Acknowledgements

I would like to personally thank the owners of Paragon Salons Inc., Steve and Debbie Celek, for their patience and willingness to work with me to create this project. I would also like to thank Professor Sanyal for the help and support throughout the project.

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Abstract

Paragon Salons Inc. is a Cincinnati company that specializes in salon and spa treatment of the highest quality. Paragon was started in 1982 in Western Hills. Since the opening, the owners have opened two other locations; 1) the Carew Tower downtown and 2) Montgomery. Data communication between the three locations does not exist. The owners are looking for a solution to share data and communicate between the three locations. The solution to solve this problem was to take the current network infrastructure and redesign it to allow for scalability and functionality. An Active Directory network was put into place at each location to provide this functionality, and a secure virtual private tunnel was created between each site pair to allow for communication and data sharing. The server was also configured for remote access to allow for administration and the ability to work from home. The network rebuild gives Paragon Salons the ability to communicate between locations and is scalable to meet their growing needs.

Paragon Salons Inc. Wide Area Network Upgrade

1. Problem Statement

1.1 Definition of the Need

Paragon Salons Inc. is a Cincinnati company that specializes in salon and spa treatment of the highest quality. Paragon was started in 1982 in Western Hills. Since the opening, the owners have opened two other locations; 1) the Carew Tower downtown and 2) Montgomery. Data communication among the three locations does not exist. The owners are looking for a solution to share data and communicate among the three locations.

The owners of the salon would like to install a system that allows each location to connect to the other locations so managers can run daily reports and have the ability to share information between locations. They would like a secure but functional network that allows users to be managed from one location and also have the ability to control user accessibility. The current networks are entirely Microsoft based and will remain that way. The owners would like to upgrade all the operating systems to a common platform. The network backbone will have to be upgraded. It is outdated and limits the functionality of the network. A diagram of the three salon's original network setup is shown in Appendix A.

The salon runs a program called Salon Management Software (SMS). The current version the salons are using is SMSv4. SMS is located on the server and all the client machines connect to the server to run the software. The software stores information such as payroll, client appointments, inventory, and other information. This software will have to be maintained, but secured so only users of the Paragon network can gain access.

It is imperative that SMS continues to run in the new environment. The salon's day-to-day operations demand SMS to be up and running.

1.2 Description of the Solution

The solution to remedy Paragon Salons current network problems is to provide the company with an upgraded network. The network will be designed with the least amount of change for the end users. Minimal training on the new system will be necessary. The network will provide a secure and stable working environment for users to do their daily tasks with limited interference. The solution will solve all problems that exist on the current network.

The new network will bring all workstation systems to one common platform and all server systems to the same version. Any workstation hardware that is outdated will be replaced with newer hardware. All old networking equipment will be replaced with faster, more reliable equipment. A secure work environment will be established. The network will also provide users with a single sign on so they can switch from machine to machine without having to remember the local account password for each machine. Each salon will also have the ability to communicate with each of the other locations. Finally, the network will provide administration the ability to remotely connect and gain access to resources.

The remote administration will provide the owner of the company, or an administrator the ability to make changes that are necessary from any location. This will provide faster response time to problems and the ability to manage all three networks from one location. The remote connection will also allow for managers and the owner to run reports or see daily information from any one location.

1. 3 User Profiles

There will be three different user profiles for this network.

1.3.1 SMS Users

An SMS user is an employee using the network to run SMS. They will be using the workstations for scheduling appointments, cashing out customers, checking clients in, and updating inventory. The user can print out bills, gift certificates, and any other items that they need. These users will be limited in what they can do on the machines. Of all the groups, their accounts will be locked down the tightest. They will not have the ability to install software or change any settings on the workstations.

1.3.2 Managers

A manager needs access to other programs apart from SMS. They will have the ability to use any Office product on the machine to produce necessary documents needed. Managers will have Internet access for research and other operations. They will be able to VPN into the network from remote locations. The managers will also have the ability to manage printers on the machines.

1.3.3 Administrator

The administrator will be overseeing the network. He/she will be adding users for new employees, editing old accounts with new information, and deleting accounts of former employees. This group will maintain all machines/printers. They will also delegate power to the users that need abilities other than what was specified above. The administrators will install and maintain all software\hardware on the workstations/server. They will also be in charge of fixing any problem that occurs on the network. The owner of the company will have the privileges of this profile.

2. Design Protocols

2.1 Organizational Scheme

Paragon Salon's network will be broken down into four major parts: 1) Western Hills LAN, 2) Montgomery LAN, 3) Downtown LAN and 4) WAN. The Local area network at all three locations will have the ability to run independently. The fourth part of the network will be the Wide Area Network (WAN) connection between each location. The four parts will become the final network after each is completed. Each local area network will contain a domain controller capable of distributing IP address, maintaining DNS services, and allowing users to login to the workstations. The WAN links between the salon locations will allow for replication of user accounts or shared directories to be updated. The WAN will be created by using VPN connections from location to location. If the WAN link were to go down for any reason, each salon location will still be able to function independently. The user account information will be stored in Active Directory. Managers will have the ability to log into the network remotely (this will give them the opportunity to get work done if they are sick or from another location).

2.2 Western Hills Protocols

The network at the Western Hills location will be designed using a star topology. The cabling used is cat5 cable, which is already in place. The network switches will be replaced with three new 10/100Mbps switches, creating a faster, more efficient backbone to the network. This location is already equipped with a high-speed Internet connection, and will only require the router/firewall to be reconfigured with the new settings. The firewall will be responsible for performing Network Address Translation (NAT), for the

ability to have multiple connections to the Internet using one outside IP address. This keeps the entire internal IP address space private. The firewall has a built in stateful packet firewall and will be enabled to prevent unwanted attacks from the outside accessing the network. To create a VPN link between Downtown and Montgomery to this location, site-to-site VPN tunnels on the router will be used to allow for secure communication between locations.

There are five workstations at this location that need their operating systems upgraded to Windows XP Professional. The workstations that are currently running Windows XP will be patched with security updates and vulnerability patches. The server will have a new SCSI controller and Network Interface Card (NIC) installed that are compatible with Windows Server 2003. The server operating system will be upgraded to Windows Server 2003 Standard Edition, which will provide a secure server with the built in functionality that the network needs. The server will also be updated with patches and service packs after installation to remove any vulnerability in the operating system. The final thing to be installed on the server will be Norton Antivirus 10.0. This antivirus suite will allow the ability to remotely install the software from the server to any machine on the network. Norton gives the administrator the ability to setup scheduled times for all computers on the network to update the virus definition files and to run scans on the local drives.

The server will provide services such as DHCP, DNS, and RAS. The server will also be a fileserver for SMS. Dynamic Host Configuration Protocol (DHCP) will be enabled to allow for the distribution of IP addresses to workstations. Domain Name System (DNS) will provide the ability to translate computer names to IP addresses,

allowing for easier accessibility to network resources. Remote Access Service (RAS) will be installed for users to connect to the network from remote locations. The fileserver will be setup to allow all users to connect to the SMS files for the daily salon operations. The server will also be a domain controller, housing all users and other resource information. This will allow for single-sign-on to any machine using the same logon credentials, and the ability to control what the users can do. Figure 1 on the next page shows the network topology of the Western Hills location.

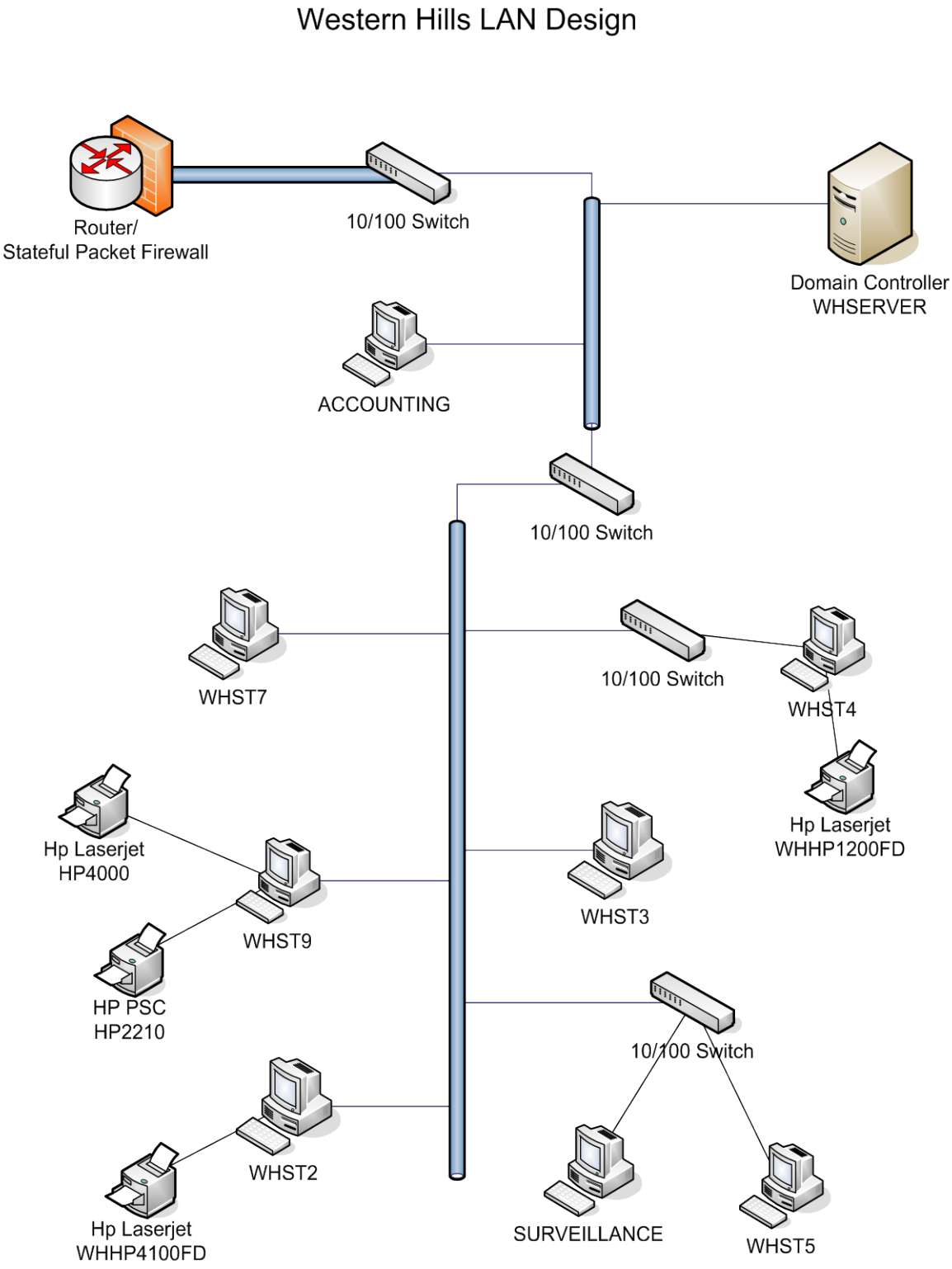

Figure 1: Western Hills LAN Design

2.3 Montgomery Protocols

The Montgomery network will be designed using a star topology. The cable at this location is cat5. It is capable of supporting up to 100Mbps speeds of data transfer rates. One cable of cat5 cable will be dropped for the high-speed internet connection from the phone block to the office that contains the firewall/router. Three new 10/100Mbps switches will be installed to the network backbone to replace outdated hubs. This will get the most out of the network bandwidth. A high speed internet connection will have to be purchased through Cincinnati Bell with a dedicated IP address to allow for Internet access. A Linksys firewall/router will be installed to provide NAT, a stateful packet firewall, and site-to-site VPN connections between the locations. A new workstation will be purchased to replace a workstation that does not support Windows XP Professional.

There are three workstations at this location that need their operating systems upgraded to Windows XP Professional. All other workstations will be updated and patched for vulnerabilities and security threats fixed by Microsoft. The server will have a new SCSI controller installed that is compatible with Windows Server 2003. The server will be upgraded to Windows Server 2003 Standard Edition and updated with all available patches and security updates. The server will have Norton Antivirus 10.0 installed to provide a virus protection suite. This allows the ability to remotely control when and how workstations run scans.

The server will have DHCP, DNS, and RAS configured on it. These services provide the server the ability to distribute IP addresses to client machines, resolve client machine names to the IP address, and allow for remote connections to the network. The

server will also be setup as a fileserver for SMS. This will allow all users of the network to connect to the SMS files to run the daily operations of the salon. The server will function as a domain controller to house all user and computer information for the network. This will provide a centralized location to manage resources, and allow for single-sign-on to the network. Figure 2 on the next page shows the network topology of the Montgomery location.

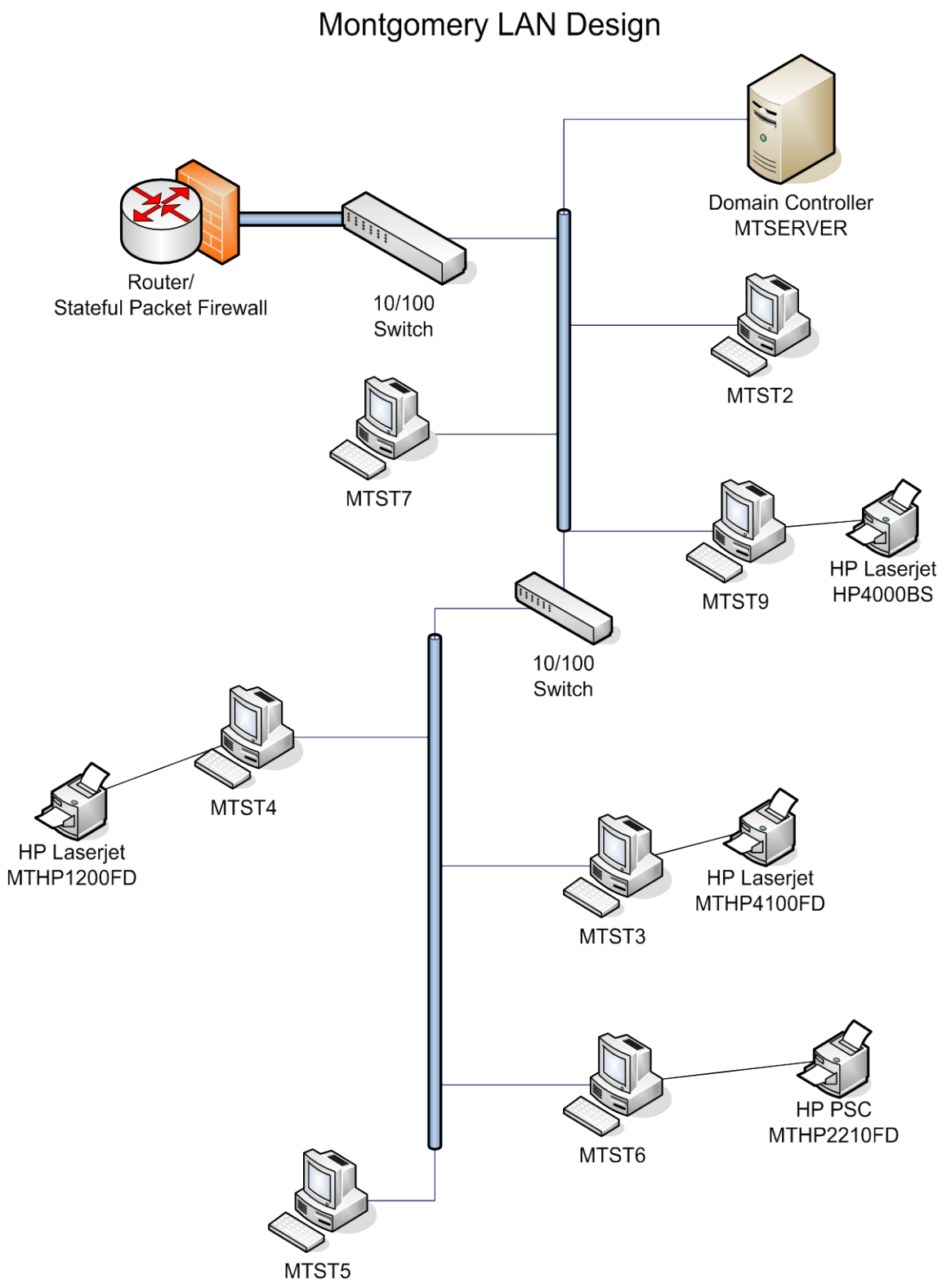

Figure 2: Montgomery LAN Design

2.4 Downtown Protocols

The Downtown location network will also be designed around a star topology. The cabling currently run is cat5 cable, capable of supporting data transfer speeds up to 100Mbps. A new 10/100Mbps switch will be installed to provide faster transfer rates and to use the bandwidth of the network more efficiently. Cincinnati Bell will install a high-speed internet connection with a dedicated IP address. A Linksys firewall/router will be installed to provide NAT, a stateful packet firewall, and site-to-site VPN links to the other salon locations.

Three of the workstations will be upgraded to Windows XP Professional. The other workstation will be updated to patch security holes and vulnerabilities in the operating system. The server will be upgraded to Windows Server 2003 Standard Edition, and updated with all available patches to create the most secure server possible. The server will also have Norton Antivirus 10.0 installed to provide a virus protection suite that allows for remote control of how the client machines virus protection is set up.

The server will provide DHCP, DNS, and RAS for the following functionality. DHCP will be used to distribute IP addresses to all client machines on the network. DNS will provide the ability to resolve computer names to IP addresses. RAS will allow for users to connect to the network from any remote location with a high speed internet connection. The server will also be set up as a fileserver for SMS. This will allow all users to access the SMS files that are needed for daily salon operations. The server will be promoted to a Domain Controller for a centralized location to manage resources, and to control the security of the resources. Figure 3 below shows the network topology of the Downtown location.

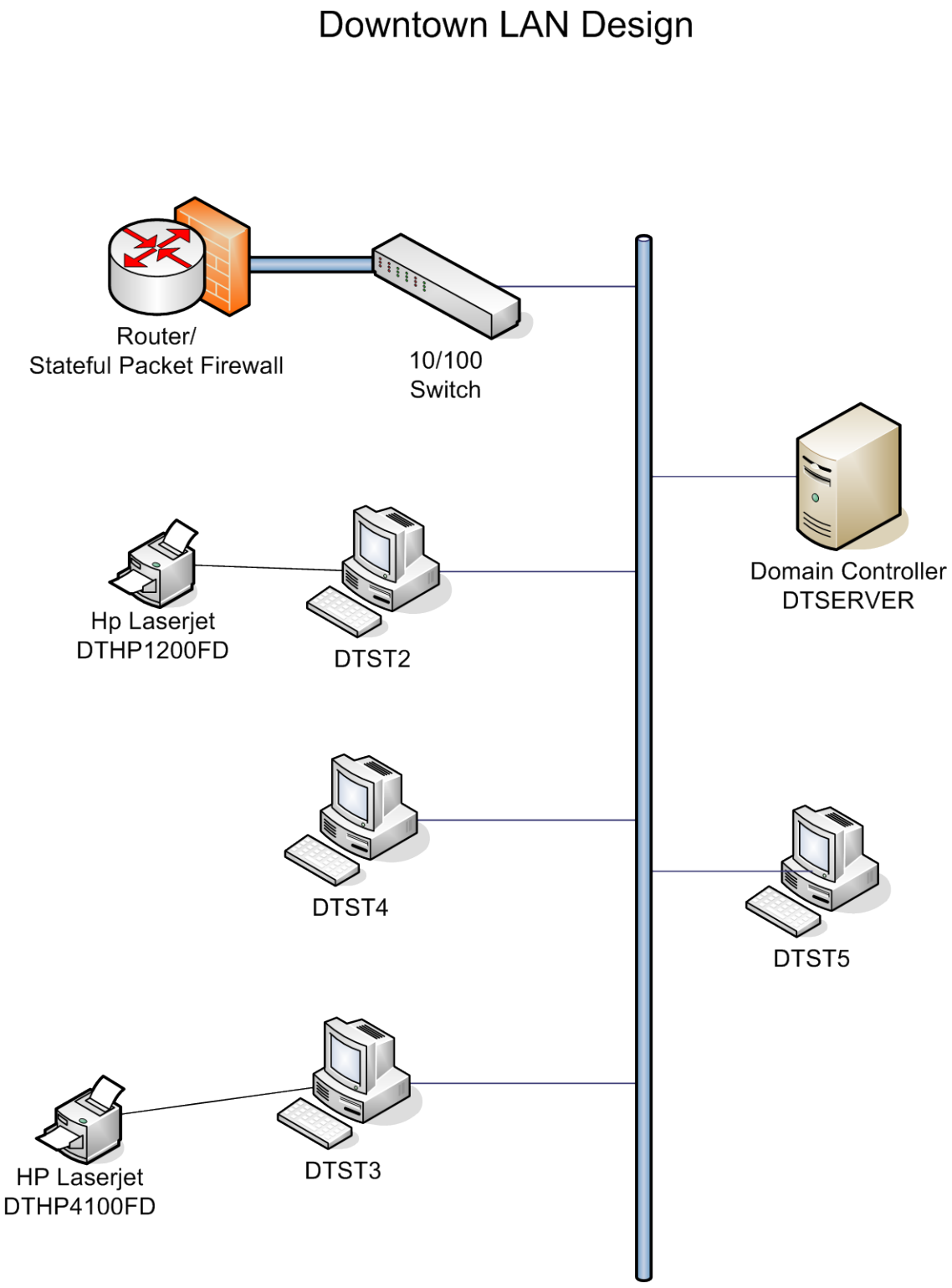

Figure 3: Downtown LAN Design

2.5 WAN Protocol

The WAN will be established through the site-to-site VPN connections on the routers at each location. Figure 4 below shows what the WAN will look like when all the VPN links are established.

