M3 Lab: Physical Layer

CITA 220: DATA COMM & NETWORK TECH

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2 WINDOWS

2.1 STARTING THE COMMAND PROMPT

Log into a Windows computer. Press the R key while holding down the Windows key (⊞). Type **cmd** and press **Enter**. See Figure 1. The **Command Prompt** program starts. See Figure 2.

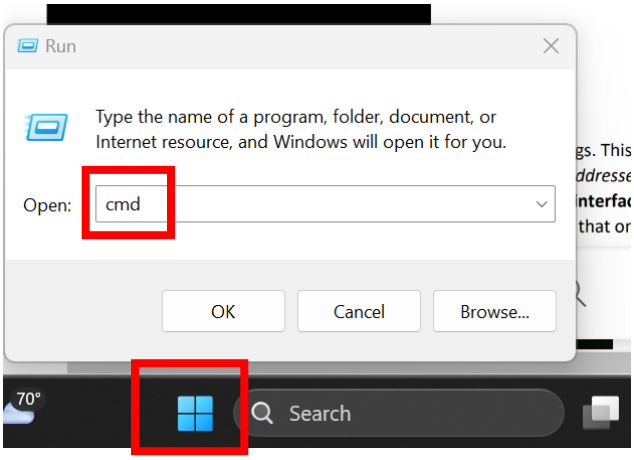

Figure 1. Starting the Command Prompt Program

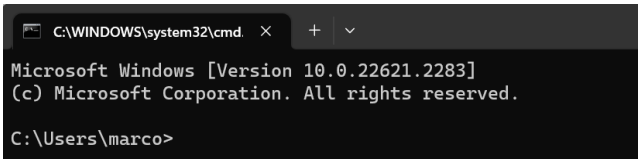

Figure 2. Command Prompt Program

2.2 Displaying the Network Settings

The **ipconfig** command is used to display the current network settings. This command is typically used with the **/all** switch. See Figure 3. The network settings, such *IP addresses, MAC addresses, and default gateway addresses*, are grouped into one or more **network interfaces (adapters)**. An interface may be a physical network interface card (NIC) or a virtual interface that only exists in the device's RAM.

