



**L440GX+ Server Board**  
**Multi-Purpose Server Integration Guide**  
**Using Microsoft\* Windows NT\* 4.0**

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## **Integrating an Intel® L440GX+ Server Board as a Multi-Purpose High Performance Server**

### **Safety Warning:**

Whenever working in the system ensure the power cord is fully disconnected. Power supplies that support Wake-On Lan\* or the Emergency Management Port (EMP) provide a continuous 800 milliamps, +5v standby voltage to the system board.

### ***Assumptions***

This installation procedure assumes the reader is installing Microsoft Windows NT 4.0 Server on a server system built with an Intel L440GX+ server board and an Intel® Astor II server chassis. In addition, it is assumed seven new or unformatted hard drives are being used: 2 EIDE hard drives for installation and mirroring of the Operating System (O/S), and 5 identical SCA2 Ultra2 Wide SCSI “hot-swap” hard drives for setting up a RAID 5 disk array. The first two hard drives for installing the O/S should be at least 1GB and the other five can be almost any capacity, but it is recommended that they be identical. It is further assumed that a RAID controller add-in card is used for controlling the RAID 5 disk array and that the onboard Adaptec\* AIC-7896 Ultra2 SCSI controller is used for controlling the SCSI tape device. The networking protocol assumed for this installation is TCP/IP and the network adapter used is assumed to be the onboard Intel 82559 single-chip Ethernet\* adapter. The Intel 82559 on-board NIC is functionally equivalent to the Intel® PRO/100+ network interface controller. Refer to Windows NT documentation for details on network protocols and other information if necessary.

Note: No UPS (un-interruptable power supply) was integrated with the server system in this example. Intel strongly recommends the use of a UPS to back up the power source of any server that contains critical customer data.

### ***Hardware Integration Overview***

- ❖ Prepare the Astor II Server Chassis Sub-Assembly Kit for server board installation according to instructions included with the chassis.
- ❖ Install the L440GX+ Server board into the Astor II Server Chassis.
- ❖ Install the Pentium® III Processor(s) and/or termination cards on the L440GX+ Server board.
- ❖ Install the Memory DIMM(s) on the L440GX+ server board.
- ❖ Install the Floppy disk drive into the Astor II Chassis.
- ❖ Install an IDE ATAPI CD-ROM drive into the bottom 5.25” external drive bay.
- ❖ Install a SCSI tape device into the top 5.25” external drive bay.
- ❖ Install the 5 SCA2 Ultra2 Wide SCSI hard drives into the 3.5” hot-swap drive cage and reinstall the drive bay into the chassis.

- ❖ Install the RAID controller add-in card in an available PCI slot<sup>1</sup>.
- ❖ Install the two EIDE boot drives into the internal IDE drive bay.
- ❖ Connect all appropriate power and signal cables.

### ***Integration Tips***

For this configuration two Western Digital\* Caviar\* 12100 2.1GB EIDE drives were installed in the internal IDE drive bay for use as a mirrored O/S boot drive. The outermost drive was configured as the Master and the innermost drive as the Slave, via jumpers on the drives. They were both connected to the IDE cable attached to the Primary IDE channel connector on the server board. The IDE CD-ROM was connected to a second IDE cable, not included with the server board, as the Master attached to the secondary IDE channel on the server board. The RAID controller was placed in PCI slot 5 so as to operate as the single device on a dedicated PCI bus, and connected to the Astor II server chassis Ultra2 (LVD) “hot-swap” SCSI back plane with the two-connector wide SCSI cable supplied with the Astor II. The Astor II SCSI backplane handles all termination requirements and SCSI ID assignments of the SCA2 hard drives. The SCSI tape drive was attached to the single ended SCSI connector on the server board, closest to the front of the chassis, with the wide SCSI cable supplied with the server board.

