

TCP/IP 通訊協定及應用

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<http://wmlab.csie.ncu.edu.tw/course/tcp>

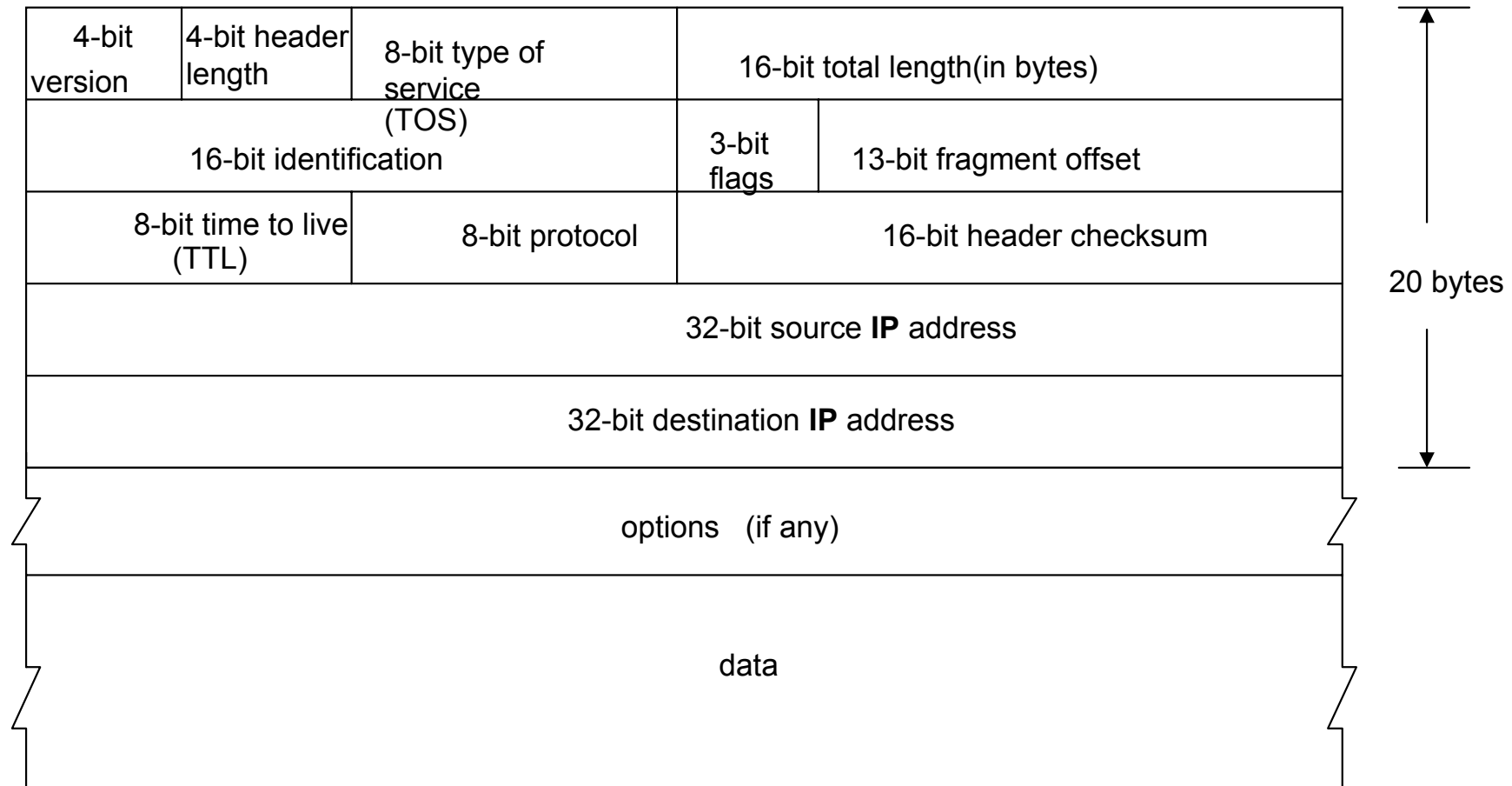
We provide
無線網路多媒體實驗室
Wireless
Wireless Network & Multimedia Laboratory
Solution

IP: INTERNET PROTOCOL

IP : INTERNET PROTOCOL

- Introduction
 - Unreliable
 - Connectionless
- IP
- header
- IP routing
- Cover subnetting