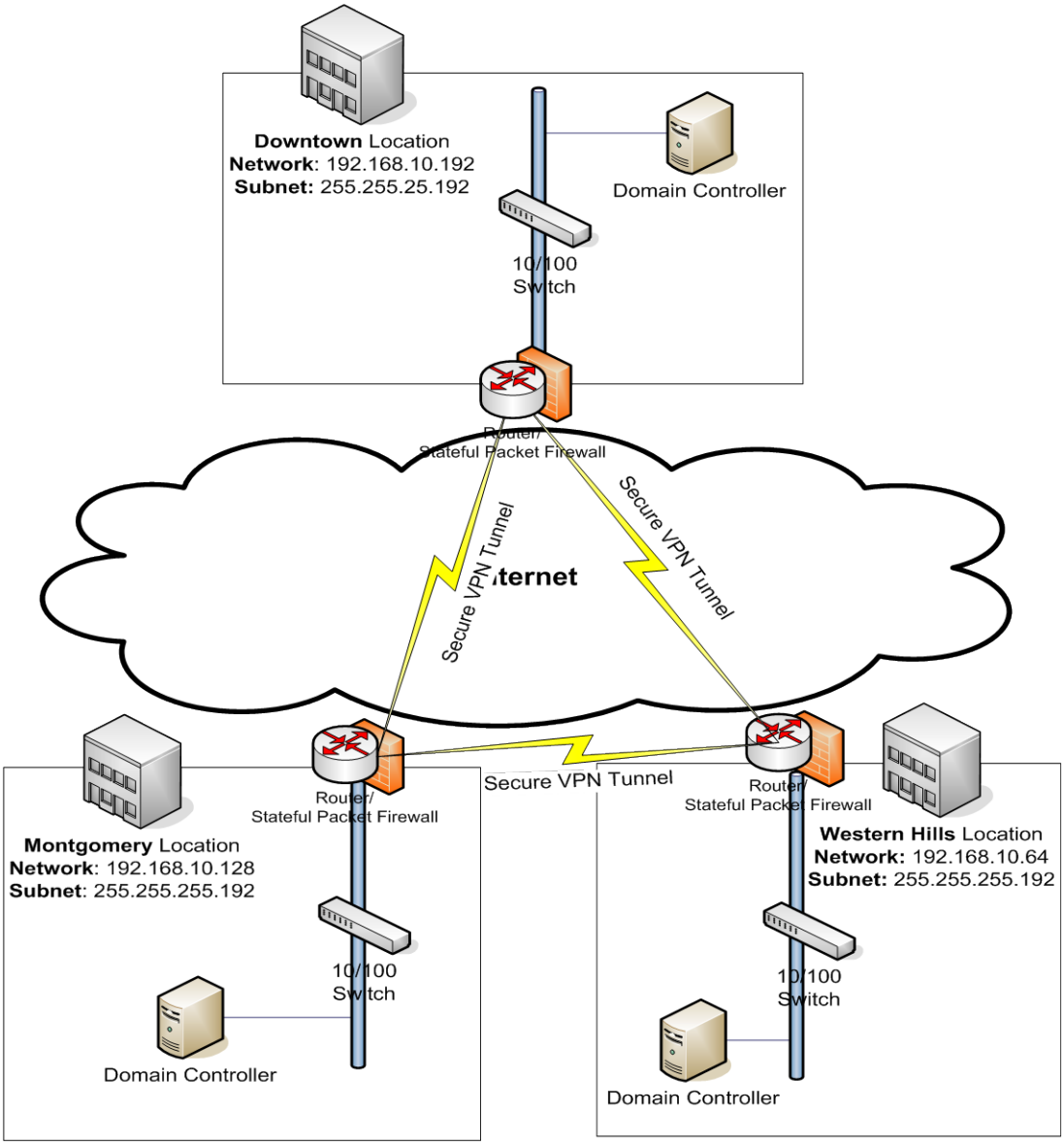

Figure 4: WAN diagram

3. Deliverables

To provide a secure but functional network for Paragon Salons, and give them the ability to share information between locations, the following deliverables will be implemented.

3.1 Wide Area Network

a. Inter-connect all three Salon locations with site-to-site VPN Connections

3.2 Western Hills

a. Software:
- Upgrade 5 workstation operating systems to Windows XP Pro
- Patch all existing Windows XP workstation operating systems
- Install Virus Protection Suite

b. Hardware:
- Install 3 10/100 Linksys switches
- Install SCSI controller and NIC in server

c. Server:
- Upgrade server operating system to 2003 Standard Edition
- DHCP
- DNS
- Remote Access Server
- Domain Controller
- Fileserver

d. Firewall:
- Enable Stateful Packet Firewall
- Enable Network Address Translation
- Create 2 site-to-site VPN connections to Downtown and Montgomery

e. Functionality:
- Join Paragon Domain
- Single-sign-on for users
- Group Policies defining what user groups can do
- Remote Access ability
- SMS File share for users to run daily business application
- Ability to share information between Montgomery and Downtown
- Provide a secure but functional network

3.3 Montgomery

a. Software:
- Upgrade 3 workstation operating systems to Windows XP Pro
- Patch all existing Windows XP workstation operating systems
- Install Virus Protection Suite

b. Hardware:
- Install 3 10/100 Linksys switches
- Install SCSI controller in server
- New workstation
- Install Router/Firewall

c. Server:
- Upgrade server operating system to 2003 Standard Edition
- DHCP
- DNS
- Remote Access Server
- Domain Controller
- Fileserver

d. Firewall:
- Enable Stateful Packet Firewall
- Enable Network Address Translation
- Create 2 site-to-site VPN connections to Downtown and Western Hills

e. Functionality:
- Join Paragon Domain
- Single-sign-on for users
- Group Policies defining what user groups can do
- Remote Access ability
- SMS File share for users to run daily business application
- Ability to share information between Downtown and Western Hills
- Provide a secure but functional network

3.4 Downtown

a. Software:
- Upgrade 3 workstation operating systems to Windows XP Pro
- Patch all existing Windows XP workstation operating systems
- Install Virus Protection Suite

b. Hardware:
- Install 1 10/100 Linksys switches
- Install Firewall/Router

c. Server:
- Upgrade server operating system to 2003 Standard Edition
- DHCP
- DNS
- Remote Access Server
- Domain Controller
- Fileserver

d. Firewall:
- Enable Stateful Packet Firewall
- Enable Network Address Translation
- Create 2 site-to-site VPN connections to Western Hills and Montgomery

e. Functionality:
- Join Paragon Domain
- Single-sign-on for users
- Group Policies defining what user groups can do
- Remote Access ability
- SMS File share for users to run daily business application
- Ability to share information between Montgomery and Western Hills
- Provide a secure but functional network

4. Design and Development

4.1 Project Schedule

The initial schedule called for the connection of the Western Hills and Downtown locations. The owner of the Company decided to upgrade the Montgomery location before the Downtown facility.

During the upgrading of the server at the Western Hills location, it was found that the SCSI controller and the NIC were not compatible with the OS. This glitch pushed the schedule back (1) week and a new timeline had to be established.

The Montgomery location took extra time to have the high speed internet connected. Scheduling was pushed back further due to the necessity of high speed internet to join Montgomery with the domain at Western Hills and to patch the operating

systems. Once the Montgomery location was connected with the Western Hills location, the Downtown location could be worked on.

The Downtown location project went fairly smooth. Initial predictions of completion were slightly delayed due to some unforeseen events that involved the owners.

Appendix B shows the final timeline of the projects completion.

4.2 Project Resources

The tables below, figure 5-7, are a list of the resources needed to create the networks. The tables are broken down into the different locations. The resources include all hardware and software for each location.

Resources needed for Western Hills			
Item	**Quantity**	**Price**	**Total Price**
Microsoft Windows Server 2003 Standard Edition	1	$697.52	$697.52
Windows XP Professional SP2 upgrade	5	$199.00	$995.00
Linksys 8-port 10/100 switches	3	$49.99	$149.97
3Com 10/100 NIC	1	$52.00	$52.00
Adaptec 29160 SCSI RAID Controller	1	$253.00	$253.00
Virus Protection (Per license)	9	$40.00	$360.00
Grand Total			**$2,507.49**

Figure 5: Western Hills Resources

Resources needed for Montgomery			
Item	**Quantity**	**Price**	**Total Price**
Microsoft Windows Server 2003 Standard Edition	1	$697.52	$697.52
Windows XP Professional SP2 upgrade	3	$199.00	$597.00
Linksys Firewall/Router	1	$79.99	$79.99
Linksys 8-port 10/100 switches	3	$49.99	$149.97
Adaptec 29160 SCSI RAID Controller	1	$253.00	$253.00
Virus Protection (Per license)	7	$40.00	$280.00
High Speed Internet Connection	1	$100.00	$100.00
New Workstation	1	$550.00	$550.00
Grand Total			**$2,707.48**

Figure 6: Montgomery Resources

Resources needed for Downtown			
Item	**Quantity**	**Price**	**Total Price**
Microsoft Windows Server 2003 Standard Edition	1	$697.52	$697.52
Windows XP Professional SP2 upgrade	3	$199.00	$597.00
Linksys Firewall/Router	1	$79.99	$79.99
Linksys 8-port 10/100 switches	1	$49.99	$49.99
High Speed Internet Connection	1	$100.00	$100.00
Virus Protection (Per license)	5	$40.00	$200.00
Grand Total			**$1,524.70**

Figure 7: Downtown Resources

4.3 Project Budget

The project budget includes the resources and labor cost of all three locations. The estimated labor rate is $20/hr based on personal experience and level of schooling. Although I am not getting paid for this project, this would be the rate for my services. Figure 8 on the next page shows the budget of the project.

ID	Task Name	Total Cost	Baseline	Variance	Actual
1	**Senior Design III**	**$18,742.80**	**$0.00**	**$18,742.80**	**$18,742.80**
2	**Western Hills Networking Equipment**	**$204.00**	**$0.00**	**$204.00**	**$204.00**
3	Install 3 10/100 Switches	$108.00	$0.00	$108.00	$108.00
4	Configure Router	$96.00	$0.00	$96.00	$96.00
5	**Western Hills Workstations**	**$2,241.00**	**$0.00**	**$2,241.00**	**$2,241.00**
6	Upgrade to Win XP	$1,315.00	$0.00	$1,315.00	$1,315.00
7	Install Virus Protection	$278.00	$0.00	$278.00	$278.00
8	Add to Domain	$16.00	$0.00	$16.00	$16.00
9	Get all machines os updated & patched	$224.00	$0.00	$224.00	$224.00
10	Testing	$408.00	$0.00	$408.00	$408.00
11	**Western Hills Server**	**$2,346.00**	**$0.00**	**$2,346.00**	**$2,346.00**
12	Find drivers for Server 2003	$80.00	$0.00	$80.00	$80.00
13	Order New SCSI & NIC Card	$0.00	$0.00	$0.00	$0.00
14	Install SCSI & NIC	$8.00	$0.00	$8.00	$8.00
15	Upgrade to Server 2003	$732.00	$0.00	$732.00	$732.00
16	Create Domain	$48.00	$0.00	$48.00	$48.00
17	Setup Active Directory	$320.00	$0.00	$320.00	$320.00
18	Setup Group Policies	$48.00	$0.00	$48.00	$48.00
19	Enable DHCP & DNS	$16.00	$0.00	$16.00	$16.00
20	Install Virus Protection Suite	$238.00	$0.00	$238.00	$238.00
21	Update & patch Operating system	$80.00	$0.00	$80.00	$80.00
22	Setup VPN Connection	$24.00	$0.00	$24.00	$24.00
23	Setup RAS Server	$16.00	$0.00	$16.00	$16.00
24	Testing	$736.00	$0.00	$736.00	$736.00
25	**Montgomery Network Equipment**	**$585.80**	**$0.00**	**$585.80**	**$585.80**
26	Install High Speed Internet Connection	$99.00	$0.00	$99.00	$99.00
27	Install 3 10/100 Switches	$150.00	$0.00	$150.00	$150.00
28	Install Router/Firewall	$176.00	$0.00	$176.00	$176.00
29	Create VPN Connection to WH	$160.80	$0.00	$160.80	$160.80
30	**Montgomery Workstations**	**$3,736.00**	**$0.00**	**$3,736.00**	**$3,736.00**
36	**Montgomery Server**	**$4,716.00**	**$0.00**	**$4,716.00**	**$4,716.00**
42	**Downtown Networking Equipment**	**$269.00**	**$0.00**	**$269.00**	**$269.00**
47	**Downtown Workstations**	**$1,923.00**	**$0.00**	**$1,923.00**	**$1,923.00**
53	**Downtown Server**	**$2,722.00**	**$0.00**	**$2,722.00**	**$2,722.00**
59	Design Freeze Presentation	$160.00	$0.00	$160.00	$160.00

Figure 8: Project Budget Breakdown

5. Proof of Design

When a user logs onto a system, they will not use the local user accounts that they previously used, but they will use a domain account setup for each individual user. This account allows for single-sign-on. The user only has to remember this user account to logon to any of the workstations, instead of the local account on the specific machine. This will create separate accounts on the computer for each user, keeping all their files separate. Figures 9 & 10 following show a domain user logging into a workstation on the

network. Figure 9 shows logon information. Figure 10 shows a successful login to a workstation.

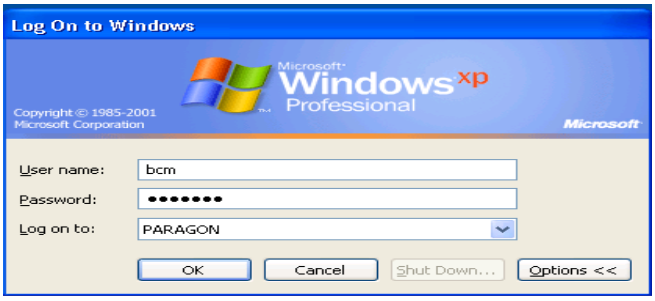

Figure 9: Domain Logon Screen

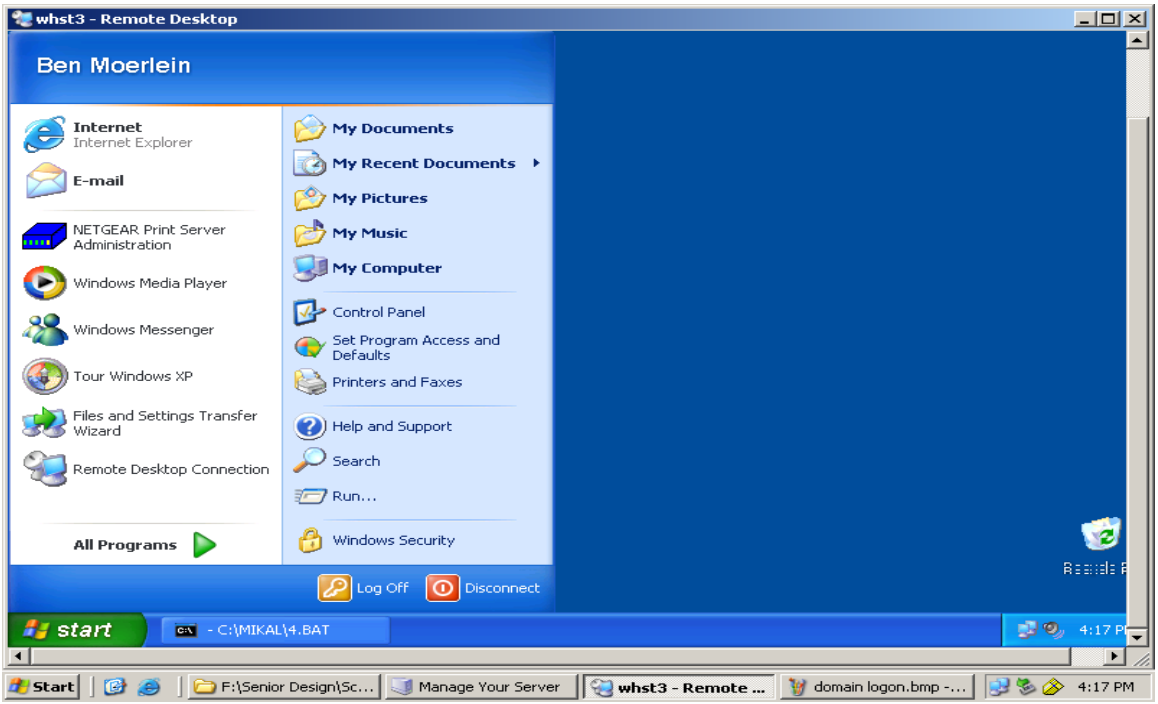

Figure 10: Successful logon to the Domain

With the three different user profiles that were established earlier, group policies were put into place to restrict access to specific resources on the workstations. Figures 11 and 12 show the difference between the SMS user and the Managers user profiles. The SMS user is missing all the administrative tools from the start menu. The manager user has all the tools available to them. In Appendix C the entire group policy is shown for

both user groups. The domain administrators group does not have a group policy associated with it. The users have been added to the domain administrators built in group of Active Directory for their privileges.

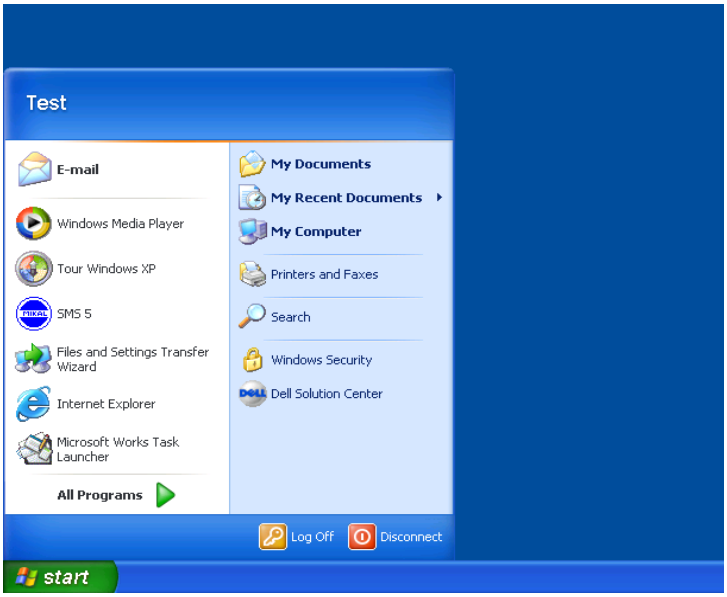

Figure 11: SMS Group Start Menu

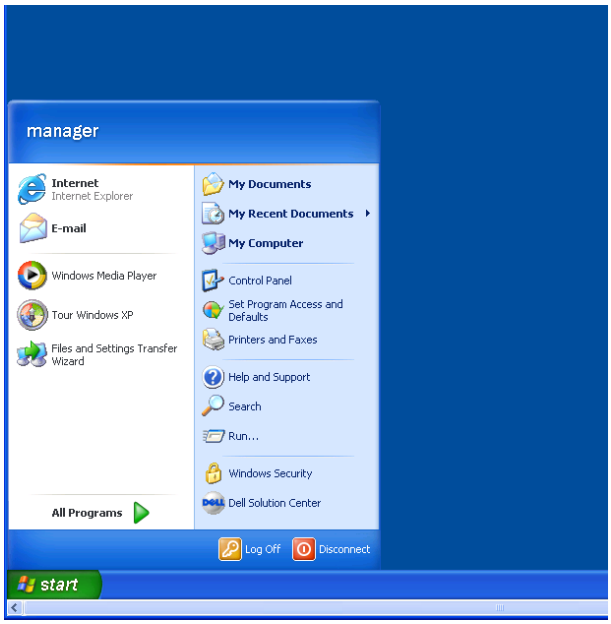

Figure 12: Managers Group Start Menu

The computers networking hardware was changed. They were replaced with 10/100 Mbps switches. Tests followed to ensure the computers were still connected and able to communicate. This occurred by pinging all the machines on the network see these machines. Figure 13 shows a single ping request used to test one of the connections.

