

Internet Protocol (IP) Address

Part 2



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Subnet Design

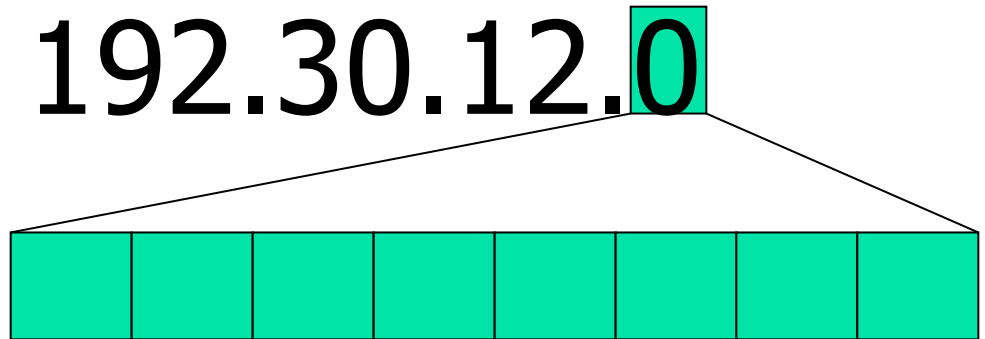
- Given a network 194.30.12.0 with 16 hosts in each subnetwork
- Find the following:
 - The number of subnetworks
 - Sub-network ID / Broadcast Address
 - Sub-netmask
 - First/Last address that can be used for each subnet

Subnet Design

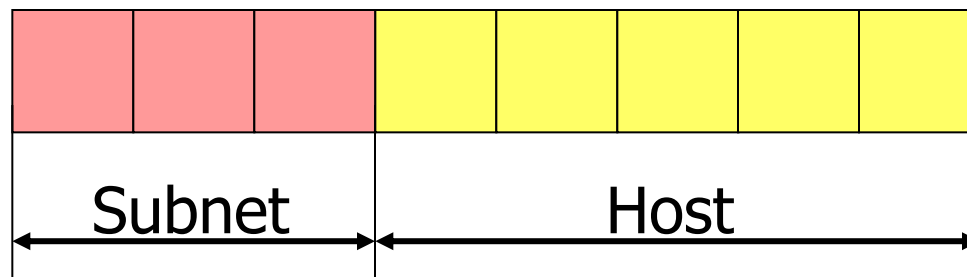
Class C IP address

192.30.12.0

Last Byte(Host ID)



- 16 Hosts $\rightarrow 2^4 = 16$ is not enough (subnetID and broadcast)
- $\rightarrow 2^5 = 32 \rightarrow$ total of 30 hosts
- \rightarrow 5 bits for Host and 3 bits for subnet



Subnet Design



Subnet Mask	255	.	255	.	255	.1 1 1 0 0 0 0 0
	255	.	255	.	255	. 224
Subnet ID	194	.	30	.	12	. 00000000 = 0
	194	.	30	.	12	. 00100000 = 32
	194	.	30	.	12	. 01000000 = 64
	194	.	30	.	12	. 01100000 = 96
	194	.	30	.	12	. 10000000 = 128
	194	.	30	.	12	. 10100000 = 160
	194	.	30	.	12	. 11000000 = 192
	194	.	30	.	12	. 11100000 = 224