### ***Software Utilities***

#### *System Setup Utility*

The System Setup Utility (SSU) is a utility that should be run whenever the hardware configuration of the server is changed. It assists the integrator in configuring the system and saves the configuration to non-volatile memory of the server board (NVRAM). The configuration can also be saved to a floppy diskette for backup and ease in the integration of multiple servers with the same hardware configuration. The SSU can be run by booting the server to the resource CD-ROM provided with the server board, and selecting <Run Utilities> and then <System Setup Utility>. Additionally, the SSU can be run from a set of three bootable diskettes, which can be made from the resource CD-ROM by booting to it and selecting <make diskettes by function> and then <SSU>. The diskettes can also be made by inserting the CD into a PC running Microsoft Windows 95/98 or NT 4.0 and selecting <Utilities> from the left-hand menu bar of the Autorun 32bit graphical user interface (gui) program that launches. Select <SSU> from the pulldown menu at the top of the display and click on <create diskette> in the upper right corner of the application.

#### *Field Replaceable Unit/Sensor Data Record (FRU/SDR) Utility*

The FRU/SDR Utility is a utility that only need be run upon initial server configuration and if the total number of fans in the server system changes. Processor active heatsinks

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<sup>1</sup> The PCI slots chosen for specific add-in cards should be selected with the overall system configuration in mind. Refer to the Intel L440GX+ server board Technical Product Specification (TPS) for further details on PCI IRQ routing to assist in determining optimum slots to use based on system configuration. PCI slot 5 was used in this configuration.

(fansinks), as well as system fan SDRs are loaded by the FRU/SDR Utility. In layman terms, the FRU/SDR utility programs the NVRAM of the Baseboard Management Controller (BMC) with the number of fans in the system and where they are connected for proper server management monitoring of fan health. The FRU/SDR Utility can be run from a bootable diskette that can be made by booting to the Resource CD-ROM and selecting <Create diskettes>, <Create disks by function> and then <FRU-SDR>. Similar to the SSU, the diskette can also be made by inserting the CD into a PC running Microsoft Windows 95/98 or NT 4.0 and selecting <Utilities> from the left-hand menu bar of the Autorun 32bit gui program that launches. Select <FRU-SDR> from the pulldown menu at the top of the display and click on <create diskette> in the upper right corner of the display application.

For further details on either the SSU or FRU/SDR Utilities, refer to the L440GX+ server board Product Guide, also available on the Resource CD-ROM that ships with the product.

#### *L440GX+ Diagnostics*

The L440GX+ Diagnostics are a specific iteration of Intel “PCDiags,” a diagnostic utility used by the Intel factory during the manufacturing process to verify proper server board operation. It is comprised of many different test modules designed to stress the server board and “hot-swap” SCSI back-plane board level components in addition to the processors, memory, and hard disk drives. The diagnostics are intended to be run on a configured system to verify proper hardware integration and operation prior to loading of the O/S.<sup>2</sup> The L440GX+ Diagnostics can be run from a bootable diskette that can be made by booting to the Resource CD-ROM and selecting <Create diskettes>, <Create disks by function> and then <BYODiags>. The diskette can also be made by inserting the Resource CD-ROM into a PC running Microsoft Windows 95/98 or NT 4.0 and selecting <Utilities> from the left-hand menu bar of the Autorun 32bit gui program that launches. Select <Diagnostics> from the pulldown menu at the top of the display and click on <create diskette> in the upper right corner of the display application.

For further details on the L440GX+ Diagnostics refer to the *L440GX+ Server Board Diagnostics Installation and Operating Instructions*, available from the pop-up menu in the “Utilities” section of the “autorun” L440GX+ resource CD-ROM.

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<sup>2</sup> The L440GX+ Diagnostics Hot-Swap Controller (HSC) tests will not run properly with an add-in RAID controller card connected to the Astor II server chassis “hot-swap” SCSI back-plane. Run the diagnostics with the Adaptec SCSI controller on the L440GX+ server board connected directly to the “hot-swap” SCSI back-plane of the Astor II server chassis.

## Creating and initializing a RAID 5 drive array with the Mylex\* AcceleRAID\* 250 (DAC960PTL-1\*) PCI to Ultra2 SCSI RAID Controller

1. Ensure that you have the latest BIOS and upgrade if necessary. Power up your system and note at the initial screen what level of BIOS is installed. The latest BIOS can be downloaded from: <http://support.intel.com/support/motherboards/server/l440gx/software.htm>
2. Place the AcceleRAID 250 on an anti-static work space and configure jumper JP10 to disable SCSI Interrupt Steering Logic (SISL).<sup>3</sup>

**Note: The default condition for jumper JP10 enables SISL and will prevent the controller from functioning when integrated with the L440GX+ server board.**

3. ***Ensure the system is powered off and unplugged*** prior to opening the chassis. Insert the Mylex AcceleRAID 250 into any available PCI slot.

