COMP 8670 - Take Home Exam

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March 31, 2025

1 Problem 1 - Printer Attack

1.1 Can Attila arrange to learn the contents of Vicky's document without physically accessing any of the printers?

1.2 Describe two distinct Denial-of-Service (DoS) attacks that Attila could execute against the Printer Discovery Protocol.

1.3 Can Attila modify what is printed on the printer?

2 Problem 2 - Hilltop Academy IT Security

2.1 What would be the source IP address and the MAC address in the ICMP Redirect message sent by Leo's Laptop to the Teacher's Workstation?

2.2 After receiving the ICMP Redirect message, what changes occur in the routing table of the Teacher's Workstation?

2.3 Indicate the new route (including the next-hop IP address) that the Teacher's Workstation will use to send packets intended for the Internal Web Service Server after the ICMP Redirect attack is successful.

2.4 What should be the content of the ICMP Redirect message to make sure the Teacher's Workstation routes the traffic as intended by Leo?

2.5 If Eva notices unusual network activity and investigates the traffic coming to and from the Teacher's Workstation, identify the signs that would indicate an ICMP Redirect attack is taking place.

3 Problem 3 - Python From Section 2

See Python Implementation.

4 Problem 4 - Link-State and Distance-Vector Routing

4.1 Assume we are using Link-State routing for the network in figure "Network Topology A". Is it possible to for oscillation problem to occur.

4.2 Assume we are using Distance-Vector routing for the network in figure "Net- work Topology A". Is it possible to for a routing loop problem to occur.

4.3 Assume we are using Link-State routing for the network in figure "Network Topology B". Is it possible to for oscillation problem to occur.

4.4 Assume we are using Distance-Vector routing for the network in figure "Net- work Topology B".

5 Problem 5 - Congestion Control

5.1 Show for sending 15 different packets (duplicate packets do not count), how the window size will change, and the packets sent in each window.

Window Size	Packets Sent
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-
-	-

Table 1: Window Size vs. Packets Sent

5.2 **Assume that we set the initial estimated RTT to 20 ms and we measured the actual RTT for packets 2, 5, 9, 13 as shown in table 2. Calculate the estimated RTT for packet number 14.**

Packet #	2	5	9	13
RTT (ms)	21	19	24	22

Table 2: Round-Trip Time (RTT) for Different Packets

6 Problem 6 - TimeSync Protocol

6.1 **Define the message format for both time synchronization requests and responses in your protocol.**

6.2 **Sketch a timeline for the operation of your protocol in case of a simple time synchronization request and response with no error, and in case there is one error (e.g. time drift greater than 30 seconds)**

7 Problem 7 - RDT Protocol

7.1 **Draw a time chart for the packets between A and B, showing the number of data and acknowledgment packets exchanged between A and B. When B received the message "CAT" correctly, there was no crash or time failure.**

7.2 **Draw a time chart for the packets between A and B, showing the number of data and acknowledgment packets between A and B. When B only receives the message "CA" and not "CAT" due to time failure. A and B will fail to detect that the message was sent incorrectly and terminate the connection.**

7.3 **Draw a time chart for the packets between A and B, showing the number of data and acknowledgment packets between A and B. B only receives the message "CATC" and not "CAT" due to time failure. A and B will fail to detect that the message was sent incorrectly and terminate the connection.**