

IP address & Subnet

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Internet (Network) Layer

purpose: to find the routers for a packet to the destination (packet delivery)

- packets can be delayed, corrupted, or lost

Example:

IP = Internet Protocol (provides packet delivery)

ICMP = Internet Control Message Protocol

TCP/IP MODEL

Application Layer

Transport Layer

Internet Layer

Network Access Layer

(DNS)

(TCP)

(WiFi)
(802.11)

OSI MODEL

7 Application

6 Presentation

5 session

4 Transport

3 Network

2 Data Link

1 Physical

= Encapsulation

= Decapsulation

IP address = unique global address
has a network num & host num

Domain Name, ppl will remember

IP address, ppl will not remember

IP & Subnetting

CLASS RANGES

A: used for networks with a lot of hosts

B: medium to large networks

C: small networks

A = (1 - 126)

B = (128 - 191)

C = (192 - 223)

D = (224 - 239)

E = (240 - 255)

HOW TO
SUBNET?

★ Subnetting allows the network admin to further divide the host part into subnets ★

Bitwise operator or binary operators

- used throughout electronics & programming
 - use boolean logic (0 is False, 1 is True)
 - performs functions bit by bit
- AND, OR, NOT, XOR

x	y	or	and	xor
		$x y$	$x \& y$	$x \wedge y$
0	0	0	0	0
0	1	1	0	1
1	0	1	0	1
1	1	1	1	0

1 = True
0 = False

AND = &

XOR = ^

OR = |

NOT = ~

NETWORK LAYER

IP fragmentation, reassembly

Internet (datagram)

- network links have MTU (max. transfer size) → largest possible link-level frame
- large IP datagram divided ("fragmented") within net
 - one datagram becomes several
 - "reassembled" only at final destination
 - IP header bits used to identify, order related fragments

What is a Routing Table?

IP addressing: 32-bit identifier for host, router interface

interface • connection between host/router & physical link

- routers have multiple interfaces

- host has 1 or 2 interfaces (wired, Ethernet, wireless 802.11)

IP addresses are associated with each interface

Every host & router on internet must have an IP to identify connection to network

- specified as a 2-level hierarchy: - Network num

what is Network num & host num

- host number

ISP = Internet Service Provider
(ex: COX or Verizon)

NETWORK

IP addressing

CIDR notation

CIDR: Classless InterDomain Routing

EX: /27

• subnet portion of address of arbitrary length

• address format: a.b.c.d /x

- x is # of bits in subnet portion of address

200.23.16.0 /23

255.255.255.0

00000000 = network address
11111111 = Broadcast address } Both are reserved

255.255.255.248 = /29 bc theres 29 1's in binary & 3 0's

1. How to find network name & host name?

→ IP: 172.18.244.233 /27

/27 = 27 1's & 5 0's

→ IP: 172.18.244.233

(binary) subnet mask: 11111111.11111111.11111111.11100000

128 64 32 16 8 4 2 1

IP in binary: 10101100.00010010.1110100.11101001

Subnet binary: 11111111.11111111.11111111.11100000

10101100.00010010.1110100.11100000

network name

host name

172.18.244.225 is first IP address

3 14
2 4 4
1 2 8
-
2 4 6
64
52
32
20
16
4

2 13
2 3 3
1 2 8
-
0 1 0 5
64
34
32
2
1
0

6 12
1 7 1
-
44
32
12
4