

Real-World Scenario 6-2: Subnetting a Network

Scenario: The organization you work for has several departments. There is a lot of unnecessary traffic flowing between the Human Resources, Accounting, and Marketing departments. Each department has 10 to 15 computers running within it. Your task is to implement subnetting so that each of the three departments' computers are placed on separate subnets, thus reducing overall traffic, as well as securing the connections between the departments.

In this scenario you will use the 192.168.100.0 network. The current subnet mask is 255.255.255.0. You will need to modify this. Plan the network so that there are eight subnets in total. Specify which subnet ID each department uses and what the usable ranges of IP addresses for those subnets are. Your answers may vary from the example solution.

Real-World Scenario 6-2 Solution

Using subnetting is an excellent way of compartmentalizing the network. It reduces broadcast traffic between the various computers on the network and secures different departments. This is because many types of traffic now cannot pass from one subnet to the next (without an expressed routing rule). Therefore, it is an effective security method.

In the scenario you were given the 192.168.100.0 Class C network to work with. To end up with eight subnets, you would need to use the 255.255.255.224 subnet mask. This can be represented as 192.168.100.0/27 because the subnet mask will have 27 masked bits (1s). The table on the following page shows the eight possible subnets and their ranges. Though they can be used, in many cases a network engineer will opt to not use the first and last subnets, so subnet IDs 1 to 6 become fair game.

Subnet		
ID	Mathematical IP Range	Usable IP Range
ID 0	192.168.100.0– 192.168.100.31	192.168.100.1– 192.168.100.30
ID 1	192.168.100.32– 192.168.100.63	192.168.100.33– 192.168.100.62
ID 2	192.168.100.64– 192.168.100.95	192.168.100.65– 192.168.100.94
ID 3	192.168.100.96– 192.168.100.127	192.168.100.97– 192.168.100.126
ID 4	192.168.100.128– 192.168.100.159	192.168.100.129– 192.168.100.158
ID 5	192.168.100.160– 192.168.100.191	192.168.100.161– 192.168.100.190
ID 6	192.168.100.192– 192.168.100.223	192.168.100.193– 192.168.100.222
ID 7	192.168.100.224– 192.168.100.255	192.168.100.225– 192.168.100.254

Each subnet has 30 usable IP addresses. (Remember that you can't use the first or the last because they are reserved for the subnet IP and the broadcast IP.) So, for example, we could use subnet ID 1 for the Human

Resources department, subnet ID 2 for the Accounting department, and subnet ID 3 for the Marketing department.

The computers in each of those networks would then need to be configured properly. There are a lot of ways to do this. Automation is the best way. For example, set up three DHCP scopes configured on a DHCP server (be it a Microsoft server or a router), each of which corresponds to the appropriate subnetwork within a router. The key is to make sure that the DHCP server hands out the correct subnet ID addresses to each department. This requires additional configuring that goes beyond the extent of this case study. However, for more information on defining DHCP scopes in Windows Server, see the following link:

<http://technet.microsoft.com/en-us/library/dd759218.aspx>

For more information about DHCP subnet configuration on Cisco routers, see the following link:

http://www.cisco.com/c/en/us/td/docs/voice_ip_comm/cucm/admin/8_5_1/ccmcfg/bccm-851-cm/b02dhsub.html

Or simply search for “Cisco DHCP subnet configuration.”

Video Solution: Watch the video solution “6-2: Subnetting a Network.” This reviews subnet masks and shows an example of subnetting.