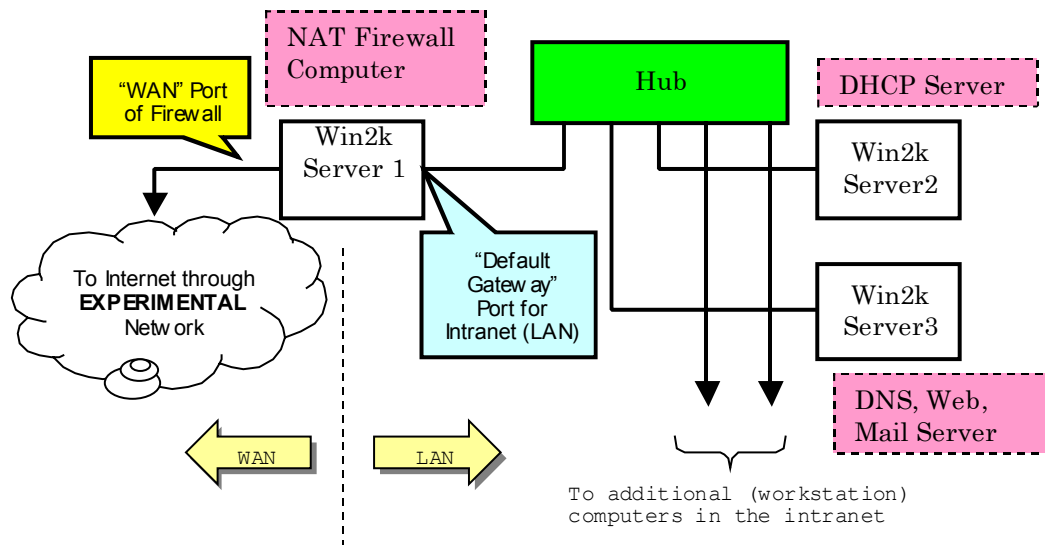


CET442 Lab #1

Windows 2000 Server and Workstation Installation

Introduction:

In CET442L you'll be designing and constructing a complete network for a small business. When you've finished all the labs in this course, your group's network will be similar to the one shown in Figure 1.



Parts of a Corporate Network

The network of Figure 1 consists of a *firewall*, *hub*, and various *server computers*. Also, notice that the network is physically divided into two parts, the *WAN* (Wide Area Network) and *LAN* (Local Area Network) portions by the firewall. Let's examine what each of these components do.

Firewall. The Internet is not a very friendly place. In fact, there is a small but significant faction of Internet users who invade the computer systems of others. Some of these people do it for personal gain (to gain private information, such as credit card numbers), or for the thrill they get from "cracking a system." The firewall's job is to keep these interlopers out of your local area network (LAN) while still allowing LAN computers to access the Internet. In simplest terms, the firewall permits outgoing traffic but blocks unauthorized inbound packets from reaching the LAN. The firewall employs network address translation to convert the internal IP addresses used in the LAN to one or more routable (public) IP addresses; this conserves public IP addresses (they're running out), and hides the internal architecture of your LAN from prying eyes.

TIP: The firewall computer requires two NIC (network interface) cards. The computers at the north end of the bench have two NICs installed for this purpose.

Hub. The hub is the central relay point for any connections within the LAN. It is merely a repeater of traffic "frames" between devices on the LAN portion of the network. Your bench may be equipped with a *switch* instead of a hub. It still performs the same purpose. A switch is more efficient since it filters traffic; only the correct destination computer on the LAN gets the message, whereas a hub repeats all messages to all devices.

Server Computers. Server computers provide services needed to make the LAN operate. Up to now, you may have taken these services for granted; however, they're quite necessary. During the course of the term you'll be adding the following services:

- DHCP. This is *dynamic host configuration protocol*. It tells workstation computers what IP address to use, where to find DNS, where to send Internet-bound packets, plus other important information. Without DHCP, every workstation has to be manually configured for TCP/IP, which is bothersome and error-prone. (Please note that the *server* computers on a LAN *never* use DHCP to obtain IP addresses. Server computers use static IP addresses. Server IP addresses never change.)
- DNS. This is the *domain name system*. DNS lets you refer to a computer by a logical name such as "mike.cet442.com" instead of a raw IP address such as 10.0.1.7. The workstations (and servers) on your LAN will need DNS services to find hosts on the Internet. In addition, the Internet needs *your* DNS service to resolve authorized hosts within your *domain* (logical subnetwork).
- Web. The web service provides a storefront for the business. It is how the outside world normally sees the company. A web server provides web pages for one or more web sites by use of the HTTP (hyper-text transfer protocol). Both Internet and Intranet sites can be supported by the same web server.
- Mail. A mail server transfers electronic mail (e-mail) in and out of the domain. It provides a place for incoming mail to rest until an individual retrieves it, and it also acts as a post office for delivery of messages to other places on the Internet.

These are the basic parts of a network for a small business. Keep Figure 1 in mind as you work on the labs this term; it will help you understand how all the pieces fit together.

Procedure:

The electronics/LAN lab computers feature removable hard drives. For your class, a number of hard drives have been reserved in the stockroom. You may find an installable software image on these drives, or nothing at all (more likely).

If there's no image on the hard drive, use a Windows 2000 (or later) Server installation CD. This CD may be marked "Advanced Server." This will allow you to install the operating system onto an empty hard disk. The lab *may* supply you with an empty hard disk.

1. Make sure your group is sharing one hub or switch, and that this hub is disconnected from the DeVry academic network. (To disconnect from the academic network, remove the jumper between the hub and the network feedpoint at the end of the bench. The jumper should be red or yellow in color and will be plugged into a socket at the far right on the front panel of the switch or hub.)

