

Addressing and Forwarding

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Problem Statement

- Flat Addressing: N hosts needs N entries in the table (MAC addresses)
- Millions of hosts, address lookup in forwarding becomes a bottleneck
- Need a method of reducing entries in the forwarding table for scalability purposes

MAC



Vijay, son of Ajay, grandson of Sanjay - ... Air India flight

Rinki, daughter of Pinki, granddaughter of Dinky - ... Air India flight

⋮

⋮

IP



List of countries

India, Mumbai, Powai, B-4, Vijay

India, Delhi, Dwaraka, D-16, Rinki

⋮

India - Air India flight

⋮

Solution: Hierarchical Addressing

- Structure to addresses: Address captures location in the network topology
- IP address (32 bits) consists of two parts: network and host
 - Network part identifies the network to which host is connected
 - Host part uniquely identifies each host in the network
- How does this help?↖ 30,000
 - An entire network (in some specific direction) could be represented by a single entry at a router↗ network portion 1 entry

IP Address

- Size of network and host part are not the same
- Organizations obtain set of addresses of a given class
- Divided into five classes $2^7 = 128$ 2^{24}
 - Class A: 0, network(7), host(24); Mask 8 32 bits
 - Class B: 10, network(14), host(16); Mask 16 31 bits
 - Class C: 110, network(21), host(8); Mask 24 2^{14} host
 - Class D: 1110, bits-28 (Multicast)
 - Class E: 1111, bits 28 (Reserved)

IP Address



→ not allocated to organizations

- Private IP addresses:

→ IIT Bombay

- A: 10.0.0.0 through 10.255.255.255

- B: 172.16.0.0 through 172.31.0.0

- C: 192.168.0.0 through 192.168.255.0.

→ wifi AP

- 127.0.0.1 is loopback address.

NAT

(127.0.0.0 to 127.255.255.255)

loopback address block

ifconfig lo

↳ with 'host'

