Name:

Student ID:

Date:

You will be provided with a hexadecimal dump of the contents of FOUR Ethernet frames. Two of the captured frames have an alphabetic ID. For each of two these packets please complete the information below. Each answer is worth ONE mark each.

1. Write the letter designating the first Ethernet frame: _____

(i) What transmission mode was used for this Ethernet frame (tick the correct answer)
[ ] unicast
[ ] multicast
[ ] broadcast

(ii) Examine the type of Ethernet payload. Which is true?
[ ] This is an IPv4 network layer packet
[ ] This is not a frame carrying an IPv4 packet.

(iii) A vendor has been assigned two Organisationally Unique Identifiers (OUIs) by the IEEE: 00:13:80 and B1:E2:15.
[ ] The packet was sent by a network device from this vendor.
[ ] The packet was sent by another vendor's network device.

2. Write the letter designating the second Ethernet frame: _____

(i) What transmission mode was used for this Ethernet frame (tick the correct answer)
[ ] unicast
[ ] multicast
[ ] broadcast

(ii) Examine the type of Ethernet payload. Which is true?
[ ] This is an IPv4 network layer packet
[ ] This is not a frame carrying an IPv4 packet.

(iii) A vendor has been assigned two Organisationally Unique Identifiers (OUIs) by the IEEE: 00:13:80 and B1:E2:15.
[ ] The packet was sent by a network device from this vendor.
[ ] The packet was sent by another vendor's network device.

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Continued overleaf

Two of the captured frames have a numeric ID. For these packets please complete the information below. Each answer on this page is worth TWO marks each.

3. Write the number designating the third Ethernet frame: _____

(i) What is the MAC address of the Ethernet interface that originated this frame (please provide an answer in hexadecimal):

0x _____

(ii) What is the network-layer destination address of this IP Packet (please write your answer in dotted decimal notation)?

_____. _____. _____. _____

(iii) Given the sending netmask is 255.255.255.0, was this packet sent to a local destination or is it directed to the remote router?

[ ] This frame was sent to a device on the same IPv4 network as the sender.
[ ] This frame was sent to the default router.
[ ] It is not possible to tell if this frame was sent to the default router.

(iv) Which destination port was used (please provide answer in decimal): _____.

4. Write the number designating the third Ethernet frame: _____

(i) What is the MAC address of the Ethernet interface that originated this frame (please provide an answer in hexadecimal):

0x _____

(ii) What is the network-layer destination address of this IP Packet (please write your answer in dotted decimal notation)?

_____. _____. _____. _____

(iii) Given the sending netmask is 255.255.255.0, was this packet sent to a local destination or is it directed to the remote router?

[ ] This frame was sent to a device on the same IPv4 network as the sender.
[ ] This frame was sent to the default router.
[ ] It is not possible to tell if this frame was sent to the default router.

(iv) Which destination port was used (please provide answer in decimal): _____.