**Note:** Consideration should be given to the overall intended system configuration and the interrupt routing scheme of the L440GX+ server board when selecting a slot for the AcceleRAID 250. The L440GX+ server board's interrupt routing scheme is described in the L440GX+ server board Technical Product Specification (TPS) that can be found on the L440GX+ support website: <http://support.intel.com/support/motherboards/server/l440gx>.

PCI slot four should be used last when configuring the server if the onboard Adaptec\* AIC-7896\* Ultra2 SCSI controller is also intended to be used in the system. This is because PCI slot four shares the primary PCI interrupt (PCI\_Int\_A) with the AIC-7896. The L440GX+ has two peer PCI busses, one implemented via the Intel® 21150 AGP-PCI bridge, so it is possible to place the RAID controller on what could be configured as a dedicated bus, ideal for optimal PCI RAID to Ultra2 SCSI performance. PCI slot five is the best choice for this implementation as it is the slot on the secondary PCI bus (PCI Slots 5 & 6) that retains a dedicated primary interrupt, i.e. unshared.

4. Connect the two – connector Wide SCSI cable that ships with the Astor II server chassis from the internal 68 pin connector on the upper edge of the AcceleRAID 250 (connector J1) to the 68 pin connector on the managed Hot-Swap SCSI Back-plane (HSBP).
5. Power on the system and boot to the L440GX+ server board Resource CD-ROM that ships with the server board. During the server's Power On Self Test (POST) note that the Mylex Option-ROM loads and then the appropriate SCSI devices are displayed as well.

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<sup>3</sup> SISL is a technology that enables a RAID controller in a specific slot on a server board to use the SCSI channels embedded on the server board for RAID control. In order to function properly, SISL must be supported by both the SCSI controller on the server board and the RAID controller add-in card. While the Mylex AcceleRAID 250 supports SISL, the Adaptec AIC-7896 does not.

6. The ROM-DOS\* operating system will load from the CD and display a set of basic menus. Using the cursor arrows select **<Run Utilities>** and then **<System Setup Utility>**.
7. When the SSU is finished loading select the Resource Configuration Add-in (RCA) and it will ask you if you want to restore the system configuration from a backup. Select **<No>** and the SSU will probe the server's hardware.
8. You should see the RAID controller displayed and can view the system resources it has allocated to it at this time. Select **<Save>** and the configuration will be saved to the server's Non-Volatile Flash memory. You will then also be asked if you desire to backup the configuration to a file. Insert a blank floppy diskette labeled as the "SSU configuration backup" into drive A: and Select **<Yes>**. Exit the SSU.
9. Restart the server and remove the L440GX+ Resource CD-ROM from the server.
10. During the server's Power On Self Test (POST), select **<ALT-M>** to access the AcceleRAID BIOS set-up options menu. Ensure that the AcceleRAID BIOS is enabled and change any other options you desire. For purposes of this example, default values will be used. Please refer to the AcceleRAID Installation Guide for further details.
11. During POST, select **<ALT-R>** to run the Mylex DACCF utility from the BIOS of the RAID controller.
12. The DACCF utility will search for and spin up the SCSI drives in the system. This may take a few minutes.
13. To create a RAID5 array using 3 or more identical drives choose "Automatic Configuration" from the Main Menu of the DACCF utility. This is the easiest method to configure a RAID array.
14. The program will prompt: "Do you wish to have a standby drive." A standby drive is also known as a "Hot Spare." A standby drive is an installed, unused drive that automatically replaces a drive that fails. It must be in addition to the drives required for the RAID (i.e. at least 3 drives + 1 for the standby.) The standby drive should be an identical drive to the drives in the RAID but a drive at least as large as the biggest drive in the array may be used. A Standby drive was available and desired in this configuration so **<Yes>** was chosen.
15. The program will prompt: "Do you want to have Write Cache enabled?" Select **<NO>** to set the write policy of the system drive to "write through."<sup>4</sup>
16. The system will show: "Saving Configuration, please wait."
17. A screen will appear which details the number of system drives, RAID level, cache settings, number of physical drives, and capacity of the drives. It should also display "Automatic Configuration successfully done. Created system drive is available for immediate use."
18. Select **<Enter>** to go to the main menu.

