

Name _____ Date _____

Module 9 – Address Resolution

Introduction to Networks – Semester 1

Student Version

Module 9 Sections:

- 9.0 Introduction
- 9.1 MAC and IP
- 9.2 ARP
- 9.3 Neighbor Discovery
- 9.4 Module Practice and Quiz

Required Materials:

Reading Organizer

Packet Tracer Activities: 9.1.3 - Identify MAC and IP Addresses
 9.2.9 - Examine the ARP Table
 9.3.4 - IPv6 Neighbor Discovery

Labs: None

Module's 8 – 10 Exam

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Note: The Reading Organizer has weighted scoring. Any question with the word **explain, define, or describe** in it is expected to have a longer answer and is worth two points each.

After completion of this chapter, you should be able to:

- Compare the roles of the MAC address and the IP address.
- Describe the purpose of ARP.
- Describe the operation of IPv6 neighbor discovery.

9.1 MAC and IP

1. There are two primary addresses assigned to a device on an Ethernet LAN. List and describe both.

a. _____ –

b. _____ –

2. Layer 2 physical addresses are used to deliver the data link frame with the encapsulated IP packet from one NIC to another NIC that is on the _____ network.

3. List the two addresses a Layer 2 Ethernet frame contains.

a.

b.

4. List the two addresses a Layer 3 IP packet contains.

a.

b.

5. When the destination IPv4 or IPv6 address is on a remote network, the destination MAC address will be the address of the host _____.

6. What process does IPv4 use to associate an IP address to the MAC address on each link along the path to the destination?

7. What process does IPv6 use to associate an IP address to the MAC address on each link along the path to the destination?

9.2 ARP

8. In a network is using the IPv4 communications protocol, the _____, is what you need to map _____ addresses to _____ addresses.

9. Explain the following terms.

a. Destination MAC address –

b. Source MAC address –

10. Describe the two basic functions ARP provides.

a.

b.

11. When a packet is sent to the data link layer to be encapsulated into an Ethernet frame, the device refers to a table in its memory to find the MAC address that is mapped to the IPv4 address. What is this table called?

12. Explain what happens when a sending device searches its ARP table for a destination IPv4 address on the same network.

13. Explain what happens when a sending device searches its ARP table for a destination IPv4 address on a different network.

14. Each entry, or row, of the ARP table binds an IPv4 address with a MAC address. We call the relationship between the two values a _____.

15. If a device locates the IPv4 address, its corresponding MAC address is used as the destination MAC address in the frame. If there is no entry found, then the device sends an _____.

16. Explain what happens when an ARP request that is associated with an IPv4 address is sent.

17. ARP messages are encapsulated directly within an _____ frame. There is no IPv4 _____.

18. When an Ethernet frame containing an ARP request is sent what is the destination MAC address?

19. ARP requests are broadcasts, they are flooded out all ports by the switch, except the _____ port.

20. Every _____ must process the ARP request to see if the target IPv4 address matches its own.

21. Will a router forward an ARP request?

22. Which device will answer an ARP request?

23. Where is the ARP reply sent?

24. If no device responds to the ARP request, what happens?

25. Entries in the ARP table are _____

26. What happens if a device does not receive a frame from a particular device before the timestamp expires?

27. Static map entries can be entered in an ARP table. Static ARP table entries do not expire over time and must be _____ removed.

28. IPv6 uses a similar process to ARP for IPv4, known as _____ .

29. IPv6 uses _____ and _____ messages, similar to IPv4 ARP requests and ARP replies.

30. When the destination IPv4 address is not on the same network as the source IPv4 address, where does the source device need to send the frame?

31. When a host creates a packet for a destination, it compares the destination IPv4 address and its own IPv4 address. Explain why?

32. Explain what happens if the destination host is not on its same network?

33. For each device, an ARP cache timer removes ARP entries that have not been used for a specified period of time. The times differ depending on the operating system of the device. What is the timeline for newer Windows operating systems to store ARP table entries?

34. What command is used to display the ARP table on a Cisco router?

35. What command is used to display the ARP table on a Windows 10 PC?

36. What can happen if a large number of devices were to be powered up and all start accessing network services at the same time?

37. A threat actor can use ARP spoofing to perform an ARP poisoning attack. Explain how this attack works.

9.3 Neighbor Discovery

38. If your network is using the IPv6 communications protocol, the _____, or _____, is what is used to match IPv6 addresses to MAC addresses.

39. IPv6 Neighbor Discovery protocol is sometimes referred to as _____ or _____.

40. List the five messages ICMPv6 ND uses to perform its services.

- a.
- b.
- c.
- d.
- e.

50. _____ and _____ messages are used for device-to-device messaging such as address resolution (similar to ARP for IPv4).

51. _____ and _____ messages are for messaging between devices and routers.

52. What ICMPv6 ND message is used for better next-hop-selection?

53. ICMPv6 Neighbor Solicitation messages are sent using special Ethernet and IPv6 multicast addresses. Explain what this allows the Ethernet NIC of the receiving device to do?