IP Header



Recommended values for type-of-service field

Application	Minimize delay	Maximize throughput	Maximize reliability	Minimize cost	Hex value
Telnet/Rlogin	1	0	0	0	0X10
FTP control	1	0	0	0	0X10
FTP data	0	1	0	0	0X08
any bulk data	0	1	0	0	0X08
TFTP	1	0	0	0	0X10
SMTP command phase	1	0	0	0	0X10
SMTP data phase	0	1	0	0	0x08
DNS UDP query	1	0	0	0	0X10
DNS TCP query	0	0	0	0	0X00
zone transfer	0	1	0	0	0X08
ICMP error	0	0	0	0	0X00
ICMP query	0	0	0	0	0X00
any IGP	0	0	1	0	0X04
SMNP	0	0	1	0	0X04
BOOTP	0	0	0	0	0X00
NNTP	0	0	0	1	0X02

Tos--precedence field

Precedence

- 111 - Network Control
- 110 - Internetwork Control
- 101 - CRITIC/ECP
- 100 - Flash Override
- 011 - Flash
- 010 - Immediate
- 001 - Priority
- 000 - Routine

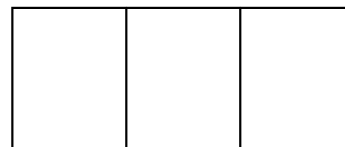
FLAGS

Various control flags

bit 0 : reserved , must be zero

bit1 : 0=may fragment , 1= can't fragment

bit2 : 0=last fragment , 1= more fragment2



0 1 2

routing table

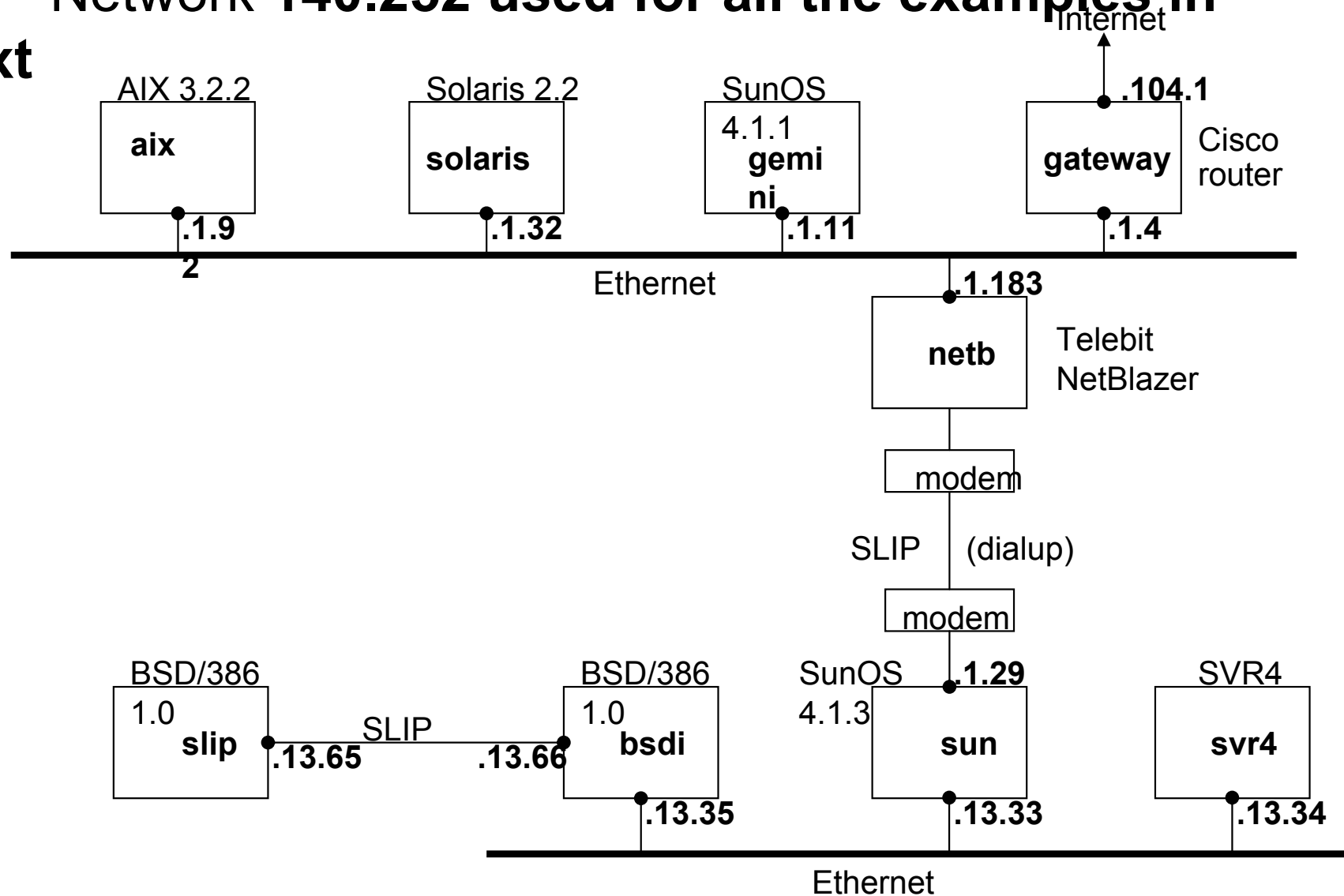
- Destination IP address
- IP address of a *next-hop router* , or the IP address of a directly connected network
- flags
- Specification of which network interface the datagram should be passed to for transmission

