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**The University of Queensland**  
**School of Information Technology and Electrical Engineering**  
**Semester Two, 2011**

**COMS3200 – Tutorial 10**

**Questions**

1. What is meant by interactivity for streaming stored audio/video? What is meant by interactivity for real-time interactive video?
2. What is the difference between end-to-end delay and packet jitter?
3. A compact disc holds 650 MB of data. Is compression used for audio CDs? Explain your reasoning.
4. An audio streaming server has a one-way distance of 50 msec with a media player. It outputs at 1 Mbps. If the media player has a 1MB buffer, what can you say about the position of the low-water mark and the high-water mark?
5. The H.323 and SIP protocols are two most popular protocols for Voice over IP (VoIP). Both of them are used by the networking vendors. For example the Cisco voice gateway supports both H.323 and SIP. Compare the H.323 and SIP protocols. Explain why H.323 prevails in the Internet backbone but is less popular than SIP in the “local loop” (domestic VoIP)?
6. When audio is sent over the Internet it is often sent as “interleaved audio”, i.e. odd numbered audio samples are sent in one packet and even numbered samples are sent in another packet (adjacent samples are not sent together). If one packet is lost it results in several small gaps in the reconstructed audio instead of one large gap. This allows the audio application to survive an occasional lost packet without introducing a gap in the playback. However, when used for Internet telephony, it also has a small disadvantage. What is that?
7. Does voice over IP have the same problems with firewalls that streaming audio does? Discuss your answer.
8. What is the bit rate for transmitting uncompressed 88 x 600 pixel colour frames with 8 bits/pixel at 40 frames/sec?
9. Consider a 100,000-customer video server, where each customer watches two movies per month. Half the movies are served at 8 pm. How many movies does the server have to transmit at once during this time period? If each movie requires 4 Mbps, how many OC-12 connections (622 Mbps each) does the server need to do the work?
10. Assume that real-time video is sent over TCP. What effect will the TCP congestion avoidance have on video delivery?