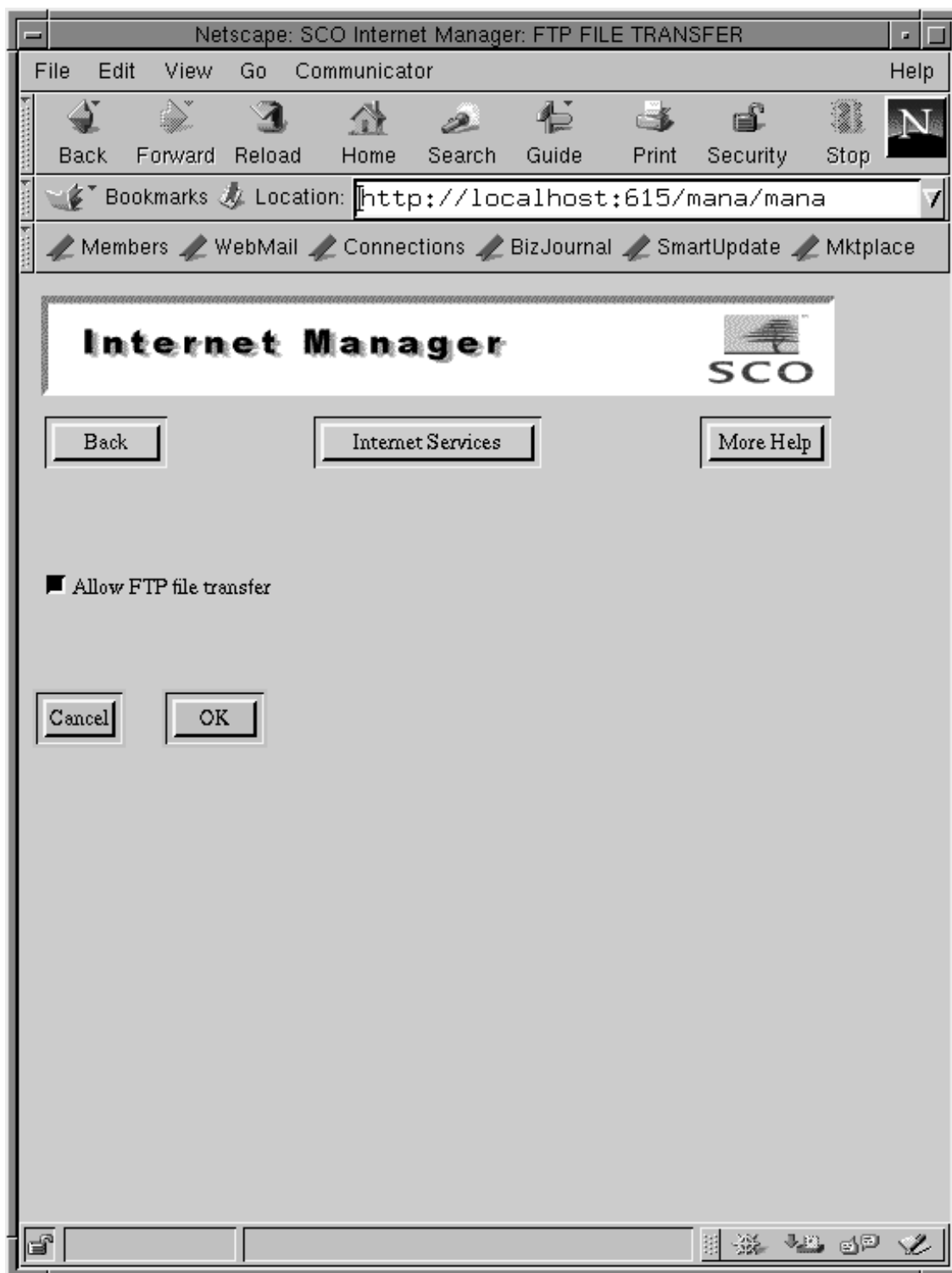
Authentication Password (again):