Subnet Design

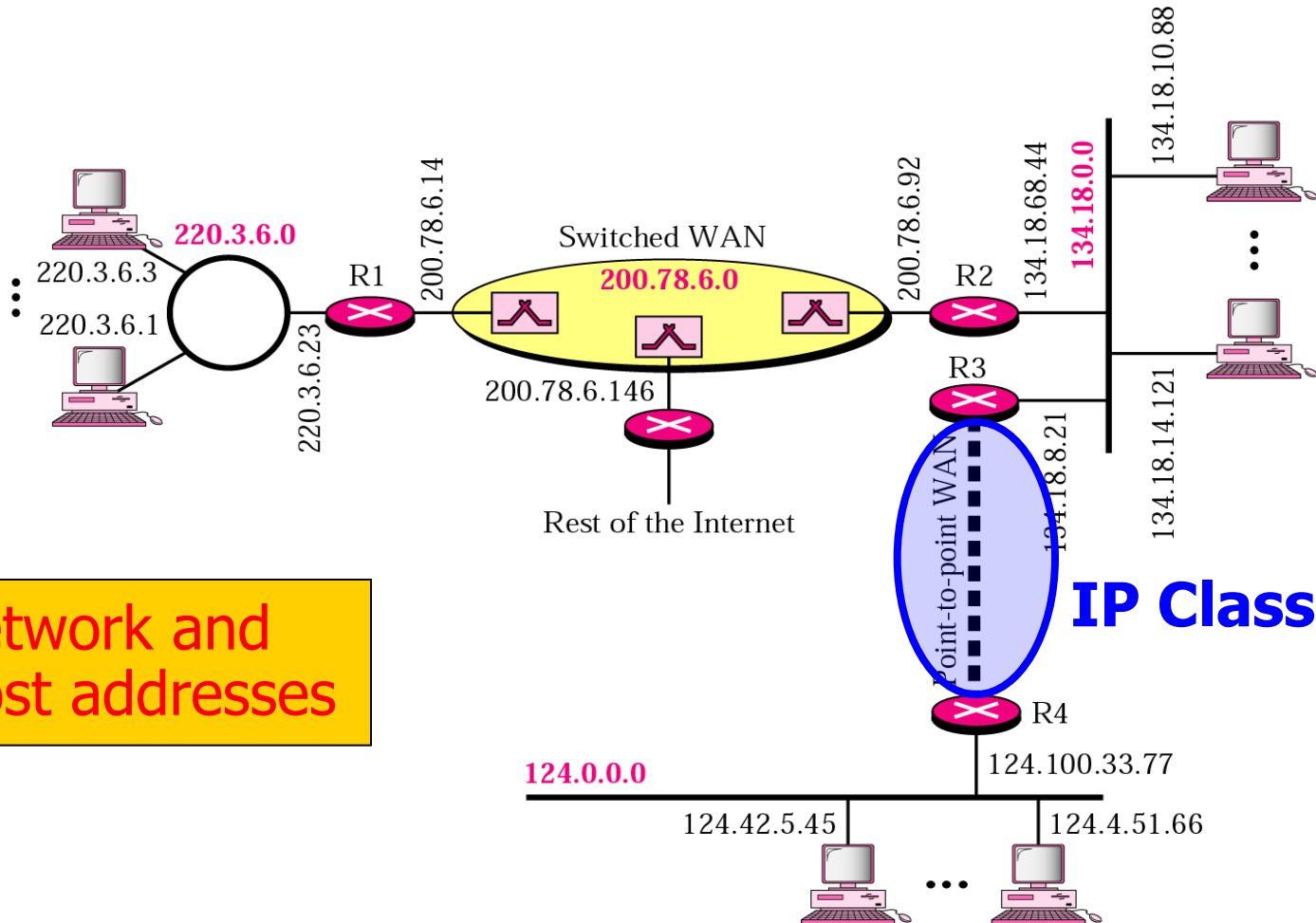
Subnet	Subnet ID	1 st Add	Last Add	Broadcast
0	192.30.12.0	192.30.12.1	192.30.12.30	192.30.12.31
1	192.30.12.32	192.30.12.33	192.30.12.62	192.30.12.63
2	192.30.12.64	192.30.12.65	192.30.12.94	192.30.12.95
3	192.30.12.96	192.30.12.97	192.30.12.126	192.30.12.127
4	192.30.12.128	192.30.12.129	192.30.12.158	192.30.12.159
5	192.30.12.160	192.30.12.161	192.30.12.190	192.30.12.191
6	192.30.12.192	192.30.12.193	192.30.12.222	192.30.12.223
7	192.30.12.224	192.30.12.225	192.30.12.254	192.30.12.255



Outline

- IP Address
- CIDR

Sample internet



Network and Host addresses

IP Class ?



CIDR

- Classless Inter-Domain Routing
- Not use binary representation
 - CIDR Notation
 - Ex. 158.106.0.0/16

