

CS5248 Systems Support for Continuous Media Quiz 1 (10 points)

Answer ALL questions in the space provided. Please state your assumptions (if any) clearly.

1. For B and P frames the H.264 compression algorithm does not require that all macroblocks in the current frame must be predicted from the same reference frame. Instead, multiple reference frames can be used for prediction. Describe (a) what the advantage is of using multiple reference frames and why and (b) what 2 possible disadvantages are and why. (6 points)

(a) If multiple reference frames are available it may be possible to find a better matching macroblock for prediction (i.e., one that is more similar). This will result in a higher compression (i.e., less bandwidth) because the algorithm only encodes a smaller difference. A smaller difference results in less bits in the output stream.

(b.1) Searching multiple frames for a matching macroblock takes more time and CPU instructions, hence the computational complexity increases.

(b.2) The encoding and decoding latency may increase because more frames need to be available for the search. These frames need to be stored in memory and the codec algorithm needs to wait until the frames are available.

2. The IP multicast protocol is not stateless at the routers (i.e., routers need to keep information about every active multicast group – or session – in memory). Describe 2 reasons why this can be a disadvantage compared to a stateless protocol. (4 points)

(a) [Session Limit] Since every IP multicast session takes up some memory in the router, there is a limited number of concurrent sessions that can be supported with a fixed amount of memory.

(b) [Error Recovery] If a router or a link crashes, or if a session has to be re-routed, then the session information will be lost and must be re-constructed on another router. This may disrupt the IP multicast session for a longer time than a stateless protocol would, i.e., recovery is slower.