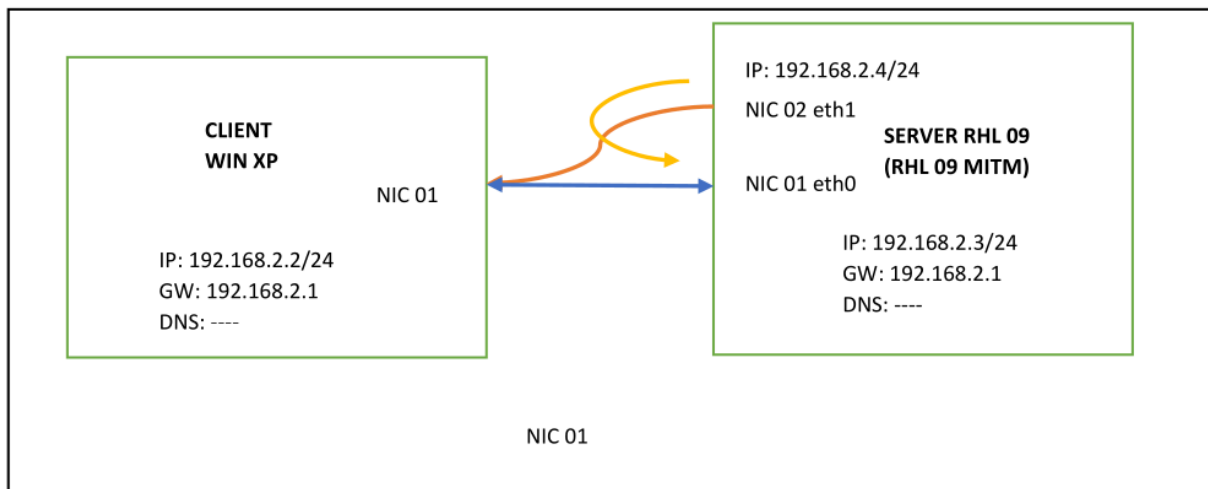


Network Lab
Assignment 3
TCP Packet Generation
(Credits to Hiran V Nath, CSED NIT Calicut)
Submission & date: 21/08/2025