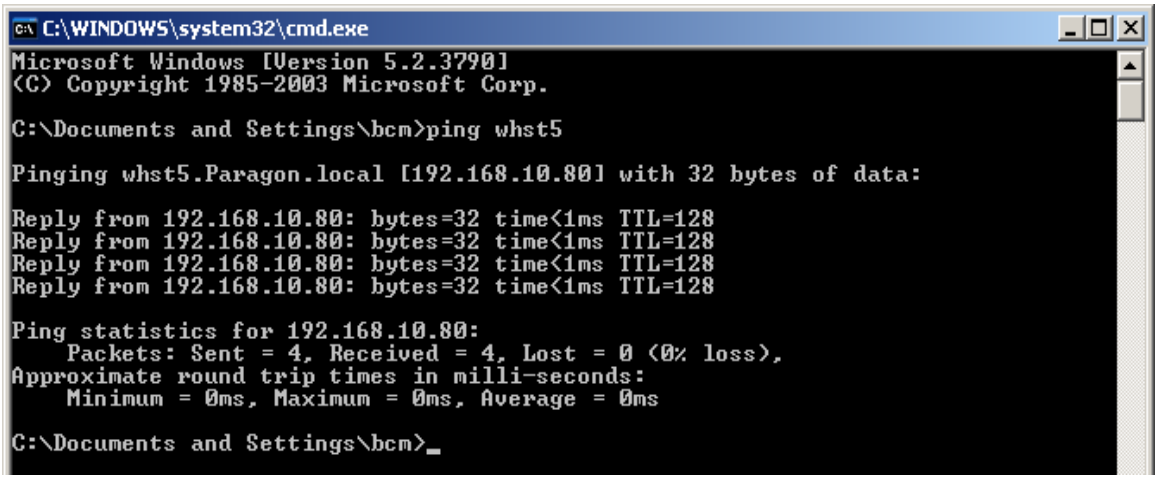

Figure 13: Ping request

The servers at each location are configured to provide Dynamic Host Configuration Protocol (DHCP) services for distributing IP addresses to the workstations. Figures 14 - 16 on the following pages show start up of the DHCP service on the domain controllers at all the locations distributing IP addresses to all workstations on their subnet.

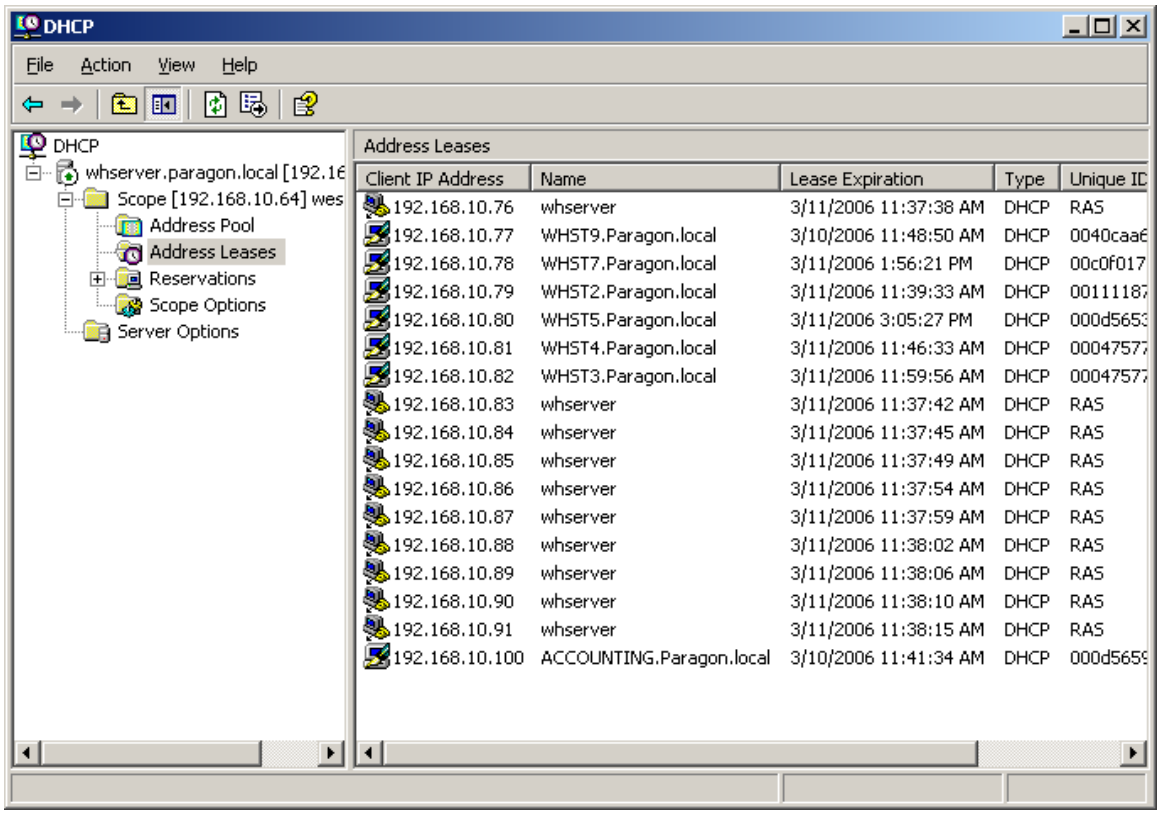

Figure 14: Western Hills DHCP Service

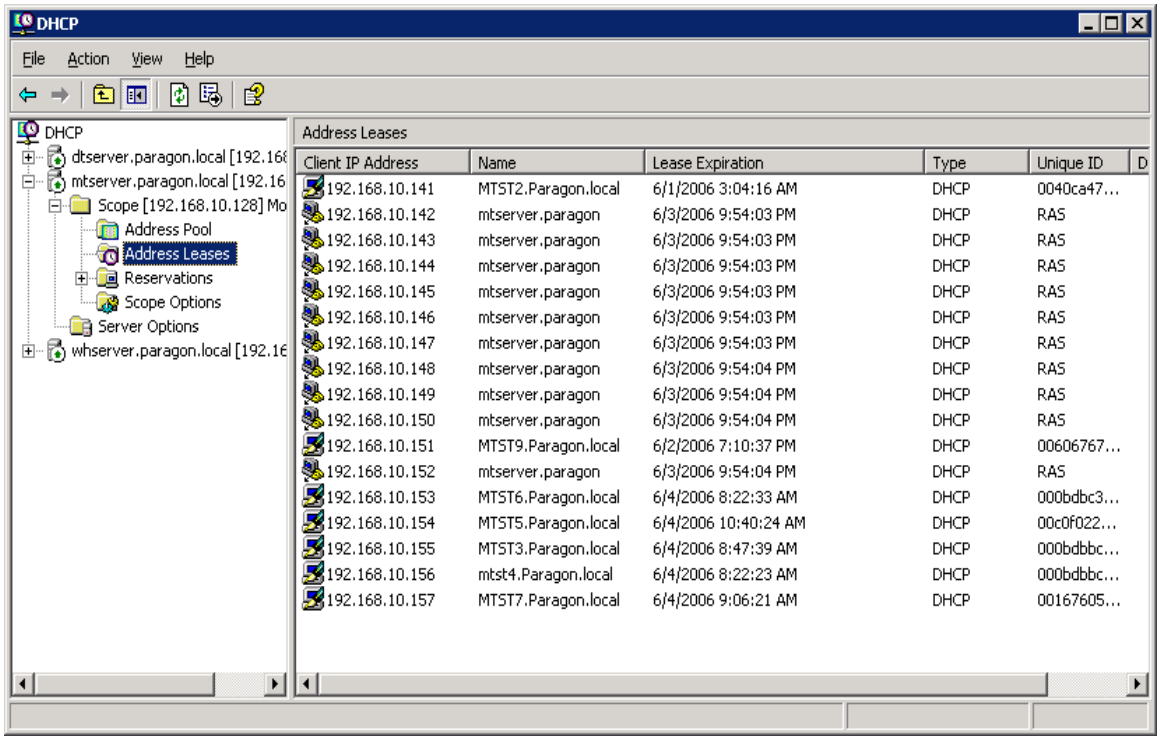

Figure 15: Montgomery DHCP Service

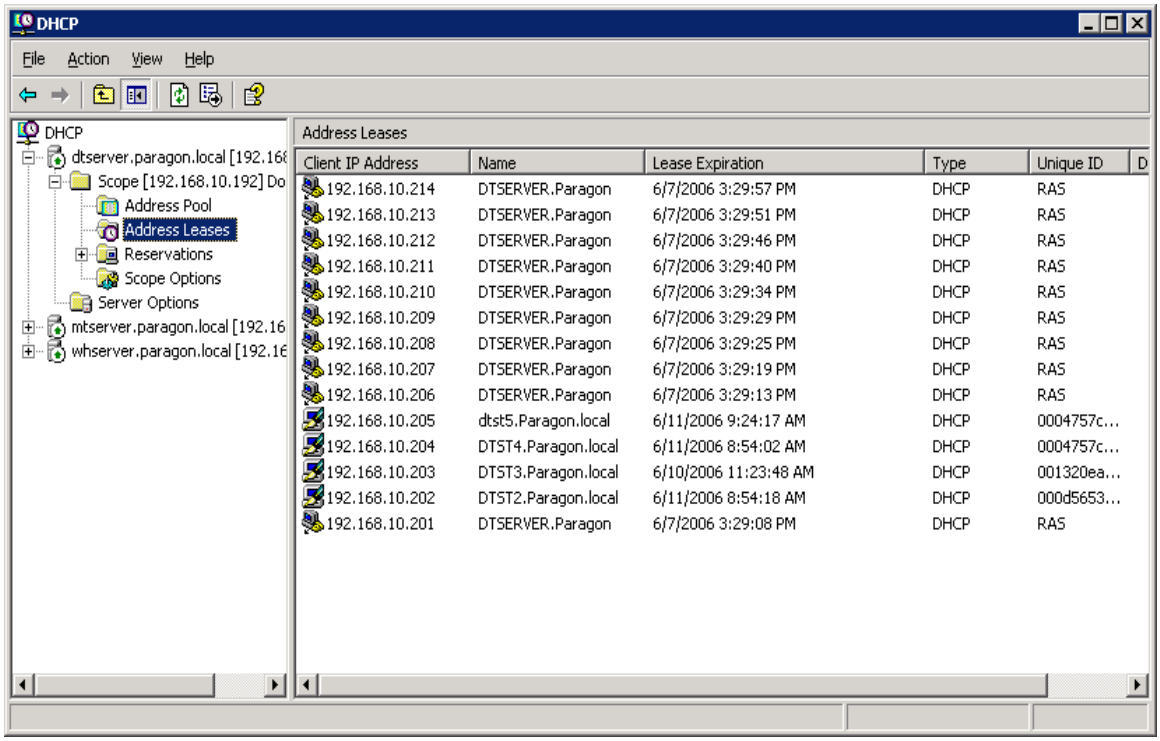

Figure 16: Downtown DHCP Service

The servers at each salon location are configured for Domain Name Server (DNS) which resolves computer names to IP addresses. Figure 17 shows the DNS forward lookup addresses for the entire domain that the servers have stored to resolve the computer names to IP addresses. This information is replicated between each server to allow for the different subnets to communicate with all the machines on the network.

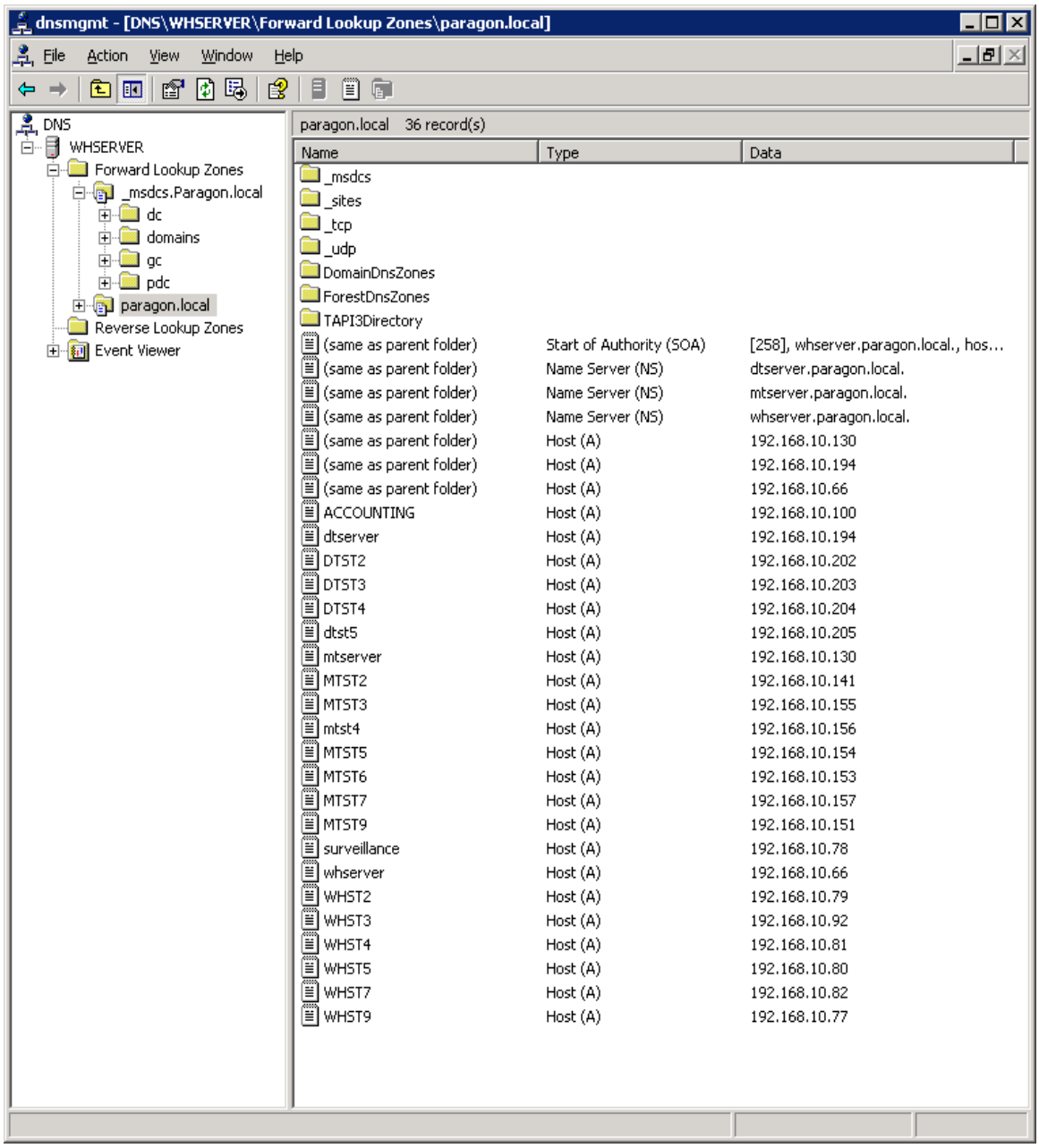

Figure 17: DNS forward lookup table

The servers at all locations have Remote Access Service (RAS) setup to provide remote access for managers and administrators. Figure 18 shows the RAS at Western Hills and a connection established from a remote user. Figure 19 and 20 show establishing a remote connection from a workstation. The RAS service is setup exactly

the same at each location and all three uses the same Remote access group for client authentication.

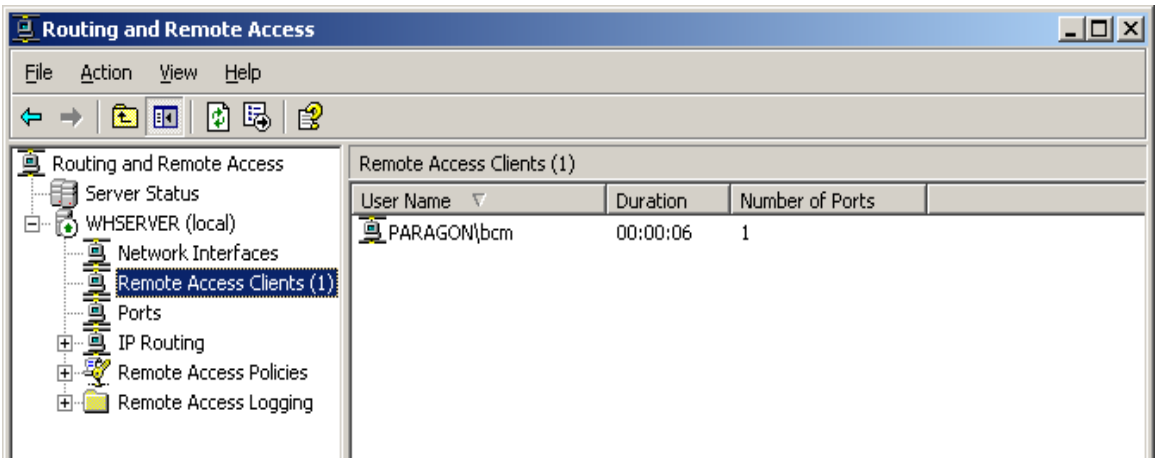

Figure 18: RAS session

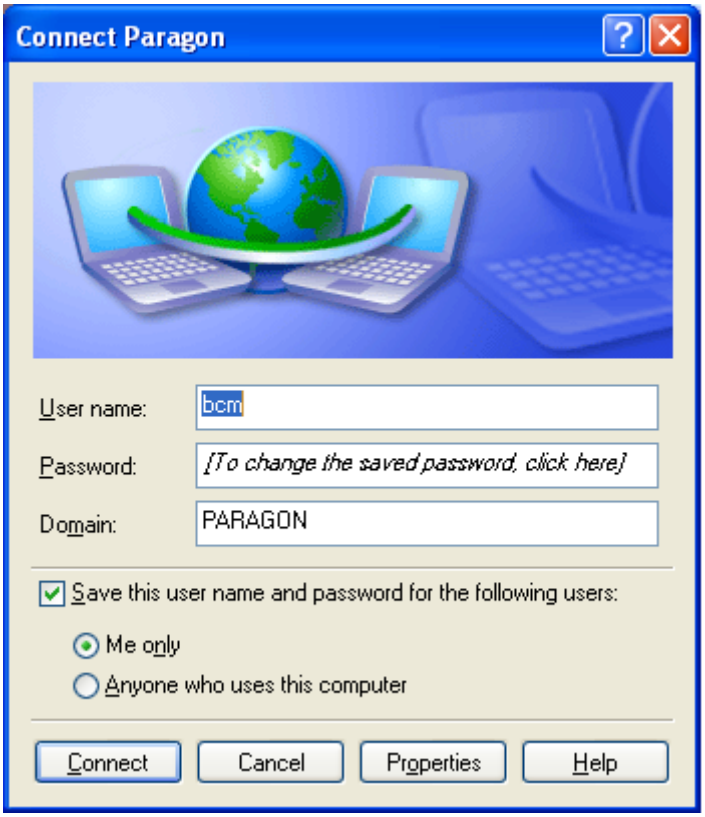

Figure 19: Remote Access logon

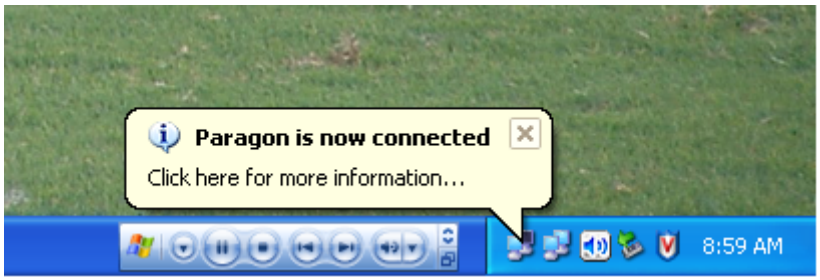

Figure 20: Successful remote connection

The servers are setup as the virus protection managers. Norton Antivirus 10.0 was installed and configured on each server. This service allows for remote installation and administration of all client computers virus configuration. Figure 21 shows the virus protection suite installed on the server. Figure 22 shows the log of all activity on the machines that are running virus protection. All three locations are setup similar. Each locations server handles the workstations at its location.