IP routing performs

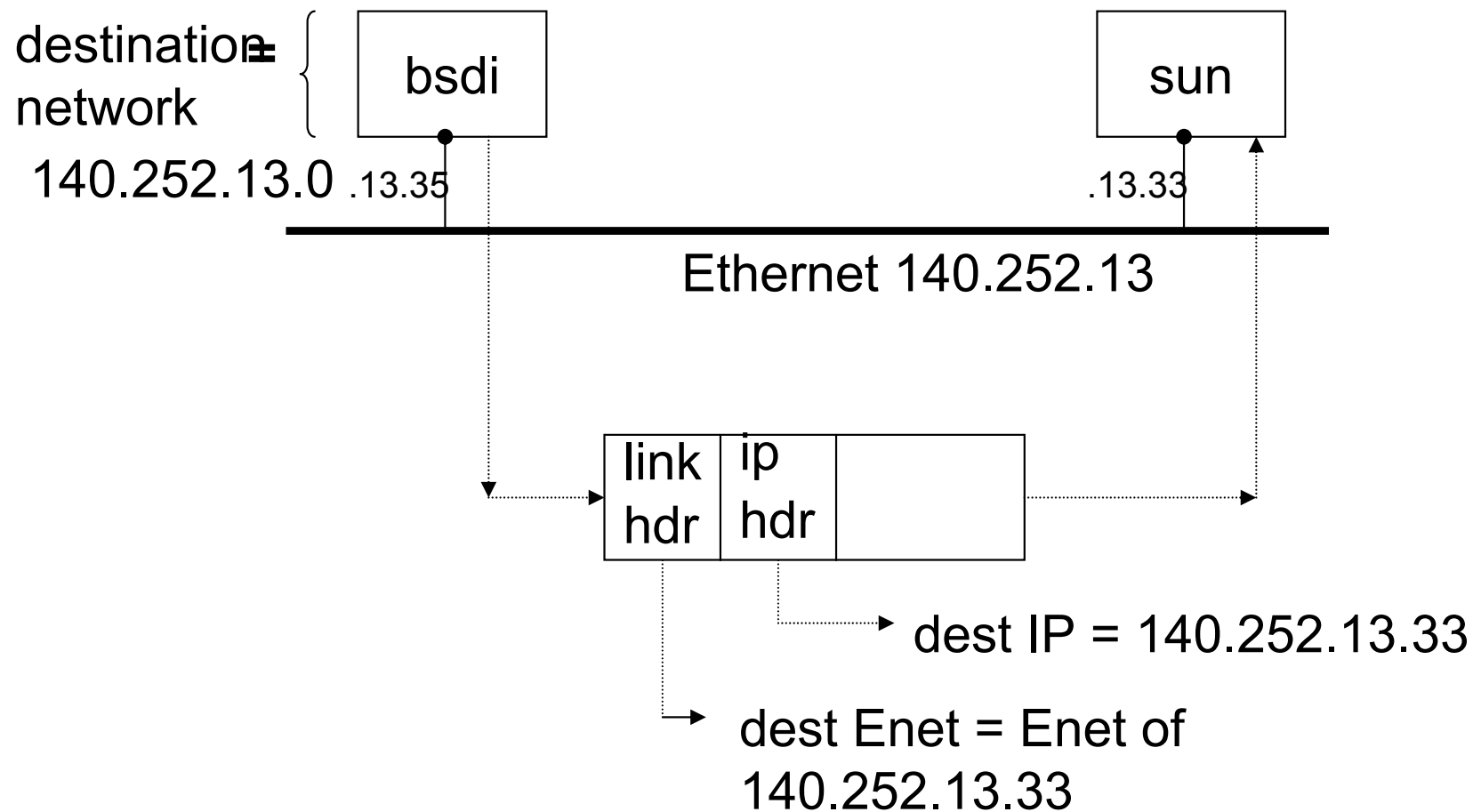
tions

- Search the routing table for an entry that matches the complete destination IP address
- Search the routing table for an entry that matches just the destination network ID
- Search the routing table for an entry labeled “ default”