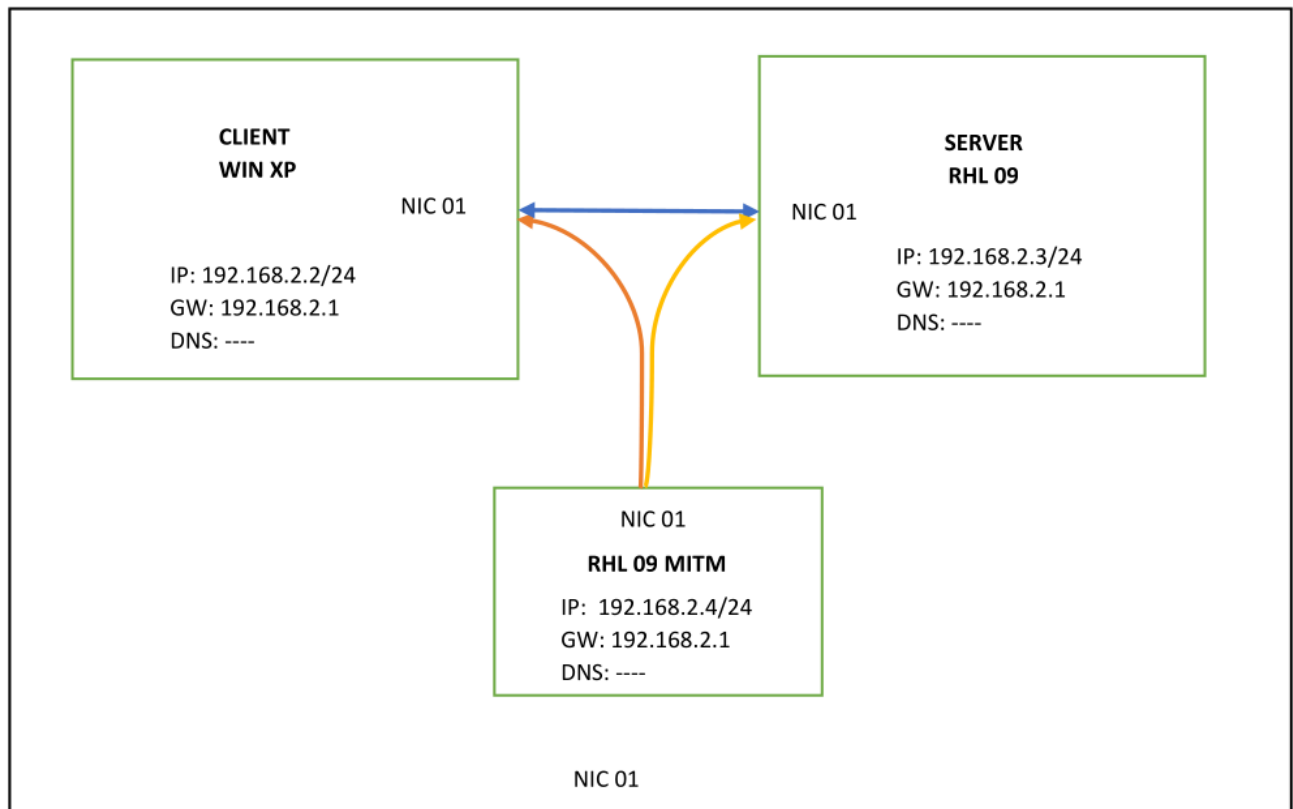
This assignment has to be done individually. Each of you could set up the network on your laptop/desktop using a VM. The assessment evaluation would be done individually; this includes a demonstration of the generation of the TCP packet that is accepted by the other party, followed by a viva and an online quiz, where the questions relating to the assignment will be asked.

After completing this assignment, you will get a feel for how to generate TCP packets and push them into the network. There are powerful libraries available for the creation and injection of arbitrary packets into the network, which can be used to significantly simplify the coding effort needed to create such attacks. One such library is the libnet (<http://www.packetfactory.net/projects/libnet>) packet creation and injection library written by Mike Schiffman. While you won't be required to code using the library in this lab, you will profit considerably from understanding how to use the API (in your spare time), perhaps by writing a general-purpose traffic generator with it.

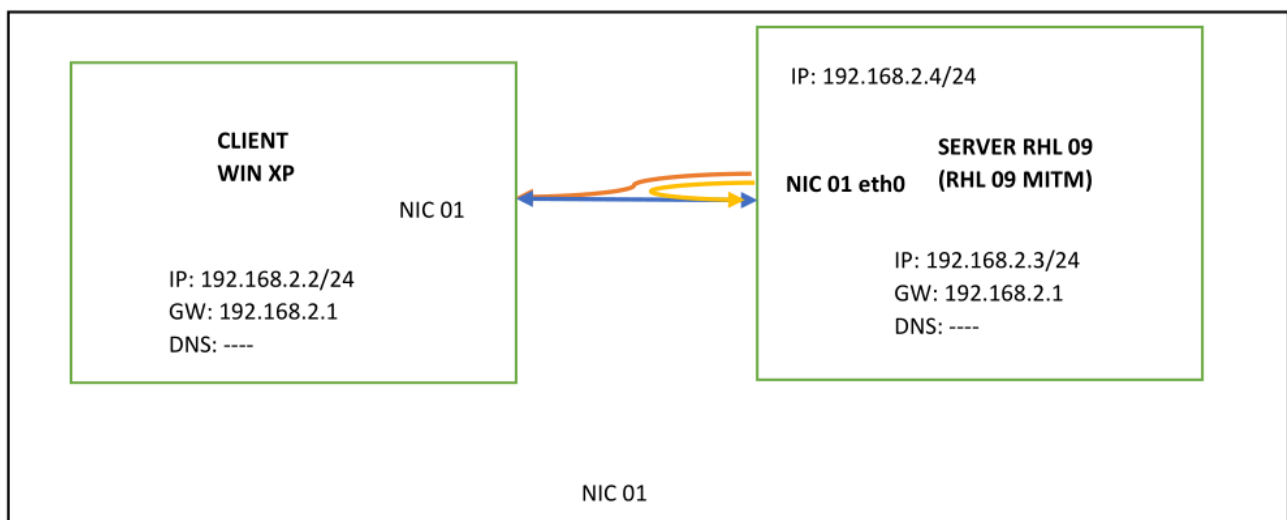
Network Diagram—with Static IP addressing (Basic for systems with less RAM)



