IP Addressing/Subnetting Assignment

Answer the following questions in your journal. Show all steps.

1. Your workstation's IP host address is 200.210.220.230, and you are using 255.255.255.0 for a subnet mask. What is the IP address of your subnet? What is the broadcast address of your subnet?

2. You have just been given the IP network address 204.212.15.0, and you need at least four subnets, each supporting a minimum of twenty-seven PC's. What is the class of your network? What subnet mask(s) will accomplish the goal? What are the IP addresses of your four subnets? What is the range of legal host addresses for each of your subnets? What is the broadcast address for each of your subnets?

3. A server's IP host address is 173.240.250.60/16. What is the IP address of its subnet? What is the broadcast address of its subnet? What is the server's IP host address in hexadecimal?

4. Assume that the Army's IP network address is 11.0.0.0, that a battalion owns twenty IP-addressable items of equipment, and that each piece of equipment requires an IP host address. Each battalion has its own subnet, and there are 200,000 battalions. What subnet mask(s) will accomplish the mission?

5. You have been assigned IP network address 183.56.0.0, and you need 645 subnets, each supporting fourteen DEC (Compaq) Alpha workstations. What subnet mask(s) will satisfy the requirements?

6. Given the IP network address 148.25.0.0, what subnet mask(s) will provide for a minimum of 100 subnets, each supporting at least 200 PC's? Using the subnet mask of your choice, what are the subnet addresses, the ranges of host addresses for each subnet, and the broadcast addresses of your subnets?

7. Your company's IP network address is 220.193.19.0, and you currently have 187 Ethernet hosts on the network. You have just received word that the company will be adding an additional 90 employees, each requiring a workstation with an IP host address, over the next six months. Will you need to subnet? If so, what mask will you use, and what are the subnet addresses?

8. A router's TO2 port has an IP address of 219.220.150.33/29. What is the IP address of this port's subnet? What is the IP address of this port's network? What is the broadcast address of this port's subnet? How many Macintosh clients can be present on this port's subnet? How many subnets are available?

9. Your IP host address is 206.23.56.4/28. Based on this address and mask, how many legal IP host addresses are available on your subnet? On your entire network?

10. Given any class C network, and a subnet mask of 255.255.255.254, how many usable subnets are available? How many usable host addresses are available on each subnet?

11. Given network address 148.202.0.0/17, how many usable subnets are available? How many usable host addresses are available on each subnet?

12. A router has four interfaces, E0, TO0, TO1 and S0. Interface E0 has an IP address of 207.29.4.61/27. Can we assign interface TO0 an IP address of 207.29.4.195/27? If so, can we give interface TO1 the IP address 207.29.4.196/27? Can we assign interface S0 the IP address 207.29.4.121/26? In all cases, if not, why not?
13. If your company is using network 10.0.0.0 with a subnet mask of 255.255.192.0, how many subnets can you have? How many hosts per subnet? How many total hosts? Is this more or less than the number of total hosts you could have if you were using the default subnet mask? If you want to connect to the public Internet, what will you have to do?

14. A company with an IP network address of 173.95.0.0 has just retained your services in the area of network design. They have seven divisions running token ring, and each division is located in a different geographical area. The seven areas are mesh-connected by 56 kbps WAN links. Two of the divisions have twenty to thirty hosts each, and the remaining divisions have between forty and fifty hosts each. If each division requires its own subnet, what subnet mask(s) will satisfy the requirements? Based on your choice of subnet mask, what is the maximum number of hosts that a division can have, and how many divisions are possible on the network?

15. ACME Widgets, Incorporated, whose Ethernet network's IP address was 162.53.0.0, has just merged with the AJAX-Dipthong Company, which had a Token Ring network using an IP address of 216.1.7.0 prior to the merger. The new corporation will be known as ACME-Dipthong. As the newly minted CIO of A-D, you'd like to consolidate your address space. Since your combined enterprise has a total of 400 Ethernet and 100 Token Ring devices, each needing an IP address, which network address should the new ACME-Dipthong use? Do you need to subnet your network? If so, what subnet mask will you use?

16. Comrade Network Engineer, the Chernobyl nuclear-electric generating station has five nuclear reactors (that have not, as of yet, melted down). In each reactor, seventeen independently addressable Control Rod Drive Mechanisms move seventeen zirconium-clad hafnium control rods (one rod per CRDM), to control the average reactor coolant temperature. Given that Chernobyl Power & Light has an assigned IP network address of 199.28.7.0, if each reactor needs its own subnet, and each CRDM requires its own IP host address, what subnet mask(s) will meet CP&L's requirements? Based on your recommendation for a subnet mask, what is the SCRAM (emergency shutdown) IP broadcast address for each reactor, comrade?

17. Exponential Growth, Inc., has an IP network address of 145.94.0.0/28, with 47 subnets. The maximum number of hosts they have on any one subnet is eleven. They plan to double the number of hosts per subnet by the year 2000, and they are worried about running out of IP addresses. They just called you in to analyze their IP network. Can you help them?

18. Given network address 9C-2A-00-00 (hex), you need 64 subnets, each supporting 113 hosts. What are the hexadecimal representations of all subnet mask(s) that fulfill the specifications?

19. A manageable hub has an IP address of 217.225.73.41, with a subnet mask of 255.255.255.240. If the hub sends an IP broadcast to its own subnet, what destination and source IP addresses will it use? If it sends a directed-broadcast to the subnet containing IP host address 6.42.89.184/13, what destination IP address will it place in the packet?
20. Given the following host addresses and subnet masks, find each subnet and its range of host addresses and write the subnet mask in dotted decimal notation:
   a. 209.86.254.114/28
   b. 10.15.17.22/13
   c. 192.63.83.105/26
   d. 134.72.29.55/20
   e. 25.0.0.99/29
   f. 223.16.38.101/27
   g. 176.17.123.209/30
   h. 205.195.23.95/24

21. Given the following networks, numbers of subnets, and hosts per subnet, specify all possible subnet masks in both dotted-decimal and CIDR notation:

<table>
<thead>
<tr>
<th>Network</th>
<th>Subnets</th>
<th>Hosts/Subnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 194.26.84.0</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>b. 137.10.0.0</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>c. 172.16.0.0</td>
<td>105</td>
<td>66</td>
</tr>
<tr>
<td>d. 206.99.1.0</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>e. 64.0.0.0</td>
<td>2000</td>
<td>300</td>
</tr>
<tr>
<td>f. 206.14.72.0</td>
<td>2</td>
<td>115</td>
</tr>
<tr>
<td>g. 198.25.82.0</td>
<td>60</td>
<td>2</td>
</tr>
<tr>
<td>h. 187.53.0.0</td>
<td>515</td>
<td>290</td>
</tr>
</tbody>
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