

CS 450 Computer Networks
Laboratory Project 1
Due Date: September 30, 2009

PURPOSE

The purpose of this laboratory project is to give you a hands-on experience on some basic network hardware, addressing, troubleshooting tools, and packet capturing programs.

PART I

Use the following pin-out diagram to create a 6-foot UTP-CAT5 cable.



Procedure:

1. Cut approximately 6 feet of cable from the roll of cable in the lab using a wire cutter and retrieve two RJ-45 connectors from the box in the lab.
2. Using a wire-stripping tool, remove approximately one-half inch of outside insulation for each end of your cable.
3. Note the colors of the insulation around the eight wires (4-pairs)
4. Following the diagram above, insert the wires into the RJ-45 connector. Be sure the wires are inserted all the way to the end of the RJ-45 connector so that the contacts will pierce the wires.
5. Using a crimp tool, insert each end of your newly terminated cable into the appropriate slot and crimp down.
6. Retrieve the MicroScanner tool from the lab to test your cable. Measure the length of your cable using the microscanner. You now own that cable, take it home, and may use it in the next laboratory activity.
7. Pick one cable connected to the switch in the lab and, by using the microscanner and the inductive amplifier (200EP) tool, determine where that cable terminates. Write down your observations.

REPORT FORMAT and SUBMISSION PROCEDURE

You are required to prepare and submit a hardcopy of a formal report on your experiences in the lab. This report should be treated similar to reports you would do for a standard science laboratory. The contents of the report should embody an answer to the following questions: What was to be performed? How was it performed? What was observed? What factors influenced the outcomes? Specific questions that you need to address in the report for this part of the project are the following: Why are the white/green and green/white pairs separated? We used eight wires, but 4 wires may also used; why this discrepancy? What is the difference between using eight wires and only 4 wires? How could the MicroScanner tool determine the length of a segment of cable? Be sure to include the names of all group members in the report.

PART II

IPCONFIG. Use IPConfig to examine the current system.

Procedure:

1. Using a computer in the Fedora/Windows lab, go to the command prompt and type the following command: `ipconfig /? | more`
This command shows you all of the options for the ipconfig command and displays them one screen at a time.
2. Select the option that gives you ALL ip information.
3. From your observations record the following: machine name, ip address, hardware address, gateway address, DNS server(s) address(es), subnet mask, and DHCP status. Describe briefly each one of these items.
4. Repeat the step 3 using a different machine in the same lab.
5. Repeat step 3 using another machine in a lab elsewhere on campus.
6. Find the equivalent command in Fedora Linux and repeat the process.

NETSTAT. Use NetStat to explore the types of packets on a network

Procedure:

1. Using a computer in the Fedora/Windows lab, go to the command prompt and type the following command: `netstat /? | more`
This command shows you all of the options for the netstat command and displays them one screen at a time.
2. Select the option(s) that will provide the information for ALL connections, all Ethernet statistics, and per-protocol

statistics.

3. Record your observations on the following:
 - For Interface Statistics: Bytes (sent and received), Unicast packets (sent and received), Non-unicast packets (sent and received) and Unknown protocols.
 - For IP Statistics: Packets Received, Received Header Errors, Received Address Errors, Unknown Protocols Received, Received Packets Discarded, Received Packets Delivered, and Output Requests.
 - For TCP Statistics: Active Opens, Failed Connection Attempts, Reset Connections, Current Connections, Segments Received, Segments Sent, and Segments Retransmitted.
 - For UDP Statistics: Datagrams Received, No Ports, Receive Errors, and Datagrams Sent.
4. Repeat the above for a different machine in the same lab.
5. Repeat the above for a machine in a lab elsewhere on campus.

ARP. Use arp to explore routing on a network

Procedure:

1. Using a computer in the Ubuntu Linux/Windows (AH257) lab, go to the command prompt and type the following command: arp /? | more
This command shows you all of the options for the arp command and displays them one screen at a time.
2. You should select the option(s) that will display all of the gathered data.
3. Record your observations and write a report describing the output in detail.
4. Repeat the above for a different machine in the same lab.
5. Repeat the above for a machine in a lab elsewhere on campus.
6. Find the equivalent command in Ubuntu Linux and repeat the process.

TRACEROUTE. Use tracert to determine the number of hops needed to get to another host on the Internet

Procedure:

1. Using a Windows XP computer in the Ubuntu Linux/Windows (AH257) Lab, activate the run the tracert command.
2. Record the output on the screen.
3. Repeat the above for a different machine in the same lab.
4. Find the equivalent command in Fedora Linux and repeat the process.
5. Perform an analysis of the output. Describe the output and how that output can be useful to a network administrator for troubleshooting?

REPORT FORMAT and SUBMISSION PROCEDURE

Similar to that in Part I, you are required to prepare and submit a hardcopy of a formal report on your experiences in the lab. This report should be treated similar to reports you would do for a standard science laboratory. The contents of the report should embody an answer to the following questions: What was to be performed? How was it performed? What was observed? What factors influenced the outcomes? Specific questions that you need to address in the report for this part of the project are the following: the differences seen when the above procedures were done in different labs, the types of packets seen and how they might have originated, and what amount of traffic can be attributed to "network overhead". Be sure to include the names of all group members and each member's specific contribution in the report.

PART III

The Physical Media. You are required to write a research report on various physical media used in telecommunications. At the minimum, the report should include twisted pair, coaxial cable, optical fiber, radio waves, and infrared. In the report, you need to describe in detail the property of each medium, its advantages, its limitations, and the general theory of its operation. Make sure that all literature sources are fully cited and included in the references section.