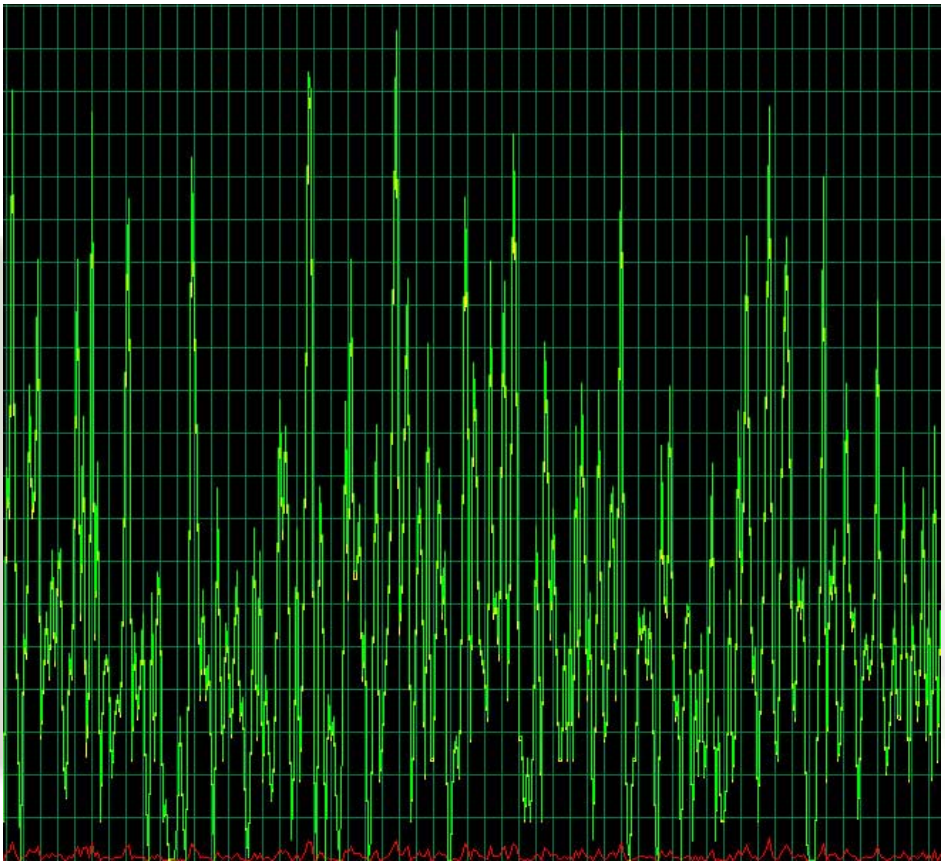
4.1.1

BANDWIDTH MONITORING

(Windows XP)



June 2008

Objective

At the end of this lab students will be able to monitor network bandwidth using built in Windows XP network monitoring, and bandwidth monitor.

Information for Laboratory

A. Students will utilize Windows XP network monitor
B. Students will utilize Bandwidth Meter

Student Preparation

The student will have completed requisite reading. The student will require paper for notes and should be prepared to discuss the exercises upon completion.

Instructor Preparation

Before class, the instructor or a lab assistant will ensure that each student has access to a Windows XP computer. Students should also have access to the Internet. Bandwidth meter should be installed and working on each student workstation. Setup a web site, ftp site, or a shared folder on your local network, in which the students have access to download large files at full 10 or 100 Mbps.

Estimated Completion Time

60 Minutes

Bandwidth in computer networking refers to the data rate supported by a network connection or interface. One most commonly expresses bandwidth in terms of bits per second (bps). Bandwidth represents the capacity of the connection, basically it's the size of your pipe to the network. The greater the capacity or size of the pipe, the more likely that greater performance will follow. The larger the pipe, the more water (data) can travel through it.

Some Examples: A V.90 modem supports a maximum bandwidth of 56 Kbps. T1 line supports a maximum bandwidth of 1.544 Mbps. Fast Ethernet (100baseT) supports a maximum bandwidth of 100 Mbps.

