INTENSIVE GRADUATE COURSE "INTERNET MULTIMEDIA"   06.09.2002

1. Brief questions (please answer with max. 100 words per item, 2 pt per item, total 10 pt).
a. What are the advantages and disadvantages of using RTP-over-TCP to carry (a) video-on-demand, (b) Internet phone calls, compared to RTP-over-UDP? (Name at least two advantages and disadvantages each.)
b. Why is DCT computed on small blocks (of 8x8 or 16x16) instead of on the whole image? (Assume the image size is 512x512.)
c. How is RTSP similar to HTTP? How is RTSP different from HTTP? Can HTTP be used to request a stream? Which is in-band vs. out-of-band? How much state is maintained between requests in each protocol?
d. Imagine compressing two audio files using gzip, a PCM (mu-law) audio file and a G.729-encoded audio file. How would you expect the compression ratios to compare? How well does this compression work? Justify your answer.
e. If you were to listen to the error signal transmitted for an ADPCM codec, what would you hear? (E.g., a reduced-volume version of the input signal?)

2. Consider the packet arrival sequence below, consisting of two talkspurts. These are PCMU (mu-law) RTP packets, with transmission starting at time 10.00.

RTP sequence number	RTP timestamp	network delay (seconds)
1	160	0.40
2	320	0.30
3	480	0.35
4	800	0.32
5	960	0.27
6	1120	0.45

Show a timeline as to when the packets are played out at the receiver. Your "algorithm" should minimize the end-to-end delay (a) without losing any packets, (b) while being allowed to drop one packet. Your algorithm can be non-causal, i.e., may look ahead in time. Compute the delay for the two cases. (5 pt)

3. The audio and video stream shown below need to be lip-synched. The figure shows the timing in the sender report. For simplicity, assume that the network has no jitter, so that the packets arrive, somewhat delayed, at the receiver. The delay for both audio and video packets is the same (is this a realistic assumption?) What audio packet should be played out when the video frame with timestamp 9000 is being displayed? Justify your answer! (5 pt)
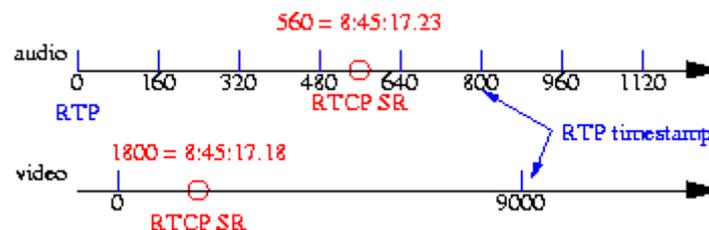
4. *Essay.* RTSP and SIP are somewhat similar. Describe the similarities and highlight the important differences between the two protocols. (10 pt)