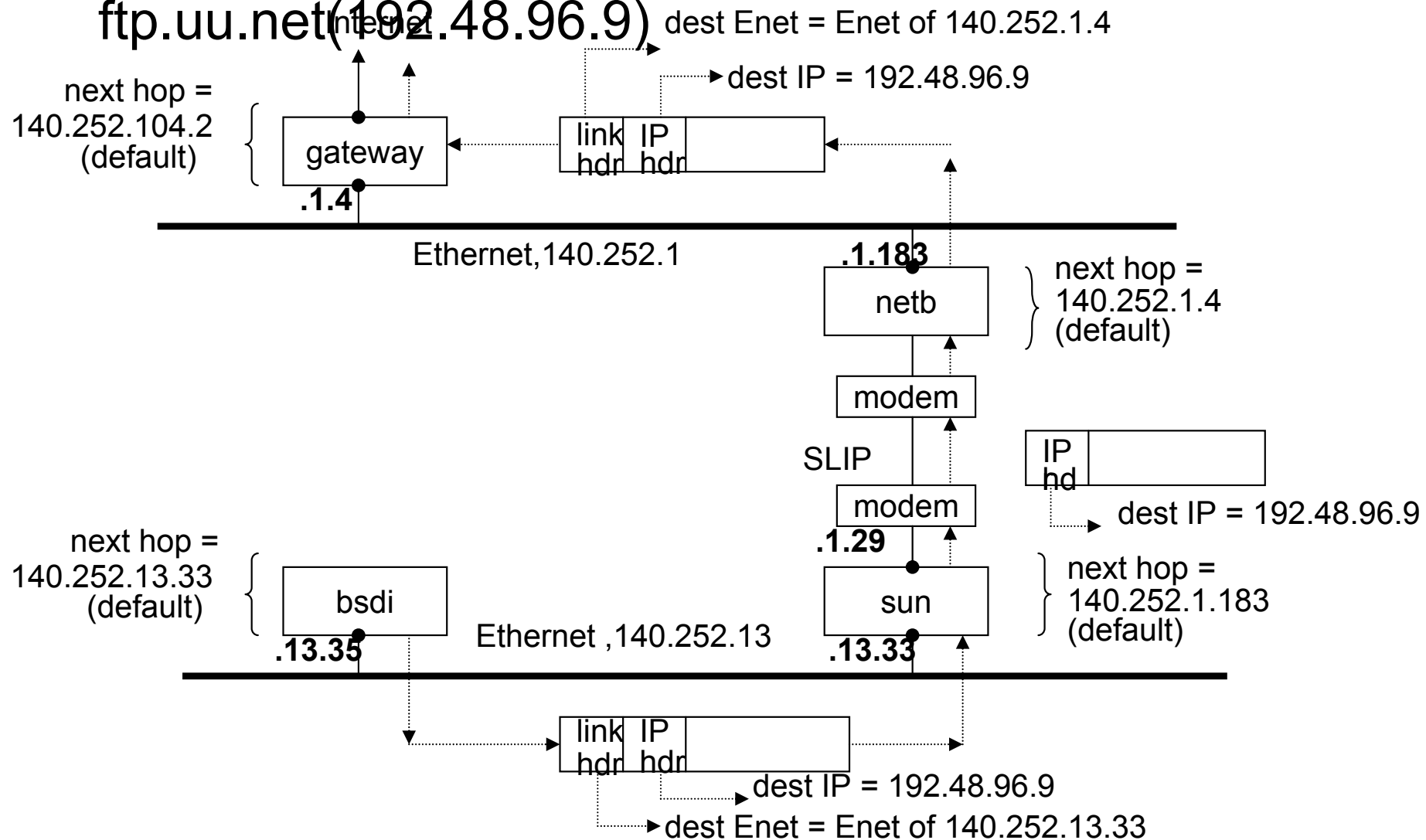
Network 140.252 used for all the examples in the text