Bandwidth monitoring has several different advantages. It can be used to verify your Internet connection speeds, identify network bandwidth bottlenecks, enable you to capture bandwidth measurements for trend analysis to proactively prepare for system expansion, identify spikes caused by illegal or unauthorized usage from within or outside your network so you can proactively eliminate it.

Windows XP network monitor

Windows now comes with a network monitor. It will monitor and graph all network connections on the local computer, from a dialup to gigabit LAN connections.

Monitoring bandwidth using Windows XP

Step 1: Starting network traffic

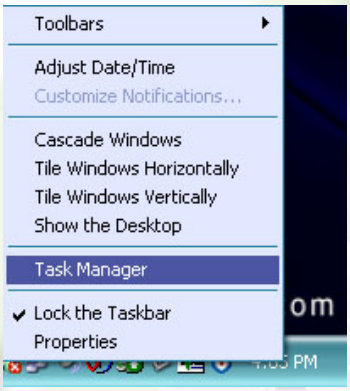
In order to get results from our monitor, we need to have some network traffic. Start a file download over the Internet that will last a few minutes.

A good example is the AVG Antivirus Free Software. It's file size is 47 MB, so it will take a while to download depending on your available bandwidth, giving us time to monitor and analyze the bandwidth used.

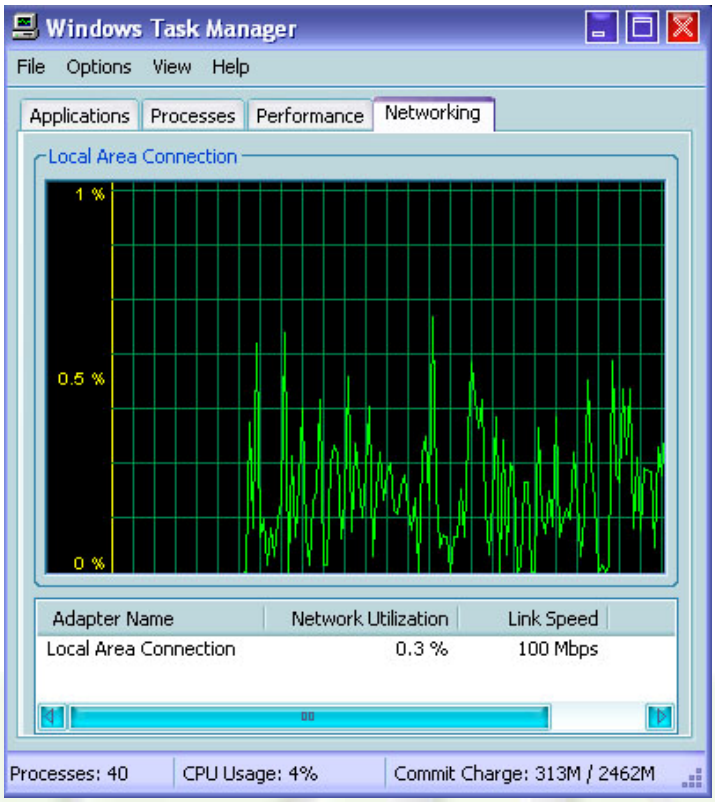
http://www.download.com/AVG-Anti-Virus-Free-Edition/3000-2239_4-10320142.html?cdlPid=10834624

Step 2: Monitoring with Task Manager

Once the download has started, right click on the task bar and click Task Manager



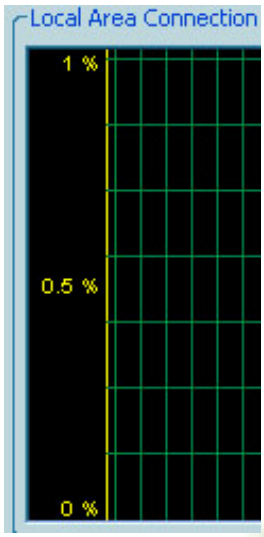
When the Task Manager opens, click on the Networking tab at the top.