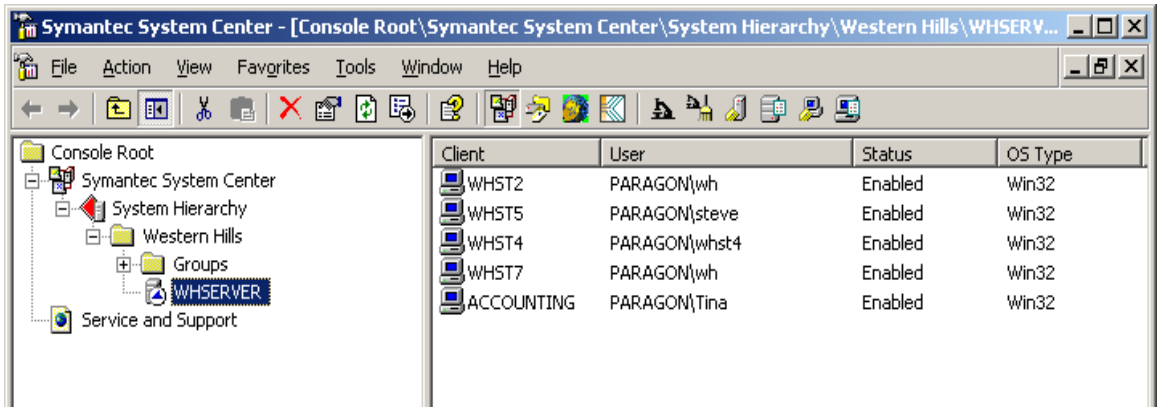

Figure 21: Norton Antivirus management console

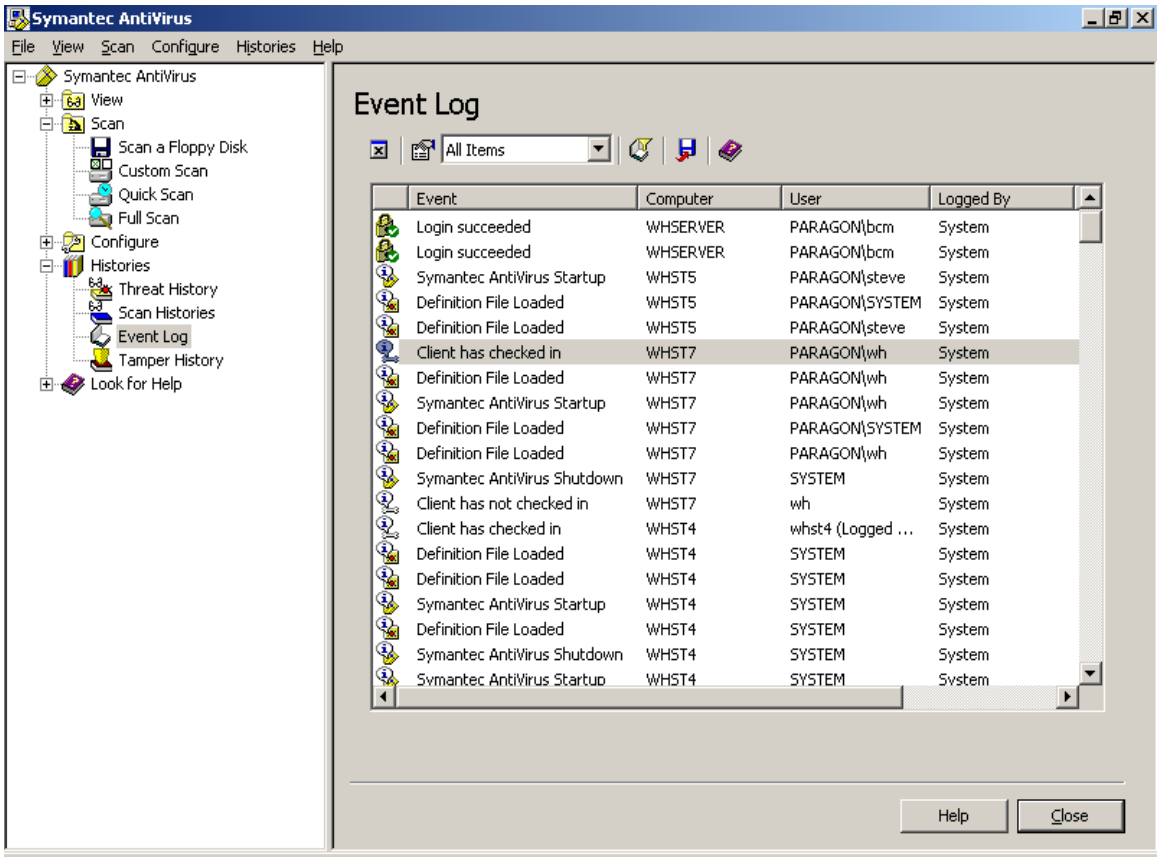

Figure 22: Norton log

Active Directory has been setup and configured on each domain controller. All the user accounts have been setup and assigned a group policy based on the user group that a particular employee is assigned. Figure 23 shows the user accounts setup at the Western Hills location. The setup of each location is like Western Hills, where each has a Managers and SMS users organization unit inside the location. This enables each user group to be assigned the specific group policy needed for those user accounts without interfering with the other user accounts from Western Hills.

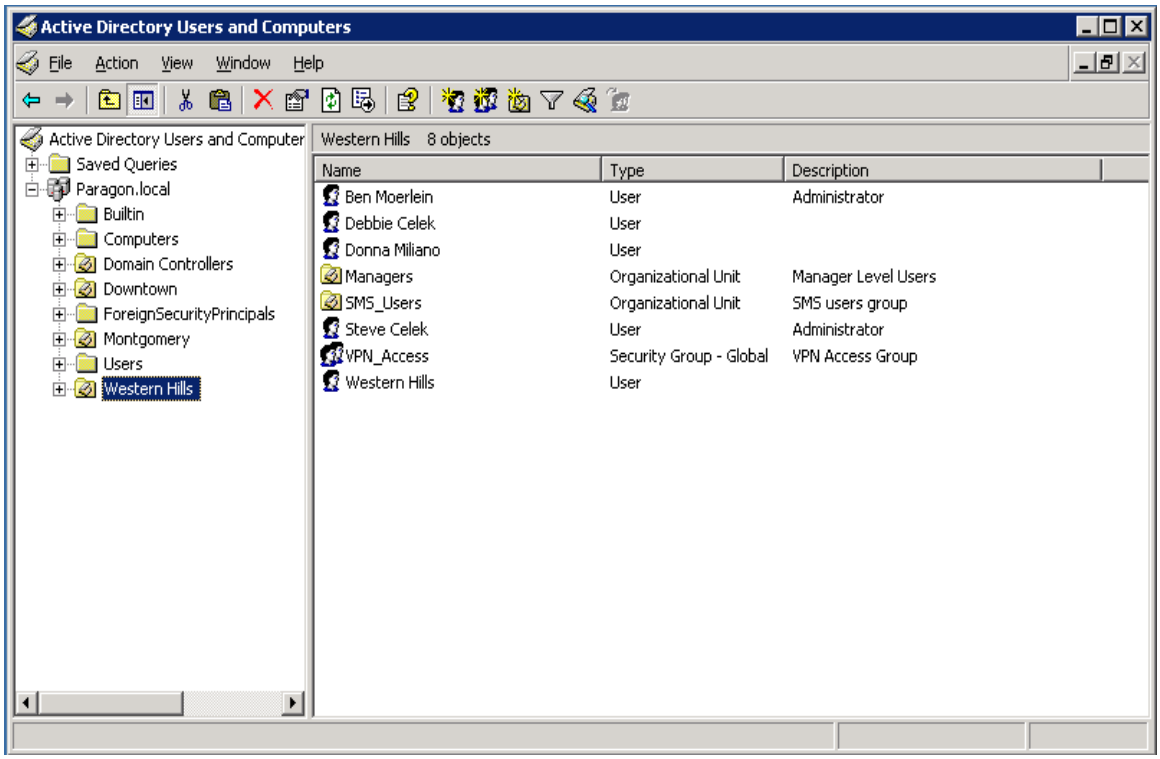

Figure 23: Active Directory Users

All the computers at each location have been upgraded to Windows XP Professional and can be established in Active Directory. Figure 24 portrays an example of a computer from the Montgomery location. The properties show that its operating system is in XP Pro with Service Pack 2. Appendix D has a sample listing of some of the computers on the domain and the settings each has.

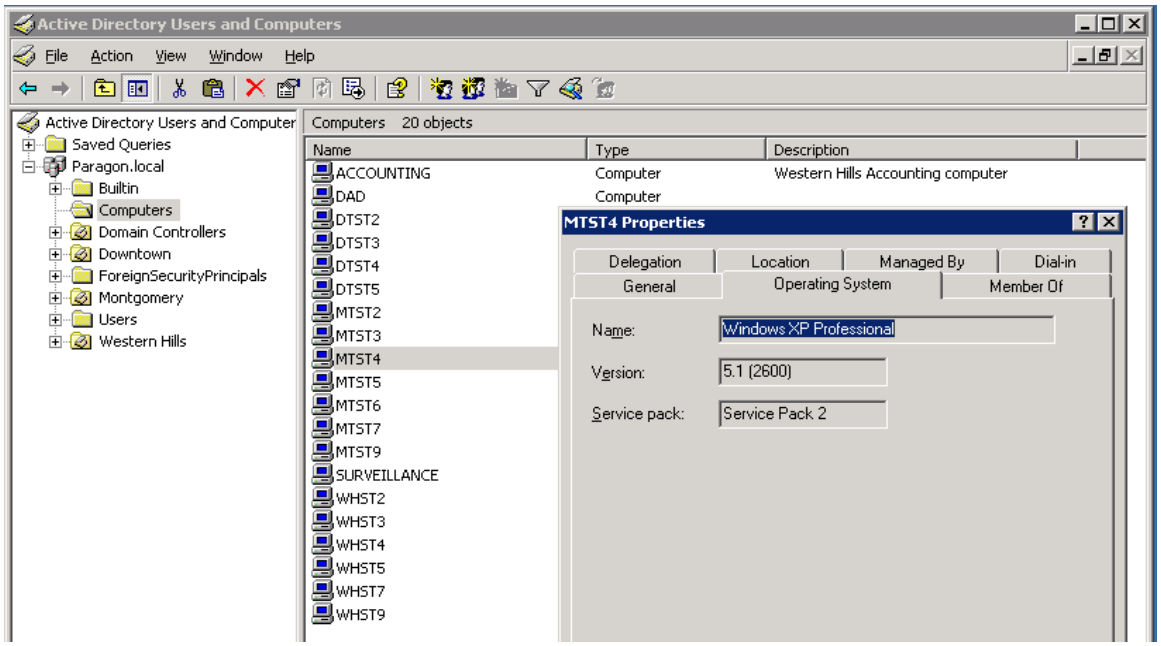

Figure 24: Active Directory computers listing

The router/firewall has been setup to establish VPN connections between each site, and it provides a stateful packet firewall to protect the network from attacks. Once the VPN configuration was setup on each router to establish this connection, the connection were tested by pinging an internal IP address of the other location. Further testing of the VPN link status was established when all three locations could replicate the domain information successfully. Figures 25-29 establishes these settings and show the ping reply that was successful between the locations. To make sure the firewalls were running properly, a port scan, using a tool call NMAP was performed to find all open ports (from inside and outside) of each location. Appendix E displays the results of each of these tests.