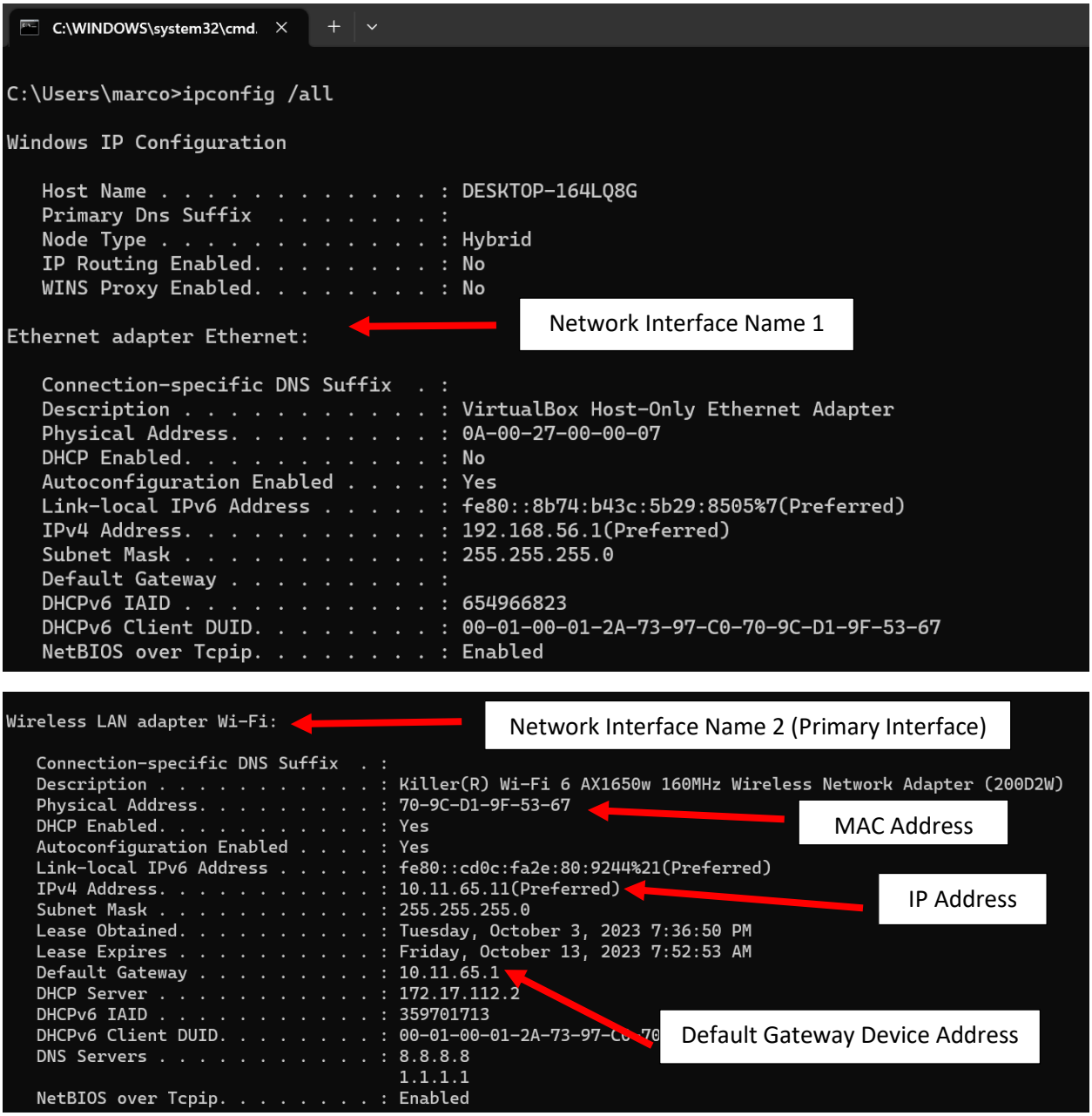

Figure 3. The ipconfig Command

Although two network interfaces are listed in Figure 3, the second address is the primary interface because the default gateway device address has an IP address (137.37.120.1). Sometimes the output shows more network interfaces with no default gateway IP address. Those interfaces are not primary interfaces.

2.3 Identifying Physical Layer Issues

If the computer is on a wired network, unplug the network cable. If the computer is on a wireless network, disconnect it from the network. Reissue the ipconfig command. Compare the outputs before

and after the simulated physical layer issue. (Compare Figure 3 and Figure 4.) Note that the **Media State** shows **Media disconnected**. See Figure 4. Reconnect the computer back to the network and re-run the ipconfig command.

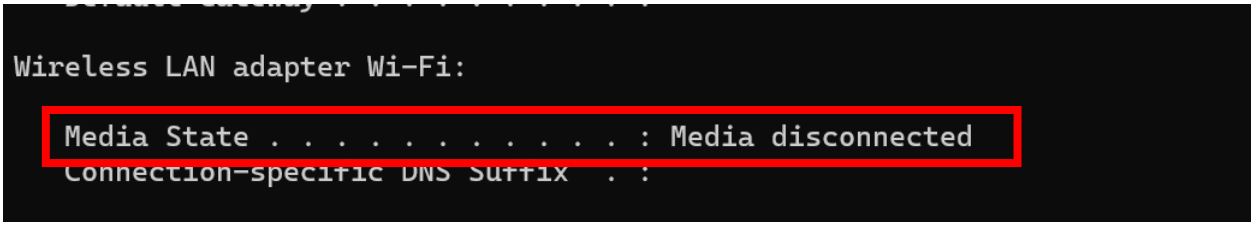

Figure 4. Media Disconnected

3 LINUX

3.1 STARTING THE TERMINAL PROGRAM

Start the CITA 220 virtual machine and log in. Click the **App Button** and type *terminal*. See Figure 5. Click the **Terminal** icon. See Figure 6.