You should notice at least one Adapter listed under Adapter Name at the bottom. Most likely it will be named Local Area Connection.

While the download is running, you will notice that the graph shows your current network bandwidth usage. The Task Manager, will list the current Link Speed of the installed network card. Notice above, the NIC used in this example is running at 100Mbps. Since the download in this example is currently running around 30 kbps, it shows as only 0.3% Network Utilization.

Notice that the graph only goes up to x%. The x means the graph automatically resizes depending on the amount of network traffic it has to report on.

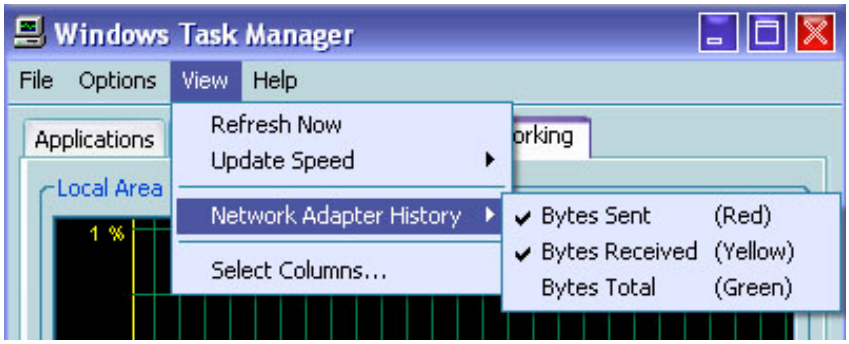


Step 3: Adjusting default settings for better performance

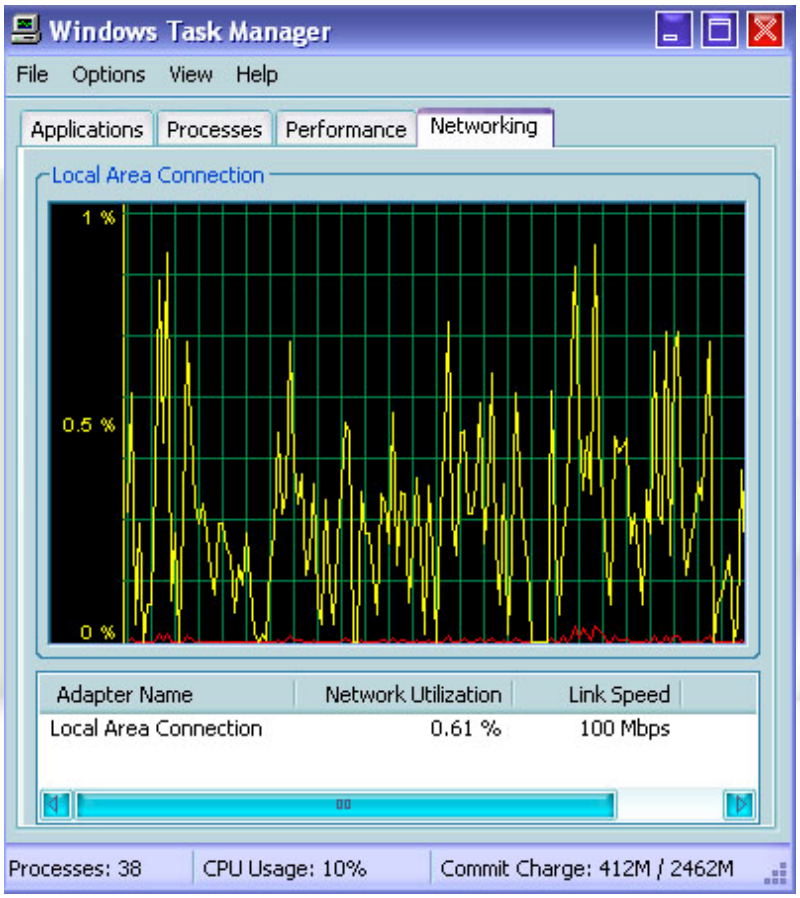
There are some options we can set to get better results from the network monitor.