Delivery of IP datagram from bsd1 to sun



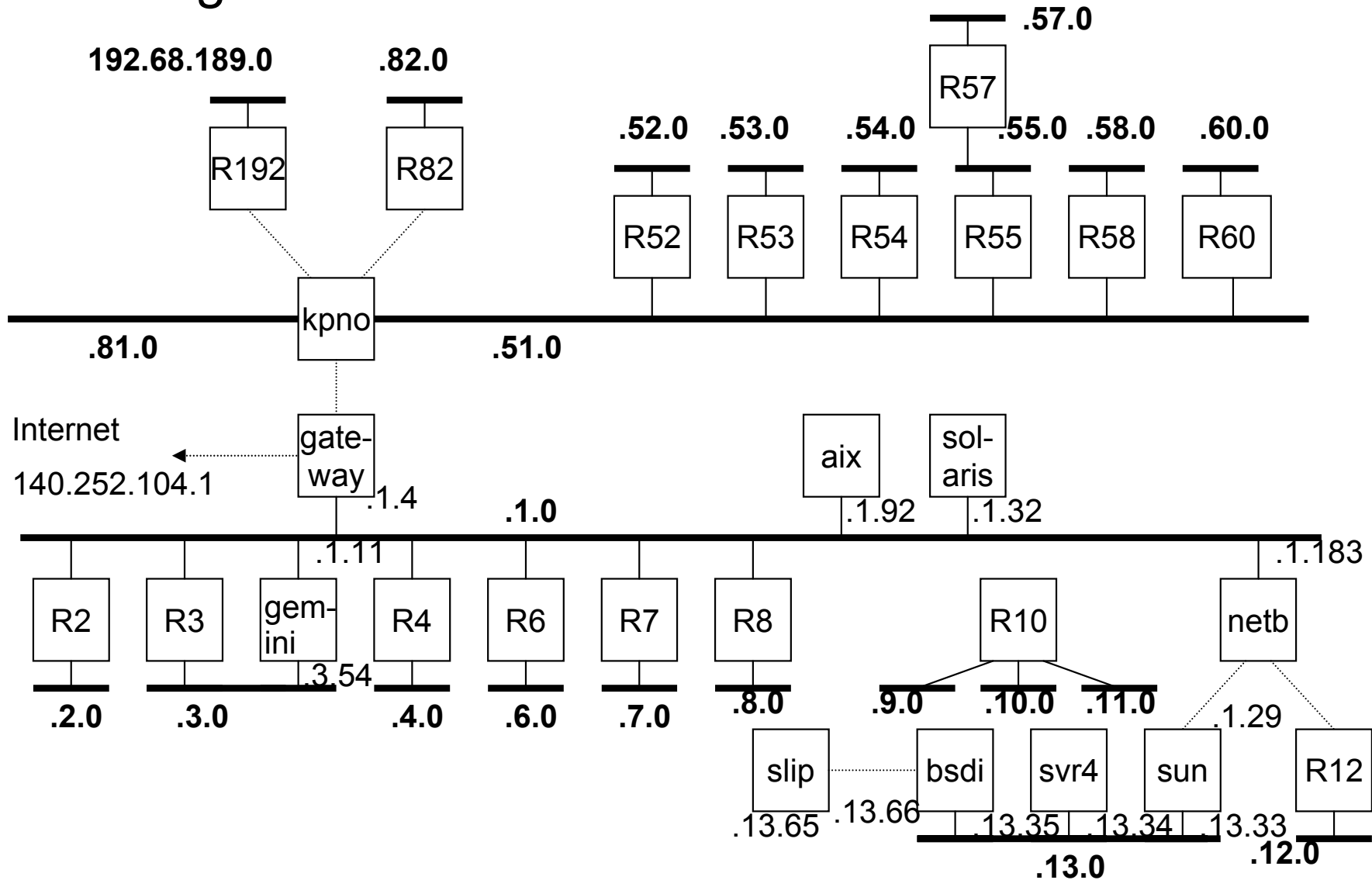
Initial path of datagram from bsd1 to ftp.uu.net(192.48.96.9)