[Return to Administrative Configuration](#)

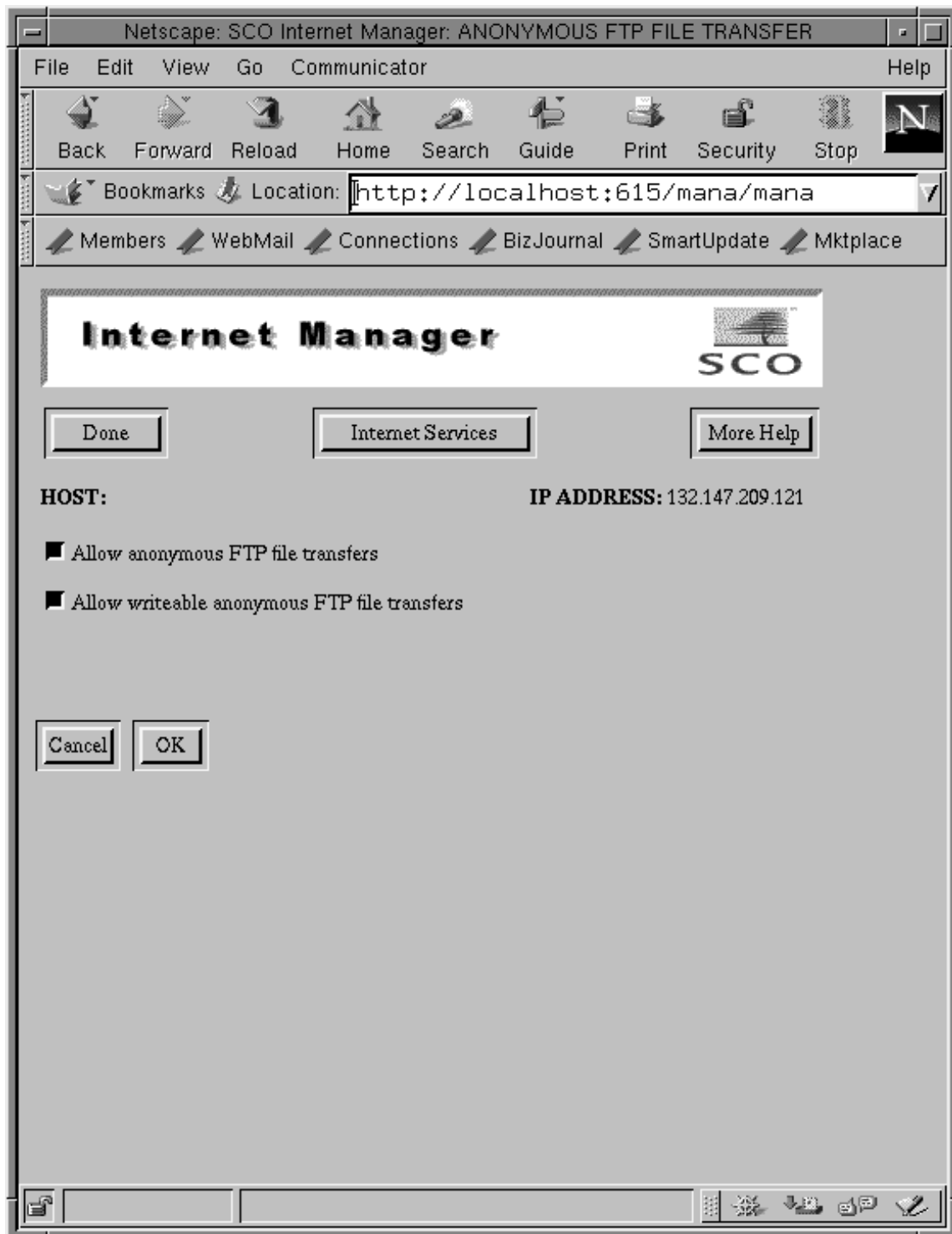
Configuring Remote Administration from the Command Line

```
NetsiteRoot /usr/internet/ns_httpd
Port 620
User root
ErrorLog /usr/internet/ns_httpd/admserv/errors
AccessLog /usr/internet/ns_httpd/admserv/access
PidLog /usr/internet/ns_httpd/admserv/pid
ServerName spider1.curric.com
Backups 10
AdminUsers /usr/internet/ns_httpd/admserv/admpw
Addresses *
Hosts (spider1.curric.com|fuji.curric.com)
```