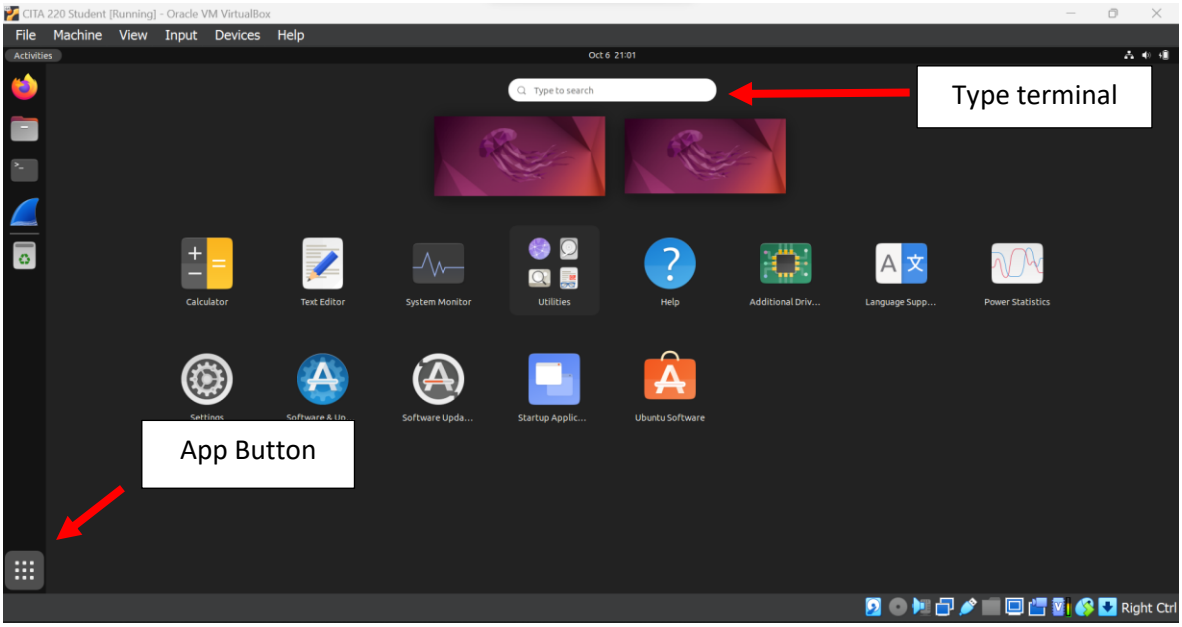

Figure 5. Searching for the Terminal Program

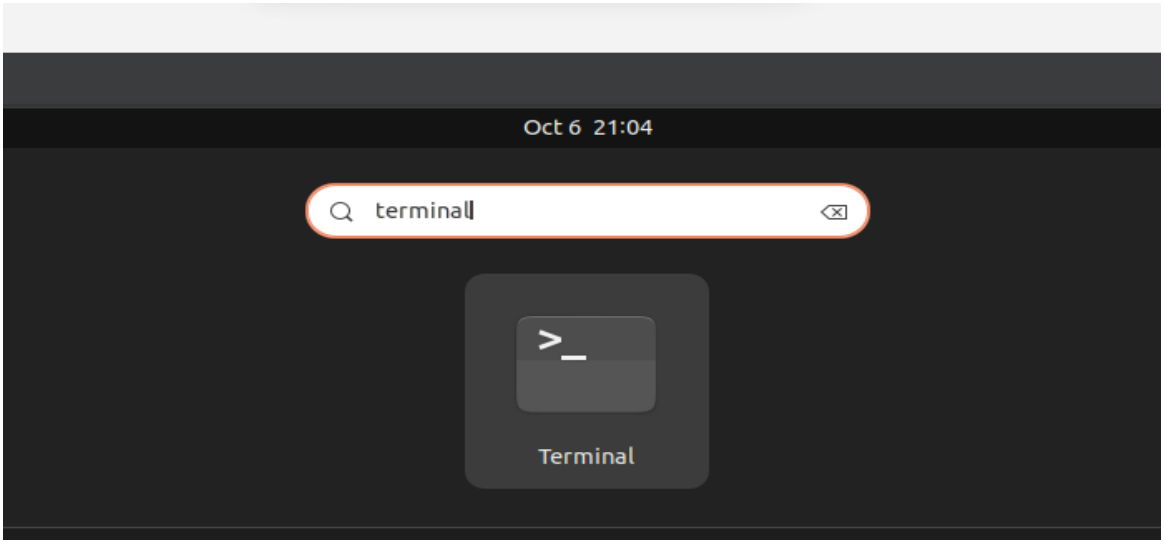

Figure 6. Starting the Terminal Program

3.2 Displaying the Network Settings

The **ifconfig** and **ip** commands identify the system's network settings. The ifconfig command is the older command, and more systems encourage users to use the ip command. The ip command is typically used with the **-4 a (-4 address)** command arguments. See Figure 7 and Figure 8.