From Task Manager, Networking, Click on View, Update Speed, and set it to High, as below.

Notice that the graph data moves faster. Next, from View, then Network Adapter History, Change the settings to only show Bytes Sent and Bytes Received.

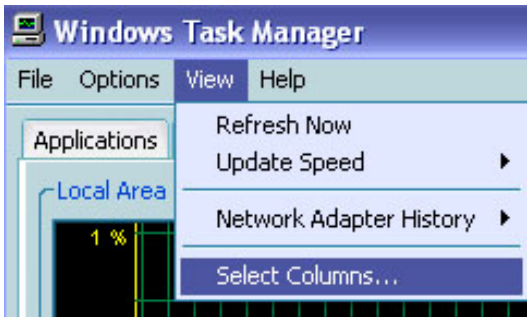


Notice that the look of the graph has changed. The Yellow line indicates bytes received, and Red indicates bytes sent.

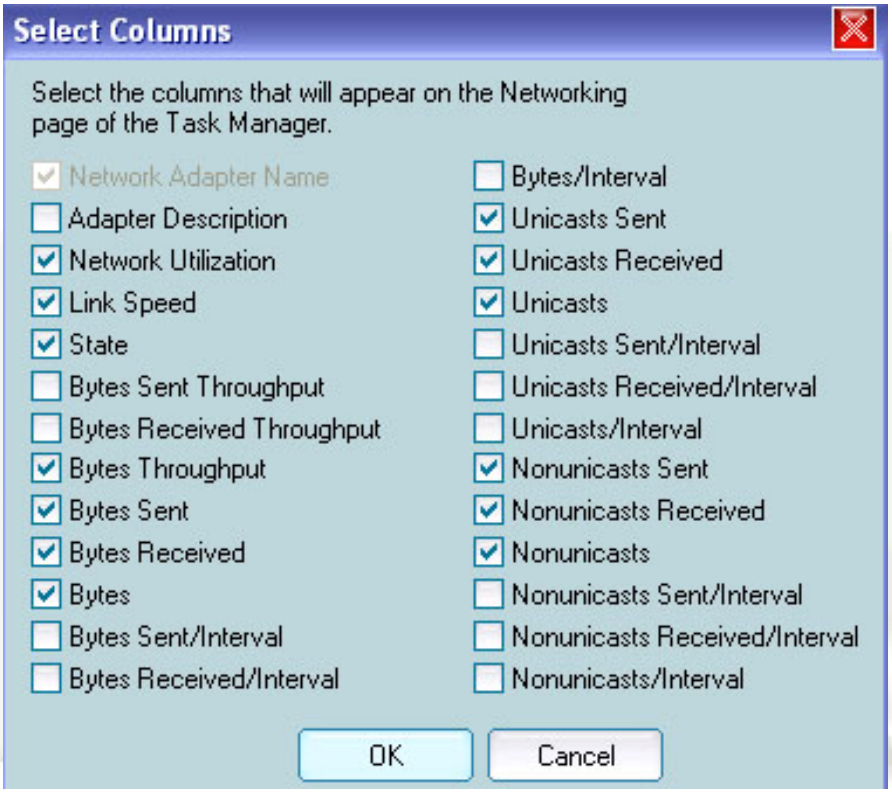


Take a screen shot of this and save to a Word Document. Make sure you put your name within the document.

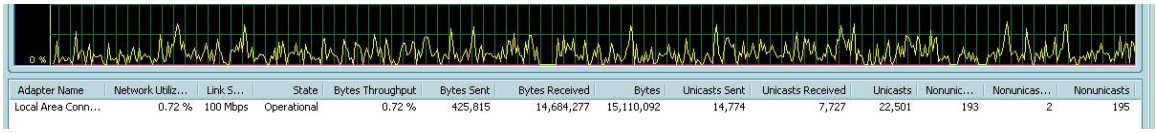
We can tune Task Manager to show us even more specific network statistical data. From View, click Select Columns.