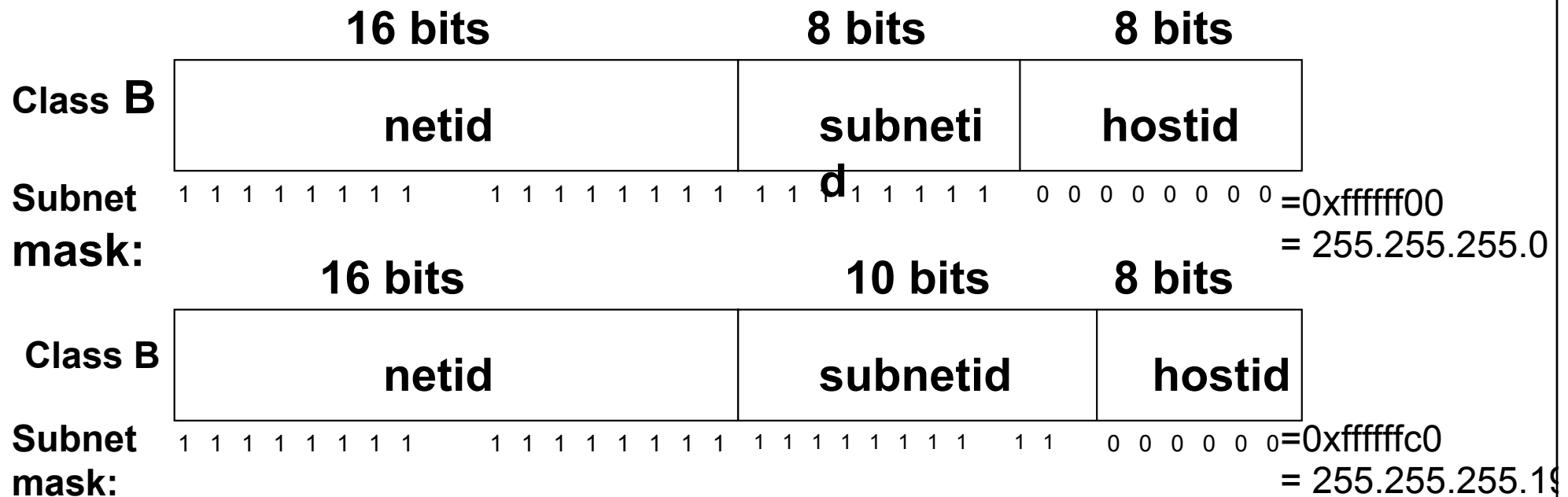
Subnetting a class B address

	16 bits	8 bits	8 bits
Class B	netid = 140.252	subnetid	hostid

Arrangement of most of the **noao.edu** 140.252 subnets

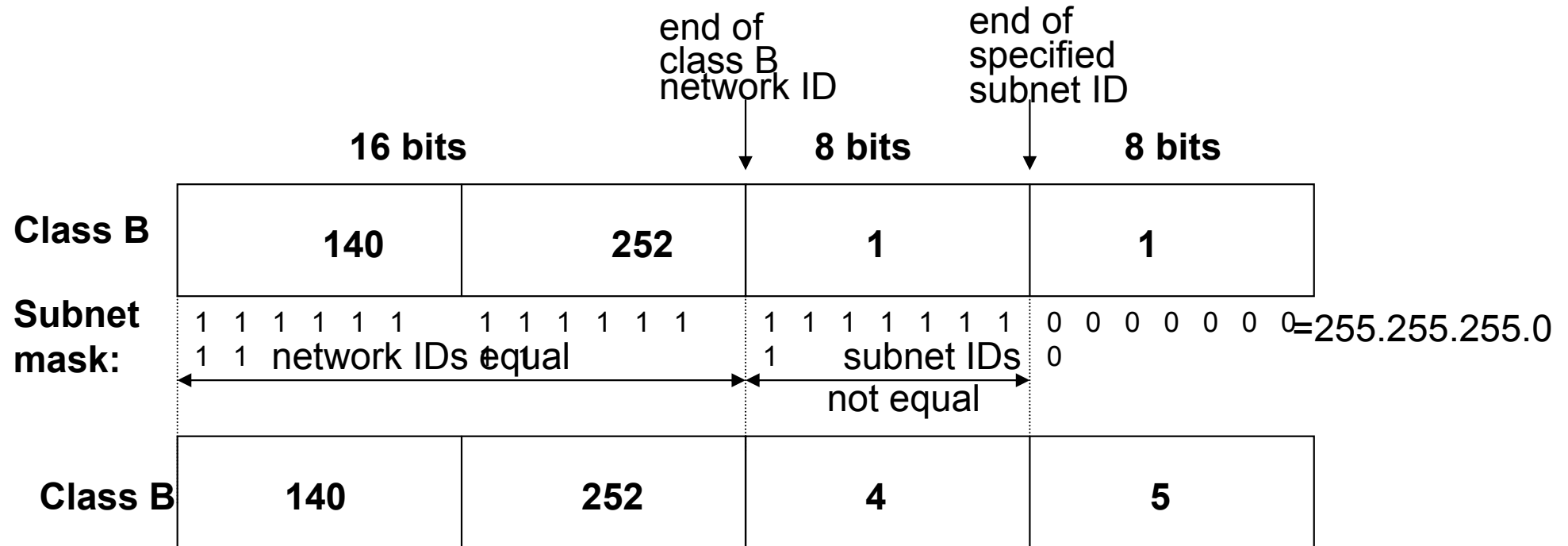