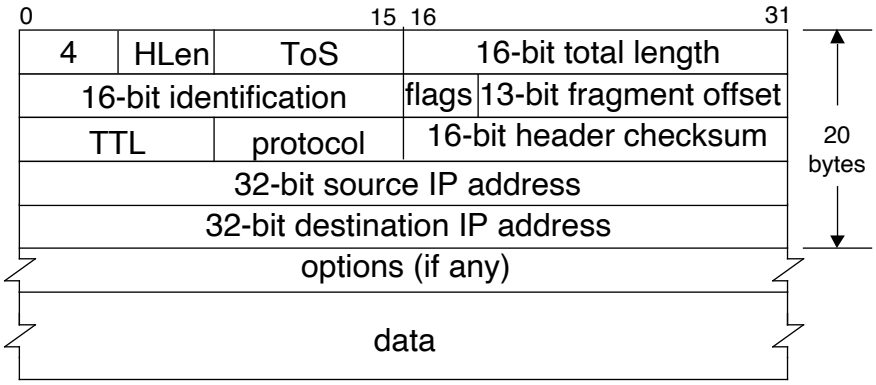
1)

```
0000  00 14 22 59 55 51 00 19 b9 34 8a 11 08 00 45 00
0010  05 4c 0b e3 40 00 40 11 79 40 8b 85 cc b7 8b 85
0020  cc bb b4 86 13 8c 05 38 b5 c7 80 a1 bf a1 66 fc
0030  b7 28 ee 3f 37 8c 47 00 44 3a 78 00 ff ff ff ff
0040  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0050  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0060  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0070  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0080  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0090  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00a0  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00b0  ff ff ff b4 e8 21 02 68 26 d9 95 99 69 da d9 e1
00c0  65 2d 77 3a 64 71 22 aa 16 04 0b 24 71 af 8f 9a
00d0  8b 5a da 52 25 5e 59 a5 1a 51 9f 56 ba 0c 4e 24
00e0  d1 69 b5 b2 6a 86 10 07 81 32 da f9 f3 e4 b5 ad
00f0  7b c0 47 40 44 1b 00 00 01 c0 01 a9 80 80 05 2b
0100  9b f3 9d bb ff fd 80 04 33 44 33 33 33 44 33 22
0110  43 22 21 24 80 09 00 00 00 00 00 00 00 00 aa aa
0120  ac ba f8 aa 3d 86 19 65 e7 a0 81 f7 e0 75 f7 1f
0130  7e 17 a2 89 f8 df 8a 39 a5 8a 39 64 93 7a 24 96
0140  79 26 78 87 78 63 28 d5 d5 5d 91 5c a6 5b 32 19
0150  5d 37 2a 37 a5 bb 65 1c 6d d8 db 45 51 41 0e 7b
0160  15 c1 46 51 2b aa 1a 25 a2 55 6e 2a 95 49 70 5e
0170  5c 4a 19 51 50 96 9c 32 aa e2 c6 67 18 d1 8d 17
0180  85 12 fa 9f 5a 75 69 12 d1 89 b4 e1 65 d5 16 85
0190  b2 98 f7 61 58 a8 dd 25 28 6b 58 94 88 49 b5 73
01a0  6a e0 d6 89 0a 69 46 db 72 01 92 64 92 3f 47 00
01b0  44 1c 9d 92 47 15 c7 d7 22 d5 61 4a 58 35 93 a3
01c0  25 56 cd 9a 59 a9 c2 e2 6e 37 0f 63 dd 24 db 7a
01d0  de 24 b2 43 55 75 ab a3 5a d5 ea 5e 93 ca 67 95
01e0  35 5f 95 d3 0e 09 24 91 1e 47 6b 91 33 87 10 96
01f0  53 fb 16 1b 6b 11 ad a8 89 89 63 a8 a7 ca 9e 69
0200  e4 ca 25 26 13 57 34 89 44 e3 87 26 6d 16 b9 a6
```

A)

```
0000  01 80 c2 00 00 00 00 13 80 b1 e2 15 00 2e 42 42
0010  03 00 00 00 00 00 80 00 00 d0 bb d6 66 c0 00 00
0020  00 00 80 00 00 d0 bb d6 66 c0 80 26 00 00 14 00
0030  02 00 0f 00 00 00 00 00 00 00 00 00
```

PDU Header Chart



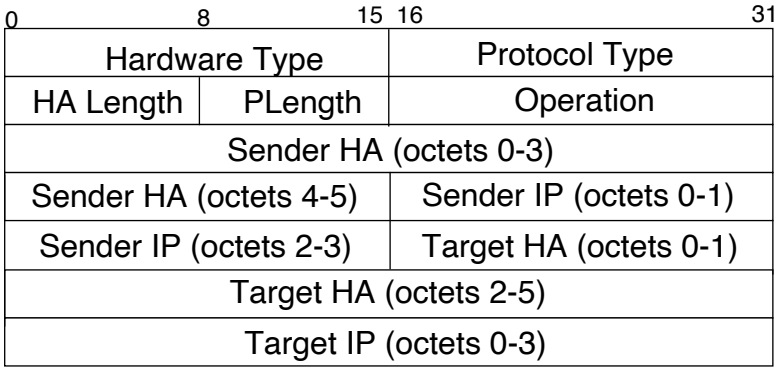
Internet Protocol Datagram (Ethernet Type = 0x800)

IP Protocol Types

0	IP
1	ICMP
2	IGMP
6	TCP
17	UDP

Flags

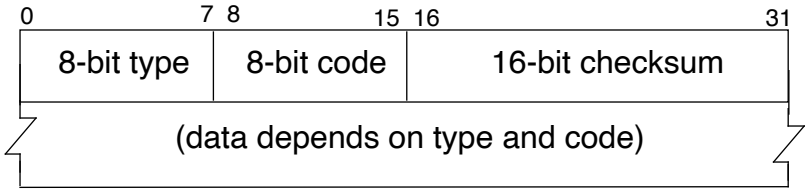
- - X	More
- X -	Don't Fragment
X - -	Unused



ARP / RARP Packet (Ethernet Type =0x806)