Network Diagram – with Static IP addressing - MITM Attack –Ideal Scenario (Recommended)



Network Diagram – with Static IP addressing (Minimum Architecture for systems with less RAM)



You have to use the **Internal Network (intnet)** for setting up this network. Any updates/package downloads to the VMs have to be done using the Bridge/NAT setting. Before trying these attacks, the

virtual network between the VMs has to be totally isolated from the Internet. You should use only the **Internal Network setting** while doing this attack/demo.

For this lab, you will use hping2 / hping3 (Linux) to generate a TCP packet that breaks a quiescent TCP connection. When a TCP connection is in the ESTABLISHED state, a RST packet received by either endpoint's TCP within the receiver's receive window signals that the other end wants to immediately break the connection. If an active attacker knows or can guess details about a TCP connection's current window, then he can break it by generating a spurious RST packet and sending it to either the source or the destination. You will download and install hping(v2/v3) on the **Linux MITM** machine for your use with the lab. Figure out the command line arguments for hping(v2/v3) that will generate a TCP packet with the help of the hping documentation available/attached.

You may use Wireshark to monitor and see the traffic. It might take time if you try to install Wireshark in older versions of Linux. This is not applicable if you are using the latest versions of Linux, where you could install Wireshark without any issues.

What you will do

Create a TCP connection (TELNET/SSH) between two machines, say A (a Linux box (SSH Server)) and B (a Windows/Linux box) or both Linux boxes. A TCP connection can be made by either telnetting from one to the other or by logging in using SSH. Run Wireshark on one of the machines to determine the sequence number of the next expected datagram from A -> B / B->A when the connection is quiescent. Invoke hping3 with appropriate arguments to break the TCP connection (ORANGE and YELLOW lines demonstrate how the RESET has to be done). You should be able to break the connection at A's end in the first demonstration and at B's end in the second demonstration. Explain what's going on. Do you need a special value for each of the header fields in the TCP packet, or does any value work? If you need a special value, what are the values conceptually?

Review questions

You don't have to submit answers to these in writing, but you must be prepared to answer them and other similar questions in the scope of this assignment.

1. What is the kind of attack you are performing in this assignment, referred to in the computer network literature?
2. TCP understands six code bits: URG, ACK, PSH, RST, SYN, FIN. Explain the purpose of each.
3. Why do we need the src_ip and src_pt numbers when constructing the attack RST packet? Why isn't it enough to just send a RST packet to the correct destination and port number? Will the RST packet generated, without giving the source IP and source port, work in any of the above scenarios?
4. What is the importance of the window size in the above attack? What is the range of values that I could select from the window size for generating a RST attack? How does it impact the attack?

5. Why do we need to estimate the sequence number of data traffic in one direction (any direction is fine) before generating the packet? Why doesn't an arbitrarily constructed RST packet work?
6. Describe the purpose of the DF and MF bits in the IP header?
7. Describe how the ping of death datagram can be constructed.
8. In SYN cookies, describe how the ISN is generated by the receiver (server). Note that the ISN from the client is ignored when computing the cookie value. Does it matter? When the client sends the final ACK, he can change his initial ISN. Does it matter?
9. Why are there ACK storms in Laurent Joncheray's TCP hijacking scheme?