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<sup>4</sup> A "write back" policy results in better performance under light to medium loads at the expense of fault tolerance. In a power failure/system crash, any data in the cache will be lost, unless an optional cache battery backup is used. A "write through" policy will result in somewhat lower performance, but no data can be lost in a power failure/system crash.



19. **Backing up the configuration to floppy.**<sup>5</sup> From the main menu of DACCF utility, choose <**07. Tools**>. The program will respond: “Starting drive(s) Please wait.”
20. From the Tools menu choose <**Backup/Restore configuration**>.
21. At the caution prompt press any key to continue.
22. At the “Backup/Restore Configuration” prompt, choose <**Backup Configuration**>.
23. Insert a blank formatted floppy and enter the filename at the prompt: **a:\filename**. Where “filename” is the name of the configuration file. Example: **a:\RaidConf** to save to the “A” drive with the filename “Raidconf”
24. At the warning: “Existing File, if any will be overwritten!” choose <**YES**>. The program will respond with “Saving Configuration to a file.” And then “Configuration saved to a file. Press any key to continue.”
25. Press any key, then <**ESC**>
26. It is advisable to make a second copy of the configuration information also. One copy can be taken off site and the other taped into the server chassis to ensure it will be available if needed.
27. **Initializing the array.** From the main menu of the DACCF utility choose <**05. Initialize System Drive**>
28. From the “Initialize System Drive” menu choose <**1. Select System Drive**>
29. Using the arrow keys move the cursor over one of the created system drives and select <**ENTER**> on it. A check will appear to it. If there are additional system drives that have been created which you would like to initialize select them also.
30. Select <**ESC**> to return to the “Initialize System Drive” menu.
31. Select <**2. Start Initialization**>
32. At the prompt: “Do you want to proceed with initialization?” select <**YES**>
33. The initialization process will take awhile, dependent on the capacity of the drives in use. After the initialization is complete, select any key (as prompted) to save the configuration.
34. **Exiting the DACCF Utility Software.** At the main menu select <**ESC**> to exit the software.
35. The program will prompt you to make sure that you have made a backup of the configuration and ask you if you really want to exit. Choose <**YES**>.
36. Remove the floppy from the “A” drive.
37. The system is now ready to have the operating system installed.

Note: For greater detail on integrating the Mylex AcceleRAID 250 product with the L440GX+ server board, please refer to *L440GX+ Server Board Installation and Operating Summary of the Mylex\* AcceleRAID\* 250 (DAC960PTL-1\*) RAID Controller posted to <http://support.intel.com/support/motherboards/server/l440gx>* and to the detailed Mylex literature that ships with the RAID card.

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<sup>5</sup> Backing up the configuration to floppy is strongly recommended as it allows the array configuration to be restored if it is lost. This is useful if for some reason the RAID card fails. A new card can be installed and the configuration loaded. Without the configuration, the exact configuration must be re-created with the DACCF utility or the data on the RAID array will be unreadable.

## Installing Microsoft Windows NT Server 4.0

**NOTE:** When operating under Microsoft Windows NT Server 4.0 it is recommended to use at least 32MB of memory for each processor installed in the system. For Windows NT Server 4.0 64MB is good starting point for amount of memory but more is almost always better. More memory will increase system performance under multi-tasking loads including user file/print requests. A list of qualified memory modules for the L440GX+ server board can be downloaded from the following web site:  
<http://support.intel.com/support/motherboards/server/l440gx/compat.htm>

For this configuration 4 128MB DIMM modules were used for a total of 512MB of SDRAM.

### Pre-Installation Steps

- A) Label a blank high density (HD) formatted 3.5" floppy disk "Emergency Repair Disk" and have it available for use during the install routine.
- B) Determine what protocol(s) this server will be running. Assuming TCP/IP record information below.