Example subnet masks for two different class B subnet arrangements



Comparison of two class B addresses using a subnet

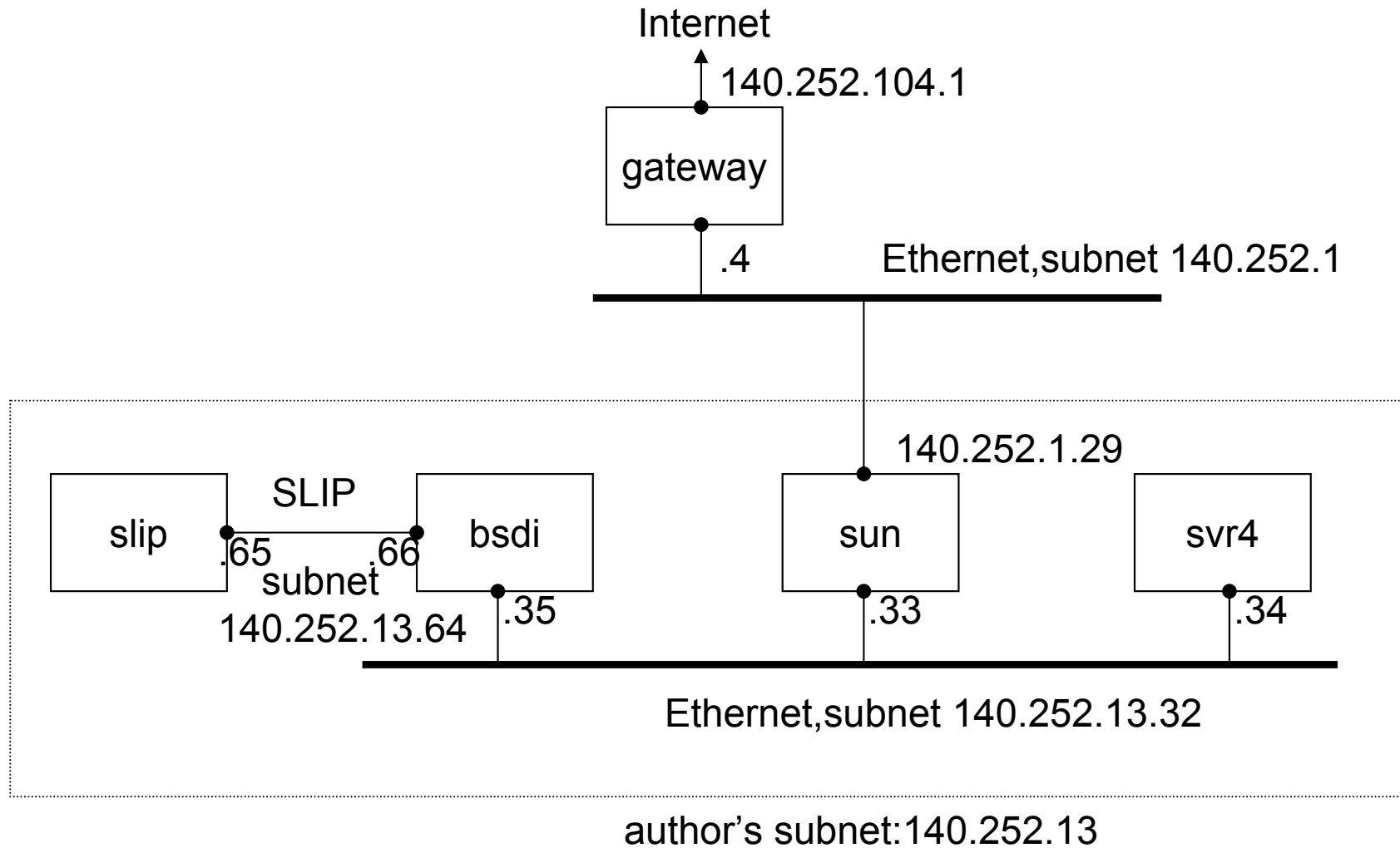
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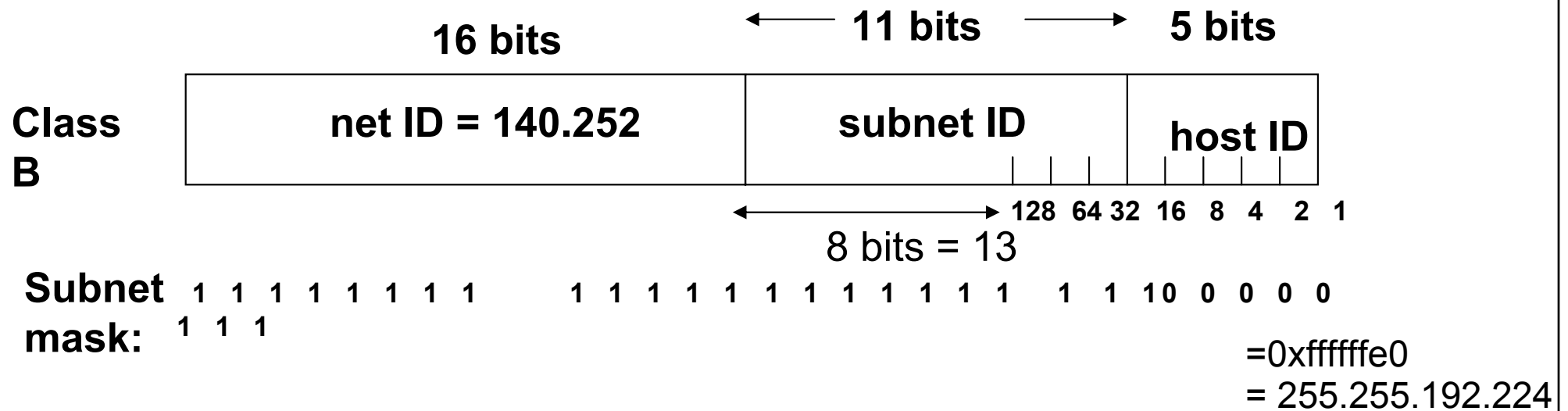
Special class IP addresses

