

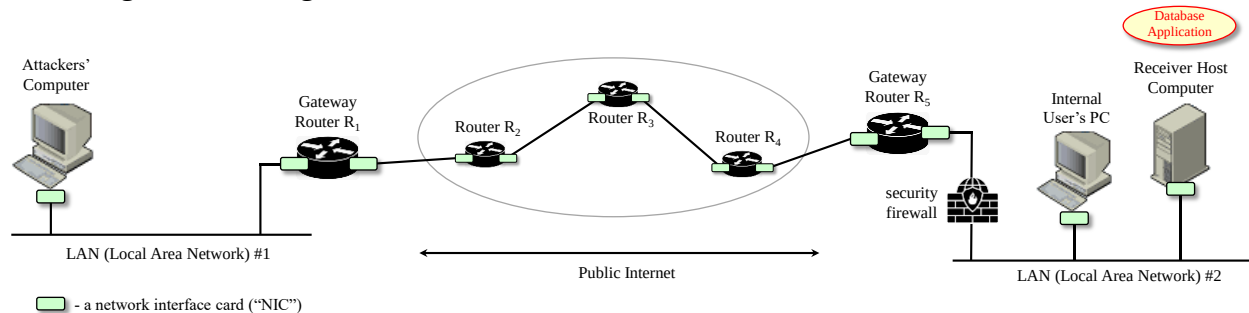
CS490-004 Network Programming

Fall 2026

Exercise Questions on September 1, 2026 (PART II)

EXERCISE

Assuming the following network structure, where:



- Attacker's host computer belongs to LAN #1
- A database server host computer belongs to LAN #2, where a network application to manipulate a networked-database server process is running, which uses TCP port "2048".
- A security firewall is set up at the immediate downstream of the gateway router for LAN #2 (it is named as "R5"). The security firewall has drops any incoming packets that is destined to TCP port 2048, to prevent any access to the networked database application from the outside of LAN #2, but it opens TCP port 80 for incoming network traffic (i.e., any incoming network traffic destined to TCP port 80 gets through the firewall. This means that any host computers that belong to LAN #2 can access the networked database, but not any host computers that are outside of LAN #2 (including the attacker's host computer).
- Assume that the networked database application speaks its own application-layer protocol, "N-DBP (Network DataBase Protocol)", instead of HTTP.

TCP ports:

- N-DBP: 2066
- HTTP: 80

IP addresses:

- Attacker's host: 201.55.12.99
- R1 (gateway router): left NIC: 124.33.240.255 right NIC: 182.76.88.109
- R2: left NIC: 151.82.3.3 right NIC: 23.52.88.99
- R3: left NIC: 10.153.1.1 right NIC: 166.165.150.49
- R4: left NIC: 199.20.92.1 right NIC: 140.130.11.10
- R5: left NIC: 46.10.12.45 right NIC: 200.48.48.48
- Receiver host: 146.163.1.1

MAC addresses:

- Attacker's host: 1B44F0
- R1:left NIC: FF00DD right NIC: 2045AB
- R2:left NIC: 202020 right NIC: DA10FF
- R3:left NIC: AC00EE right NIC: 00BD12
- R4:left NIC: BB3456 right NIC: FACD55
- R5:left NIC: 10102D right NIC: 1010FE
- Receiver host: 30AFD

Question: Describe how the attacker can access the networked database server from the outside of LAN #2 using tunneling?

Requirement 1: Explain what the attacker needs to set up before the attacker can transmit a network traffic to the networked database server?

Requirement 2: Explain the contents of network traffic the attacker sends to the networked server using tunneling by specifying the followings to the packet header 1 through 12 in the diagram below using the following rules:

- (1) If it is a TCP header, specify the TCP port number
- (2) If it is an IP header, specify both the sender and the receiver IP addresses
- (3) If it is a physical-layer header, specify the MAC address

Requirement 3: Explain how the attacker can successfully send his/her network traffic to the networked server using tunneling – using the “solution template” on the next page.

Note: for full credit, you need to show all the necessary details for the above questions.