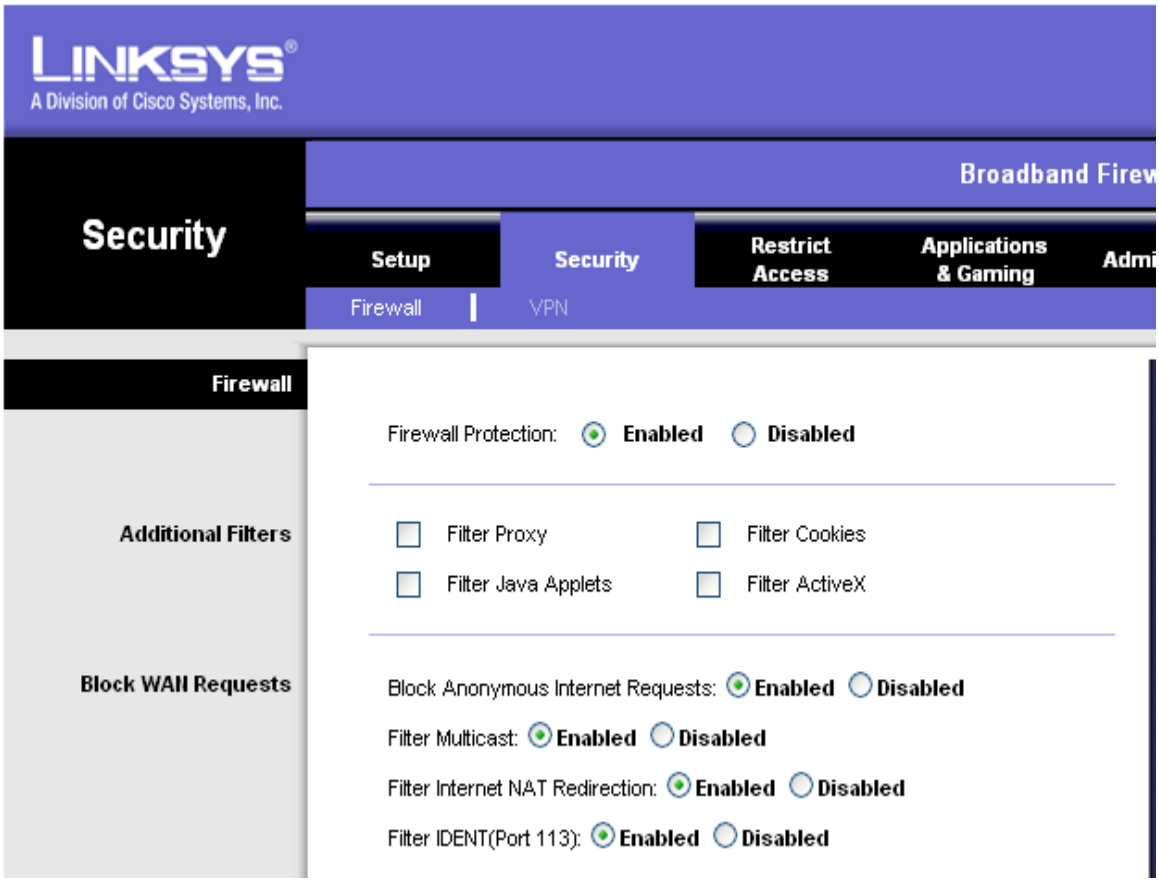

Figure 25: Stateful Packet Firewall Setup

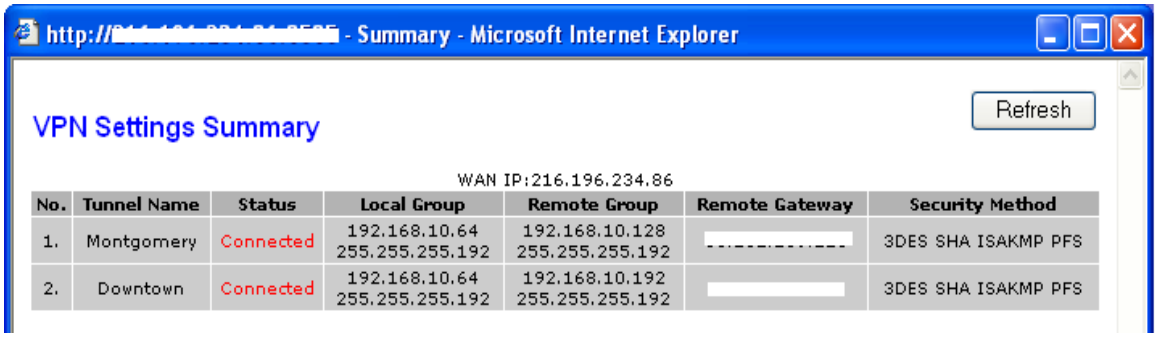

Figure 26: VPN Configuration of Western Hills

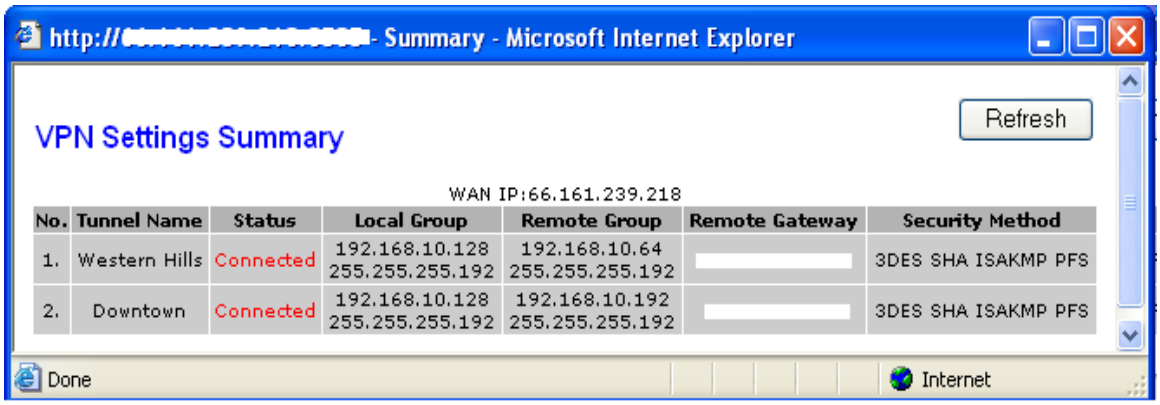

Figure 27: VPN Configuration of Montgomery

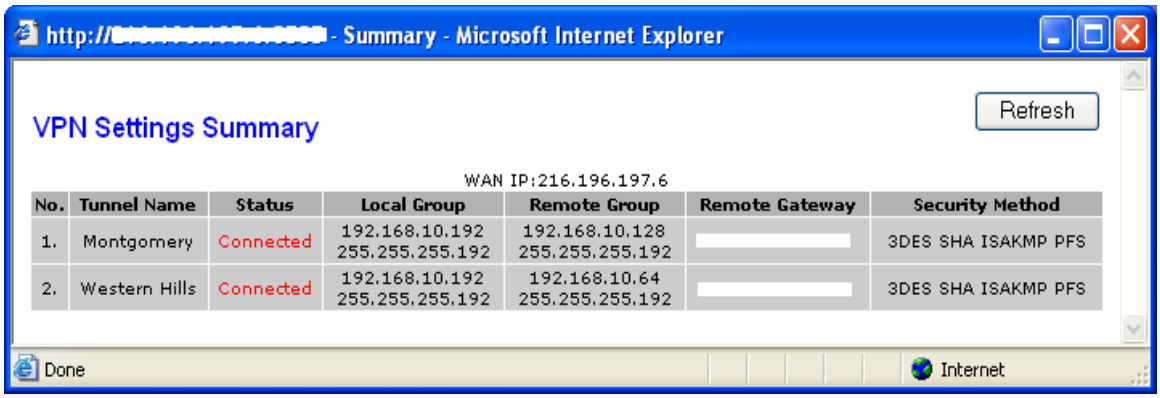

Figure 28: VPN Configuration of Downtown

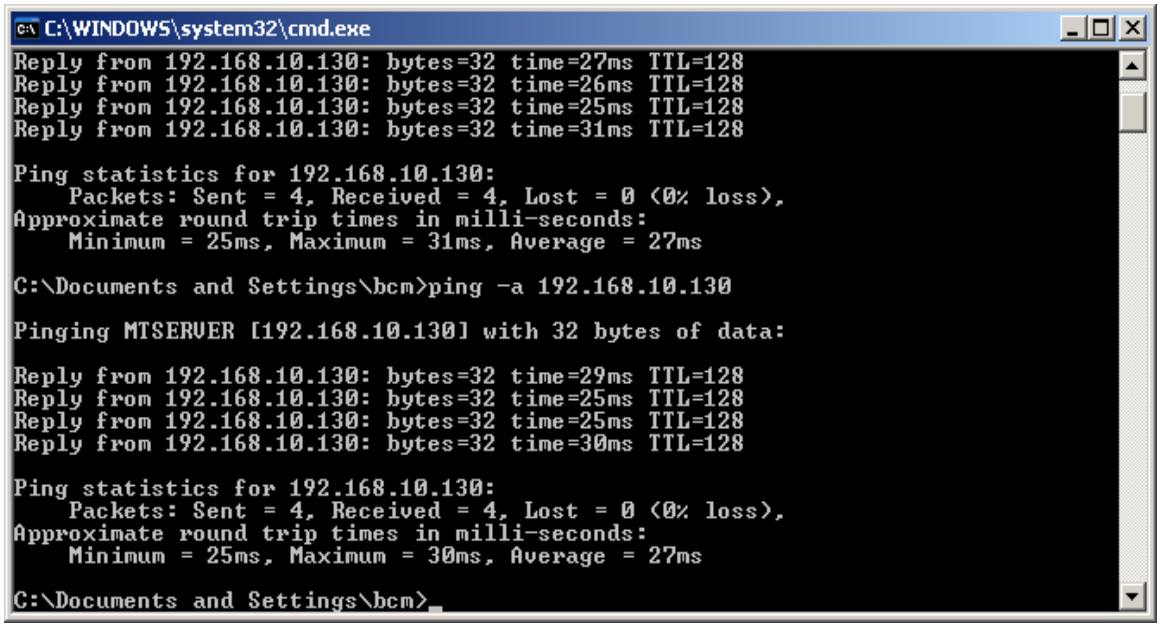

Figure 29: Ping request from Western Hills Server to Montgomery Server

After all the previous settings were in place and configured properly, all the workstations were added to the domain. Accessibility through the network for all workstations was established next. Figure 30 shows the network neighborhood displaying all the workstations in the domain. When this screen capture was taken, these machines were the only machines that were up on the network. The three locations are available by the names of the machines. WH is Western Hills, DT is Downtown, and MT is Montgomery.

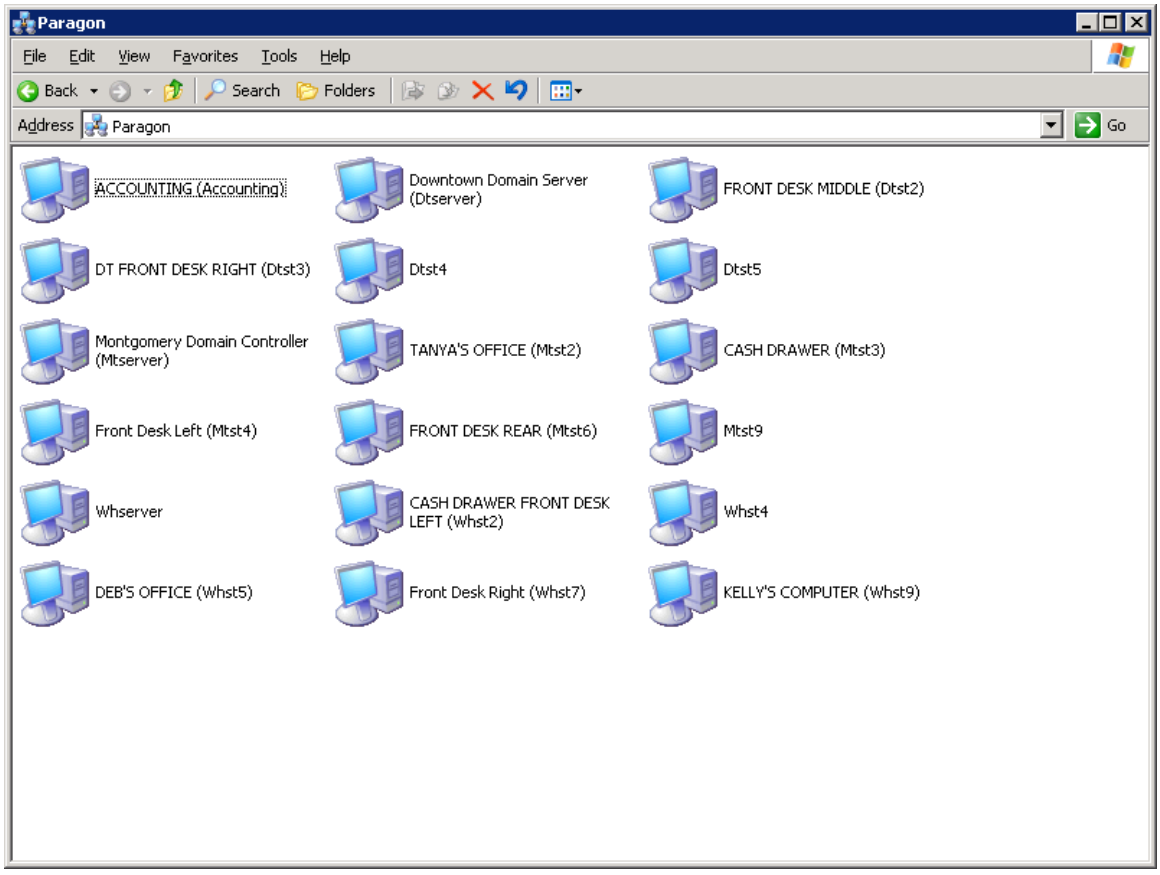

Figure 30: Paragon Network Neighborhood

The fileserver for SMS was the last setup at each location. The fileserver was setup to allow all domain users access to the drive where all the SMS files are stored.

Figure 31 shows the D share that was setup at Western Hills to allow users to access the SMS files. This was also done at Montgomery and Downtown because the three locations run independently of each other. The only difference between Downtown and the other locations is the SMS files are located on the C: drive.

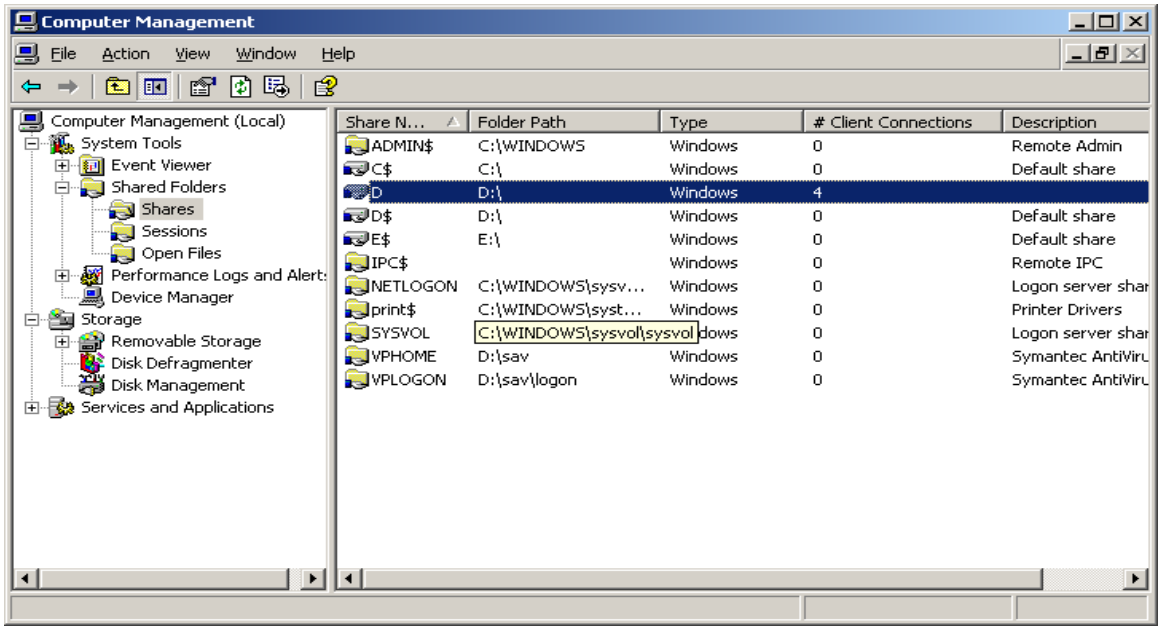

Figure 31: Western Hills SMS Fileshare

6. Testing

To ensure that all the aspects that in the design are functioning properly, test cases for each instance were performed. Figure 32 – 34 shows test cases that were performed at each location and the results of each test. The tests were done after each instance was implemented to ensure that proper installation and configuration of the step completed.

Test	Method	Success	Failure	Comments
Western Hills Location				
Switches functioning	Ping test	X		Ping to all machines on the network succesful
Internet Connection	Browse the Web	X		Able to navigate to multiple web pages through Internet Explorer
DNS	Ping test by Hostname	x		Able to resolve computer name to IP address
DHCP	Renew IP address	X		Able to obtain an IP address from the server
Logon to Domain	Logon to workstation on Domain	X		Successful login using domain account
Printing	Send test print to all printers	X		Print test page printed to all
VPN user-to-site	Create VPN connection from remote computer	X		Able to logon to network remotely,
VPN site-to-site	Create VPN connection between 2 locations	X		Successful ping between Western
Windows XP Upgrade	Test all hardware/software functionality	X		No hardware conflicts were discovered on workstations, and all software installed worked properly.
Server 2003 Upgrade	Test all hardware/software functionality	X		No hardware conflicts were
Domain Setup	Ability to get access all resources available	X		Resources are all available
Resource Access	Run Resultant Set of Policy for users/groups	X		Group policies have been setup.
Router Configuration	Test to see if settings are properly configured		X	Initially could not get outside of the network, result was a invalid IP address set on router interface

Figure 32: Western Hills Test Cases and Results

Test	Method	Success	Failure	Comments
Montgomery Location				
Switches functioning	Ping test	X		Ping to all machines on the network succesful
Internet Connection	Browse the Web	X		Able to navigate to multiple web pages through Internet Explorer
DNS	Ping test by Hostname	X		All machines were able to resolve ip address to machine names
DHCP	Renew IP address		X	DHCP initially failed because the service did not have a valid administrator account set for it to distribute addresses.
Logon to Domain	Logon to workstation on Domain	X		Domain logon was succesful
Printing	Send test print to all printers	X		Print test page printed to all printers
VPN user-to-site	Create VPN connection from remote computer			RAS is not set up at this location yet
VPN site-to-site	Create VPN connection between 2 locations	X		Successful ping between Montgomery and Western Hills
Windows XP Upgrade	Test all hardware/software functionality	X		No hardware conflicts were discovered on workstations, and all software installed worked properly.
Server 2003 Upgrade	Test all hardware/software functionality	X		No hardware conflicts were discovered on workstations, and all software installed worked properly.
Domain Setup	Ability to get access all resources available	X		Domain was established with Western Hills and replication was established between each location
Resource Access	Run Resultant Set of Policy for users/groups	X		Group policy have been put in place.
Router Configuration	Test to see if settings are properly configured	X		Able to navigate to multiple web pages through Internet Explorer, VPN connection to Western Hills up and running, and firewall appears to be working

Figure 33: Montgomery Test Cases and Results

Test	Method	Success	Failure	Comments
Downtown				
Switches functioning	Ping test	X		Ping to all machines on the network succesful
Internet Connection	Browse the Web	X		Able to navigate to multiple web pages through Internet Explorer
DNS	Ping test by Hostname	X		Able to resolve computer name to IP address
DHCP	Renew IP address		X	DHCP initially failed because the service did not have a valid administrator account set of ti to distribute addresses.
Logon to Domain	Logon to workstation on Domain	X		Successful login using domain account
Printing	Send test print to all printers	X		Print test page printed to all
VPN user-to-site	Create VPN connection from remote computer	X		Able to logon to network remotely,
VPN site-to-site	Create VPN connection between 2 locations	X		Successful ping between Western
Windows XP Upgrade	Test all hardware/software functionality	X		No hardware conflicts were discovered on workstations, and all software installed worked properly.
Server 2003 Upgrade	Test all hardware/software functionality	X		No hardware conflicts were
Domain Setup	Ability to get access all resources available	X		Resources are all available
Resource Access	Run Resultant Set of Policy for users/groups	X		Group policies have been setup.
Router Configuration	Test to see if settings are properly configured	X		Able to get outside network and connect to other locations.

Figure 34: Downtown Test Cases and Results

7. Conclusion and recommendations

The network rebuild for Paragon Salons was a successful project that all established deliverables were meet. The budget was pretty close to what had been planned. The owner has bought a few extra machines outside the budget scope. The networks at each location are now more secure than they ever were and running at speeds that were not possible six months ago. This network redesign gives the owners the abilities that they were looking for in the beginning with even more than they expected. The ability to remotely connect to the network from any high speed internet connection will provide countless rewards for the salon with the ability to run SMS and manage the network from anywhere. Overall this was a very good learning experience for myself and provided a company in need a solution to their problems. The most important thing

coming from the project is the owners are very happy with the solution. They have been opened to some technologies that they were not aware of before and are now reaping their benefits.

Recommendations that I suggest would be to continually monitor all machines at each store to make sure they update themselves and that the virus protection continues to function properly. These are two of the biggest reasons companies get hit with attacks because they have vulnerabilities in their networks. I would also suggest that the owners have someone monitor the servers on a routine basis to make sure all services and functionality is working properly. I suggest this because the owners are not familiar with the server operating system setup as a domain controller and might miss a problem on the server.