CIDR Host Address

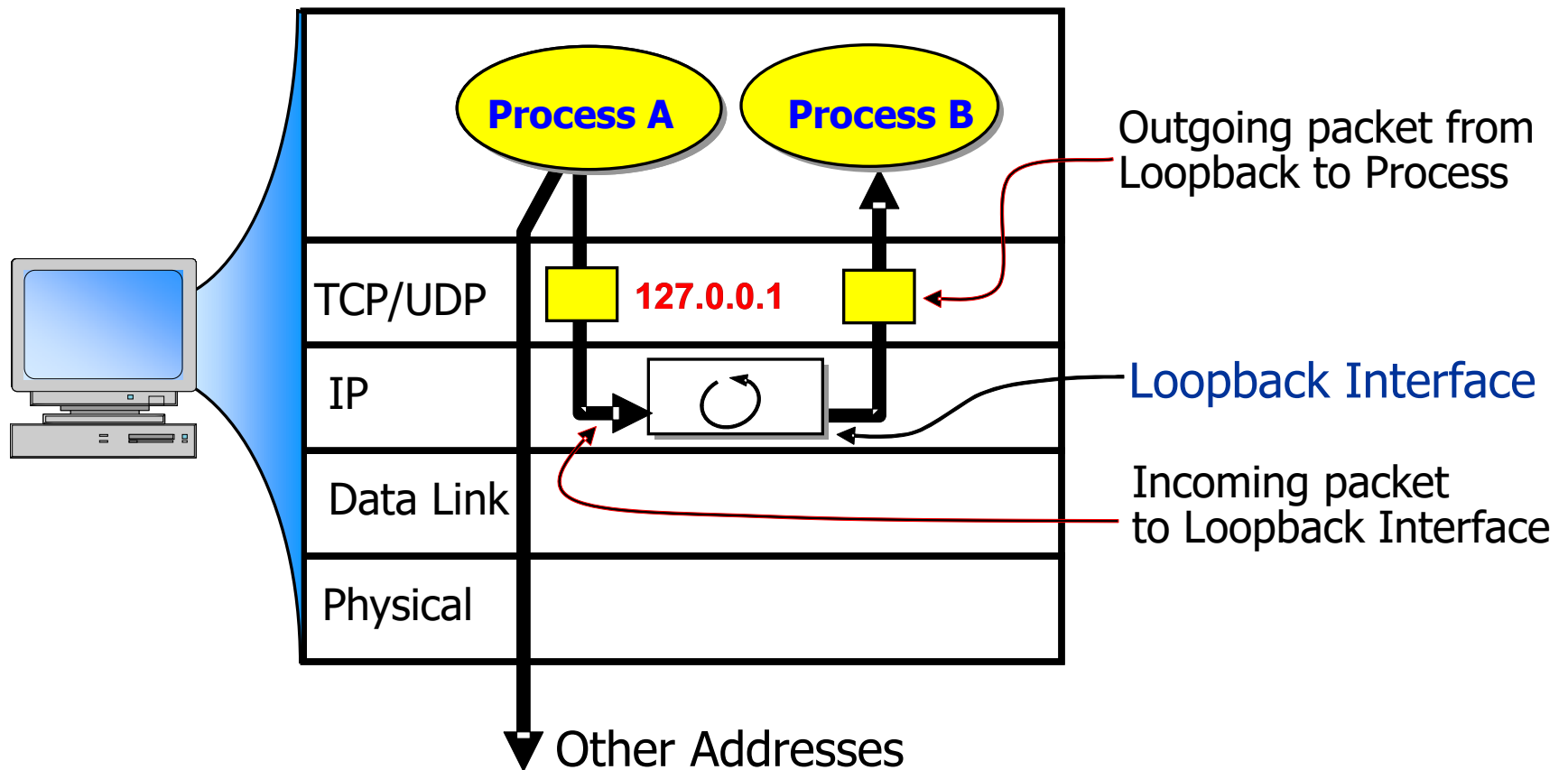




Special IP Addresses

- Network Address
 - all hosts = 0; e.g. 158.108.0.0/16
- Directed Broadcast Address
 - all hosts = 1; e.g. 158.108.255.255/16
- Limited Broadcast Address
 - all 1; e.g. 255.255.255.255
- This computer Address
 - all 0; e.g. 0.0.0.0
- Loopback Address
 - 127.0.0.0/8 → 127.0.0.1

Loopback Address





Directed Broadcast Address

- Ending with 255
- Use for sending to all nodes in class range
- Class A broadcast:
 - 10.255.255.255
- Class B broadcast:
 - 158.108.255.255
- Class C broadcast:
 - 202.100.15.255



Special IP Address

Prefix	Suffix	Type Of Address	Purpose
all-0s	all-0s	this computer	used during bootstrap
network	all-0s	network	identifies a network
network	all-1s	directed broadcast	broadcast on specified net
all-1s	all-1s	limited broadcast	broadcast on local net
127	any	loopback	testing



HW assignment

1. Given IP: 17.0.0.0
Requirement: 950 Networks

2. Given IP: 155.200.0.0
Requirement: 950 Host/network