IP address			Can appears as		Description
net ID	subnet ID	host ID	source ?	destination?	
0		0	OK	never	this host on this net (see restrictions below)
0		hostid	OK	never	Specified host on this net (see restrictions below)
127		anythin 9	OK	OK	loopback address (Section 2.7)
-1		-1	never	OK	limited broadcast (never forwarded)
netid		-1	never	OK	net-directed broadcast to <i>netid</i>
netid	subnetid	-1	never	OK	subnet-directed broadcast to <i>netid,subnetid</i>
netid	-1	-1	never	OK	all-subnets-directed broadcast to <i>netid</i>

Arrangement of hosts and networks for author's subnet



Using variable-length subnets



IP addresses on author's subnet

Host	IP address	Subnet mask	Net ID / Subnet ID	Host ID	Comment
sun	140.252.1.29	255.255.255.0	140.252.1	29	on subnet 1
	140.252.13.3	255.255.255.254	140.252.13.32	1	on author's Ethernet
svr4	140.252.13.3	255.255.255.22	140.252.13.32	2	
bsdi	140.252.13.35	255.255.255.22	140.252.13.32	3	on Ethernet
	140.252.13.66	255.255.255.22	140.252.13.64	2	point-to-point
slip	140.252.13.65	255.255.255.224	140.252.13.64	1	point-to-point
	140.252.13.63	255.255.255.224	140.252.13.3	32	broadcast addr on Ethernet

IP futures

- Over half of all class B addresses have already been allocated.
- 32-bit IP addresses in general are inadequate for the predicted long-term growth of the Internet.
- The current routing structure is not hierarchical , but flat,requiring one routing table entry per network.

Solution

- SIP, the Simple Internet Protocol.**
- PIP**
- TUBA, which stands for “TCP and UDP with Bigger Address “ is based on the
OSI CLNP (Connectionless Network Protocol) , an OSI
protocol similar to IP**
- TP/IX**