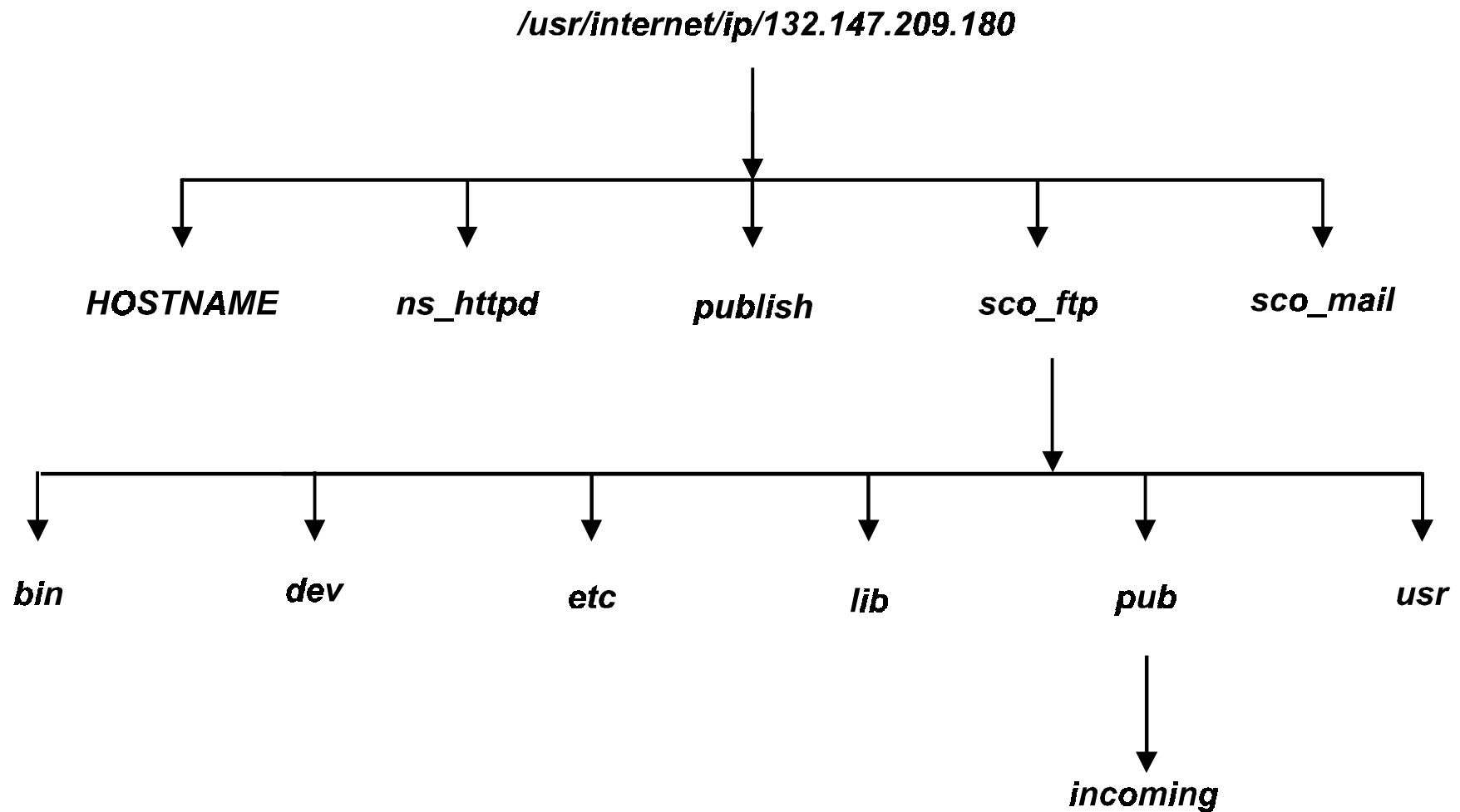
Allow FTP File Transfer



Configuring Anonymous FTP



Internet Services Configuration Files



Default */etc/ftppass* File

```
#      @(#)$Id: ftpaccess,v 6.6 1993/09/08
#      SCCS IDENTIFICATION
loginfails 3

class   all   real,guest,anonymous *

# limit   dead      0   Any           /archive/etc/messages/msg.dead
# limit   local     20   Any           /archive/etc/messages/msg.toomany
# limit   remote    100 SaSu|Any1800-0600 /archive/etc/messages/msg.toomany