IP Address	_____
Subnet Mask	_____
Default Gateway	_____
Machine Name	_____

**NOTE:** It is not recommended to use DHCP to assign the IP information of a server.

- C) Using the L440GX+ Server Board Resource CD-ROM that came with your L440GX+ Server Board to create a set of Windows NT driver disks. You will need 5 formatted, blank, high-density floppy disks. There are two ways to create the driver diskettes.

Option 1: Boot to the CD-ROM, select <create diskettes>, <create diskettes by operating system>, and then <Windows NT>.

Option 2: Insert the CD into a PC running Windows 95/98 or NT 4.0 and select the "Drivers" from the left-hand menu bar of the autorun gui program that launches. Select <Windows NT 4.0> from the pulldown menu labeled <select an OS> at the top of the display and click on <create diskette> in the upper right corner of the display application.

- i. A "DOS\* box" will pop up for each diskette to be created.
- ii. Insert a blank high-density disk into the A: drive and hit <Enter> to extract the network drivers to the floppy drive. A percentage number will be displayed indicating extraction progress. Once completed eject the disk and label it L440GX+ Pro100 NIC NT 4.0 drivers
- iii. Insert another blank high-density disk into the A: drive and hit <Enter> to extract the SCSI drivers to the floppy drive. A percentage number will be displayed

- indicating extraction progress. Once completed eject the disk and label it L440GX+ Adaptec 7800 Family Manager Win 95/98 NT 4.0 drivers.
- iv. Insert another blank high-density disk into the A: drive and hit <Enter> to extract disk 1 of the Adaptec EZ-SCSI\* utility to the floppy drive. A percentage number will be displayed indicating extraction progress. Once completed eject the disk and label it L440GX+ Adaptec EZ-SCSI for NT 4.0, disk 1 of 2.
  - v. Insert another blank high-density disk into the A: drive and hit <Enter> to extract disk 2 of the EZ-SCSI utility to the floppy drive. A percentage number will be displayed indicating extraction progress. Once completed eject the disk and label it L440GX+ Adaptec EZ-SCSI for NT disk 2 of 2.
  - vi. Insert another blank high-density disk into the A: drive and hit <Enter> to extract the Cirrus Logic\* Video drivers to the floppy drive. A percentage number will be displayed indicating extraction progress. Once completed eject the disk and label it L440GX+ Cirrus GD5480 video drivers for NT .
  - vii. After the 5<sup>th</sup> disk has been created the menu utility should be displayed again.
  - viii. Select "Quit to DOS" and hit <Enter> to exit the application.

Note: In addition to the functionality listed above, the drivers are provided in an "expanded" (unzipped) format in the \diskimage\ directory of the CD-ROM for install directly off the CD where applicable. There are individual subdirectories for LAN, SCSI, and Video, broken down further by operating system.

### **Microsoft Windows NT Server 4.0 Installation Steps<sup>6</sup>**

1. Insert the Microsoft Windows NT 4.0 Server - Setup Disk 1 into the 3.5" floppy drive and power on the system. Insert the Microsoft Windows NT 4.0 Server CD into CD-ROM drive after the system has started booting from the floppy drive.
2. System will automatically start the installation and will prompt you for Disk 2. Insert Disk 2 and hit <Enter> to continue. An initial Windows NT screen will appear recognizing one processor (regardless of what you actually have installed), the amount of memory present, and a multi-processing kernel. This is normal at this stage.
3. After 3 to 5 minutes the "Welcome to Setup" screen will appear. Press <Enter> to continue.
4. The next screen will ask you if you want to run or skip automatic detection of mass storage devices. Press <S> to force NT to skip auto-detection of mass storage devices.
5. This screen will prompt for specification of mass storage devices. Press <S> to specify additional devices.
6. By default Other (Requires disk from manufacturer) will be highlighted. Hit <Enter>.
7. Remove Disk 2 and insert the MDAC NT driver disk that shipped with the AcceleRAID 250 and hit <Enter>.

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<sup>6</sup> This installation assumes that Windows NT is being installed with the three set-up diskettes. If you are installing directly from a "bootable" CD-ROM, you must press <F6> several times to bypass the automatic detection of mass storage devices. Resume at step 4 above after this is accomplished.