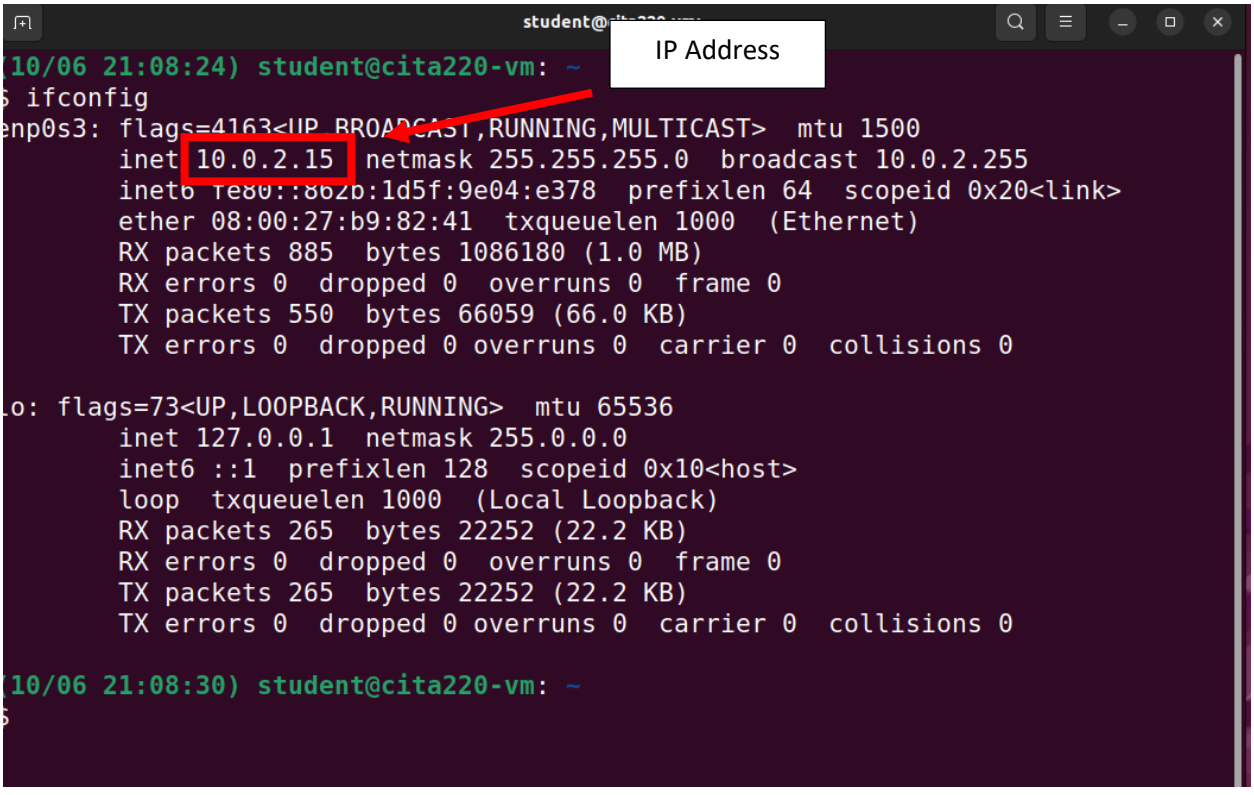

Figure 7. The ifconfig Command

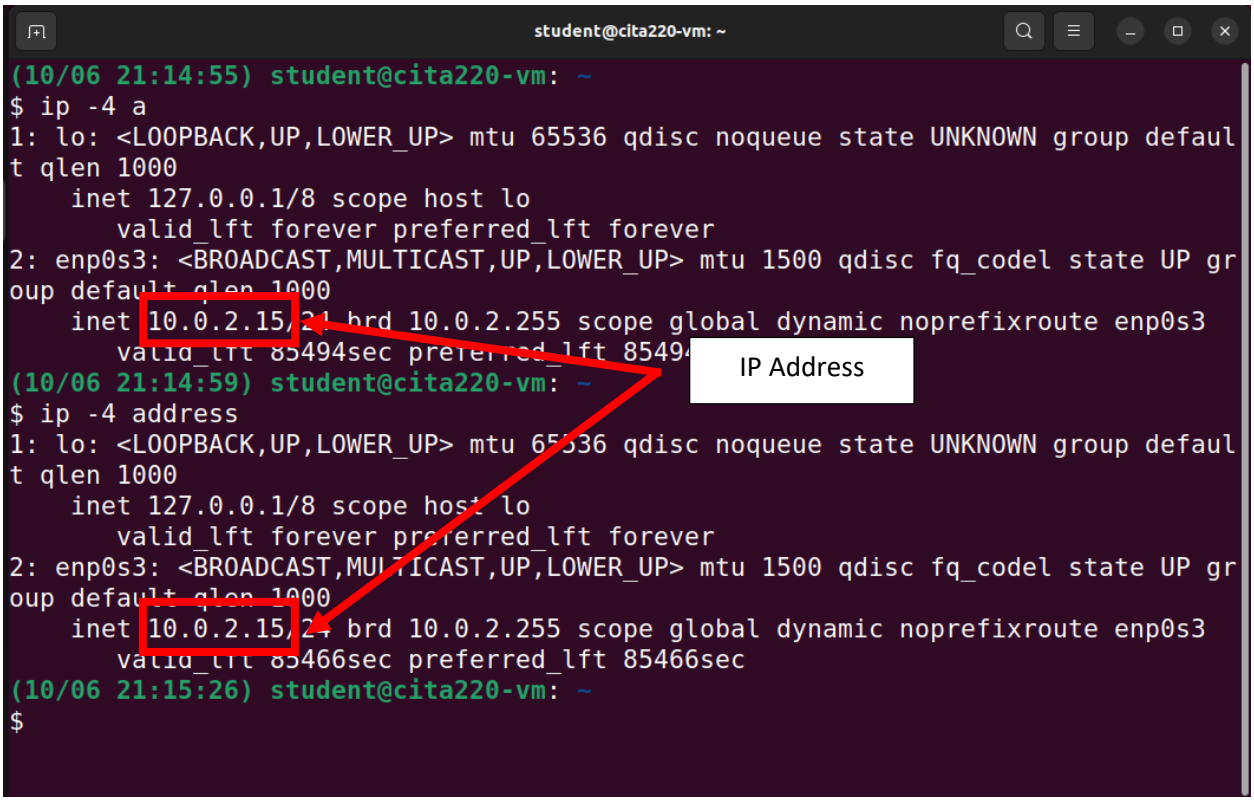

Figure 8. The ip Command

3.3 Obtaining Other Physical Layer Information

The **ethtool** command shows more physical layer information about network adapters. It shows the supported link modes, the current bandwidth, the duplex state, the link state, and other information.

