Question: Suppose Datagrams are limited to 1000 bytes (including head...

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Suppose Datagrams are limited to 1000 bytes (including header) between Host A and Router X. The MTU is 500 bytes (including header) between Router X and Router Y and the MTU is 1000 bytes (including header) between Router Y and Destination B. Assume an IP-header of size 20 bytes. In total, how many datagrams reach the destination B if Host A is required to send an MP3 file of 8 million bytes? Explain neatly with the help of a figure the various fragments that are generated, their sizes, and all the key fields of the datagram like fragmentation offset, identifier, and flags (DF, MF). [10]
The network connection is as follows:

Host A→ Router X → Router Y → Host B

Subject : data communication and computer networking

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Expert Answer

Anonymous answered this
234 answers

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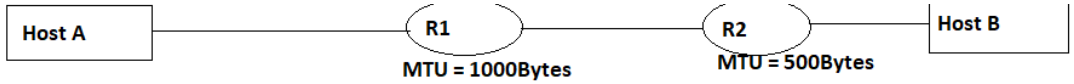
AS per the given question the MTU i.e Maximum transfter unit to Router X is 1000Bytes at a time. Means a packet of size 1000Bytes can be taken by the router X.

And Router Y have the MTU is 500Bytes. Including header means the header with each packet will be minimum of 20Bytes . Means in the packet of size 500Bytes there will be 480Bytes data and 20Bytes of header file.

In order to send the packet of size 8Million Bytes from Host A to Host B . first this packet needs to be fragmented into smaller parts . As the MTU size is lower. **The identifier value will be the unique value of 16bits. AS 496B is the packet size then the id for fragment will be like 1,497,993,.... . So, every time this id for the fragments will be different so, that when these all packets reached at destination host those packets can be assembled properly and In that order in which it came.**



Also if there are multiple Routers then we will pick the Fragment size as the lowest MTU size of all the mid Routers.

As the lowest size of MTU is 500Bytes so we need to fragment 8 Million BYtes packet into 500bytes packets.

One more thing is that the Fragment bits in the TCP/IP is of 13 bits. And because of that the framented packets which we will send it should be multiple of 8.

496Bytes is multiple of 8. So, each time we can send the packet of size 496BYtes in which 20 bYtes will be header and 476bytes will be the data.

The number of packets will be 8 * 1000000 Bytes / 476 Bytes = 16806.72 = 16807 packets . Means we need to send 16807 packets each of size 496 Bytes . In which 20 Bytes will be header and 476 Bytes will be data.

so, lets start The First datagram will look like

Fragment size = 496 Bytes, DF =0 , MF =1 , Offset =0 here DF i.e Do not fragement will be 0 as we need to send more frament as we have 16807 fragments to send. Then MF i.e More fragment will be 1 as there will be more fragment . And the size of offset will be 0 as this is the first fragment which are getting send.

Fragment 1 :	**Length = 496B**	**DF =0**	**MF = 1**	**Offset = 0**
Fragment 2 :	**Length = 496B**	**DF =0**	**MF = 1**	**Offset = 62**
Fragment 3:	**Length = 496B**	**DF =0**	**MF = 1**	**Offset = 144**
Fragment 4 :	**Length = 496B**	**DF =0**	**MF = 1**	**Offset = 186**
Fragment 5:	**Length = 496B**	**DF =0**	**MF = 1**	**Offset = 248**
Fragment 6:	**Length = 496B**	**DF =0**	**MF = 1**	**Offset = 310**

Then for fragment 3 the value of offset size will become 62 + 496/8 = 62+62 = 144 . So every time the earlier offset size and current sending file size/8 these two terms sum will be offset size. So, the Fragment will go in same order till Fragment number 16806.

Fragment 16805 : ⇨ | Length = 496B | DF =0 | MF = 1 | Offset = 1041848 |

Fragment 16806: ⇨ | Length = 496B | DF =0 | MF = 1 | Offset = 1041910 |

So, till fragment 16806 the packets size which has been sent will be 16806 * 476B= 7999656 Bytes

And there was 8000000Bytes which had to be sent. so, the packet size which left

= 8000000-7999656 Bytes =344 Bytes. So, As this is the last fragment then here

the length of the packet = 344 Bytes, DF =1 AS this is the last fragment, MF=0 as there is no fragment after this. And the offset will be 1041910 + 344/8 Bytes = 1021953Bytes

AS see below

Fragment 16807: ⇨ | Length = 344B | DF = 1 | MF = 0 | Offset = 1041953 |

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Q: Consider the Random Early Detection (RED) algorithm with MinThreshold = 100, MaxThreshold= 200, maximum buffer size =250 and maxP= 0.1. Draw the curve that gives the packet drop probabilities for all values of average

A: See step-by-step answer

Q: F 4 7. Consider the network given below: [5] a. Show the operation of Bellman Ford's(Distance Vector) algorithm for computing the least cost path from E to all destinations. Only compute the table of E. b. Explain briefly how the Spanning Tree protocol works? Build a Minimum Spanning Tree (MST) using Reverse Path Forwarding (RPF) at node E to all nodes in the given network. E G c D

A: See answer

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