8. Mylex Disk Array Controller will be highlighted. Hit <Enter> to select and continue. You should see a message at the bottom of the screen that says "Loading Device Driver and then another screen stating that "Setup has recognized the following mass storage devices in your computer"  
     *Mylex Disk Array Controller*
9. Press <S> to specify an additional device, press <Enter>
10. Remove the MDAC diskette and insert the AdaptecAIC-78xx family manager that you created earlier and press <Enter>
11. When the diskette contents load you should have a number of choices for drivers, select:  
     *Adaptec AHA-294xU2/295xU2/395xU2/AIC-789x PCI SCSI Controller (NT 4.0)*
12. Press <S> to specify an additional device, press <Enter>
13. Hit the up-arrow key and highlight "IDE CD-ROM (ATAPI 1.2)/PCI IDE Controller" and hit enter. NOTE: This step is assuming that the system is using an IDE CD-ROM connected to the secondary IDE channel as the master device on the L440GX+ Server board. If this is not correct than you will need to specify the correct controller for the CD-ROM in your system.
14. Insert Disk 3 when prompted and hit <Enter> to continue.
15. The next screen will indicate setup has recognized the following mass storage devices.  
     *Mylex Disk Array Controller*  
     *Adaptec AHA-294xU2/295xU2/395xU2/AIC-789x PCI SCSI Controller (NT 4.0)*  
     *IDE CD-ROM (ATAPI 1.2)/PCI IDE Controller*  
     **(Note: CD-ROM and any EIDE hard drives detected will vary based on the model installed.)**
16. Press <Enter> to continue. **Notes:** If you have any hard drives with greater than 1024 cylinders an advisory will appear acknowledging this. Press <Enter>. If any of your hard drives are new or unpartitioned an advisory will appear telling you that continuing the installation will destroy any information on the disk(s). Press <Enter> to continue.
17. The Windows NT Licensing Agreement will eventually appear. Scroll to the bottom of the agreement by pressing the <Page Down> key and press the <F8> key if you agree with the license.
18. You should see a list of your systems components on screen. Computer, Display, Keyboard, Keyboard layout, and Pointing Device. Press <Enter> to accept if the list is correct.
19. The next step in the installation is to specify the partition on which to install NT. Highlight the "Unpartitioned space" on 2015MB Disk 0 at Id 0 on bus 0 on atapi and press <c> to create a partition. (Note: If there are any partitions listed on this disk press <d> to delete the partition.)

20. Enter a partition size that matches the maximum size of your EIDE hard disk and press <Enter>. **Note:** If you choose not to use the entire drive for your O/S, ensure you create a “C:” partition of at least 500MB-1GB<sup>7</sup>
21. Verify that Disk 0 at ID 0 on bus 0 on atapi shows: C: New (Unformatted) and press <Enter>.
22. If an unformatted partition is selected for the install, a choice of file system formats will be presented. NTFS file system format is recommended. Select NTFS and press <Enter> to continue. The system will show a yellow status bar to indicate formatting progress.
23. Next you will be asked to choose the directory where NT is to be installed. Choose the default of \WINNT by pressing <Enter> or type in the desired directory name and press <Enter>.
24. The next screen prompts for an exhaustive examination to be performed on your disk. The time required for the examination increases in proportion to available drive space. An examination of a 1 GB drive takes well under 1 minute. Press <Enter> to run the examination.
25. You will be asked to inset the disk labeled “MDAC Software Kit” into drive A:. Insert the Mylex driver disk that came with the AcceleRAID 250.
26. You will be asked to inset the disk labeled “Adaptec 7800 Family Manager Set for Windows NT 4.0” into drive A:. Insert the Adaptec driver disk that came with the AcceleRAID 250.
27. The installation will now copy necessary files from the CD-ROM. After this is done you will be prompted to remove any floppy or CD-ROM that may be present and press <Enter> to reboot. This completes the first stage of the install.

**NOTE: At this time NT will recognize multiple processors if present. Also, the installation routine will convert the C: partition to NTFS if it was selected. This will require an additional automatic reboot of the system. This is normal.**

28. When NT comes up after the second reboot, you will be prompted to re-insert the Windows NT CD-ROM disk to continue Set Up. Then you will be presented with the Windows NT Server Setup dialog box. Click <Next> to continue.
29. Enter in a username and an organization name. After entering in the names desired, click on <Next> to continue.
30. Enter in the product ID number. This number can be found on the Certificate Of Authenticity provided with the software or on the CD case. Click on <Next> to continue.
31. This next screen is for licensing. Enter the number of concurrent connections that you have licensed. Click <Next> to continue.

