## LESSON: Dynamic Host Configuration Protocol (DHCP)

**Before you Begin**

As you prepare for this lesson you will find that you will have ample time to spend time on diving deeper with regards to the DHCP protocol and service. For example, you may consider demonstrating a packet capture for a client obtaining a DHCP lease so that they learners can observe the DORA process. For this lesson and upcoming lessons, instructors are required to ensure the following activities are completed:

* Review the “Lesson Opener” and “Real World Scenario” with the learners prior to starting the module.
* Throughout the module, you will find “Consider the Real World Scenario” slides. Review the questions found on these slides, tie the concepts back to the scenario discussed at the start of the lesson as well as content you are presenting, and encourage the learners to share their thoughts.
* Ensure learners are given opportunities for breaks throughout the lesson. The pacing guide below provides recommended breaks. However, there are additional breaks added in the slide deck, please use them if needed.
* For each lesson, you will find a “Pulse Check” slide which is the opportunity for instructors to open a poll to gather feedback from the learners. Leave the poll open for about 1 minute and after you close the poll, share the results with the learners. Encourage the learners to share their thoughts. This information will help the instructors as well as the learners better understand where they are with regards to the lesson.
* Labs are to be demonstrated live for each module. The demonstration of labs is the top priority for the lead instructor. While demonstrating each lab, encourage students to participate and explore.
* At the end of each lesson, it is important to take a few minutes to review the key concepts for the lesson, provide guidance on what the learners can do to prepare for the next lesson, and wrap up with Q&A.

### Summary

In this lesson on DHCP (Dynamic Host Configuration Protocol), learners will gain an understanding of key concepts and procedures related to IP address assignment and network configuration. They will learn how DHCP helps network administrators efficiently assign IP addresses. This lesson will cover the four-step DORA process, which describes how a client obtains an IP address from the DHCP server. Learners will also explore the renewal process for automatic and manual DHCP leases. The lesson will guide learners through the installation of DHCP services using the Server Manager application and Wizard. Additionally, they will learn about post configuration tasks required to authorize the DHCP server for leasing IP addresses. The importance of DHCP administrator and DHCP user Security groups for different levels of security administration will be explained. Learners will also discover the benefits of DHCP reservations, which allow for the assignment of specific IP addresses to devices based on their MAC addresses. Finally, they will explore DHCP filtering as a security measure to prevent unauthorized DHCP devices from accessing the network.

### Objectives

* Explain the benefits of using DHCP for IP address allocation.
* Identify the steps involved in the DORA process used in DHCP.
* Identify the components of installing DHCP.
* Explain the purpose and functionality of post-deployment in DHCP.
* Analyze the impact of Security groups in DHCP.
* Identify the components of a DHCP scope.
* Explain the purpose and functionality of DHCP console options.
* Analyze the impact of DHCP configuration on network performance and security.