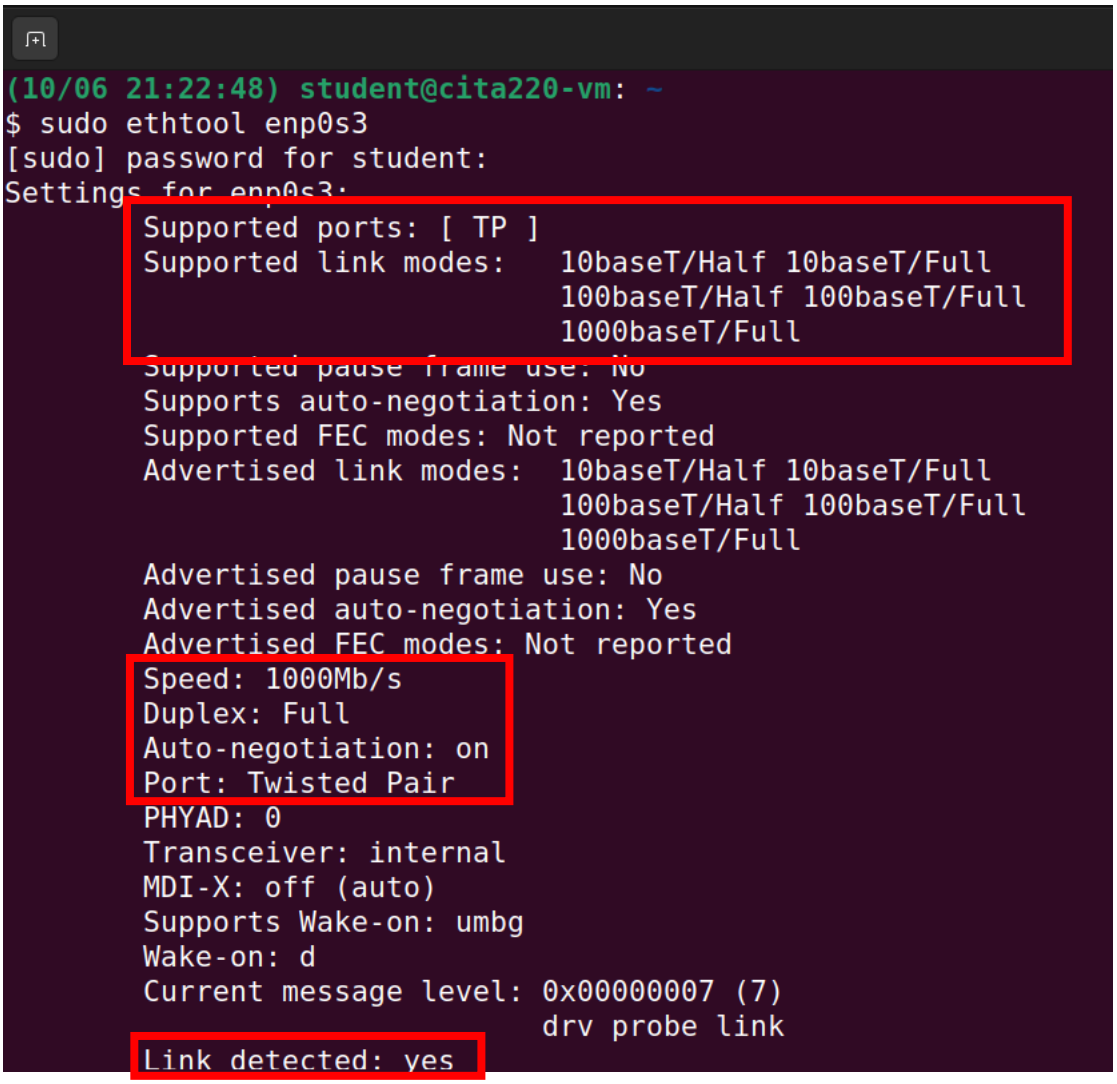

Figure 9.The ethtool Command

3.4 Identifying Physical Layer Issues

Click the **Devices** menu. (See Figure 10). Click **Network** and **Connect Network Adapter** to simulate a network cable disconnection issue. Re-execute the ifconfig, the ip, and the ethtool commands, and compare the outputs before and after the simulated issue. (Compare Figure 7 and Figure 11. Compare Figure 8 and Figure 12. Compare Figure 9 and Figure 13.) Go back to the Devices menu and restore the network connection. Re-execute the ifconfig, the ip, and the ethtool commands to make sure the simulated physical layer is resolved.

