EE384B: Multimedia Networking and Communications

Quiz #2
Closed Book
Time: 30 minutes

May 10, 2001

Score: ___ / 30

Name:_____

E-mail:_____

☐ SITN student ☐ On-campus student

I agree to abide by the Stanford Honor Code:_____
(signature)

Question 1: Data Traffic Characteristics (4 points)

Data traffic measurements over the years have found that data traffic is *"self-similar"* and *"heavy-tailed"*, and have proposed some analytical models to fit the observed data.

a) Define *"self-similar"* and *"heavy-tailed"*. (2 points)

b) What are the consequences of self-similarity when it comes to mixing data traffic with multimedia traffic? (2 points)

Question 2: Advances in Network Infrastructure - Bridges (4 points)

The GARP Multicast Registration Protocol (GMRP) is a mechanism to provide multicast forwarding services at layer-2 similar to those available at layer-3 (provided by protocols such as IGMP). Why is this needed? Give an example.

Question 3: Wireless Networking Infrastructures (4 points)

HomeRF and Bluetooth are very similar to IEEE 802.11 for data traffic. However, both of them have a special feature not present in IEEE 802.11 for carrying voice traffic. What is this feature?

Question 4: Resource Reservation Protocols (4 points)

In the older resource reservation protocol, ST-II, the reservation originates from the source, and reserves resources as it proceeds to the destination. In the newer RSVP, the reservation originates from the destination, in response to PATH messages. Point out two advantages of having the reservation come from destination instead of from the source.

Question 5: RSVP Reservation Styles (4 points)

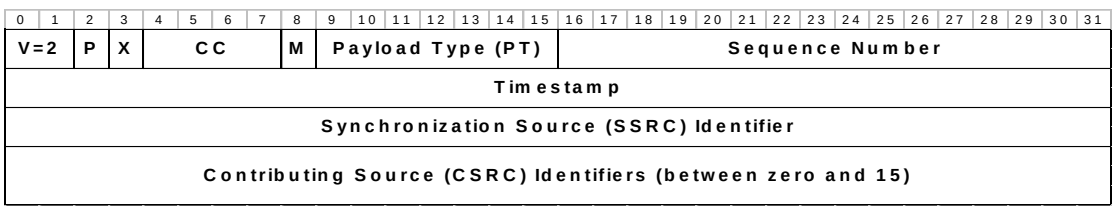
Consider the following situation: a multipoint-to-multipoint audio/video-conference between a certain number of receivers. Audio and video are carried as separate flows using different multicast addresses. All the receivers are capable of receiving and playing all the audio streams simultaneously. Some receivers are also capable of receiving and displaying a single video stream in addition to the audio. ("Capable" here means that the receiver has both the functionality and is connected with suitable bandwidth). The conference is closed, i.e., only available to a pre-selected group. What RSVP reservation styles would you use for the audio and the video streams? Justify your answers.

Question 6: DiffServ and MPLS (4 points)

One of the main driving forces behind DiffServ and MPLS is to reduce the processing complexity in the core routers and simplify the design of very large, very fast routers. Each of these techniques primarily addresses one area of the processing required in a modern router. For each technique, identify the area of processing it simplifies and explain how it simplifies that area.

Question 7: RTP (6 points)

The RTP header is depicted below:



Explain how a receiver would use the following fields in the header:

a) Payload Type (2 points)

b) Sequence Number (2 points)

c) Timestamp (2 points)

Bonus Question (4 additional points):

One of the available techniques for router queue management is Random Early Detection (RED). Its purpose is to avoid the undesirable synchronization and traffic oscillation that is introduced by the interaction of tail drop and TCP, and it works fine for that purpose. However, in some situations, the overall performance of RED is lower than that of tail drop. Construct an application scenario where this is the case (i.e., a scenario were we would be better off with plain tail drop than using RED).