Tutorial - 2

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IPv4

How does a IPv4 address look like?

143.89.144.165

1000 1111 . 0101 1001 . 1001 0000 . 0100 0001

(32-Bits, 8 bytes)

Maximum number of IPv4 address??

- 32 bits
- each bit is either 0 or 1

Maximum number of IPv4 address??

- 2^32 = 4294967296 (4.29 Billion)

Number of Internet users

Asia Population : 3.9 Billion

Asia Internet Users : 1.07 Billion

World Population : 7 Billion

World Internet Users : 2.4 Billion

http://www.internetworldstats.com/stats.htm

The Problem

- Soon we are going to have more than 4.2 Billion internet users

What happens then??????

Why this happened

- IPv4 designed in 1980
- World population in 1980 -- 4.4 Billion
- World situation
  - Universities & Research organizations in USA, EU where to be main users
  - China, Korea, India & other Asian countries -- lot of poverty & newly independent

What happens now?

Solution

1. The quick fix (NAT)
2. Long term solution (IPv6)

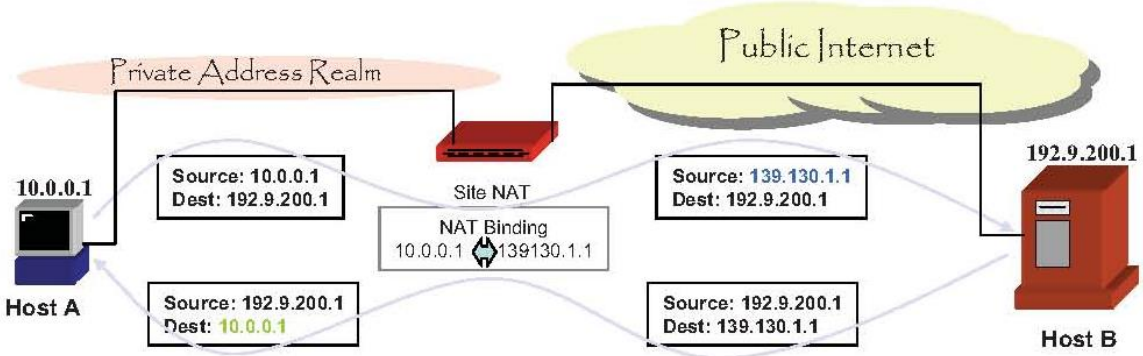
NAT - Network Address Translation

Private IP Address (Non routable IP)

Public IP

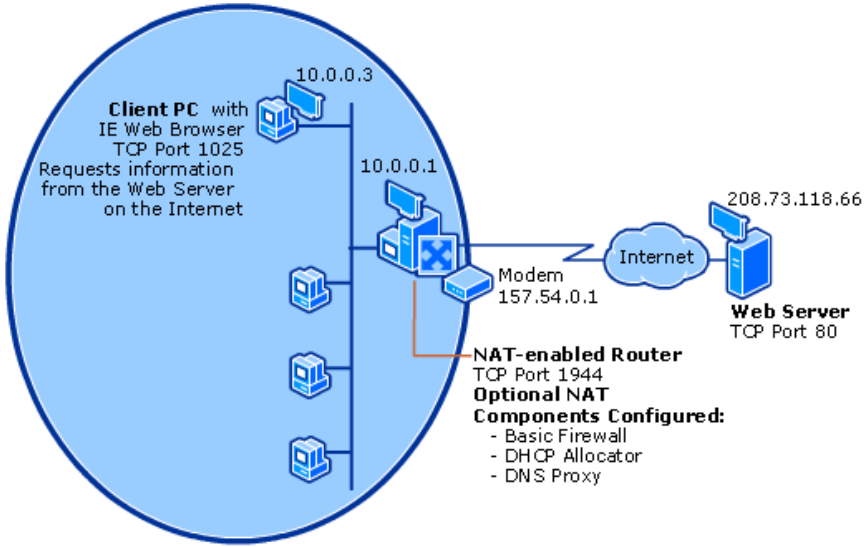
NAT (Type 1)

Number of IPs more than users



NAT (Type - 2)

Number of IPs less than users



IPV6

- 128 Bit addresses
- 2^128 addresses (3.4 E38)
- Try and calculate number of IPs per unit area of earth

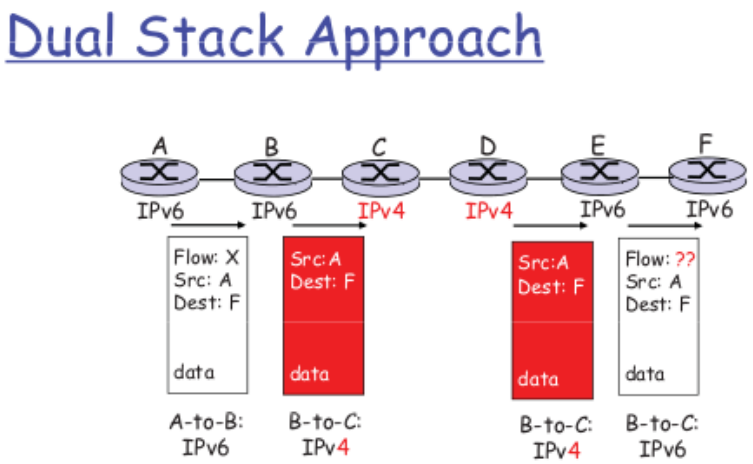
Problem having IPv6 for everyone

Not everyone willing to upgrade their routers

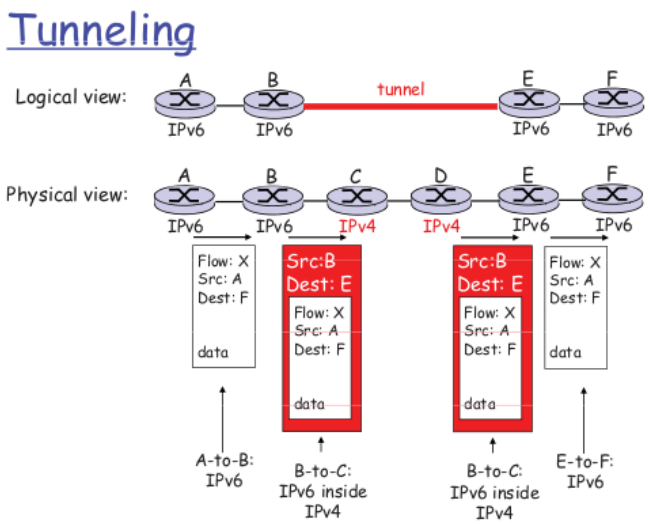
Getting around this problem

1. Dual Stack
2. Tunnelling

Dual Stack Approach



Tunneling


Tunneling
Logical view:
A
B
tunnel
E
F
IPv6
IPv6
IPv6
IPv6
Physical view:
A
B
C
D
E
F
IPv6
IPv6
IPv4
IPv4
IPv6
IPv6
Flow: X
Src: A
Dest: F
data
Src:B
Dest: E
Flow: X
Src: A
Dest: F
data
Src:B
Dest: E
Flow: X
Src: A
Dest: F
data
Flow: X
Src: A
Dest: F
data
A-to-B:
IPv6
B-to-C:
IPv6 inside
IPv4
B-to-C:
IPv6 inside
IPv4
E-to-F:
IPv6