Only Applicable for systems with Very Less RAM

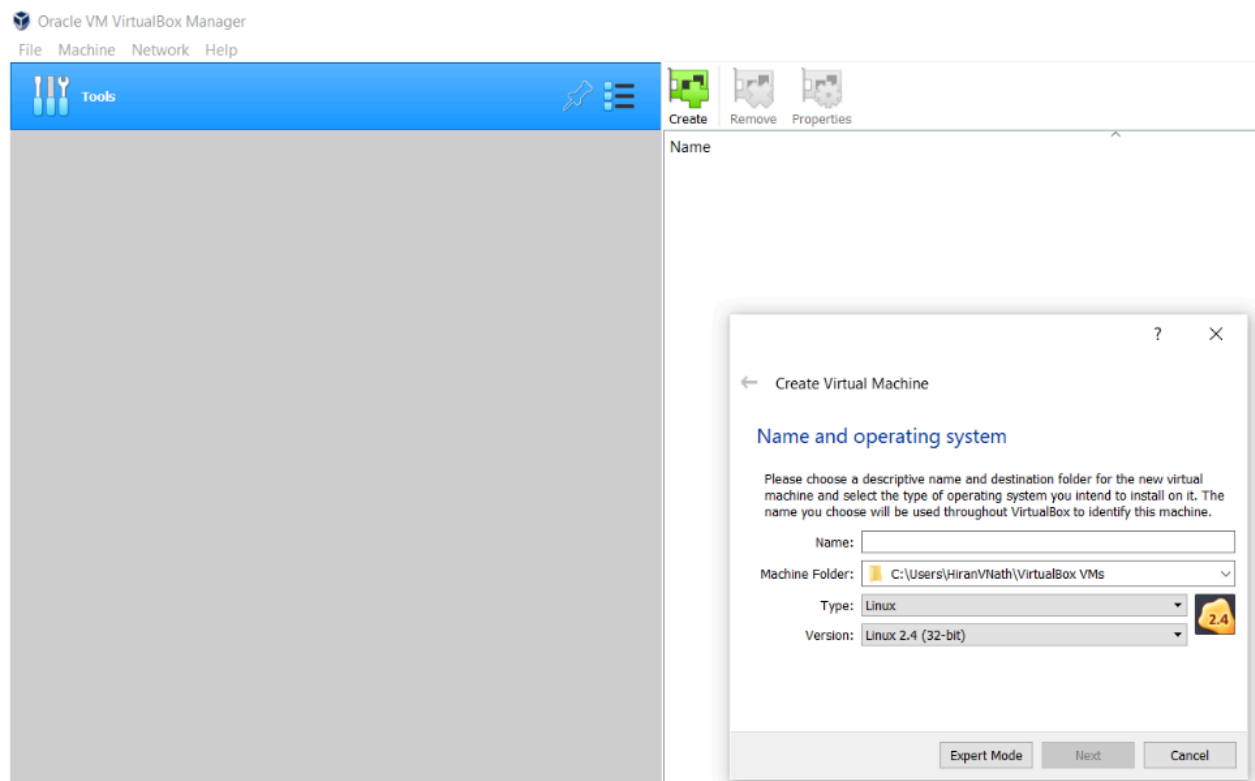
If your RAM is less than use any of the Older versions of Linux, like Red Hat Linux 09 or Fedora that required only 128MB of RAM to work, and has all inbuilt packages.

Redhat Linux 09

- <http://ftp.scientificlinux.org/linux/redhat/9/iso/> (Disk 1-3 only needed)
- https://archive.org/download/redhat-9.0_release

Installing Redhat Linux 09/old Linux versions in VirtualBox

Please make sure to select the Linux Version as listed below once you are installing as Virtual Machine.



Make sure that you select everything in the package selection.