Date: 01.04.2024

CS425A: COMPUTER NETWORKS
Homework 3

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QUESTION 1:

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

The upper layer protocol is identified as *ICMP*. This is indicated by the protocol field value of *0x01* in the packet header.

QUESTION 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.

The IP header contains *20 bytes*. To calculate the payload bytes, the header length is subtracted from the total datagram length, which is 56 bytes. Thus, the payload is 56 bytes (total length) – 20 bytes (header length) = *36 bytes* (payload size).

QUESTION 3:

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

No fragmentation has occurred for this datagram. This is deduced from the fragmentation flags and the fragment offset both being set to 0, indicating that the packet is the only fragment and is the complete, unfragmented datagram.

QUESTION 4:

What is the value in the Identification field and the TTL field?

The Identification field's value is *0x80b2*, which uniquely identifies the datagram. The TTL (Time To Live) field has a value of *1*, indicating that the datagram is allowed to be forwarded by only one more router before being discarded.

QUESTION 5:

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

The packet has indeed been *fragmented*. This is evident from the fragmentation indicators present in the packet details.

QUESTION 6:

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

The datagram's fragmentation is signified by two pieces of information in the IP header: the "More Fragments" flag is set, and the fragment offset is either zero or a non-zero value. The value in the fragment offset is *0* , and the more fragments field has been set to *1*. These details confirm that the packet is not intact and has been split into multiple segments.

QUESTION 7:

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

The position of a fragment within the original data is determined by the "Fragment offset" field. A *zero value* in this field signals that the fragment is the first piece of the data stream. If the offset is greater than zero, it denotes a subsequent segment of the original data.

QUESTION 8:

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

This is not the first fragment, which is apparent from the "Fragment offset" field in the IP header having a value greater than *zero*. Specifically, the offset of *1480* suggests this fragment follows other data from the original datagram.

QUESTION 9:

Are there more fragments? How can you tell?

There are no additional fragments following this one. The "More Fragments" flag in the header is not set (*value is 0*), indicating this is the final or only fragment.

QUESTION 10:

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

Comparing the first and second fragments, the following fields in the IP header have changed:

- The *Total Length* differs, reflecting the size of each fragment, from *1500* in the first one, to *520* in the second one.
- The *Flags* show a change, particularly the *More Fragments* flag, which is set in the first fragment and not set in the second.
- The *Fragment Offset* increases from *0* in the first fragment to *1480* in the second, indicating the sequence of the data.
- The *Header Checksum* is different in each fragment, from being *0xda69* in the first one to being *0xfd84* in the second one, as it's recalculated based on the header content of each fragment.