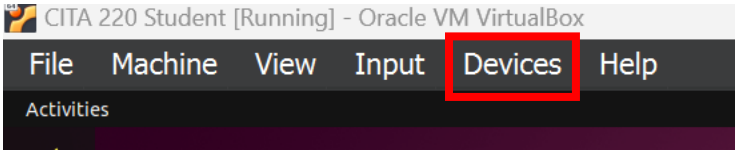

Figure 10. VirtualBox Devices Menu

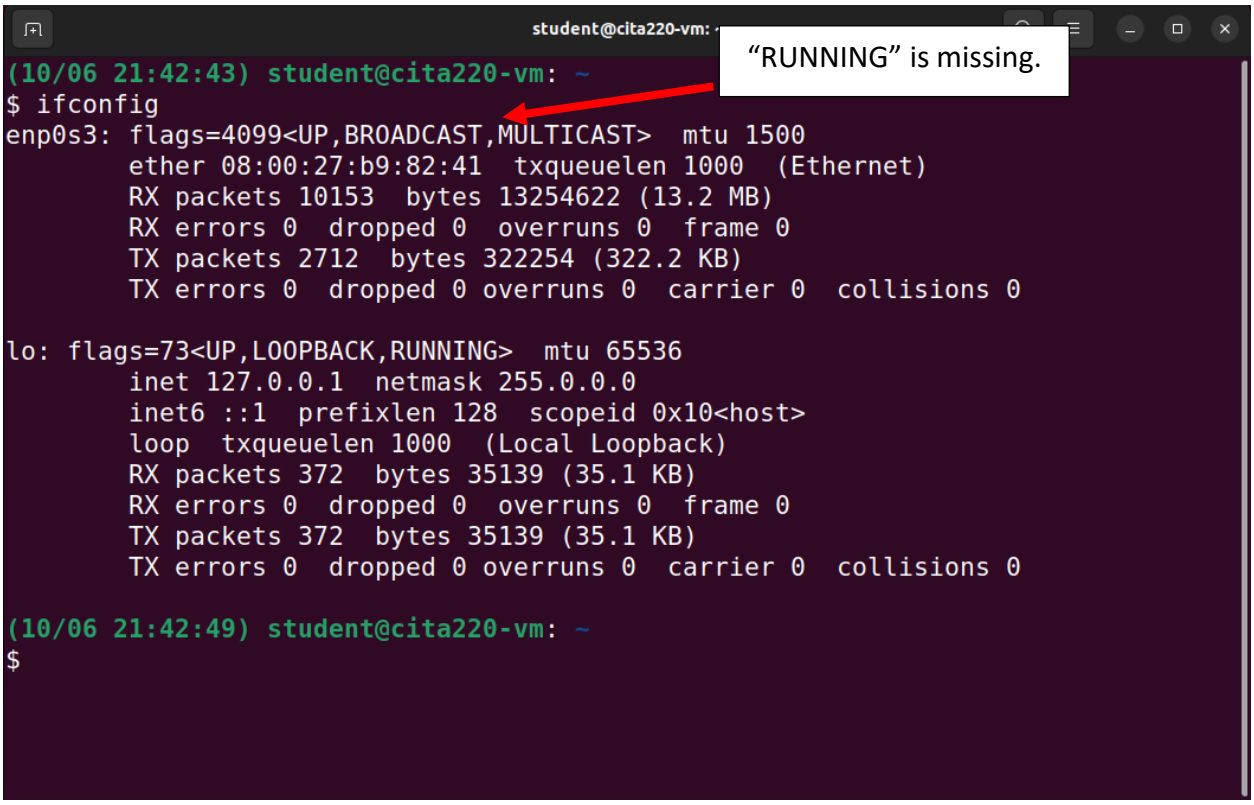

Figure 11. The ifconfig Command Output after a Simulated Issue