# limit   remote    60   Any           /archive/etc/messages/msg.toomany

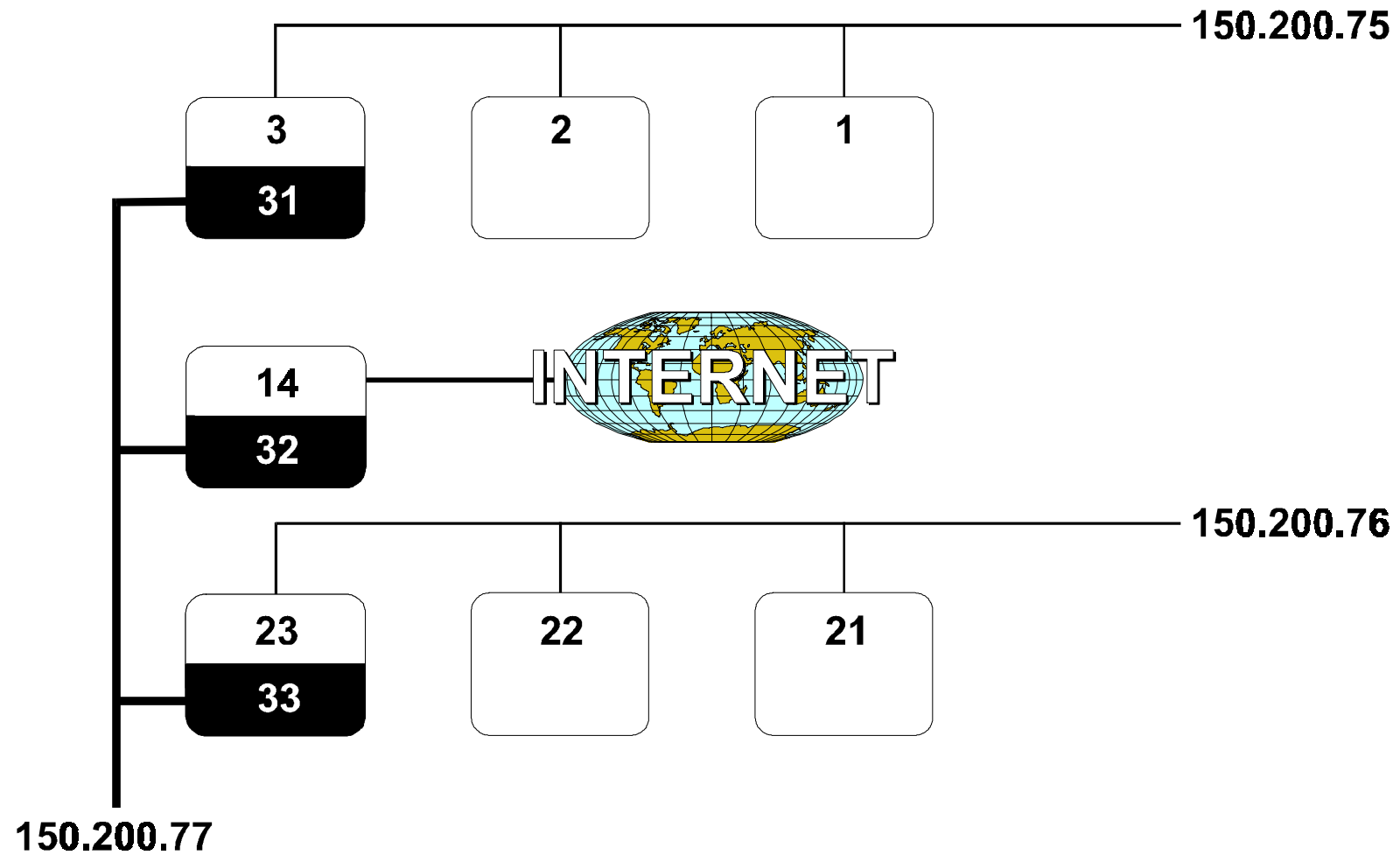
readme   README*    login
readme   README*    cwd=*
banner   /etc/issue

message  /etc/messages/mirrors.msg   cwd=/mirrors
message  /etc/messages/welcome.msg   login
message  .message                     cwd=*

compress      yes          all
tar           yes          all

# log commands real
# log transfers anonymous,real inbound,outbound
# shutdown /etc/shutmsg
```

