# ITMO 440/540 - Data Networks

# Assignment 5 - ANSWERS

# Assigned: 09/22/2015 Due: 09/29/2015

### Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Student ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Purpose: Practice reading information in data link layer**

**Use the ‘datalink-examples.pcap’ trace to answer the following questions.**

**In Frame 2 find the answers to the following questions:**

1. What is the name of the data link protocol? **Ethernet II** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What is the source data link address? (copy the numeric characters) **00:02:a5:99:d7:36** \_\_\_\_\_\_\_\_

3. What is the destination data link address? **ff:ff:ff:ff:ff:ff** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What is the protocol Type name **ARP** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. What is the hexadecimal value that is used to represent the protocol Type? **0x0806** \_\_\_\_\_\_\_\_\_

6. Is there an IP message encapsulated in this Frame? **No** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. What is the name of the protocol listed below the Datalink layer? **Address Resolution Protocol** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Open the ARP message and answer the following questions about its headers:

8. Is this ARP message a request or a reply? **Request** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. What is the ‘Sender MAC Address’? **00:02:a5:99:d7:36** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. What is the ‘Sender IP Address’? **216.47.142.109**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. What is the ‘Target MAC Address’? **00:00:00:00:00:00**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. What is the ‘Target IP Address’? **216.47.142.2** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

13. How many “bytes on the wire” does Wireshark report there were in this frame? **42** \_\_\_\_\_\_\_\_\_\_\_\_\_

Fact: Wireshark does not report the number of trailer bytes that were on the wire. The trailer for Ethernet II and for IEEE 802.3 is always 4 bytes long.

Fact: Wireshark does not report the number of padding bytes that were added to the body of the frame

So, when Wireshark reports that there are X bytes on the wire, it means that the frame header and body exclusive of padding is X bytes long.

14. How many bytes are there in the header of an Ethernet II frame? **14 bytes** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fact: You do not need to look at the Wireshark trace to answer this question. The information is in your notes and in the book. The header length is always the same. However, you can highlight the Ethernet II row in the middle window of the Wireshark display and then look in the bottom left corner of the window to read the number of bytes that are in the Ethernet II header.

15. How many bytes are in the body of the frame? **28 bytes** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

You can get the answer to this question in either of two ways. One is to subtract the number of header bytes from the number of total bytes. The other is to highlight the body of the Ethernet II frame and then look in the bottom left corner of the window to read the number of bytes that are in the body.

**In Frame 3 find the answers to the following questions:**

1. What is the name of the data link protocol? **Ethernet II** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. What is the source data link address? **00:00:0c:07:ac:8e** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. What is the destination data link address? **00:02:a5:99:d7:36** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Is there an IP message encapsulated in this Frame? **No** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Open the ARP message and answer the following questions about its headers:

8. Is this ARP message a request or a reply? **reply** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

9. What is the ‘Sender MAC Address’? **00:00:0c:07:ac:8e** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. What is the ‘Sender IP Address’? **216.47.142.2**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

11. What is the ‘Target MAC Address’? **00:02:a5:99:d7:36** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

12. What is the ‘Target IP Address’? **216.47.142.109** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fact: In Frame 2, the sender does not know the target’s MAC address, so it sent a broadcast to all the MAC addresses on the LAN. In Frame 3, the sender is the device that was the target of the ARP in Frame 2’s request. So the sender puts it MAC address into the sender MAC address field and thus answers the question that was asked in Frame 2.

**Look in Frame 4 to find the answers to the following questions.**

1. What is the datalink protocol in this frame? **IEEE 802.3 Ethernet** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Underneath the name of the datalink protocol you will find a protocol named the Logical-Link Control protocol (LLC). This is also a datalink protocol. copy the five fields that are listed below this protocol:

**DSAP: Spanning Tree BPDU (0x42)**

**IG Bit: Individual**

**SSAP: Spanning Tree BPDU (0x42)**

**CR Bit: Command**

**Control field: U, func=UI (0x03)**

*These fields identify the Destination Service Access Point; and the Source Service Access Point; as well as some flags that tell whether the Frame is a command or a response, whether it is for an individual or a group, and that the frame is an un-numbered information frame. The IEEE 802.3 datalink allows you to create different types of data links.*

3. Is there an IP layer in this frame? **No** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. What is the name of the protocol encapsulated in the data-link headers? **Spanning Tree Protocol** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. What is the Root Identifier? **4096 / 4095 / 00:d0:03: f8: c0:ce** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. What is the Root Path Cost? **6020** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Frame 18: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface** 0

Ethernet II, Src: IntelCor\_0e:3c:21 (00:27:0e:0e:3c:21), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Destination: Broadcast (ff:ff:ff:ff:ff:ff)

Source: IntelCor\_0e:3c:21 (00:27:0e:0e:3c:21)

Type: ARP (0x0806)

Padding: 000000000000000000000000000000000000

Address Resolution Protocol (request)

Hardware type: Ethernet (1)

Protocol type: IP (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: request (1)

Sender MAC address: IntelCor\_0e:3c:21 (00:27:0e:0e:3c:21)

Sender IP address: 10.200.0.23 (10.200.0.23)

Target MAC address: 00:00:00\_00:00:00 (00:00:00:00:00:00)

Target IP address: 10.200.20.22 (10.200.20.22)