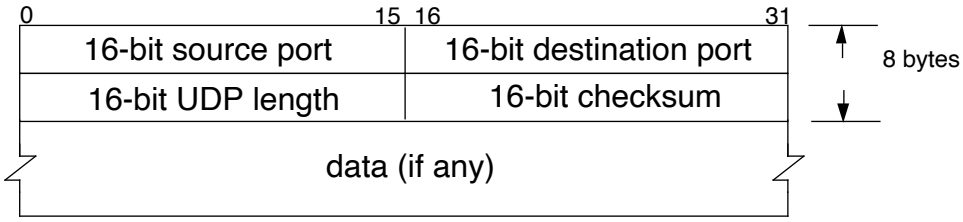
Operation ARP Message

1	ARP request
2	ARP reply
3	RARP request
4	RARP reply

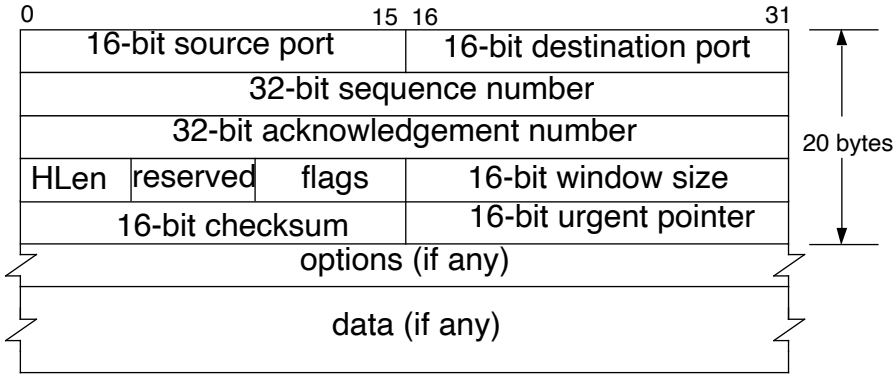


ICMP Message

ICMP Type	Message
0	Echo reply
3	Destination unreachable
4	Source quench
5	Redirect
8	Echo request



UDP Packet



TCP Packet

Well-Known TCP Server Ports

Port (decimal)	Service
23	Telnet
25	Mail
69	TFTP
8	WWW (http)

FULL DECODE FOR THE SAMPLE PACKETS FOLLOW:

This will NOT be provided in the exam, but it can be used by you to check your working when providing answers for the two sample packets.

