James McCabe Network Analysis, Architecture, and Design, Third Edition
Chapter 6 Addressing and Routing Architecture

6. Given the network address 129.99.0.0/16, develop a variable-length addressing scheme that best fits the design, with the following numbers of users:

AS Number	Location	Department	Users
1	Chicago Campus Building 1	Legal	120
		Accounting	370
	Chicago Campus Building 2	HQ	1580
		Engineering	200
2	Toronto	Sales	75
	Boston	Sales	110
3	Philadelphia	Operations1	2150
		Operations2	975
		Sales	575

Number of users for each autonomous system (constant = 200):
AS1: 120 + 370 + 1580 + 200 = 2270 => 12 Subnets
AS2: 75 + 110 = 185 => 1 Subnet
AS3: 2150 + 975 + 575 = 3700 => 19 Subnets

Total: 33 Subnets => 33x200 = 6600 IP Addresses

IP Block	AS Number	Range
129.99.0.0/16 Net Mask: 255.255.0.0 2nd byte Netmask: 11111111	AS1/1	129.99.0.0/21 255.255.248.0 11111000(8) 129.99.0.1 - 129.99.7.254
	AS1/2	129.99.8.0/21 255.255.248.0 11111000(8) 129.99.8.1 - 129.99.15.254
	AS1/3	129.99.16.0/21 255.255.248.0 11111000(8) 129.99.16.1 - 129.99.23.254
	AS1/4	129.99.24.0/21 255.255.248.0 11111000(8) 129.99.24.1 - 129.99.31.254
	AS1/5	129.99.32.0/21 255.255.248.0 11111000(8) 129.99.32.1 - 129.99.39.254
	AS1/6	129.99.40.0/21 255.255.248.0 11111000(8) 129.99.40.1 - 129.99.47.254
	AS1/7	129.99. 48.0/21 255.255.248.0 11111000(8) 129.99.48.1 - 129.99.55.254
	AS1/8	129.99.56.0/21 255.255.248.0 11111000(8) 129.99. 56.1 - 129.99.63.254
	AS1/9	129.99. 64.0/21 255.255.248.0 11111000(8) 129.99.64.1 - 129.99.70.254
	AS1/10	129.99.72.0/21 255.255.248.0 11111000(8) 129.99. 72.1 - 129.99.79.254
	AS1/11	129.99.80.0/21 255.255.248.0 11111000(8) 129.99.80.1 - 129.99.87.254
	AS1/12	129.99.0.0/21 255.255.248.0 11111000(8) 129.99.88.1 - 129.99.95.254
	AS2	129.99.88.0/21 255.255.248.0 11111000(8) 129.99.96.1 - 129.99.103.254
	AS3/1	129.99.104.0/21 255.255.248.0 11111000(8) 129.99.104.1 - 129.99.111.254
	AS3/2	129.99.112.0/21 255.255.248.0 11111000(8) 129.99.112.1 - 129.99.119.254
	AS3/3	129.99.120.0/21 255.255.248.0 11111000(8) 129.99.120.1 - 129.99.127.254
NetID LSB: 1 IP range: 129.99.0.1 - 129.99.255.254 32Blocks => 5bit	AS3/4	129.99.128.0/21 255.255.248.0 11111000(8) 129.99.128.1 - 129.99.135.254
	AS3/5	129.99.136.0/21 255.255.248.0 11111000(8) 129.99.136.1 - 129.99.143.254
	AS3/6	129.99.144.0/21 255.255.248.0 11111000(8)

	129.99.144.1 - 129.99.151.254
AS3/7	129.99.152.0/21 255.255.248.0 11111000(8) 129.99.152.1 - 129.99.159.254
AS3/8	129.99.160.0/21 255.255.248.0 11111000(8) 129.99.160.1 - 129.99.167.254
AS3/9	129.99.168.0/21 255.255.248.0 11111000(8) 129.99.168.1 - 129.99.175.254
AS3/10	129.99.176.0/21 255.255.248.0 11111000(8) 129.99.176.1 - 129.99.183.254
AS3/11	129.99.184.0/21 255.255.248.0 11111000(8) 129.99.184.1 - 129.99.191.254
AS3/12	129.99.192.0/21 255.255.248.0 11111000(8) 129.99.192.1 - 129.99.199.254
AS3/13	129.99.200.0/21 255.255.248.0 11111000(8) 129.99.200.1 - 129.99.207.254
AS3/14	129.99.208.0/21 255.255.248.0 11111000(8) 129.99.208.1 - 129.99.215.254
AS3/15	129.99.216.0/21 255.255.248.0 11111000(8) 129.99.216.1 - 129.99.223.254
AS3/16	129.99.224.0/21 255.255.248.0 11111000(8) 129.99.224.1 - 129.99.231.254
AS3/17	129.99.232.0/21 255.255.248.0 11111000(8) 129.99.232.1 - 129.99.239.254
AS3/18	129.99.240.0/21 255.255.248.0 11111000(8) 129.99.240.1 - 129.99.247.254
AS3/19	129.99.248.0/21 255.255.248.0 11111000(8) 129.99.248.1 - 129.99.255.254

IP addresses should be allocated relative to the number of users in each location and each department
e.g. Chicago Campus Building 1: AS1/1, AS1/2, AS1/3 = 129.99.0.1-129.99.23.1
Chicago Campus Building 3: AS1/3, …, AS1/12 = 129.99.24.1-129.99.95.1