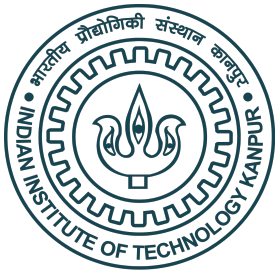

CS425 Computer Networks

Assignment 3

Amitangshu Pal

April 2, 2023

Jaya Gupta

Roll No: 200471

Problem 1:Within the IP packet header, what is the value in the upper layer protocol field?

Solution: From the figure, IP header contains the *Protocol* field which contains the value *ICMP (0x01)*.

Problem 2: How many bytes are in the IP header? How many bytes are in the payload of the IP datagram? Explain how you determined the number of payload bytes.

Solution:

- The IP header has **20 bytes** which can be seen from the field **Header length**.
- IP datagram has a payload of **36 bytes**. It can be calculated as follows:
  - Total Length field in the packet is **56 bytes**.

$$Total\_length = Header\_length + Payload$$

$$56 = 20 + Payload$$

$$Payload = 36bytes$$

Problem 3: Has this IP datagram been fragmented? Explain how you determined whether or not the datagram has been fragmented.

Solution: No the IP datagram has not been fragmented. It can seen as follows:

- Also the **Fragment Offset** of this fragment is 0, which tells us this is the first datagram.
- **Flags** field has the value 0x00, which shows more fragments also is 0, hence there is no fragment after this fragment.

Hence, this concludes that this IP datagram is not fragmented.

Problem 4:What is the value in the Identification field and the TTL field?

Solution: Identification field has value **0x80b2**. TTL (Time to live) field has value 1.

5. Can you say whether the message corresponding to the above packet has been fragmented?

Solution: This message has been fragmented because the more fragments field has been set to 1 in **Flags** field whose value is $0x02$, which means there are more fragments after this one.

6. What information in the IP header indicates that the datagram been fragmented?

Solution: Flags value ($0x02$ = $0b00000010$), shows that more fragments bit which is second least significant bit is 1, which indicates that the datagram has been fragmented.

7. What information in the IP header indicates whether this is the first fragment versus a latter fragment?

Solution: This fragment has fragment offset field set to 0, which means this is the first fragment in the datagram.

8. What information in the IP header indicates that this is not the first datagram fragment?

Solution: This fragment has Fragment offset field set to 1480, which shows that this is not the first datagram fragment. First Fragment has a offset of 0.

9. Are the more fragments? How can you tell?

Solution: No, there are no fragments after this one. We can tell this by seeing the Flags value, which is $0x00$, i.e more fragments is 0.

10. If Fig. 2 and Fig. 3 are the 1st and 2nd fragments of a message, then what fields change in the IP header between the first and second fragment?

Solution: Following fields change between the first and second fragment:

- Flags
- Fragment offset
- Total length
- Header checksum