Subnetting

- Given a network IP address, there are three types of problems involving subnetting:

  — Subnetting when given a required number of networks

  — Subnetting when given a required number of clients

  — Given an IP address & Subnet Mask, finding original network range (reverse engineering a subnet problem)

- The following several slides are based on:

https://learningnetwork.cisco.com/servlet/JiveServlet/previewBody/6014-102-1-19236/Subnetting%20Examples.pdf

Subnetting Given Number of Networks (1)

❖ **A company would like to break its Class B network IP address 172.16.0.0 into 60 different subnets. Find ranges of IP addresses for each subnet and new mask.**

o Class B network has 16 host bits → Class B subnet mask = 255.255.0.0 = 11111111.11111111.00000000.00000000

o 60 = 00111100 → we need at least 6 additional network bits

o New Mask
11111111.11111111.11111(1)00.00000000=255.255.252.0

and bit with parenthesis is the increment bit

o Start with the given network IP address and add the increment to the subnetted octet:

     172.16.0.0

     172.16.4.0

     172.16.8.0 ... etc.

Subnetting Given Number of Networks (2)

o Now add each end range, which is the last possible IP address before the next range :

Subnet 1   172.16.0.0   – 172.16.3.255

Subnet 2   172.16.4.0   – 172.16.7.255

Subnet 3   172.16.8.0   – 172.16.11.255

Subnet 4   172.16.12.0   – 172.16.15.255

...

...

Subnet 60   172.16.236.0 – 172.16.239.255

o Assign these ranges to the new networks, but the first and last address from each range (network / broadcast IP) are unusable.

Subnetting Given Number of Hosts (1)

❖ **A company would like to break its Class B private IP address 172.16.0.0 into as many subnets as possible provided that they can get *at least* 300 clients per subnet. Find ranges of IP addresses for each subnet and new mask.**

o Class B mask = 11111111.11111111.00000000.00000000

o 300 = 100101100 → we need at least 9 host bits to remain

o New Mask
  11111111.11111111.111111(1)0.00000000=255.255.254.0

  and bit with parenthesis is the increment bit

o Start with the given network address and add the increment to the subnetted octet: 172.16.0.0

  172.16.2.0

  172.16.4.0 … etc.

Subnetting Given Number of Hosts (2)

o Now add each end range, which is the last possible IP address before the next range :

Subnet 1   172.16.0.0   – 172.16.1.255

Subnet 2   172.16.2.0   – 172.16.3.255

Subnet 3   172.16.4.0   – 172.16.5.255

Subnet 4   172.16.6.0   – 172.16.7.255

...

...

Subnet 128   172.16.254.0 – 172.16.255.255

o Assign these ranges to the new networks, but the first and last address from each range (network / broadcast IP) are unusable.