TIP: In Step 1 you are creating an isolated LAN (local area network) for your group. No other computers except for your group members' machines will be visible. There will be no Internet connection in this experiment, since your firewall computer will not yet be functional. (Refer to Figure 1).

2. Check out a hard drive from the stockroom. Write down the following information:

The number on the drive.

The type of machine it is installed in, and the bench location of this machine.

Warning: Even though they may look similar, the machines in the lab are not identical. If you install your hard drive into a different machine, your installation may be invalid. It may not boot properly. Or worse, it may corrupt what you've built. You could lose your work!

3. Obtain the installation serial codes you will need to install the various software products.

Write these numbers down. You'll need them during the installation process. No printing will be possible at this point because no network services are running under DOS.

If you received blank hard drives, just use the installation CDs provided by the lab. The serial numbers will be on the CDs.

4. **Disconnect the ethernet cable from the computer.** This will prevent any interference from the "outside world" during the installation and configuration process.
5. Execute the file "WINNT.EXE" in the folder "C:\2000SVR\I386" to launch the Windows 2000 Server installer. The following is a brief summary of the events and actions:

- Windows will prompt for the directory to install from. Press ENTER.
- Setup will copy files as needed. This will take 10-15 minutes.
- Setup will restart the computer. When the computer boots, choose "Setup Windows 2000" from the options.
- Install Windows 2000 Server on drive E:
- Tell the installer to convert the partition to NTFS
- The installer will copy the operating system files. This will take 5-15 minutes.
- Setup will restart the computer again. Choose "Advanced Server" from the options list.
- The Windows GUI will launch, and you'll see the server converting the file system on E: to NTFS at this time.
- The Setup Wizard will start and search for (and install) system devices. You may need to manually configure some devices; drivers for devices are in the C:\ partition of the disk.
- Set locale to United States (US)
- Enter your name and the product key code you copied in step 2.
- Set the license mode to "PER SERVER" and maximum connections to 10.
- Set the administrator password to "eet475" (all lower case)

Step 5, continued:

- Windows will prompt for installable components. You will want the following:

IIS - Make sure FTP and WWW services are selected

Management Tools - Make sure this option is selected

Networking Services - You will need DHCP, DNS, WINS, and TCP/IP

Other Network File and Printing - You need these to share files and printers

Terminal Services - You need this to support RAS (Remote Access Service)

- Set the time zone.
- For Terminal Services setup mode, choose "Remote Administration Mode."
- Choose "Custom Networking Settings"
- Under TCP/IP in "Networking Components," manually set the IP address of the machine to 10.0.1.x where x is a unique host address in your group (1,2,3,4, . . .). Set the subnet mask to 255.255.255.0. Leave the DNS address blank.
NOTE: All groups will have the same internal IP addresses. This is perfectly legal since these are unroutable IP addresses behind firewalls.
- The computer is not in a domain. Set the workgroup name to CET442L.
- Reconnect the ethernet cable.
- Windows will install the components and reboot; this takes several minutes.

6. You may need to install specific device drivers for your machine; if so, check the crib for the installation CD (if needed). For the Gateway E-4100 PCs, you'll need to update the video and network adaptor drivers.

7. You should now be able to log into the server as Administrator. Also, network services should be running. You should be able to ping other machines within your group's LAN.

You will *not* be able to browse the web or ping any hosts on the Internet. Your LAN isn't yet connected to the outside world!

8. Build at least two servers and two Windows 2000 workstations. Use static IP addresses for all the units as described above in Step 5.

9. Study the online documentation for the Experimental Network. You can find this at:

<http://web1.kc.devry.edu/lab-tech> (choose the "tech labs, experimental network" links from this page).

Learn what portion of the experimental network is available to you; in particular, you'll need the following information in later experiments:

E-NET Subnet: _____ Subnet Mask: _____

E-NET Default Gateway (Router) IP address: _____

Submit this information with your first lab report.

The WAN interface of your firewall device (Windows Server or Cisco Router, depending on how you build your company's LAN) will be using the E-NET as the connection to the open Internet. It is very important to have the above information correctly understood and configured so that your network has Internet connectivity!

Writing the First Laboratory Report

Your group should submit one written report documenting what you've accomplished in this experiment. Your network has had a very simple beginning, and it is sure to grow as you add functionality in successive experiments. Here's what should be in the first report (the course syllabus also gives this same information):

- Cover page. Be sure your **domain name** and all group members (and their roles) are named. **You must choose a domain name that is not registered on the open Internet.**
- Inventory. Show what equipment was used to build the experimental setup, and how it was connected. This section is important; you are building a plan for your network. With accurate information in this section, you will be easily able to "rebuild" the network for subsequent experiments. Make sure to give the model number and serial number of each piece of equipment, along with its physical location (such as a bench station number). Also show the port numbers where each cable is connected. (If you're using the bench hub-to-workstation wiring, that's fine; just verify which switch or hub ports you're accessing).
- Summary of activity. Explains clearly the following:
 - a) List of goals that were to be achieved (Usually clear from the lab manual introduction of the topic)
 - b) Network diagram showing how the components are configured in the experiment. You may reference the information in the inventory if it is sufficiently detailed.
 - c) A detailed description of what procedures were performed to achieve the goals (including any problems encountered, and solutions to same.) Include any necessary data (such as screen captures) that supports your discussion.
- Experimental Network information learned in Step 9.
- Conclusion. A conclusion is an extrapolation based on the recorded data from the experiment. What do the data tell you?

All the members of your team must contribute to the written report.

What you've done in the first experiment seems simple, but in reality you're laying the groundwork for much bigger things. Your humble local area network is now alive. Feed it often and carefully!