Assignment 4

Q 1

Find the following for packet 1.

HEX	BIN
45 00 05 DC	01000101 00000000 00000101 11011100
$A5$ $E5$ 20 00	10100101 11100101 00100000 00000000
80 01 00 00	10000000 00000001 00000000 00000000
51 1C 9A 62	01010001 00011100 10011010 01100010
17 $D5$ $E6$ 9A	00010111 11010101 11100110 10011010

1. **Version number**

$$0100_2 = 4_{10} \rightarrow \text{IPv4}$$

2. **Header length (in bytes)**

$$5_{16} = 5_{10} \rightarrow 5 \times 4 = 20bytes$$

3. **Confirm that service type is 0.**
   YES
4. **Total length of IP packet (in bytes)**

$$010111011100_2 = 1500_{10}bytes$$

5. **Identification number (in decimal)**

$$A5E5_{16} = 42469_{10}$$

6. **Can we fragment this IP packet?**
   YES, DF is 0
7. **Are there more fragments following this IP packet?**
   YES, MF is 1
8. **Fragmentation offset of this packet (in decimal)**
   0, This is the first fragment
9. **Time-to-live (in decimal)**

$$80_{16} = 128_{10} \rightarrow 128 \text{ hops remain}$$

10. **Protocol (e.g., ICMP, TCP, UDP, etc.)**

$$01 = ICMP$$

11. Check that the header checksum is 0x0000 (not calculated). Calculate the checksum according to the lecture notes. Write the answer in hexadecimal.

$$
\begin{array}{rr}
 & 4500 \\
 & 05DC \\
 & A5E5 \\
 & 2000 \\
 & 8001 \\
 & 0000 \\
 & 511C \\
 & 9A62 \\
 & 17D5 \\
+ & E69A \\
\hline
 & 7AAF \\
+ & 3 \\
\hline
 & 7AB2 \\
 & FFFF \\
- & 7AB2 \\
\hline
 & 854D
\end{array}
$$

12. Source IP address (in dotted decimal)

$$51.1C.9A.62_{16} = 81.28.154.98_{10}$$

13. Destination IP address (in dotted decimal)

$$17.D5.E6.9A_{16} = 23.213.230.154$$

Q 2

Find the following for packet 2.

HEX	BIN
45 00 05 DC	01000101 00000000 00000101 11011100
$A5$ $E5$ 00 $B9$	10100101 11100101 00000000 10111001
80 01 00 00	10000000 00000001 00000000 00000000
51 $1C$ $9A$ 62	01010001 00011100 10011010 01100010
17 $D5$ $E6$ $9A$	00010111 11010101 11100110 10011010

1. Version number

$$0100_2 = 4_{10} \rightarrow \text{IPv4}$$

2. Header length (in bytes)

$$5_{16} = 5_{10} \rightarrow 5 \times 4 = 20 \text{ bytes}$$

3. **Confirm that service type is 0.**

   YES

4. **Total length of IP packet (in bytes)**

$$010111011100_2 = 1500_{10} \text{ bytes}$$

5. **Identification number (in decimal)**

$$A5E5_{16} = 42469_{10}$$

6. **Can we fragment this IP packet?**

   YES, DF is 0

7. **Are there more fragments following this IP packet?**

   NO, MF is 0

8. **Fragmentation offset of this packet (in decimal)**

$$00B9_{16} = 185_{10} \rightarrow 185 \times 8 = 1480 bytes$$

9. **Time-to-live (in decimal)**

$$80_{16} = 128_{10} \rightarrow 128 \text{ hops remain}$$

10. **Protocol (e.g., ICMP, TCP, UDP, etc.)**

$$01 = ICMP$$

11. **Check that the header checksum is 0 x 0000 (not calculated). Calculate the checksum according to the lecture notes. Write the answer in hexadecimal.**

$$\begin{array}{rr} & 4500 \\ & 05DC \\ & A5E5 \\ & 00B9 \\ & 8001 \\ & 0000 \\ & 511C \\ & 9A62 \\ & 17D5 \\ + & E69A \\ \hline & 5B68 \\ + & 3 \\ \hline & 5B6B \\ & FFFF \\ - & 5B6B \\ \hline & A494 \end{array}$$

12. **Source IP address (in dotted decimal)**

$$51.1C.9A.62_{16} = 81.28.154.98_{10}$$

13. **Destination IP address (in dotted decimal)**

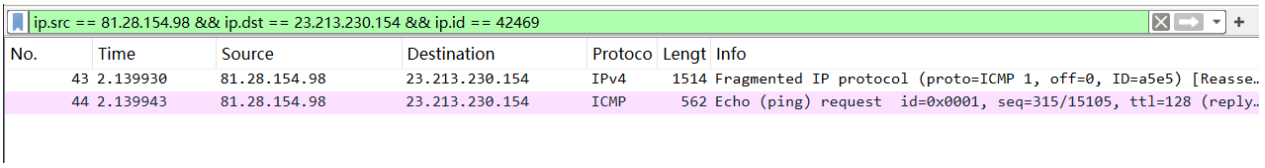
$$17.D5.E6.9A_{16} = 23.213.230.154_{10}$$

Q3

1. **Assuming that these two packets are the fragments that belong to the same packet (note the identification numbers), which packet is the first fragment and which is the last? Why?**

   Packet 1 is the first fragment because offset is 0, Packet 2 is the last fragment because MF is 0.

2. **Using Wireshark, find the above packets in the given "icmp. Cap" file. Show the filter used in Wireshark, and identify their frame numbers (e.g., packet 1 is frame 64 and packet 2 is frame 100).**



   Packet 1 is frame 43 and packet 2 is frame 44.