### Lesson Activities and Teaching Strategies

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| Estimated Time | Lesson Portion | Directions |
| 5 min | **Lesson Opener:**  Dynamic Host Configuration Protocol (DHCP) | * Introduce learners to the importance of Dynamic Host Configuration Protocol (DHCP) and why installation and configuration is important to Microsoft security administration. |
| 5 min | **Real World Scenario:**  Dynamic Host Configuration Protocol (DHCP) | * Review the real world scenario challenge and inform learners that you will be constantly coming back to this scenario throughout the lesson to discover how to solve and apply concepts to this real situation. |
| 45 min | **Cyber Uncovered:**  DHCP Introduction | * Briefly explain the importance of IP addresses in connecting systems to networks. * Discuss the two main functions of an IP address: Identifying host systems and identifying networks. * Define DHCP in relation to its function as the protocol responsible for assigning IP addresses to systems on a network. * Highlight that DHCP dynamically assigns IP addresses to network interface cards (NICs). * Emphasize the benefits of using DHCP, such as ensuring correct network information and eliminating human error in IP configuration. * List the advantages of DHCP, including automatic assignment of IP addresses and automatic client configuration updates. * Discuss the drawbacks of manual IP configuration. * Explain that DHCP leases IP addresses for a specific period of time. * Discuss the reasons behind using DHCP leases, such as efficient IP address utilization. * Describe the process of lease renewal, including the client's automatic renewal once 50% of the lease time has passed. * Time permitting and if you have the local tools, you may consider demonstrating the DORA process by capturing packets using Wireshark if you have a local VM available. * Be prepared to discuss the implications of the real world scenario presented at the beginning of the class in relation to different network types and devices. There are specific prompts that you should ask learners to reflect on to apply this concept to the real world scenario. |
| 5 min | **Break** | * Share a timer on the screen so there is clarity as to when class will resume. Ensure cameras and microphones are disabled during the break. |
| 50 min | **Cyber Uncovered:**  DHCP Installation | * Begin by explaining the importance of assigning a static IP address to the server before installing DHCP. * Walk learners through the DHCP installation process. Be sure that learners are following along and completing the steps as you demonstrate them. Pause to answer questions as they arise. * **Provide learners with a five minute break if needed.** * Explain the concept of Post-Deployment Configuration and the need for authorization of the DHCP server. * Describe how authorization should occur within an Active Directory domain using an enterprise admin group member. * Explain the purpose of DHCP administrators and DHCP user Security groups created during DHCP server authorization. * Provide examples of the rights and privileges associated with each group. * Be prepared to discuss the implications of the real world scenario presented at the beginning of class in relation to network types and devices. There are specific prompts that you should ask learners to reflect on to apply this concept to the real world scenario. |
| 5 min | **Pulse Check** | * After the poll is concluded, review the results with the learners. Encourage those in the red zone to attend office hours and/or to reach out to the instructors for assistance. |
| 5 min | **Break** | * Share a timer on the screen so there is clarity as to when class will resume. Ensure cameras and microphones are disabled during the break. |
| 50 min | **Cyber Uncovered:**  DHCP Configuration | * Start by explaining the concept of a DHCP scope, which is a range of IP addresses available for the DHCP server to assign to clients. * Discuss the importance of DHCP scopes in providing client systems with the necessary network settings. * Walk learners through the DHCP configuration process. Be sure that learners are following along and completing the steps as you demonstrate. Pause to answer questions as they arise. * **Provide learners with a five minute break if needed.** * Explain the concept of DHCP reservations for assigning fixed IP addresses to important devices. * Discuss the benefits of using reservations, such as centralized IP address management. * Describe the importance of DHCP filters and how they can be used to provide security. * Explain why ensuring that the DHCP network server and scope configurations are correct is important for network function and performance. * Be prepared to discuss the implications of the real world scenario presented at the beginning of class in relation to network types and devices. There are specific prompts that you should ask learners to reflect on to apply this concept to the real world scenario. |
| 30 min | **Lab:**  Implementing DHCP | * Remind learners to use this lab to practice and apply the concepts they learned throughout the day. * Learners will receive direct feedback on their lab to properly assess their knowledge and determine where they might need additional assistance. |
| 10 min | **Lesson Closure** | * For this lesson, spend just a few minutes reminding the learners what the key ”take-aways'' were from the lesson and what they should do to prepare for the next module. Topics should focus on the purpose of the DHCP protocol, the lease process (DORA), and how DHCP leased addresses are managed. * You will be able to use the data collected in the pulse check to help with the lesson closure. Remind those learners that reported being in the “red zone” to take advantage of office-hours. * Recommend that the learners ensure they submit all of the assignments on-time to ensure the appropriate credit is provided to them. * Recommend that the students read-ahead and come prepared for the next lesson. * Q&A |
|  | **Additional Time Filler (if needed)** | * Kahoot * Discuss interview prep and questioning * Use breakout rooms for additional lab practice * Continue Real World Scenario Conversation |