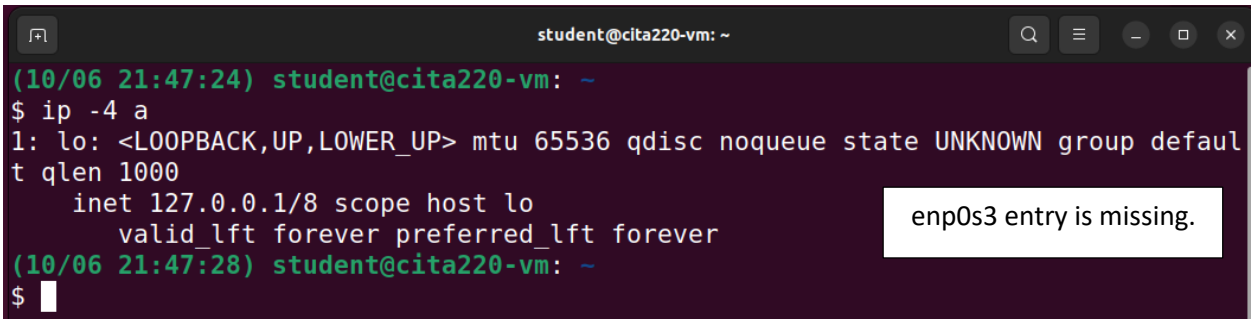

Figure 12. The ip Command Output after a Simulated Issue

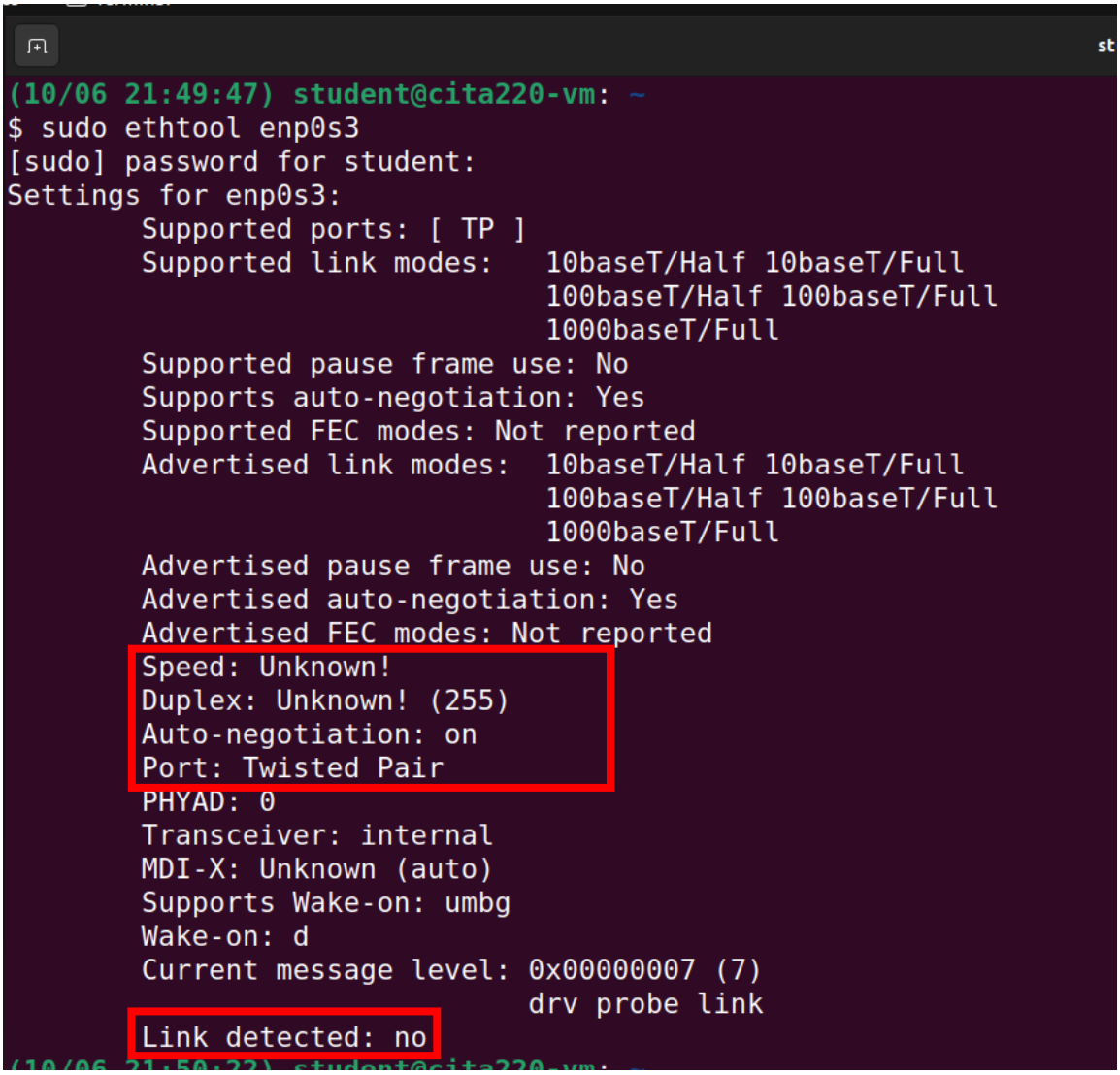

Figure 13. The ethtool Command Output after a Simulated Issue