Check the boxes off as below, and Click OK when done

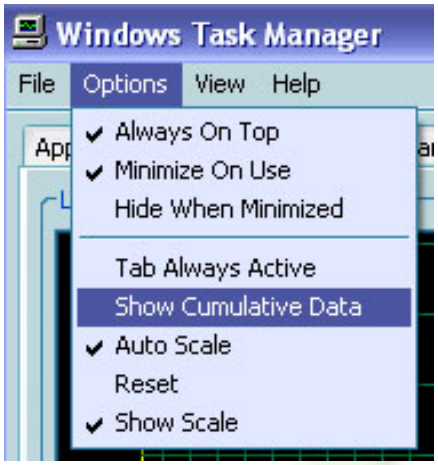


Notice the additional columns on the Task Manager.



Note the data in the bytes Received Column. Close the task manager, and open it back up. The data should be cleared, and starting from 0. If you want to see your cumulative data, Click Options, and check Show Cumulative Data. Now check

your data again, it should reflect your total bytes received since the computer was first turned on.

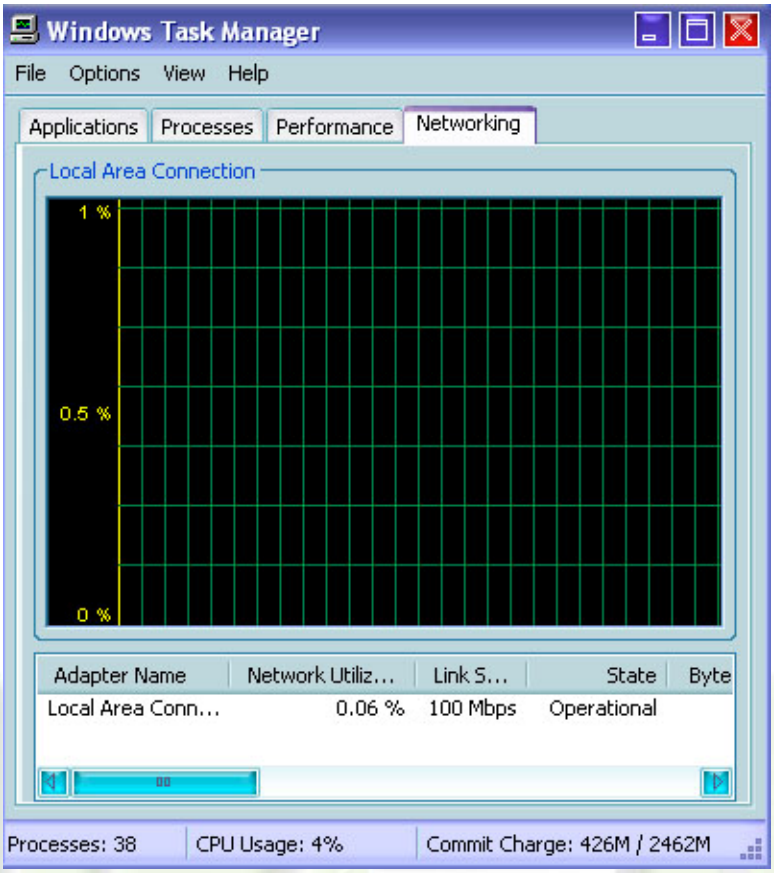


Step 4: Understanding the output

Since we have had a download running the whole time, we should see network traffic. The amount of available bandwidth limits our speed. Most Internet connections are less than 1 Mbps, and our network card in the example is 100 Mbps. This explains why a 30 kbps only shows up as .3% utilization.

Now we want to stop the download, and close all running programs. Open Task Manager, Click on the Applications tab, and make sure it is empty, that there are no open applications running.

Since there are no applications running, there should be no network utilization. Open Task Manager, Networking, and check the data. Is it what you would expect?