Appendix A.
Initial Network Diagrams

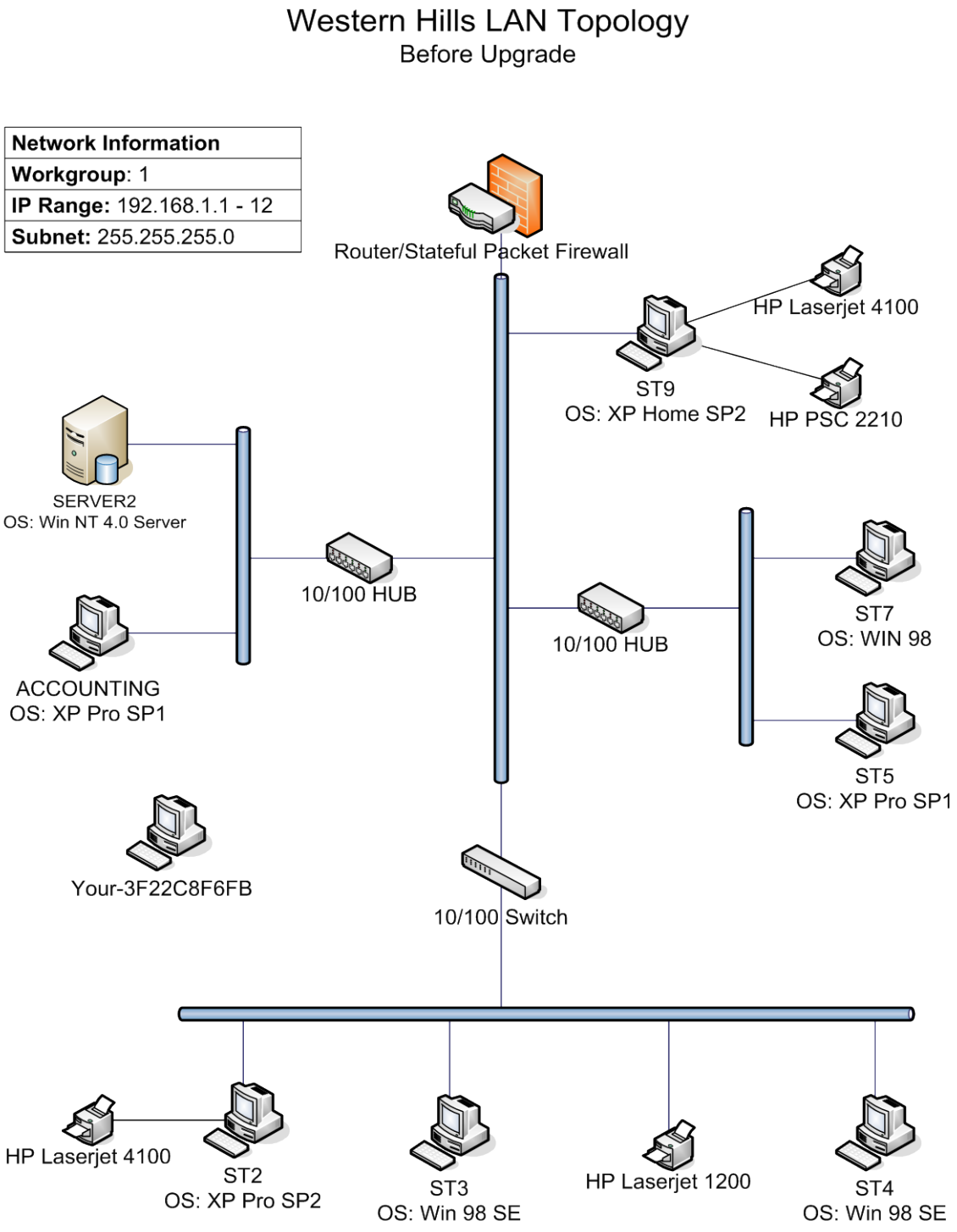

Figure 35: Western Hills LAN topology before upgrade

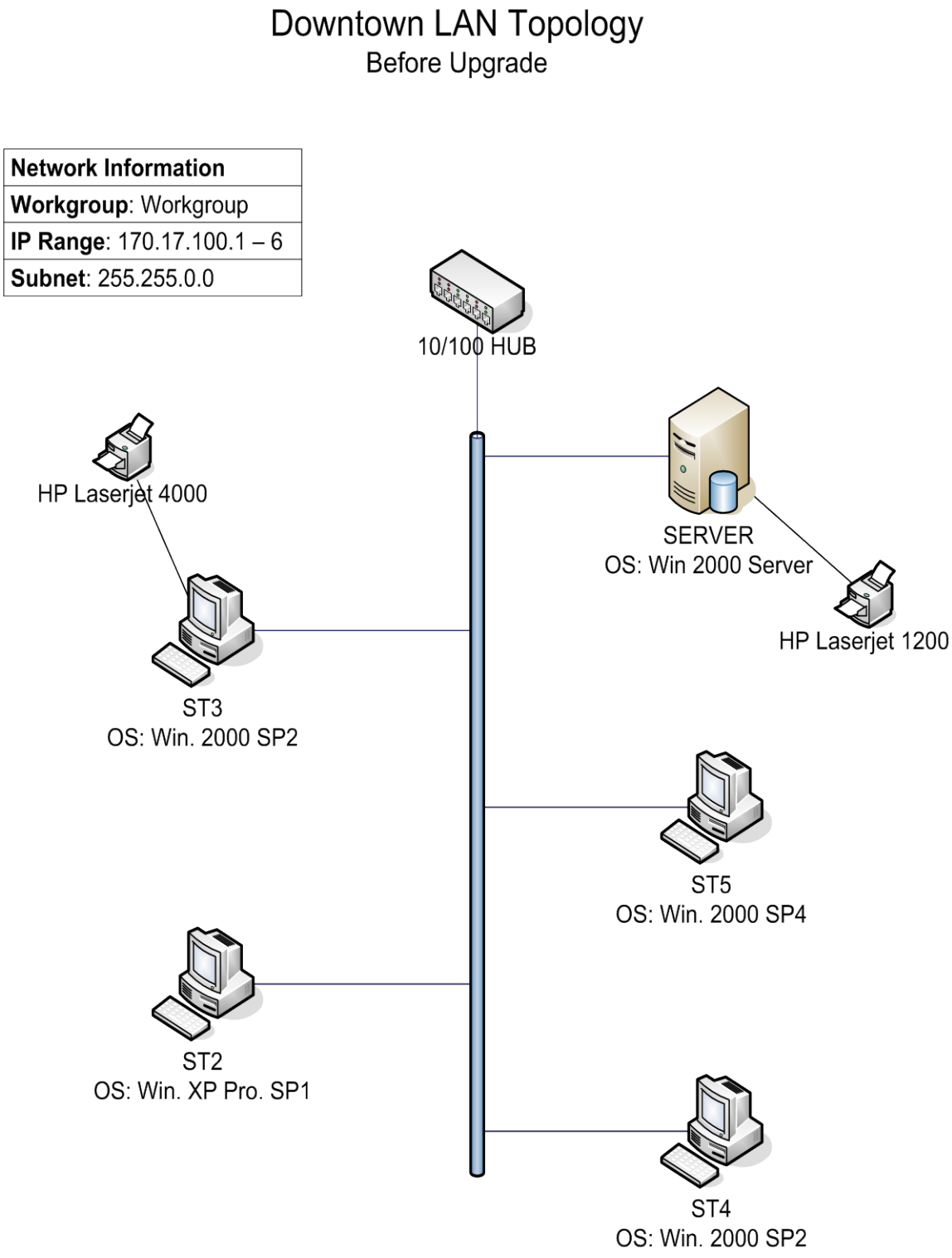

Figure 36: Downtown LAN Topology before Upgrade

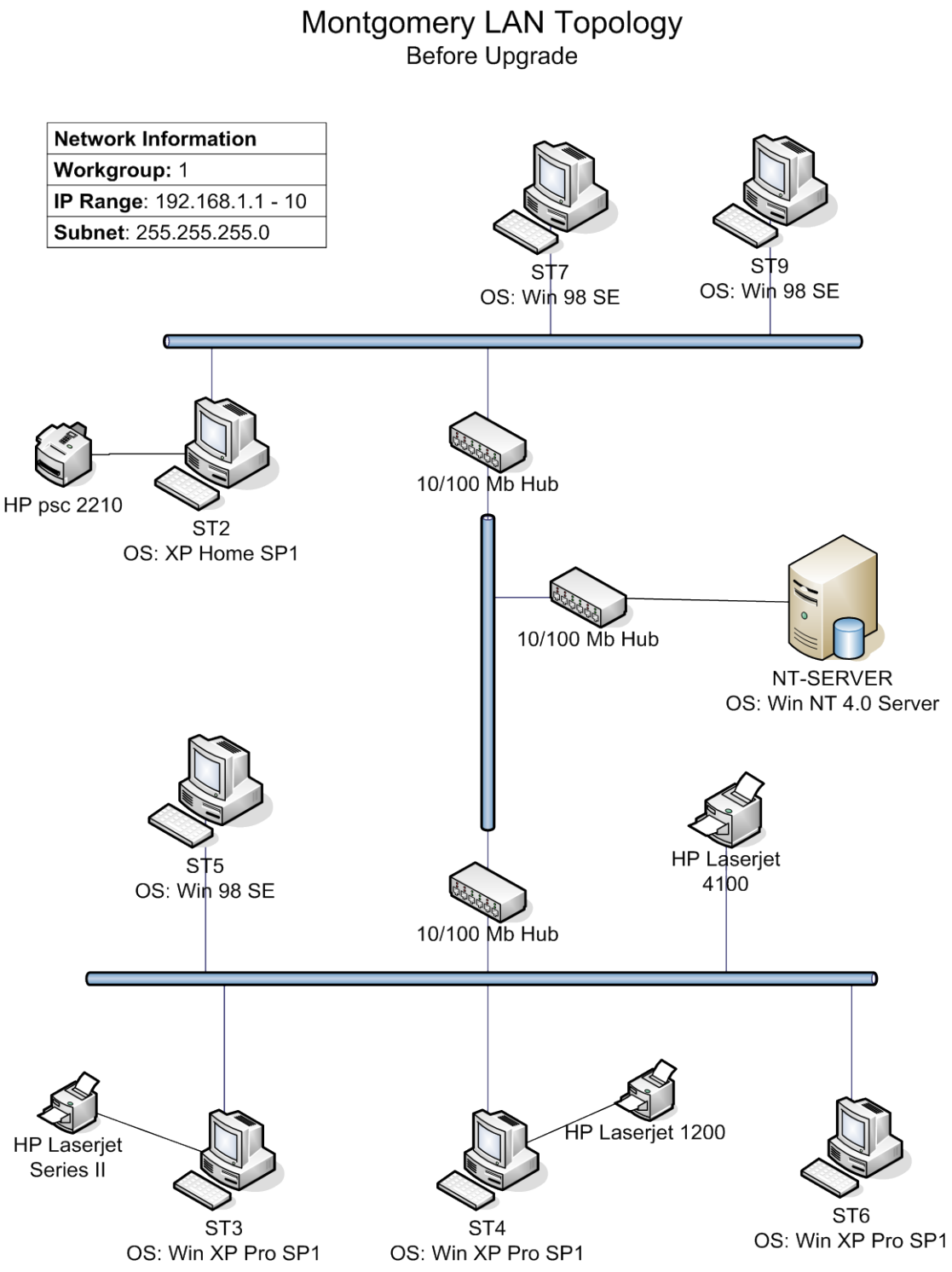

Figure 37: Montgomery LAN topology before upgrade

Appendix B.
Project Timeline

ID	Task Name	Start	Finish	Baseline Start	D
1	**Senior Design III**	**Thu 1/26/06**	**Sat 5/27/06**	**Thu 1/26/06**	
2	**Western Hills Networking Equipment**	**Sun 1/29/06**	**Sun 2/12/06**	**Sun 1/29/06**	
3	Install 3 10/100 Switches	Sun 1/29/06	Sun 1/29/06	Sun 1/29/06	
4	Configure Router	Sun 2/12/06	Sun 2/12/06	Sun 2/12/06	
5	**Western Hills Workstations**	**Thu 1/26/06**	**Wed 2/22/06**	**Thu 1/26/06**	
6	Upgrade to Win XP	Thu 1/26/06	Sun 1/29/06	Thu 1/26/06	
7	Install Virus Protection	Tue 2/14/06	Tue 2/14/06	Tue 2/14/06	
8	Add to Domain	Wed 2/22/06	Wed 2/22/06	Wed 2/22/06	
9	Get all machines os updated & patched	Thu 1/26/06	Wed 2/8/06	Thu 1/26/06	
10	Testing	Sun 1/29/06	Tue 2/14/06	Sun 1/29/06	
11	**Western Hills Server**	**Thu 2/2/06**	**Sun 4/23/06**	**Thu 2/2/06**	
12	Find drivers for Server 2003	Thu 2/2/06	Sat 2/11/06	Thu 2/2/06	
13	Order New SCSI & NIC Card	Mon 2/13/06	Wed 2/22/06	Mon 2/13/06	
14	Install SCSI & NIC	Wed 2/22/06	Wed 2/22/06	Wed 2/22/06	
15	Upgrade to Server 2003	Wed 2/22/06	Wed 2/22/06	Wed 2/22/06	
16	Create Domain	Wed 2/22/06	Wed 2/22/06	Wed 2/22/06	
17	Setup Active Directory	Wed 2/22/06	Sat 2/25/06	Wed 2/22/06	
18	Setup Group Policies	Sun 3/26/06	Tue 3/28/06	Sun 3/26/06	
19	Enable DHCP & DNS	Wed 2/22/06	Wed 2/22/06	Wed 2/22/06	
20	Install Virus Protection Suite	Thu 2/23/06	Sat 2/25/06	Thu 2/23/06	
21	Update & patch Operating system	Wed 2/22/06	Wed 2/22/06	Wed 2/22/06	
22	Setup VPN Connection	Mon 2/27/06	Mon 2/27/06	Mon 2/27/06	
23	Setup RAS Server	Thu 2/23/06	Thu 2/23/06	Thu 2/23/06	
24	Testing	Wed 2/22/06	Sun 4/23/06	Wed 2/22/06	
25	**Montgomery Network Equipment**	**Mon 2/27/06**	**Wed 3/1/06**	**Mon 2/27/06**	
26	Install High Speed Internet Connection	Mon 2/27/06	Mon 2/27/06	Mon 2/27/06	
27	Install 3 10/100 Switches	Mon 2/27/06	Mon 2/27/06	Mon 2/27/06	
28	Install Router/Firewall	Tue 2/28/06	Tue 2/28/06	Tue 2/28/06	
29	Create VPN Connection to WH	Wed 3/1/06	Wed 3/1/06	Wed 3/1/06	
30	**Montgomery Workstations**	**Mon 2/27/06**	**Sun 3/26/06**	**Mon 2/27/06**	
31	Upgrade to Win XP	Mon 2/27/06	Mon 2/27/06	Mon 2/27/06	
32	Install Virus Protection	Sun 3/12/06	Mon 3/13/06	Sun 3/12/06	
33	Add to Domain	Mon 3/13/06	Mon 3/13/06	Mon 3/13/06	
34	Update OS	Tue 2/28/06	Tue 2/28/06	Tue 2/28/06	
35	Testing	Mon 2/27/06	Sun 3/26/06	Mon 2/27/06	
36	**Montgomery Server**	**Mon 2/27/06**	**Sun 3/26/06**	**Mon 2/27/06**	
37	Install New SCSI controller	Mon 2/27/06	Mon 2/27/06	Mon 2/27/06	
38	Upgrade to Server 2003	Tue 2/28/06	Tue 2/28/06	Tue 2/28/06	
39	Join to Domain	Sun 3/12/06	Sun 3/12/06	Sun 3/12/06	

Figure 38: Project timeline

ID	Task Name	Duration	Start	Finish	Baseline Start	E
1	**Downtown Networking Equipment**	**15.38 days**	**Sun 4/2/06**	**Mon 4/17/06**	**Sun 4/2/06**	
2	Get High-speed internet connection	4 days	Sun 4/2/06	Mon 4/17/06	Sun 4/2/06	
3	Install 10/100 Switches	0.33 days	Sun 4/9/06	Mon 4/10/06	Sun 4/9/06	
4	Configure Router	0.33 days	Fri 4/14/06	Fri 4/14/06	Fri 4/14/06	
5	Create VPN connection to WH & MT	0.33 days	Sun 4/16/06	Mon 4/17/06	Sun 4/16/06	
6	**Downtown Workstations**	**19.38 days**	**Sun 4/9/06**	**Fri 4/28/06**	**Sun 4/9/06**	
7	Upgrade to Win XP	0.33 days	Sun 4/9/06	Mon 4/10/06	Sun 4/9/06	
8	Add to Domain	0.33 days	Mon 4/17/06	Mon 4/17/06	Mon 4/17/06	
9	Install Virus Protection	0.33 days	Wed 4/19/06	Wed 4/19/06	Wed 4/19/06	
10	Patch & update operating systems	2.67 days	Mon 4/10/06	Wed 4/19/06	Mon 4/10/06	
11	Testing	5 days	Sun 4/9/06	Fri 4/28/06	Sun 4/9/06	
12	**Downtown Server**	**39.38 days**	**Sun 4/9/06**	**Thu 5/18/06**	**Sun 4/9/06**	
13	Upgrade to Server 2003	0.33 days	Sun 4/9/06	Mon 4/10/06	Sun 4/9/06	
14	Join to Domain	0.33 days	Sun 4/16/06	Mon 4/17/06	Sun 4/16/06	
15	Update & patch Operating system	2.33 days	Mon 4/10/06	Tue 4/18/06	Mon 4/10/06	
16	Install Virus Protection Suite	1 day	Sun 4/16/06	Wed 4/19/06	Sun 4/16/06	
17	Testing	9.67 days	Sun 4/9/06	Thu 5/18/06	Sun 4/9/06	
18	**Active Directory**	**7.38 days?**	**Mon 5/22/06**	**Mon 5/29/06**	**Mon 4/17/06**	
19	Create Group Policies	1.67 days?	Mon 5/22/06	Fri 5/26/06	Mon 4/17/06	
20	Create Individual user accounts	2 days?	Mon 5/22/06	Mon 5/29/06	Sat 4/22/06	
21	Link users to Groups	1.33 days?	Wed 5/24/06	Mon 5/29/06	Tue 5/2/06	
22	Test User accounts privileges	4.38 days?	Mon 5/22/06	Fri 5/26/06	Sat 5/6/06	
23	**TechExpo Presentation**	0.33 days?	Fri 5/19/06	Fri 5/19/06	Fri 5/19/06	
24	**Design Freeze Presentation**	0.33 days	Thu 5/25/06	Thu 5/25/06	Thu 5/25/06	

Figure 39: Project timeline continued

Appendix C.
Group Policies

SMS Users

Data collected on: 5/27/2006
12:33:33 PM

General

Details

Domain	Paragon.local
Owner	PARAGON\Domain Admins
Created	5/22/2006 10:18:54 AM
Modified	5/24/2006 2:19:44 PM
User Revisions	69 (AD), 69 (sysvol)
Computer Revisions	15 (AD), 15 (sysvol)
Unique ID	{1A18D6C8-92E3-4853-9968-B137A32299BB}
GPO Status	Enabled

Links

Location	Enforced	Link Status	Path
SMS_Users	No	Enabled	Paragon.local/Western Hills/SMS_Users

This list only includes links in the domain of the GPO.

Security Filtering

The settings in this GPO can only apply to the following groups, users, and computers:

Name
NT AUTHORITY\Authenticated Users

WMI Filtering

WMI Filter Name	None
Description	Not applicable

Delegation

These groups and users have the specified permission for this GPO

Name	Allowed Permissions	Inherited
NT AUTHORITY\Authenticated Users	Read (from Security Filtering)	No
NT AUTHORITY\ENTERPRISE DOMAIN CONTROLLERS	Read	No
NT AUTHORITY\SYSTEM	Edit settings, delete, modify security	No
PARAGON\Domain Admins	Edit settings, delete, modify security	No
PARAGON\Enterprise Admins	Edit settings, delete, modify security	No

Computer Configuration (Enabled)

Windows Settings

Security Settings

System Services

Help and Support (Startup Mode: Disabled)

Permissions
No permissions specified
Auditing
No auditing specified
Administrative Templates
System/Windows Time Service/Time Providers

Policy	Setting
Configure Windows NTP Client	Enabled

NtpServer	WHSERVER
Type	NT5DS
CrossSiteSyncFlags	2
ResolvePeerBackoffMinutes	15
ResolvePeerBackoffMaxTimes	7
SpecialPollInterval	3600
EventLogFlags	0

Policy	Setting
Enable Windows NTP Client	Enabled

User Configuration (Enabled)
Windows Settings
Security Settings
Public Key Policies/Autoenrollment Settings

Policy	Setting
Enroll certificates automatically	Enabled

Renew expired certificates, update pending certificates, and remove revoked certificates	Disabled
Update certificates that use certificate templates	Disabled

Administrative Templates
Control Panel

Policy	Setting
Prohibit access to the Control Panel	Enabled

Control Panel/Add or Remove Programs

Policy	Setting
Hide Add New Programs page	Enabled
Hide Add/Remove Windows Components page	Enabled
Hide Change or Remove Programs page	Enabled
Hide the Set Program Access and Defaults page	Enabled
Remove Add or Remove Programs	Enabled

Control Panel/Printers

Policy	Setting
Browse the network to find printers	Enabled
Default Active Directory path when searching for printers	Enabled
Default Active Directory path	LDAP://DC=WHSERVER,DC=Paragon,DC=local
example --> LDAP://DC=Domain1,DC=MyCompany,DC=com.	

Desktop

Policy	Setting
Hide Internet Explorer icon on desktop	Enabled
Hide My Network Places icon on desktop	Disabled
Remove Properties from the My Computer context menu	Enabled

Desktop/Active Desktop

Policy	Setting
Enable Active Desktop	Enabled
Allows HTML and JPEG Wallpaper	

Policy	Setting
Prohibit changes	Enabled
Prohibit deleting items	Enabled

Network/Network Connections

Policy	Setting
Ability to Enable/Disable a LAN connection	Disabled
Ability to rename LAN connections or remote access connections available to all users	Disabled
Prohibit access to properties of a LAN connection	Enabled
Prohibit access to properties of components of a LAN connection	Enabled

Shared Folders

Policy	Setting
Allow shared folders to be published	Enabled

Start Menu and Taskbar

Policy	Setting
Add Logoff to the Start Menu	Enabled
Lock the Taskbar	Enabled
Prevent changes to Taskbar and Start Menu Settings	Enabled
Remove Favorites menu from Start Menu	Enabled

Remove Help menu from Start Menu	Enabled
Remove links and access to Windows Update	Enabled
Remove My Music icon from Start Menu	Enabled
Remove My Pictures icon from Start Menu	Enabled
Remove Network Connections from Start Menu	Enabled
Remove Run menu from Start Menu	Enabled
Remove Set Program Access and Defaults from Start menu	Enabled

System

Policy	Setting
Don't display the Getting Started welcome screen at logon	Enabled
Prevent access to registry editing tools	Enabled
Disable regedit from running silently?	Yes

Policy	Setting
Prevent access to the command prompt	Enabled
Disable the command prompt script processing also?	No

System/Ctrl+Alt+Del Options

Policy	Setting
Remove Task Manager	Enabled

System/Internet Communication Management

Policy	Setting
Restrict Internet communication	Enabled

System/Internet Communication Management/Internet Communication settings

Policy	Setting
Turn off downloading of print drivers over HTTP	Enabled
Turn off Internet download for Web publishing and online ordering wizards	Enabled
Turn off Internet File Association service	Enabled
Turn off printing over HTTP	Enabled
Turn off the "Order Prints" picture task	Enabled
Turn off the "Publish to Web" task for files and folders	Enabled
Turn off the Windows Messenger Customer Experience Improvement Program	Enabled
Turn off Windows Movie Maker automatic codec downloads	Enabled
Turn off Windows Movie Maker online Web links	Enabled

Turn off Windows Movie Maker saving to online video hosting provider	Enabled

System/Power Management

Policy	Setting
Prompt for password on resume from hibernate / suspend	Enabled

Windows Components/Internet Explorer

Policy	Setting
Disable Internet Connection wizard	Enabled

Windows Components/Microsoft Management Console

Policy	Setting
Restrict the user from entering author mode	Enabled
Restrict users to the explicitly permitted list of snap-ins	Enabled

Windows Components/Task Scheduler

Policy	Setting
Prevent Task Run or End	Enabled
Prohibit Browse	Enabled
Prohibit New Task Creation	Enabled
Prohibit Task Deletion	Enabled

Windows Components/Windows Media Player

Policy	Setting
Prevent CD and DVD Media Information Retrieval	Enabled
Prevent Music File Media Information Retrieval	Enabled
Prevent Radio Station Preset Retrieval	Enabled

Windows Components/Windows Messenger

Policy	Setting
Do not allow Windows Messenger to be run	Enabled
Do not automatically start Windows Messenger initially	Enabled

Windows Components/Windows Movie Maker

Policy	Setting
Do not allow Windows Movie Maker to run	Enabled

Figure 40: SMS users' group policy

Managers

Data collected on: 5/27/2006 12:32:51 PM

General

Details

Domain	Paragon.local
Owner	PARAGON\Domain Admins
Created	5/24/2006 2:05:40 PM
Modified	5/24/2006 3:13:44 PM
User Revisions	22 (AD), 22 (sysvol)
Computer Revisions	2 (AD), 2 (sysvol)
Unique ID	{256BB900-E74D-44C4-8E95-1DCE8213AA72}
GPO Status	Enabled

Links

Location	Enforced	Link Status	Path
Managers	No	Enabled	Paragon.local/Western Hills/Managers

This list only includes links in the domain of the GPO.

