Real World Scenario & Lesson Companion

Real World Scenario

Subnetting

Read the scenario. Then, use this guide as you work through the lesson. Answer the questions to help you connect your learning to the scenario.

Scenario:

Scaling Up: Subnetting Adventures

Agile Shield is a rapidly growing defense contracting company that is planning to open a new office to accommodate their growth in business and the additional employees it will need. The new office will require a network infrastructure that is capable of supporting 400 network devices, including computers, printers, servers, and other network devices. The company is expected to continue to grow and eventually expects the network to support an additional 100 devices.

As the company's Network Administrator, you are expected to design this network infrastructure. Your supervisor has made it clear that all of the devices on the new office's network must be able to communicate with each other and the devices at the original office. This means that the new office's network infrastructure is required to perform at a high level, while also remaining scalable and easy to manage.

To accomplish these goals, you decide to turn to subnetting and will apply subnetting techniques to assist in the design of the network infrastructure.

Task 1: Define the Dependencies

What external factors can affect the outcome of the scenario?

What skills or knowledge must be acquired before tackling the scenario?

What are the potential consequences of making certain decisions within the scenario?

Task 2: Assess the Needs

What is the purpose of the scenario and what needs does it aim to address?

What skills or knowledge are needed to successfully address the needs of the scenario?

What resources are required to address the needs of the scenario and how can they be acquired?
How can the scenario be evaluated to determine whether the identified needs have been effectively addressed?

Task 3: Create an Implementation Plan

What are the main steps required to implement the solution to the scenario?
What resources (e.g., materials, personnel, time, budget) are needed to implement the solution?
What stakeholders (e.g., customers, employees, shareholders, regulators) must be considered when implementing the solution and how can their needs be addressed?
How can the implementation plan be evaluated to determine whether the solution was effective in addressing the scenario?

Lesson Companion

Subnetting

Use this lesson companion to help you retain and synthesize the information that is integral to your progress. As you engage with the lesson material alongside your instructor, take note of key points and extract pertinent details.

Number Systems

How many numbers does the decimal number system have? 10 1-9 & 0
How many digits does the binary number system have and what are those digits? 2
How many digits does the hexadecimal number system have and what are those digits? 16
When thinking about positional notation, each number's value can be calculated as a result of a function. number=digit * base ^ position
What is the equation of the function? ^^
What are some tricks to calculate binary? ON 1 = positional value * 1
OFF=Omitted – add up only values that are switched on – Division Calculation
Which three steps can you use to convert binary to hex? Positional Values ON added to each other

What is subnetting?

The act of taking one network into many networks. Subdividing.

Subnetting Overview

What does subnetting mean?The act of taking one network into many networks. Subdividing.
What does subnetting do? Allows you to create rules for connectivity
What are large broadcast domains?
Operating a class 16 network will have a huge amount of overhead
Why use subnetting? To start to reduce that overhead and start setting rules.
Access control lists – enables administrators a degree of control not otherwise available.
What is the octet boundary? The boundary in ips between numbers…8/16/24

Real World Scenario Connection

Knowing what you now know about subnetting, why would a network administrator at Agile Shield use subnetting? To add more ip's and/or hosts
What are the benefits of subnetting the network at Agile Shield's new office? Because they need intercommunication between many devices we can subnet as needed and then set rules

CIDR Notation

Why does using IPv4 address classes result in a waste of addresses? Bc address' must be reserved for local and broadcast
What does CIDR do? Gives you your usable address ranges

Real World Scenario Connection

Why would Agile Shield want to use CIDR notation?
If they want subnetting they will need to use CIDR notation to calculate their usable address ranges
Are there any disadvantages to using CIDR notation?
It only gives you ranges, also doesn't account for the lost address' to broadcast and local

Describe a CIDR subnetting example. In a /16 network 10.1.230.112 and 10.1.231.245 – are on the same subnet while 10.1.1.1/24 10.2.1.1/24 are not.

What can subnets borrow to create additional masks? You can borrow bits from a different class.

Real World Scenario Connection

What would be the impact of creating too many subnet masks by borrowing too many host bits? Your losing a large amount of address' available to hosts by borrowing bits
If Agile Shield wanted to create eight subnetworks, how many host bits would have to be borrowed? You'd want a /27 – so borrowing 3 bits

Subnetting Case Studies

Cyberskills: Try It Together

A network manager requests to extend the current network by an additional five subnetworks. The given IP address and subnet mask is 192.168.0.0/24.

How would you add five more networks?
What are the new network addresses?

Network Address	Usable IP Addresses	Broadcast Address
172.16.0.5/26		

Cyberskills: Try it Yourself

A network manager requests a 300-workstation expansion of the network. The workstations are to be installed in a single broadcast domain. The correct given address is 10.0.0.0. The aim of the expansion is to use as few resources as possible.

How would you use the least number of resources possible?

What is the new network address, network range, and broadcast address?

Network Address	Usable IP Addresses	Broadcast Address

VLSM

What is VLSM? Variable length subnet mask
Describe a VLSM subnetting example. Method by which subnets are subnetted

Real World Scenario Connection

As the new Agile Shield office continues to grow, additional devices will have to be added to the network. Using your recently acquired knowledge, is there a business justification for further subnetting the network using VLSM? What are the advantages of doing so?
When the network starts at a very high class, then the class and subnetting is lowered and classed out so there is less overhead

Network Address Scheme Design

What do you need to examine when planning a network? The amount of hosts and networks needed and the amount of segmentation required
List and describe three planning considerations. Future proofing the network so that if we need how many devices business growth and how hosts addresses with be assigned. Prevent Duplication Access Control Monitor
What must be reconfigured when address schemes change?
Hardware, Subnet Masks, Servers & Hosts
What are servers typically configured with? Statically Assigned
What are routers typically configured with? dynamically
What is a gateway?

Real World Scenario Connection

As the Network Administrator for Agile Shield, your job is to design the network infrastructure for their new office to accommodate 400 network devices, with a future growth expectation of an additional 100 devices.

Divide the subnet: Explain how you would divide network address 10.0.0.0/24 into two subnets to accommodate the new office's network devices.
Determine the new subnet mask address: Calculate and write down the new subnet mask address for each subnet.
Illustrate the new address scheme: Create a diagram or provide a written description that illustrates the new address scheme for the two subnets. Show the range of IP addresses allocated to each subnet and explain how the host addresses will be assigned.