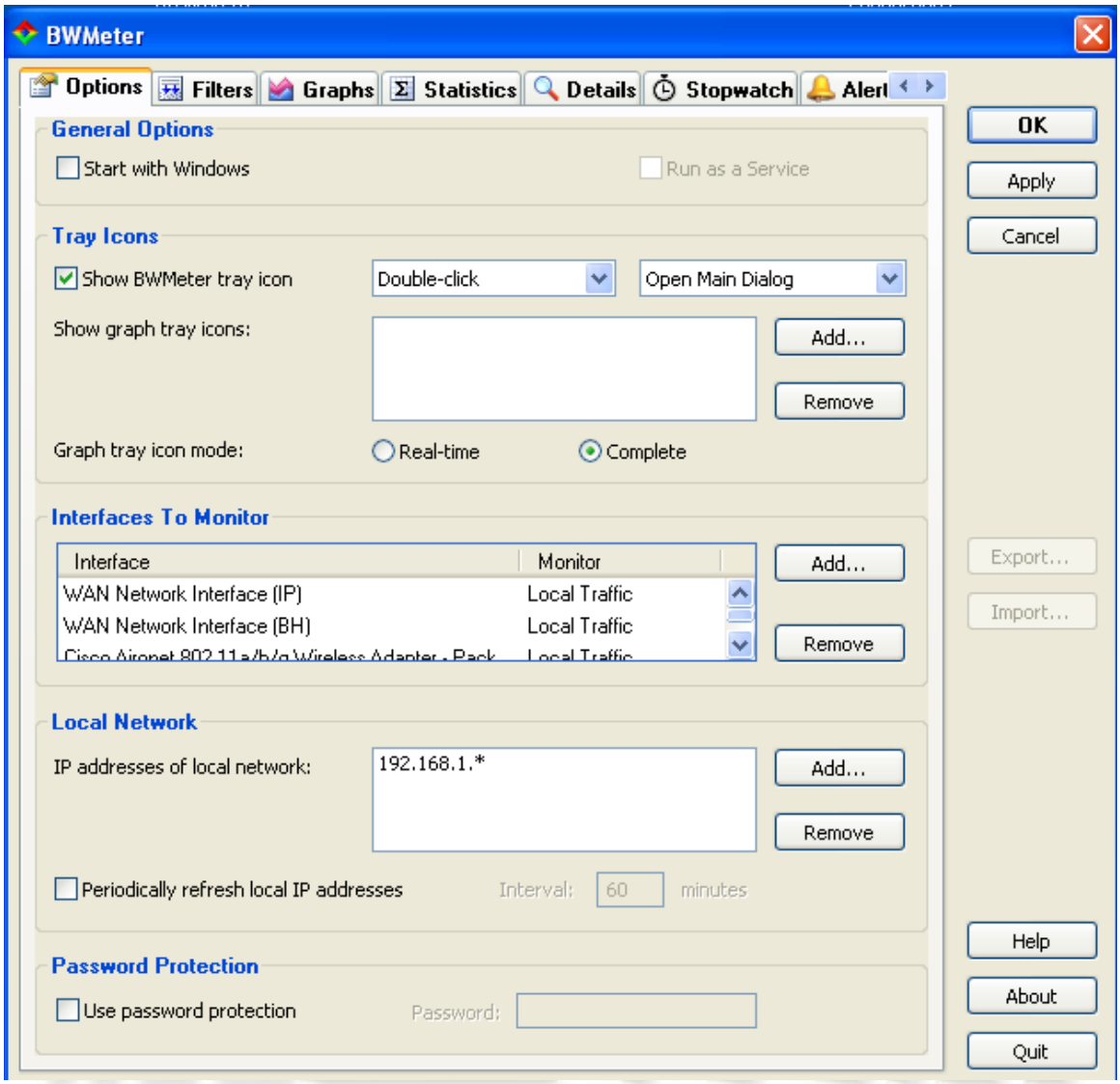
As you can see from the example above, The Network Utilization is only at 0.06%. Since Ethernet is a Multi-access broadcast type of network, there will be some network traffic by just being plugged into the network.