Security Filtering

The settings in this GPO can only apply to the following groups, users, and computers:

Name
NT AUTHORITY\Authenticated Users

WMI Filtering

WMI Filter Name	None
Description	Not applicable

Delegation

These groups and users have the specified permission for this GPO

Name	Allowed Permissions	Inherited
NT AUTHORITY\Authenticated Users	Read (from Security Filtering)	No
NT AUTHORITY\ENTERPRISE DOMAIN CONTROLLERS	Read	No
NT AUTHORITY\SYSTEM	Edit settings, delete, modify security	No
PARAGON\Domain Admins	Edit settings, delete, modify security	No
PARAGON\Enterprise Admins	Edit settings, delete, modify security	No

Computer Configuration (Enabled)

Administrative Templates

System

Policy	Setting
Do not display Manage Your Server page at logon	Enabled

System/Logon

Policy	Setting
Don't display the Getting Started welcome screen at logon	Enabled

User Configuration (Enabled)

Windows Settings

Security Settings

Public Key Policies/Autoenrollment Settings

Policy	Setting
Enroll certificates automatically	Enabled
Renew expired certificates, update pending certificates, and remove revoked certificates	Disabled
Update certificates that use certificate templates	Disabled

Administrative Templates

Control Panel

Policy	Setting
Force classic Control Panel Style	Enabled

Control Panel/Printers

Policy	Setting
Browse the network to find printers	Enabled
Default Active Directory path when searching for printers	Enabled
Default Active Directory path	LDAP://DC=WHSERVER,DC=Paragon,DC=local
example --> LDAP://DC=Domain1,DC=MyCompany,DC=com.	

Network/Network Connections

Policy	Setting
Ability to Enable/Disable a LAN connection	Enabled

Shared Folders

Policy	Setting
Allow shared folders to be published	Enabled

Start Menu and Taskbar

Policy	Setting
Add Logoff to the Start Menu	Enabled
Remove Favorites menu from Start Menu	Enabled
Remove My Music icon from Start Menu	Enabled
Remove My Pictures icon from Start Menu	Enabled

System

Policy	Setting
Don't display the Getting Started welcome screen at logon	Enabled

System/Power Management

Policy	Setting

Prompt for password on resume from hibernate / suspend	Enabled

Windows Components/Windows Messenger

Policy	Setting
Do not allow Windows Messenger to be run	Enabled
Do not automatically start Windows Messenger initially	Enabled

Windows Components/Windows Movie Maker

Policy	Setting
Do not allow Windows Movie Maker to run	Enabled

Figure 41: Managers users' group policy

Appendix D
Sample Computer Configurations

Windows Server Installation Documentation

Basic Information

Operating System	Windows Server 2003 Standard Edition		
Server Name	WHSERVER	NetBios Name	WHSERVER
Product Version		Installation Date	January '06
Time Zone	(GMT-05:00) Eastern time (US & Canada)		
Organization	Paragon	Company	Paragon Salons, Inc.

Physical Section

Memory	768 MB		
Physical Disk (1) Capacity	18 GB	File Name	
Physical Disk (2) Capacity	18 GB	File Name	
Physical Disk (3) Capacity		File Name	
RAID Configuration	RAID 1		
Logical Disks Capacity	C: 4.4 GB, D: 12.6 GB		
Dynamic Volumes			
Network Interface Card (1)	3Com Etherlink XL 10/100 PCI		
Network Interface Card (2)			
Network Interface Card (3)			
Network Interface Card (4)			

Windows Configuration

Server Role(s)	Domain Controller		
Domain/Workgroup Name	Paragon		
Protocol[s]	DHCP, DNS, RAS		
Server TCP/IP Address (1)	192.168.10.66	Subnet	255.255.255.192
Server TCP/IP Address (2)		Subnet	
Server TCP/IP Address (3)		Subnet	
Server TCP/IP Address (4)		Subnet	
DNS Server No 1	192.168.10.66	DNS Server No 2	
DHCP Configuration	Yes	Gateway Address	192.168.10.65
WINS No 1		WINS No 2	
Administrative Accounts	Administrator	Password	
Automatic Updates	Download and notify		

Installed Utilities, Service Packs, and Applications

Adobe Reader 7.0.7	Symantec Antivirus	
Dell Inkjet Printer J740	Symantec System Center	
LiveUpdate 2.6 (Symantec Corp)	WIBU-KEY Setup	
Microsoft Group Policy Management Console with SP1	Service Pack 1	
	Windows Support Tools	

Notes

All Services — Installed

Alerter	Intel File Transfer	Remote Procedure Call (RPC)	Terminal Services Session Directory
Application Experience Lookup Service	Intel PDS	Remote Procedure Call (RPC) Locator	Themes (Except 64 bit edition)
Application Layer Gateway Service (Except Web edition)	Intersite Messaging	Remote Registry	Uninterruptible Power Supply
Application Management	IPSEC Services	Removable Storage	Upload Manager
Automatic Updates	Kerberos Key Distribution Center	Resultant Ser Of Policy Provider	Virtual Disk Service
Background Intelligent Transfer Service	License Logging	Routing And Remote Access	Volume Shadow Copy
Clipbook	Logical Disk Manager	Secondary Logon	WebClient
COM+ Event System	Logical Disk Manager Administrative Service	Security Accounts Manager	Windows Audio
COM+ System Application	Messenger	Server	Windows Image Acquisition (WIA)
Computer Browser	MS Software Shadow Copy Provider	Shell Hardware Detection	Windows Installer
Crytographic Services	Net Logon	Smart Card	WMI
DCOM Server Process Launcher	NetMeeting Remote Desktop Sharing (Except 64 bit edition)	SNMP Service	WMI Driver Extensions
DHCP Client	NetSentinel	SNMP Trap Service	Windows Time
DHCP Server	Network Connections	Special Administration Console Helper	WinHTTP Web Proxy Auto-discorvery Service
Distributed File System	Network DDE	System Event Notification	Wireless Configuration
Distributed Link Tracking client	Network DDE DSDM	Symantec Antivirus Definition Watcher	WMI Performance Adapter
Distributed Link Tracking Server	Network Location Awareness (NLA)	Symantec Event Manger	Workstation
Distributed Transaction Coordinator	NT LM Security Support Provider	Symantec Network Drivers Service	
DNS Client	Performance Logs and Alerts	Symantec Password Validation	
DNS Server	Plug and Play	Symantec Settings Manager	**Others**
Error Reporting Service	Portable Media Serial Number (Except 64 bit edition)	Symantec SPBBCSvc	
Event Log	Print Spooler	Task Scheduler	
File Replication Service	Protected Storage	TCP/IP NetBIOS Helper	
Help and Support	Remote Access Auto Connection Manager	Telephony	
HTTP SSL	Remote Access Connection Manager	Telnet	
Human Interface Device Access	Remote Desktop Help Session Manager	Terminal Services	
IMAPI CD-Burning COM Service			
Indexing Service			
Intel Alert Handler			

Microsoft Windows XP Installation Documentation

Basic Information

Operating System	Windows XP Professional SP2		
Computer Name	ACCOUNTING	NetBios Name	ACCOUNTING
Product Version		Installation Date	01/06
User Name	bcm	Organization	Paragon Salons, Inc.

Physical Section

Memory	256 MB		
Physical Disk (1) Capacity	74.5 GB	File Name	
Physical Disk (2) Capacity		File Name	
Physical Disk (3) Capacity		File Name	
RAID Configuration	RAID 0 RAID 1 RAID 5 RAID 0+1 Other:		
Logical Disks Capacity	C: 74.5 GB		
Dynamic Volumes			
Network Interface Card (1)	Broadcom 440x 10/100 Integrated Controller		
Network Interface Card (2)			
Network Interface Card (3)			
Network Interface Card (4)			

Windows Configuration

Product Key		Time Zone	(GMT-05:00) Eastern time (US & Canada)	
Administrative Account	Administrator	Password		
Country or Region	United States of America	Area Code	513	
Regional Settings	English (United States)	Language Group	Western Europe and United States	
Domain/Workgroup Name	Paragon			
Protocol(s)	TCP/IP			
Computer TCP/IP Address (1)	DHCP	Subnet	255.255.255.192	Computer TCP/IP Address (2)
DNS Server #1	192.168.10.66	DNS Server #2	N/A	
DHCP Configuration	Yes	Gateway Address	192.168.10.65	
WINS Server #1		WINS Server #2	N/A	
Automatic Updates	Enabled: Every day @ 3:00 a.m.		Download Only	

Windows Components (**Bold** – Default Components)

Accessories and Utilities	**MSN Explorer**
Accessories	**Networking Services**
Calculator	**Internet Gateway Device Discovery and Control Client**
Character Map	**Outlook Express**
Clipboard Viewer	**Update Root Certificates**
Desktop Wallpaper	**Windows Media Player**
Document Templates	**Windows Messenger**
Mouse Pointers	
Paint	
Games	
Freecell	
Hearts	
Internet Games	
Minesweeper	
Solitaire	

Spider Solitaire	
Internet Explorer	

Installed Applications

Adobe Reader 7.0.7	**Symantec Antivirus**
Broadcom Management Programs	**WIBU-KEY Setup**
Dell Inkjet Printer J740	**Windows Installer 3.1**
Dell Solution Center	
Easy CD Creator 5 Basic	
HighMAT Extention to Microsoft Windows XP CD Writing Wizard	
HP Photo and Imaging 1.0 - HP PSC - HP OfficeJet	
HP Photo and Imaging 1.0 - HP PSC - HP OfficeJet	
HP Photo and Imaging 1.0 - HP PSC - HP OfficeJet Drivers	
Intel Extreme Graphics Driver	
Java 2 Runtime Environment, SE v1.4.2	
LiveUpdate 2.6 (Symantec Corporation)	
Microsoft Works 7.0	
OMCI	
Quickbooks Pro 99	

Windows Services (**Bold** – Default components)

Alerter	**Messenger**	**Smart Card**	**WMI Performance Adapter**
Application Layer Gateway Service	**MS Software Shadow Copy Provider**	Symantec Antivirus Definition Watcher	**Workstation**
Application Management	**Net Logon**	Symantec Event Manger	
Automatic Updates	**NetMeeting Remote Desktop Sharing**	Symantec Network Drivers Service	**OTHER:**
Background Intelligent Transfer Service	**Network Connections**	Symantec Password Validation	
Clipbook	**Network DDE**	Symantec Settings Manager	
COM+ Event System	**Network DDE DSDM**	Symantec SPBBCSvc	
COM+ System Application	**Network Location Awareness (NLA)**	**SSDP Discovery Service**	
Computer Browser	**Network Provisioning Service**	**System Event Notification**	
Cryptographic Services	**NT LM Security Support Provider**	**System Restore Service**	
DCOM Server Process Launcher	**Performance Logs and Alerts**	**Task Scheduler**	
DHCP Client	**Plug and Play**	**TCP/IP NetBIOS Helper**	
Distributed Link Tracking Client	**Portable Media Serial Number**	**Telephony**	
Distributed Transaction Coordinator	**Print Spooler**	**Telnet**	
DNS Client	**Protected Storage**	**Terminal Services**	
Error Reporting Service	**QoS RSVP**	**Themes**	
Event Log	**Remote Access Auto Connection Manager**	**Uninterruptible Power Supply**	
Fast User Switching Compatibility	**Remote Access Connection Manager**	**Universal Plug and Play Device Host**	
Help and Support	**Remote Desktop Help Session Manager**	**Volume Shadow Copy**	
HTTP SSL	**Remote Procedure Call (RPC)**	**WebClient**	
Human Interface Device Access	**Remote Procedure Call (RPC) Locator**	**Windows Audio**	
Iap	**Remote Registry**	**Windows Firewall/Internet Connection Sharing (ICS)**	
IMAPI CD-Burning COM Service	**Removable Storage**	**Windows Image Acquisition (WIA)**	
Indexing Service		**Windows Installer**	
IPSEC Services	**Routing and Remote Access**	**Windows Management Instrumentation (WMI)**	
	SavRoam	**WMI Driver Extensions**	

Logical Disk Manager	**Secondary Logon**	**Windows Time**	
Logical Disk Manager Administrative Service	**Security Accounts Manager**	**Wireless Zero Configuration**	
	Security Center		
	Server		
	Shell Hardware Detection		

Installed Patches and Updates

XP Service Pack 2		

Notes

Microsoft Windows XP Installation Documentation

Basic Information

Operating System	Windows XP Professional SP 2		
Computer Name	MTST2	NetBios Name	MTST2
Product Version		Installation Date	March 2006
User Name	bcm	Organization	Paragon Salons Inc.

Physical Section

Memory	112 MB		
Physical Disk (1) Capacity	37 GB	File Name	
Physical Disk (2) Capacity		File Name	
Physical Disk (3) Capacity		File Name	
RAID Configuration	RAID 0 RAID 1 RAID 5 RAID 0+1 Other:		
Logical Disks Capacity	C: 33.8 GB; D: 3.43 GB		
Dynamic Volumes			
Network Interface Card (1)	Realtek RTL8139 Family PCI Fast Ethernet		
Network Interface Card (2)			
Network Interface Card (3)			
Network Interface Card (4)			

Windows Configuration

Product Key		Time Zone	(GMT-05:00) Eastern time (US & Canada)	
Administrative Account	Administrator	Password		
Country or Region	United States of America	Area Code	513	
Regional Settings	English (United States)	Language Group	Western Europe and United States	
Domain/Workgroup Name	Paragon Domain			
Protocol(s)	TCP/IP			
Computer TCP/IP Address (1)	DHCP	Subnet	255.255.255.192	
Computer TCP/IP Address (3)	N/A	Subnet	N/A	
DNS Server #1	192.168.10.130	DNS Server #2	N/A	
DHCP Configuration	Yes	Gateway Address	192.168.10.129	
WINS Server #1		WINS Server #2	N/A	
Automatic Updates	Enabled: Everyday @ 3:00 a.m.		Download & Install	

Windows Components (**Bold** – Default Components)

Accessories and Utilities	**Internet Explorer**
Accessories	**MSN Explorer**
Calculator	**Networking Services**
Character Map	**Internet Gateway Device Discovery and Control Client**
Clipboard Viewer	**Outlook Express**
Desktop Wallpaper	**Update Root Certificates**
Document Templates	**Windows Media Player**
Mouse Pointers	**Windows Messenger**
Paint	
Games	
Freecell	
Hearts	

Internet Games	
Minesweeper	
Solitaire	
Spider Solitaire	

Installed Applications

Adobe Acrobat 5.0	**Microsoft Works 7.0**	**WIBU-KEY Setup**
CCleaner	**PS2**	**Windows Installer 3.1**
Coloreal	**Readiris 7.5**	**Windows Defender**
HihgMAT Extension to Mic. Win. XP CD Writing Wiz.	**RealOne Player**	
hp instant support	**RecordNow**	
HP Photo and Imaging 1.0 - HP PSC - HP Officejet	**RecordNow Update Manger**	
Inactive HP Printer Drivers	**S3Display**	
Indeo Software	**S3Gamma2**	
Intel 82845G Graphics Driver Software	**S3Info2**	
Java 2 Runtime Environment Standard Edition	**Simple Installer - Multilanguage Version**	
Java 2 Runtime Environment, SE v1.4_01	**Symantec Antivirus**	
Java Web Start	**Viewpoint Media Player**	
KBD		
LiveReg (Symantec Corp)		
LiveUpdate2.6 (Symantec Corp)		

Windows Services (Bold – Default Services)

Alerter	**Messenger**	**Server**	**WMI Performance Adapter**
Application Layer Gateway Service	**MS Software Shadow Copy Provider**	**Shell Hardware Detection**	**Workstation**
Application Management	**Net Logon**	**Smart Card**	
Automatic Updates	**NetMeeting Remote Desktop Sharing**	Smart Card Helper	**OTHER:**
Background Intelligent Transfer Service	**Network Connections**	**SSDP Discovery Service**	
Clipbook	**Network DDE**	Symantec Antivirus Definition Watcher	
COM+ Event System	**Network DDE DSDM**	Symantec Event Manger	
COM+ System Application	**Network Location Awareness (NLA)**	Symantec Network Drivers Service	
Computer Browser	**Network Provisioning Service**	Symantec Password Validation	
Content Monitoring Tool	**NT LM Security Support Provider**	Symantec Settings Manager	
Cryptographic Services	**Performance Logs and Alerts**	Symantec SPBBCSvc	
DCOM Server Process Launcher	Pml Driver HPZ12	**System Event Notification**	
DHCP Client	**Plug and Play**	**System Restore Service**	
Distributed Link Tracking Client	**Portable Media Serial Number**	**Task Scheduler**	
Distributed Transaction Coordinator	**Print Spooler**	**TCP/IP NetBIOS Helper**	
DNS Client	**Protected Storage**	**Telephony**	
Error Reporting Service	**QoS RSVP**	**Telnet**	
Event Log	**Remote Access Auto Connection Manager**	**Terminal Services**	
Fast User Switching Compatibility	**Remote Access Connection Manager**	**Themes**	
Fax	**Remote Desktop Help Session Manager**	**Uninterruptible Power Supply**	
Help and Support	**Remote Procedure Call (RPC)**	**Universal Plug and Play Device Host**	
HTTP SSL	**Remote Procedure Call (RPC)**	**Volume Shadow Copy**	

	Locator		
Human Interface Device Access	**Remote Registry**	**WebClient**	
IMAPI CD-Burning COM Service	**Removable Storage**	**Windows Audio**	
Indexing Service	**Routing and Remote Access**	**Windows Firewall/Internet Connection Sharing (ICS)**	
IPSEC Services	SavRoam	**Windows Image Acquisition (WIA)**	
Logical Disk Manager	**Secondary Logon**	**Windows Installer**	
Logical Disk Manager Administrative Service	**Security Accounts Manager**	**Windows Management Instrumentation (WMI)**	
	Security Center	**WMI Driver Extensions**	
		Windows Time	
		Wireless Zero Configuration	

Installed Patches and Updates

Service Pack 2		

Notes

Microsoft Windows XP Installation Documentation

Basic Information

Operating System	Windows XP Professional		
Computer Name	WHST2	NetBios Name	WHST2
Product Version		Installation Date	January '06
User Name	bcm	Organization	Paragon Salons, Inc.

