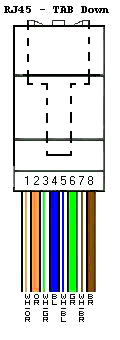
CPADS HW Activity V

“Reach Out and Touch Someone!”

(Unfortunately) the days of isolated computing are long gone. Networking, through the Internet in particular, has become almost a necessity. It allows for things such as file and data sharing, distributed computing, multiplayer gaming, e-commerce, etc. Most PC's these days have onboard LAN and most laptops also have integrated wireless (which we'll explore later). To tap into this wonderful world of networking, we are going to start by making our own Ethernet cables. Then you will need to perform some simple configuration to allow your networked machine to talk with another machine. Finally, you benchmark the ‘real’ world performance of the NIC (Network Interface Card).

**1. Make a Cable**

Since you've already installed the LAN driver for the onboard Ethernet, your first task is to make an Ethernet cable using the following wiring order:



* Cut a small length of CAT5e cable so you and your partner can both work on one end simultaneously.
* Obtain two RJ-45 ends and make a straight through cable, i.e. such that both ends are the *same*.
* When you have completed your cable ask your instructor to test it. A poorly made network cable can cause connectivity and data corruption issues. Best to make sure it’s done correctly.

**2. Basic Configuration**

* Determine the MAC address of your computer's onboard NIC either through the Ethernet connection properties or from a command prompt using **ipconfig /all**

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* In Control Panel → System and Security → System, be sure your computer’s name is set to **CPADS-##** where ## is your PC's number.
* Set the workgroup to **CPADS**. After changing this you may need to reboot.
* Since we are not using a router with DHCP, we will need to set the IP information manually. Open the Ethernet connection properties by clicking on the network icon in the lower right corner and “Open Network and Sharing Center”. In the left column select “Change adapter settings” and choose the appropriate LAN connection. If you don’t see any LAN connections here, then you probably didn’t install your LAN driver! In the dialog that appears choose Properties, select Internet Protocol Version 4 (TCP/IP) and click Properties. Set the following information (where ## should be replaced by your computer's number) and close the dialog box.
* IP Address: 192.168.10.1##
* Subnet mask: 255.255.255.0
* Default gateway: 192.168.10.1
* Your computer is now setup to connect to the simple CPADS network. Inform your instructor that you’re ready and you will be provided with an Ethernet cable that you will use to complete the next few steps.
* Open a command prompt (All Programs → Accessories → Command Prompt) and ping 192.168.10.254 noting the following information (which will indicate that you have made a good cable).

Approximate round trip times in milli-seconds:

Minimum = \_\_\_\_\_\_\_\_\_ms, Maximum = \_\_\_\_\_\_\_\_\_\_ms, Average = \_\_\_\_\_\_\_\_\_\_\_ms

* Ping [www.google.com](http://www.google.com/) and write down the following information.

Approximate round trip times in milli-seconds:

Minimum = \_\_\_\_\_\_\_\_\_ms, Maximum = \_\_\_\_\_\_\_\_\_\_ms, Average = \_\_\_\_\_\_\_\_\_\_\_ms

Why are these values different than the first ones (consider what your computer is connected to)?

**3. Throughput Measurement**

We will now perform a very crude measurement of the network card's speed.

* Open Task Manager (Ctrl-Alt-Del) and select the Networking tab. Find the LAN connection and note the link speed.

Link Speed: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This gives the *theoretical* maximum transfer rate.

* Locate the CPADS shared directory on **ASUS-3D** (using My Network Places). If you are not able to find the **ASUS-3D** computer, *check your workgroup setting*. Use the login information:

Login: **cpads-guest**

Password: **cpads**

* With the Task Manager open, drag and drop the file from that directory onto your desktop and using the graph approximate the *average* percentage throughput obtained (cancel the transfer before it completes).

Filename: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Approximate Network Utilization %: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Using the above information and the theoretical maximum speed, compute the *actual* achieved speed in MB/s (note the system gives Mb/s)

Achieved Throughput (MB/s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Compare the theoretical and actual throughputs. Why do you think they are drastically different, i.e. why does the network not achieve nearly what it is capable of? Hint: Consider where the data is coming from, i.e. are there any limitations from the *server*?