Monitoring bandwidth using Bandwidth Meter

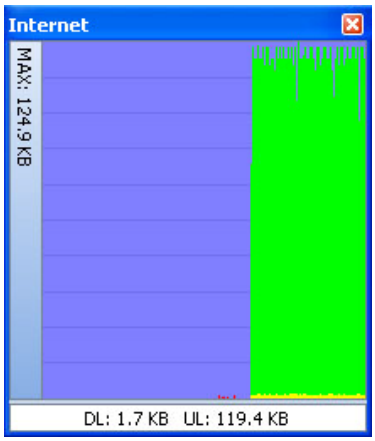
Step 7: Configuring Bandwidth Meter for your Internet connection

Launch Bandwidth Meter from START, All Programs, BWMeter, BWMeter.

Bandwidth meter will start with default settings.



Start the Internet Download again to generate some network traffic to monitor.

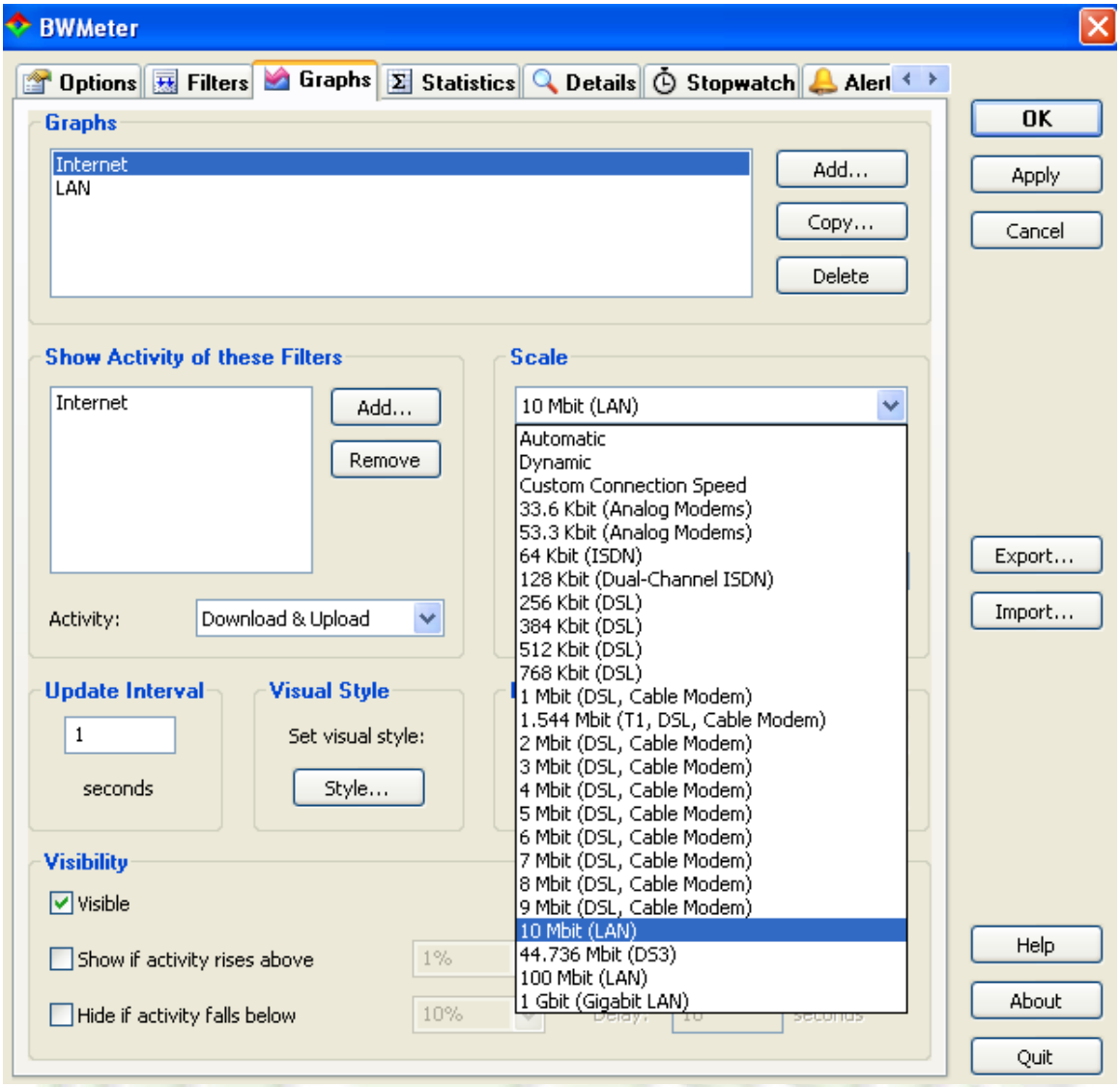


Bandwidth meter automatically starts to graph and monitor network traffic, as show above.

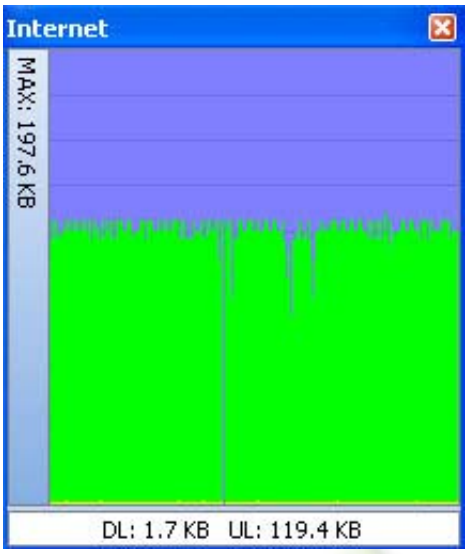
The Internet bandwidth graph from Bandwidth meter, is configured to automatically resize depending on how much bandwidth is used.

From the Taskbar, double click on the BWMeter icon.

To configure, go to the Graphs tab on the Bandwidth meter Options page. Select the Internet graph from the Graphs box, and make sure that Visible is checked. Next, configure the Scale of the graph to better represent your current Internet connection. Choose your Internet connection speed, **ask your Instructor what you should pick.** For this example, We are using a T1 1.544 Mbit Internet connection. When done, Click OK in the top right corner.



Your Internet bandwith graph should have changed as below.



As you can see from above, we are only using 119.4 Kb of the total possible 197.6 KB for the T1 1.544 Mbit Internet connection, and now our graph shows a much better representation of the data.

Do a print screen of your Internet Meter and save to the same word document as you used before. Print off for your instructor.

Close Bandwidth meter.

Extra Practice

Your Instructor or lab assistant has setup a web site, ftp, or a shared folder for you to download from on the local network. Check with them for instructions on how to connect. Copy a file from the local server that is also running at 100 Mbps. Monitor the used bandwidth with both Windows XP Network monitor, and Bandwidth meter. Compare the 100 Mbps to 100 Mbps file copy vs. the Internet download.

Step 6: Analysis

1) For which applications is Bandwidth monitoring best suited?

2) After working with Task Manager, what about bandwidth monitoring do you feel you should study further? Why?

3) Why should you monitor your bandwidth?

4) What could it mean if no applications are running, but your 100 Mbps network connection is at a utilization rate of say 5% or higher?

Summary Discussion

A classroom discussion should follow the lab. Review the lab questions and your analyses as a group. Share your experiences and knowledge with the class.

Appendix:

This lab was developed using Windows XP Professional operating system utilities, which are included with XP.

The OS environment for this lab was Windows XP Professional, Version 2002, Service Pack 2 (8/04).

Bandwidth Meter can be downloaded from
http://www.desksoft.com/BWMeter_Download.htm