1) RTP (on port 5004)

```
0000  00 14 22 59 55 51 00 19 b9 34 8a 11 08 00 45 00
0010  05 4c 0b e3 40 00 40 11 79 40 8b 85 cc b7 8b 85
0020  cc bb b4 86 13 8c 05 38 b5 c7 80 a1 bf a1 66 fc
0030  b7 28 ee 3f 37 8c 47 00 44 3a 78 00 ff ff ff ff
0040  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0050  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0060  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0070  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0080  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
0090  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00a0  ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff ff
00b0  ff ff ff b4 e8 21 02 68 26 d9 95 99 69 da d9 e1
00c0  65 2d 77 3a 64 71 22 aa 16 04 0b 24 71 af 8f 9a
00d0  8b 5a da 52 25 5e 59 a5 1a 51 9f 56 ba 0c 4e 24
00e0  d1 69 b5 b2 6a 86 10 07 81 32 da f9 f3 e4 b5 ad
00f0  7b c0 47 40 44 1b 00 00 01 c0 01 a9 80 80 05 2b
0100  9b f3 9d bb ff fd 80 04 33 44 33 33 33 44 33 22
0110  43 22 21 24 80 09 00 00 00 00 00 00 00 aa aa
0120  ac ba f8 aa 3d 86 19 65 e7 a0 81 f7 e0 75 f7 1f
0130  7e 17 a2 89 f8 df 8a 39 a5 8a 39 64 93 7a 24 96
0140  79 26 78 87 78 63 28 d5 d5 5d 91 5c a6 5b 32 19
0150  5d 37 2a 37 a5 bb 65 1c 6d d8 db 45 51 41 0e 7b
0160  15 c1 46 51 2b aa 1a 25 a2 55 6e 2a 95 49 70 5e
0170  5c 4a 19 51 50 96 9c 32 aa e2 c6 67 18 d1 8d 17
0180  85 12 fa 9f 5a 75 69 12 d1 89 b4 e1 65 d5 16 85
0190  b2 98 f7 61 58 a8 dd 25 28 6b 58 94 88 49 b5 73
01a0  6a e0 d6 89 0a 69 46 db 72 01 92 64 92 3f 47 00
01b0  44 1c 9d 92 47 15 c7 d7 22 d5 61 4a 58 35 93 a3
01c0  25 56 cd 9a 59 a9 c2 e2 6e 37 0f 63 dd 24 db 7a
01d0  de 24 b2 43 55 75 ab a3 5a d5 ea 5e 93 ca 67 95
01e0  35 5f 95 d3 0e 09 24 91 1e 47 6b 91 33 87 10 96
01f0  53 fb 16 1b 6b 11 ad a8 89 89 63 a8 a7 ca 9e 69
0200  e4 ca 25 26 13 57 34 89 44 e3 87 26 6d 16 b9 a6
```

```
 Ethernet II, Src: Dell_34:8a:11 (00:19:b9:34:8a:11), Dst: Dell_59:55:51 (00:14:22:59:55:51)
    Destination: Dell_59:55:51 (00:14:22:59:55:51)
        Address: Dell_59:55:51 (00:14:22:59:55:51)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
    Source: Dell_34:8a:11 (00:19:b9:34:8a:11)
        Address: Dell_34:8a:11 (00:19:b9:34:8a:11)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
    Type: IP (0x0800)
Internet Protocol Version 4, Src: 139.133.204.183 (139.133.204.183), Dst: 139.133.204.187 (local)
(139.133.204.187)
    Version: 4
    Header length: 20 bytes
    Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (Not ECN-Capable
Transport))
        0000 00.. = Differentiated Services Codepoint: Default (0x00)
        .... ..00 = Explicit Congestion Notification: Not-ECT (Not ECN-Capable Transport) (0x00)
    Total Length: 1356
    Identification: 0x0be3 (3043)
    Flags: 0x02 (Don't Fragment)
        0... .... = Reserved bit: Not set
        .1.. .... = Don't fragment: Set
        ..0. .... = More fragments: Not set
    Fragment offset: 0
    Time to live: 64
    Protocol: UDP (17)
    Header checksum: 0x7940 [correct]
        [Good: True]
        [Bad: False]
    Source: 139.133.204.183 (139.133.204.183)
    Destination: 139.133.204.187 (139.133.204.187)
User Datagram Protocol, Header Size: 8 Bytes
Src Port: 46214 (46214), Dst Port: avt-profile-1 (5004)
    Source port: 46214 (46214)
    Destination port: avt-profile-1 (5004)
    Length: 1336
    Checksum: 0xb5c7 [validation disabled]
        [Good Checksum: False]
        [Bad Checksum: False]
Data (1328 bytes)
    Data: 80a1bfa166fcb728ee3f378c4700443a7800ffffffffffff... [Length: 1328]
```

A) Spanning tree packet -----

```
0000  01 80 c2 00 00 00 00 13 80 b1 e2 15 00 2e 42 42
0010  03 00 00 00 00 00 80 00 00 d0 bb d6 66 c0 00 00
0020  00 00 80 00 00 d0 bb d6 66 c0 80 26 00 00 14 00
0030  02 00 0f 00 00 00 00 00 00 00 00 00
```

```
IEEE 802.3 Ethernet
    Destination: Spanning-tree-(for-bridges)_00 (01:80:c2:00:00:00)
        Address: Spanning-tree-(for-bridges)_00 (01:80:c2:00:00:00)
        .... ...1 .... .... .... .... = IG bit: Group address (multicast/broadcast)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
    Source: Cisco_b1:e2:15 (00:13:80:b1:e2:15)
        Address: Cisco_b1:e2:15 (00:13:80:b1:e2:15)
        .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
        .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
    Length: 46

Ethertype field: 0x002e
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)
        000. 00.. = Command: Unnumbered Information (0x00)
        .... ..11 = Frame type: Unnumbered frame (0x03)
Spanning Tree Protocol (not IP)
    Protocol Identifier: Spanning Tree Protocol (0x0000)
    Protocol Version Identifier: Spanning Tree (0)
    BPDU Type: Configuration (0x00)
    BPDU flags: 0x00
        0... .... = Topology Change Acknowledgment: No
        .... ...0 = Topology Change: No
    Root Identifier: 32768 / 0 / 00:d0:bb:d6:66:c0
        Root Bridge Priority: 32768
        Root Bridge System ID Extension: 0
        Root Bridge System ID: 00:d0:bb:d6:66:c0
    Root Path Cost: 0
    Bridge Identifier: 32768 / 0 / 00:d0:bb:d6:66:c0
        Bridge Priority: 32768
        Bridge System ID Extension: 0
        Bridge System ID: 00:d0:bb:d6:66:c0
    Port identifier: 0x8026
    Message Age: 0
    Max Age: 20
    Hello Time: 2
    Forward Delay: 15
```