

CIDR: Classless Interdomain Routing

Surasak Sanguanpong

nguan@ku.ac.th

<http://www.cpe.ku.ac.th/~nguan>

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Address allocation problem

- Exhaustion of the class B network address space.
- The lack of a network class of a size which is appropriate for mid-sizes organization;
 - class C, with a max of 254 hosts, is too small,
 - while class B, with a max of 65534 hosts, is too large.
- Allocate blocks of class C instead and downside is more routes entry in routing table
 - 1) requires fewer than 256 addresses 1 class C network
 - 2) requires fewer than 512 addresses 2 contiguous class C networks
 - 3) requires fewer than 1024 addresses 4 contiguous class C networks
 - 4) requires fewer than 2048 addresses 8 contiguous class C networks
 - 5) requires fewer than 4096 addresses 16 contiguous class C networks
 - 6) requires fewer than 8192 addresses 32 contiguous class C networks
 - 7) requires fewer than 16384 addresses 64 contiguous class C networks

Routing Table problems

- Issue multiple (block) class C addresses (instead single class B address) solves a running out of class B address but...
- Introduces a problem of routing table
 - By default, a routing table contains an entry for every network
 - How large a routing table should be for all Class C networks?
- Growth of routing table in the Internet routers beyond the ability of current software and hardware to manage

How to Solve

- Topological allocate IP address assignment
- We divide the world into 8 regions like this : (RFC1466)

Multi-regional 192.0.0.0 - 193.255.255.255

Europe 194.0.0.0 - 195.255.255.255

Others 196.0.0.0 - 197.255.255.255

North America 198.0.0.0 - 199.255.255.255

Central/South America 200.0.0.0 - 201.255.255.255

Pacific Rim 202.0.0.0 - 203.255.255.255

Others 204.0.0.0 - 205.255.255.255

Others 206.0.0.0 - 207.255.255.255

IANA reserved 208.0.0.0 - 223.255.255.255

Classless Interdomain Routing

- **Class C address's concept becomes meaningless on these route between 'domains', the technique is called **Classless Interdomain Routing** or **CIDR** (pronounce cider)**
- **Key concept is to allocate multiple IP addresses in the way that allow summarization into a smaller number of routing table (route aggregate)**
- **CIDR is supported by BGP4 and based on **route aggregation****
 - **e.g 16 class C addresses can be summarized to a single routing entry (router can hold a **single** route entry for the main trunks between these areas**

Supernetting

- CIDR is also called **Supernetting** in contrast to subnetting
- an organization has been allocated a block of class C addresses in 2^n **with contiguous address space**
 - archive by using bits which belongs to the **network address** as host bits
 - class C example : altering the default class C subnet mask such that some bit change from 1 to 0

(Super) netmask

4 class C networks appear to networks outside as a single network

11111111 11111111 11111100 00000000

255.255.252.0

Supernetting Sample

- an organization with 4 class C
 - 190.0.32.0, 190.0.33.0, 190.0.34.0 190.0.35.0

11111111	11111111	11111100	00000000	mask = 255.255.255.252.0
11000010	00000000	00100000	00000000	net = 190.0.32.0
11000010	00000000	00100001	00000000	net = 190.0.33.0
11000010	00000000	00100010	00000000	net = 190.0.34.0
11000010	00000000	00100011	00000000	net = 190.0.35.0

Bit wise AND results 190.0.32.0

- *This organization's network has changed from 4 net to a single net with 1022 hosts*

Supernetting Sample, cont.

org#1 192.0.0.X - 192.0.127.X 255.255.0.0 (128 nets)

org#1 192.0.128.X - 192.0.255.X 255.255.128.0 (128 nets)

datagrams 192.0.5.1 & 255.255.0.0 = 192.0.0.0 => org#1

datagrams 192.0.5.1 & 255.255.128.0 = 192.0.0.0 not match org#2

The Longest Match Supernetting

- Europe has 194.0.0.0 - 195.255.255.255 with mask 254.0.0.0
- A case of one organization (195.0.16.0-195.0.36.0 mask 255.255.254.0) needs different routing entry
- datagrams 195.0.20.1 matches both Europe's and this organization. How to do?
- Routing mechanism selects the longest mask (255.255.254.0 is longer than 254.0.0.0), then route to the organization

Summary

- **routing decisions are now made based on masking operations of the entire 32 bit address, hence the term “classes”**
- **No existing routes is changed**
- **CIDR slows down the growth of routing tables (current ~ 50K entries in core routers)**
- **Short term solution to solve routing problem**
- **limitation : not all host/router software allows supernet mask**