CS536: Data Communication and Computer Networks

Lab4 Answers

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1 Problem 2

1. **(c) session initiation race condition**

   If two hosts send the initiation request to each other at the same time, the two hosts will go into the DECISION state at the same time, which will both wait for the initiation ACK packet. This is called **deadlock** and we cannot avoid this. These two hosts will have to wait for 15 seconds and then try to initiate a connect again.

   If multiple session request initiation requests arrive at the same time, the request arrived first will be caught and the following initiation requests would be dropped when the app is at decision state. This can be easily implemented. The SIGIO signal handler will receive multiple requests at one call, when the app is at initiation state and receive a session request, it will drop the remaining packets at this signal handler before transition and change the state immediately.

2. **(d) irregular session termination**

   Heartbeat packets would be used to detect whether the peer is still alive or not. The format of these packets is the same as other packet. It has a new header value 10. Each peer would maintain a heartbeat counter and an alarm used for heartbeat. The following procedure describes the heartbeat protocol.

   - The app will send a heartbeat packet to the peer every 5 seconds. The heartbeat counter will increase by one after sending.
   - If the app receives a heartbeat packet from the peer, it will reset the heartbeat counter to zero.
   - If the heartbeat counter reaches 3 in the heartbeat alarm handler, the app may believe that the peer is disconnected and offline. Therefore, it will send a SIGQUIT signal to itself and terminate the current session.

2 Bonus

Option 1: After receiving a SIGQUIT signal or termination package, the app will terminate the last session, and transit to INITIATION state and ready for new session.