**Frame 19: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0**

Ethernet II, Src: IntelCor\_0f:6a:53 (00:27:0e:0f:6a:53), Dst: IntelCor\_0e:3c:21 (00:27:0e:0e:3c:21)

Destination: IntelCor\_0e:3c:21 (00:27:0e:0e:3c:21)

Source: IntelCor\_0f:6a:53 (00:27:0e:0f:6a:53)

Type: ARP (0x0806)

Padding: 000000000000000000000000000000000000

Address Resolution Protocol (reply)

Hardware type: Ethernet (1)

Protocol type: IP (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: reply (2)

Sender MAC address: IntelCor\_0f:6a:53 (00:27:0e:0f:6a:53)

Sender IP address: 10.200.20.22 (10.200.20.22)

Target MAC address: IntelCor\_0e:3c:21 (00:27:0e:0e:3c:21)

Target IP address: 10.200.0.23 (10.200.0.23)

**Frame 26: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0**

Ethernet II, Src: IntelCor\_0f:6d:00 (00:27:0e:0f:6d:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Destination: Broadcast (ff:ff:ff:ff:ff:ff)

Source: IntelCor\_0f:6d:00 (00:27:0e:0f:6d:00)

Type: ARP (0x0806)

Padding: 000000000000000000000000000000000000

Address Resolution Protocol (request)

Hardware type: Ethernet (1)

Protocol type: IP (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: request (1)

Sender MAC address: IntelCor\_0f:6d:00 (00:27:0e:0f:6d:00)

Sender IP address: 10.200.20.24 (10.200.20.24)

Target MAC address: 00:00:00\_00:00:00 (00:00:00:00:00:00)

Target IP address: 10.200.20.22 (10.200.20.22)

**Frame 27: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0**

Ethernet II, Src: IntelCor\_0f:6a:53 (00:27:0e:0f:6a:53), Dst: IntelCor\_0f:6d:00 (00:27:0e:0f:6d:00)

Destination: IntelCor\_0f:6d:00 (00:27:0e:0f:6d:00)

Source: IntelCor\_0f:6a:53 (00:27:0e:0f:6a:53)

Type: ARP (0x0806)

Padding: 000000000000000000000000000000000000

Address Resolution Protocol (reply)

Hardware type: Ethernet (1)

Protocol type: IP (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: reply (2)

Sender MAC address: IntelCor\_0f:6a:53 (00:27:0e:0f:6a:53)

Sender IP address: 10.200.20.22 (10.200.20.22)

Target MAC address: IntelCor\_0f:6d:00 (00:27:0e:0f:6d:00)

Target IP address: 10.200.20.24 (10.200.20.24)

**Frame 51: 42 bytes on wire (336 bits), 42 bytes captured (336 bits) on interface 0**

Ethernet II, Src: IntelCor\_0f:6c:4d (00:27:0e:0f:6c:4d), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Destination: Broadcast (ff:ff:ff:ff:ff:ff)

Source: IntelCor\_0f:6c:4d (00:27:0e:0f:6c:4d)

Type: ARP (0x0806)

Address Resolution Protocol (request)

Hardware type: Ethernet (1)

Protocol type: IP (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: request (1)

Sender MAC address: IntelCor\_0f:6c:4d (00:27:0e:0f:6c:4d)

Sender IP address: 10.200.20.23 (10.200.20.23)

Target MAC address: 00:00:00\_00:00:00 (00:00:00:00:00:00)

Target IP address: 10.200.201.242 (10.200.201.242)

**Frame 52: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0**

Ethernet II, Src: Dell\_71:90:af (78:2b:cb:71:90:af), Dst: IntelCor\_0f:6c:4d (00:27:0e:0f:6c:4d)

Destination: IntelCor\_0f:6c:4d (00:27:0e:0f:6c:4d)

Source: Dell\_71:90:af (78:2b:cb:71:90:af)

Type: ARP (0x0806)

Padding: 000000000000000000000000000000000000

Address Resolution Protocol (reply)

Hardware type: Ethernet (1)

Protocol type: IP (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: reply (2)

Sender MAC address: Dell\_71:90:af (78:2b:cb:71:90:af)

Sender IP address: 10.200.201.242 (10.200.201.242)

Target MAC address: IntelCor\_0f:6c:4d (00:27:0e:0f:6c:4d)

Target IP address: 10.200.20.23 (10.200.20.23)

**Frame 64: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0**

IEEE 802.3 Ethernet

Logical-Link Control

DSAP: Spanning Tree BPDU (0x42)

IG Bit: Individual

SSAP: Spanning Tree BPDU (0x42)

CR Bit: Command

Control field: U, func=UI (0x03)

Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

BPDU flags: 0x00

Root Identifier: 32768 / 0 / 00:06:d7:1b:bd:40

Root Path Cost: 0

Bridge Identifier: 32768 / 0 / 00:06:d7:1b:bd:40

Port identifier: 0x8025

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

**Frame 91: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0**

IEEE 802.3 Ethernet

Logical-Link Control

DSAP: Spanning Tree BPDU (0x42)

IG Bit: Individual

SSAP: Spanning Tree BPDU (0x42)

CR Bit: Command

Control field: U, func=UI (0x03)

Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

BPDU flags: 0x00

Root Identifier: 32768 / 0 / 00:06:d7:1b:bd:40

Root Path Cost: 0

Bridge Identifier: 32768 / 0 / 00:06:d7:1b:bd:40

Port identifier: 0x8025

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15