Physical Section

Memory	512 MB		
Physical Disk (1) Capacity	37 GB	File Name	
Physical Disk (2) Capacity		File Name	
Physical Disk (3) Capacity		File Name	
RAID Configuration	RAID 0 RAID 1 RAID 5 RAID 0+1 Other:		
Logical Disks Capacity	C: 37GB		
Dynamic Volumes			
Network Interface Card (1)	Intel PRO/100 VE		
Network Interface Card (2)			
Network Interface Card (3)			
Network Interface Card (4)			

Windows Configuration

Product Key			Time Zone	(GMT-05:00) Eastern time (US & Canada)	
Administrative Account	Administrator		Password		
Country or Region	United States of America		Area Code	513	
Regional Settings	English (United States)		Language Group	Western Europe and United States	
Domain/Workgroup Name	Paragon				
Protocol(s)	TCP/IP				
Computer TCP/IP Address (1)	DHCP	Subnet	255.255.255.192	Computer TCP/IP Address (2)	N/A
Computer TCP/IP Address (3)	N/A	Subnet	N/A	Computer TCP/IP Address (4)	N/A
DNS Server #1	192.168.10.66	DNS Server #2	N/A		
DHCP Configuration	Yes No	Gateway Address	192.168.10.65		
WINS Server #1	<default>	WINS Server #2	N/A		
Automatic Updates	Enabled: Everyday @ 3:00 a.m.		Download & Install		

Windows Components (**Bold** – Default Components)

Accessories and Utilities	**Internet Explorer**
Accessories	**MSN Explorer**
Calculator	**Networking Services**
Character Map	**Internet Gateway Device Discovery and Control Client**
Clipboard Viewer	**Outlook Express**
Desktop Wallpaper	**Update Root Certificates**
Document Templates	**Windows Media Player**
Mouse Pointers	**Windows Messenger**
Paint	
Games	

Freecell	
Hearts	
Internet Games	
Minesweeper	
Solitaire	
Spider Solitaire	

Installed Applications

Ad-Aware SE Personal		
Adobe Download Manager 2.0		
Adobe Reader 7.0.7		
Adobe Photshop Album Starter Edition 3.0		
HP LaserJet 4100 Uninstaller		
Intel Extreme Graphics 2 Driver		
Intel PRO Network Connections Drivers		
Intel PROSet		
Java 2 Runtime Environment, SE v1.4.2_03		
LiveUpdate 2.6 (Symantec Corp)		
Spybot - Search & Destroy 1.4		
Symantec Antivirus		
WIBU-KEY Setup		
Windows Installer 3.1		
Yahoo! Toolbar		

Windows Services (Bold – Default Services)

Alerter	**Messenger**	**Server**	**Windows Management Instrumentation (WMI)**
Application Layer Gateway Service	**MS Software Shadow Copy Provider**	**Shell Hardware Detection**	**WMI Driver Extensions**
Application Management	**Net Logon**	**Smart Card**	**Windows Time**
Automatic Updates	**NetMeeting Remote Desktop Sharing**	**SSDP Discovery Service**	**Wireless Zero Configuration**
Background Intelligent Transfer Service	**Network Connections**	Symantec Antivirus Definition Watcher	**WMI Performance Adapter**
Clipbook	**Network DDE**	Symantec Event Manger	**Workstation**
COM+ Event System	**Network DDE DSDM**	Symantec Network Drivers Service	
COM+ System Application	**Network Location Awareness (NLA)**	Symantec Password Validation	**OTHER:**
Computer Browser	**Network Provisioning Service**	Symantec Settings Manager	
Cryptographic Services	**NT LM Security Support Provider**	Symantec SPBBCSvc	
DCOM Server Process Launcher	**Performance Logs and Alerts**	**System Event Notification**	
DHCP Client	**Plug and Play**	**System Restore Service**	
Distributed Link Tracking Client	**Portable Media Serial Number**	**Task Scheduler**	
Distributed Transaction Coordinator	**Print Spooler**	**TCP/IP NetBIOS Helper**	
DNS Client	**Protected Storage**	**Telephony**	
Error Reporting Service	**QoS RSVP**	**Telnet**	
Event Log	**Remote Access Auto Connection Manager**	**Terminal Services**	
Fast User Switching Compatibility	**Remote Access Connection Manager**	**Themes**	
Help and Support	**Remote Desktop Help Session Manager**	**Uninterruptible Power Supply**	
HTTP SSL	**Remote Procedure Call (RPC)**	**Universal Plug and Play Device Host**	
Human Interface Device	**Remote Procedure Call**	**Volume Shadow Copy**	

Access	**(RPC) Locator**		
IMAPI CD-Burning COM Service	**Remote Registry**	**WebClient**	
Indexing Service	**Removable Storage**	**Windows Audio**	
IPSEC Services	**Routing and Remote Access**	**Windows Firewall/Internet Connection Sharing (ICS)**	
Logical Disk Manager	**Secondary Logon**	**Windows Image Acquisition (WIA)**	
Logical Disk Manager Administrative Service	**Security Accounts Manager**	**Windows Installer**	
	Security Center		

Installed Patches and Updates

XP Service Pack 2		

Notes

Appendix E
Port Scan Tests

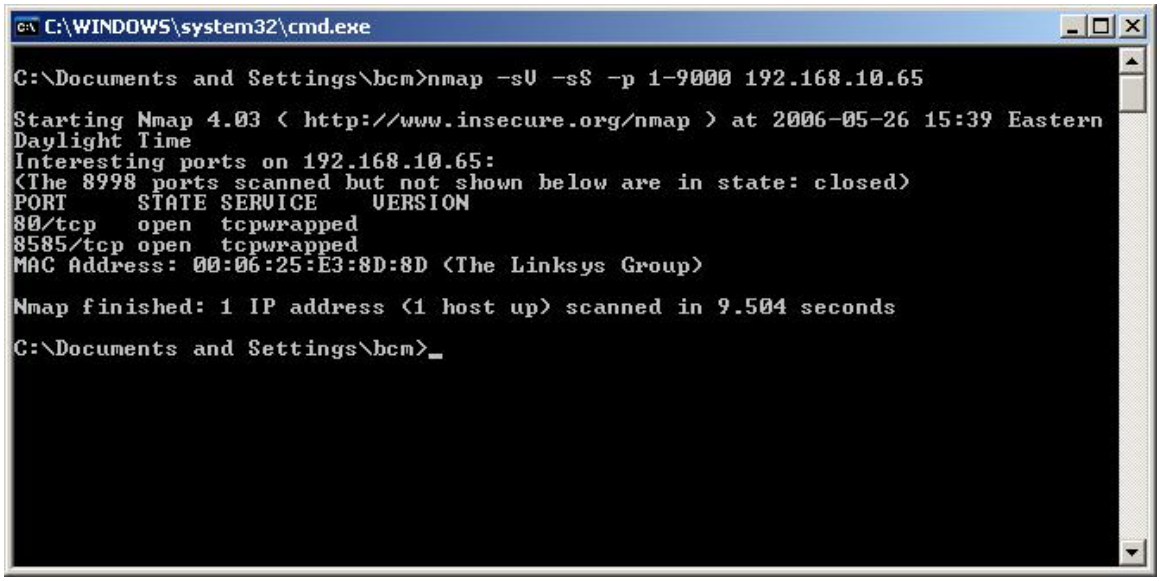

Figure 42: Western Hills internal port scan

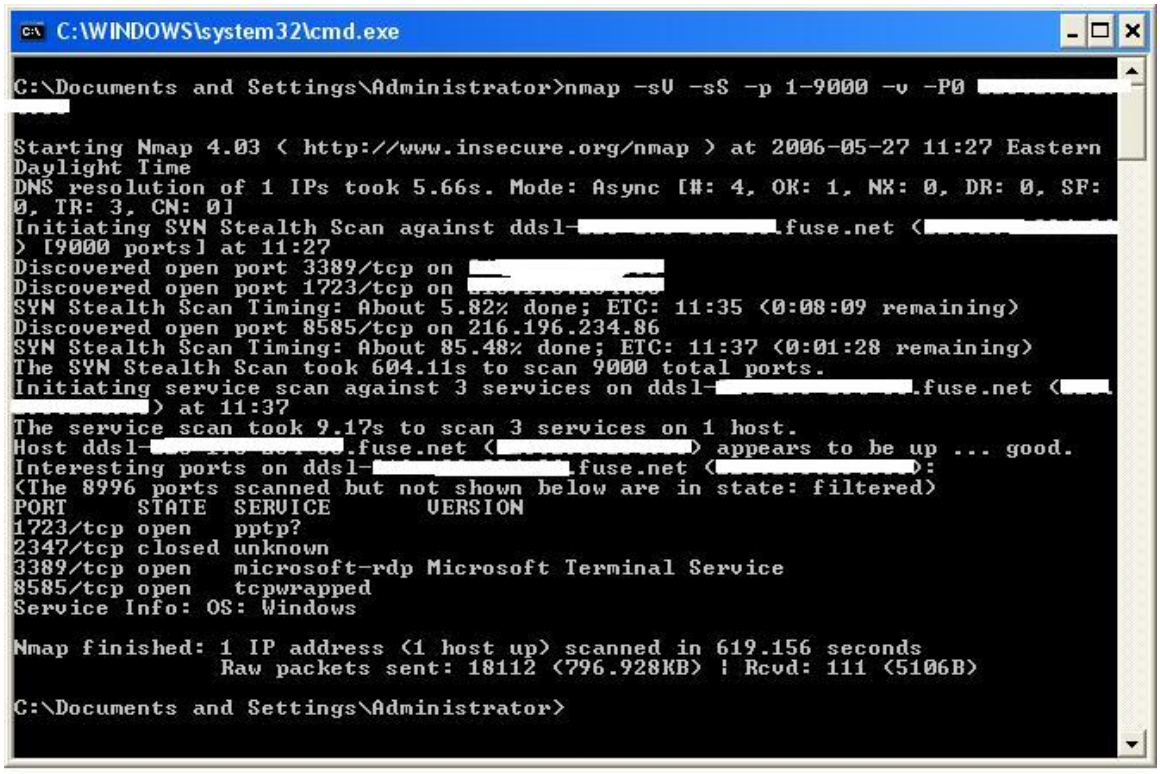

Figure 43: Western Hills external ports scan

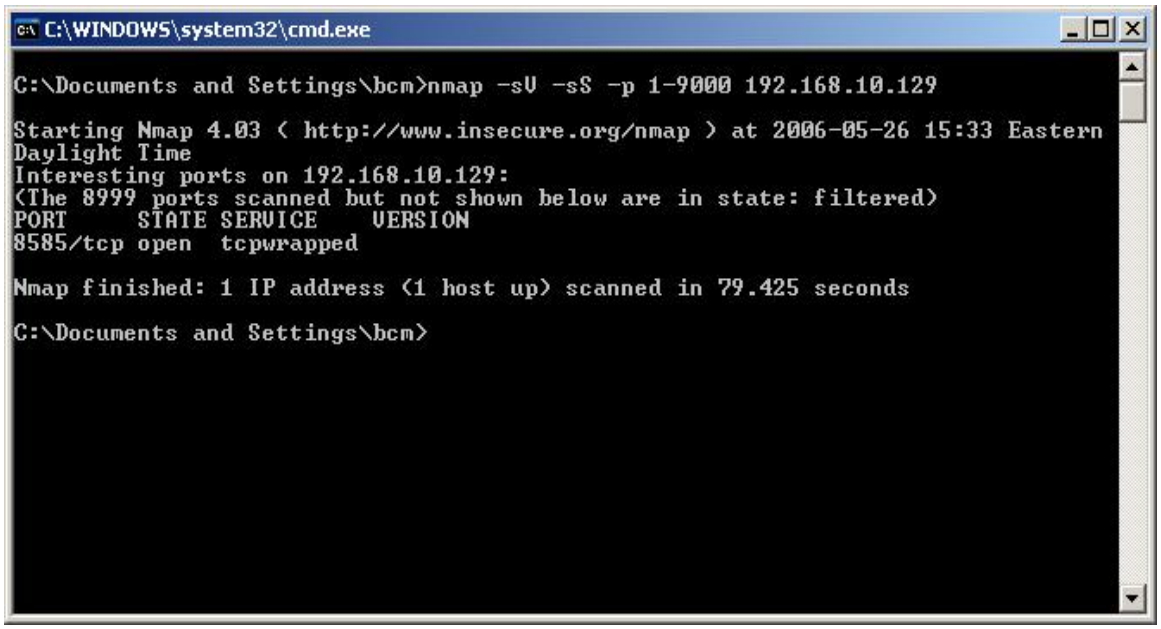

Figure 44: Montgomery internal ports scan

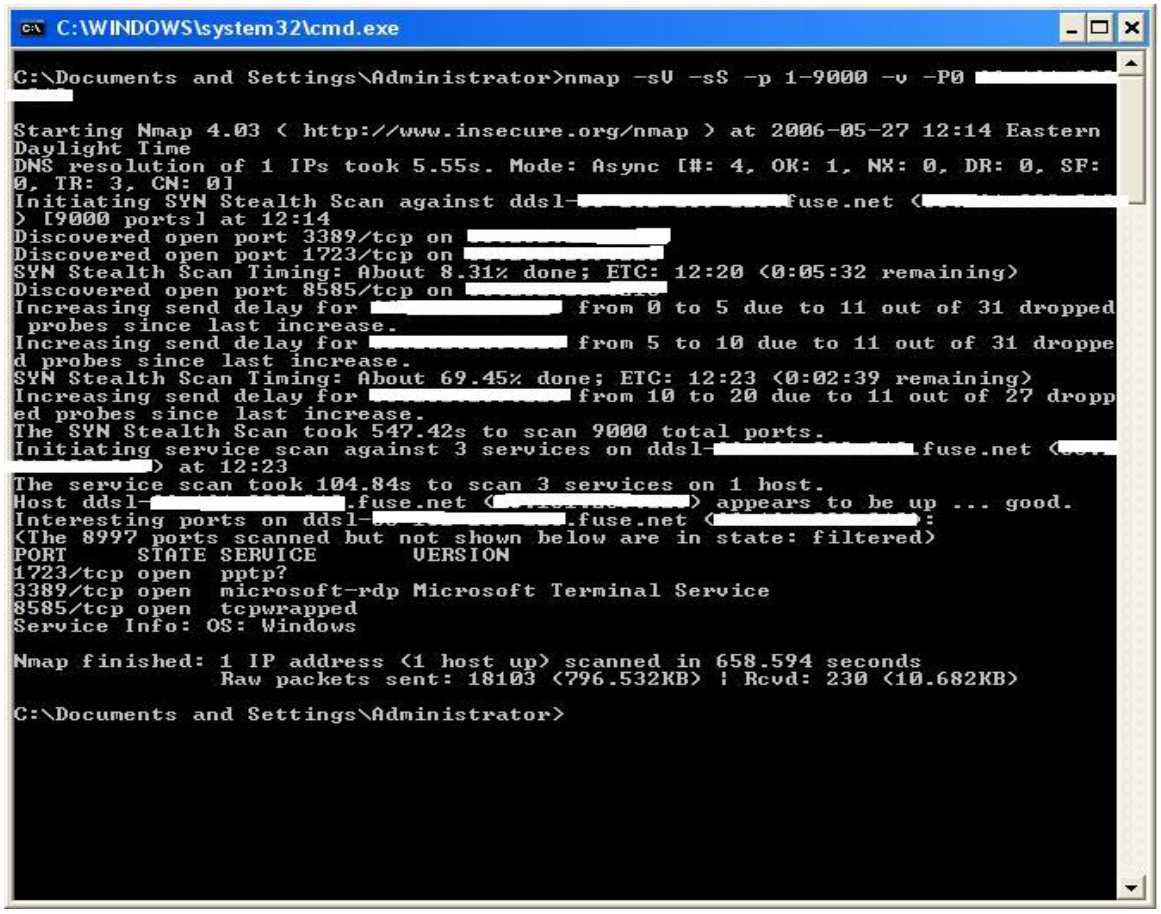

Figure 45: Montgomery external ports scan

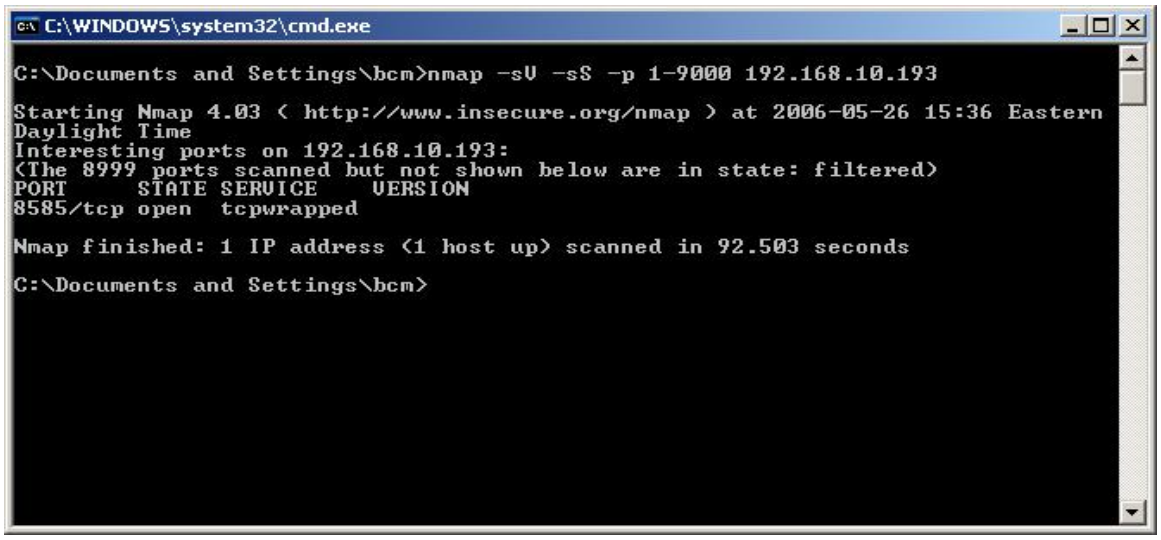

Figure 46: Downtown internal ports scan

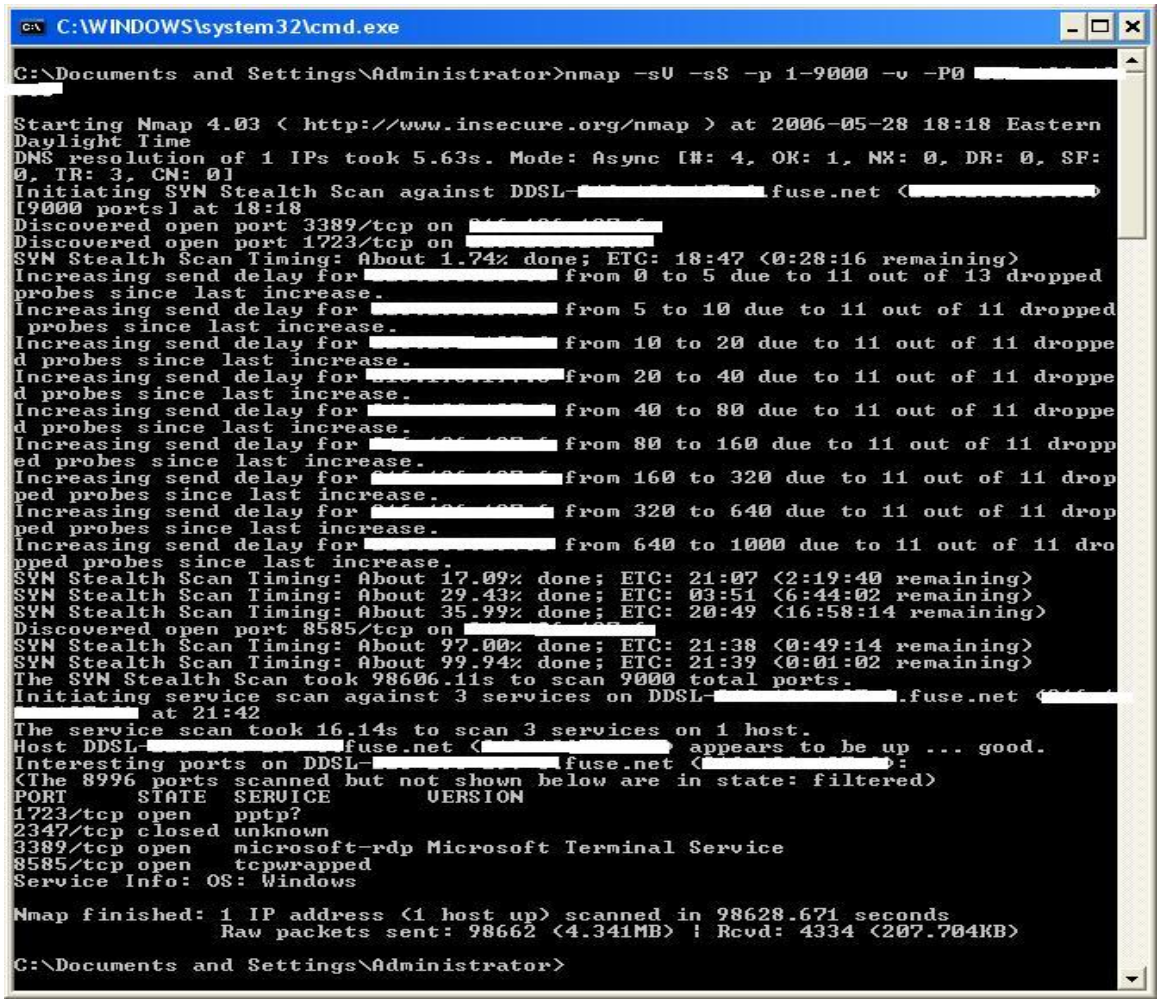

Figure 47: Downtown external ports can

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   visited: 2/27/06

2. http://support.microsoft.com/kb/291382/en-us
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   visited: 2/24/06

4. Palmer, Michael. Hands-On Microsoft Windows Server 2003. Boston: Course Technology, 2003.

5. Thomsho, Greg, Ed Tittel, and David Johnson. Guide to Networking Essentials. Canada: Course Technology, 2003.