Configuring Time Servers



The */etc/ntp.conf* File

/etc/ntp.conf on host 13/32

```
#  
#Peer configuration file for 150.200.77.32  
#  
peer 128.105.201.11      # ben.cs.wisc.edu  
peer 128.118.25.3        # clock.psu.edu  
peer 127.127.1.1         # local clock  
fudge 127.127.1.1 stratum 10
```

/etc/ntp.conf on host 21

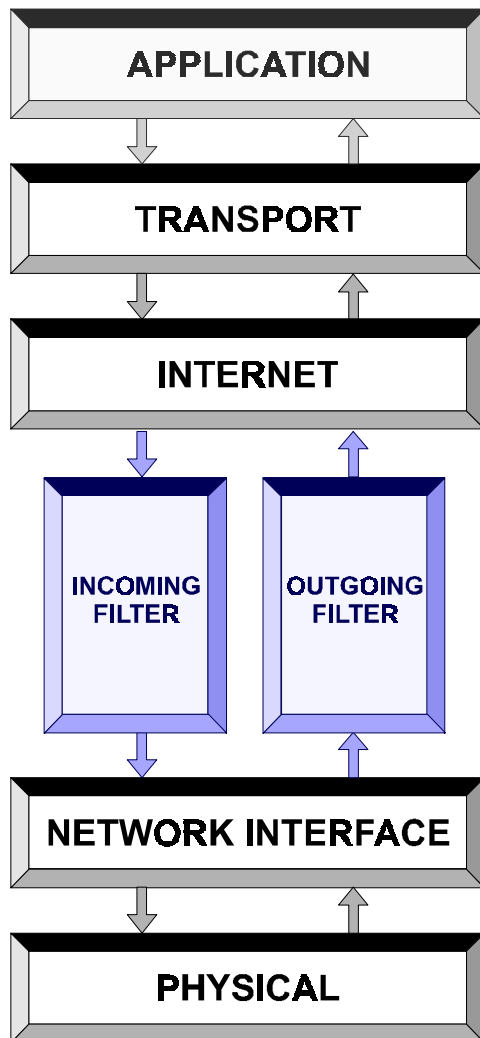
```
#  
#Peer configuration file for 150.200.76.21  
#  
peer 150.200.77.32       # host 13/32  
peer 127.127.1.1         # local clock  
fudge 127.127.1.1 stratum 10
```

Network Security

- Firewalls
- Packet Filters
- Proxies
- Packet Sniffing
- The Secure Socket Layer (SSL)

Packet Filters

With Packet Filters



Without Packet Filters