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<sup>7</sup> This number indicates the capacity of the “C:” drive in which NT and associated utilities will be installed. The smallest partition size for installing NT is about 200MB. However this will leave very little room for growth and installation of other applications which default to a directory in “C:”. You must also note that this partition is used for NT’s swap space, meaning for every megabytes of RAM you install, NT will require at least 1 MB of space in “C:”. If you install 256MB of RAM then the minimum space recommended is 200+256 or roughly 500MB. Remember, there is no penalties for a large C: partition size, so a 1024 or 2048 MB is advisable.

32. Enter in a computer name of 15 characters or less. Click <Next> to continue.
33. Select a server type. For this example, select “Stand Alone Server.” Click <Next> to continue.
34. For the Administrator Account Password, use something simple to begin with as you can always change it later. Click <Next> to continue.
35. Select “No, do not create an emergency repair disk”. While this is an important step, it is more efficient to wait until you have completed the install. Click <Next> to continue.
36. At the next screen, accept the default list of components to be installed. Click <Next> to continue.
37. The installation of Windows NT networking will now start. Click <Next> to continue.
38. Verify “Wired to the network” is selected. Click <Next> to continue.
39. You should de-select “Install Microsoft Internet Information Server (IIS)” since this will install IIS2 while IIS 4 is available for download from Microsoft. Click <Next> to continue.
40. Click “Select from list”
41. Click “Have Disk...”
42. Insert the L440GX+ Intel PRO 100 NIC Driver disk created during the pre-installation routine and hit <Enter>.
43. A dialog box indicating the “Intel PRO 100 Adapter” should be displayed and highlighted. Click OK.
44. Verify the “Intel EtherExpress PRO Adapter” has a check mark beside it and click on <Next>.
45. Select the Network protocols you wish to install. For the purpose of this install only TCP/IP need be selected, deselect all other protocols. Click <Next> to continue.
46. Next you will be presented with a dialog box that lists the Network Services to be installed. Click <Next> to continue.
47. NT is now ready to install the Networking Components that you selected. Click <Next> to continue. Files will be copied from the CD-ROM.
48. Since the Intel® PRO 100+ onboard adapter is being used, an “Adapter properties” dialog box is presented.
49. Ensure that one end of a Category 5 Unshielded Twisted Pair (Cat V UTP) ethernet cable is plugged into the RJ-45 connector on the L440GX+ server board and the other end is plugged into a hub or a switch.
50. Click “Test” to run diagnostics on the NIC hardware and the cable connectivity.
51. When tests are complete, click <OK> to continue.
52. DHCP is used in large organizations where there may be a shortage of available IP addresses. The IP address of a server is then dynamically assigned by a DHCP server as soon as it logs on to the network. Select <NO> to continue.
53. The Microsoft TCP/IP properties dialog box will eventually appear, prompting for TCP/IP information. Enter in the TCP/IP information recorded in the pre-installation steps. After entering in the data click <OK> to continue. If a dialog box appears reporting that an adapter card has an empty WINS address, click <YES> to continue. Other TCP/IP fields should remain empty.

54. The next dialog box that appears will show the bindings that are enabled for the server being installed. Selected bindings may be disabled/enabled here. Click <Next> to continue. These can be changed after the installation if so desired. The network is now ready to be started. Click <Next> to continue.
55. Enter a workgroup name. Click <Next> to continue.
56. The “Finishing Setup” dialog box will now appear. Click <Finish>.
57. **(Note: If you chose to install Microsoft Internet Information Server you will be prompted with an install dialog box. Make the choices desired and click OK to continue. You will probably get a warning message indicating that no Internet Domain name has been specified. Click OK to continue. Select the SQL Server driver when prompted and click <OK>.)**
58. Select the appropriate time zone and deselect/select “Automatically adjust clock for daylight savings changes” as appropriate.
59. Click on the Date & Time tab to verify the time and date are correct. Click <Close> to continue.
60. The detected display dialog box will be shown next. Click <OK> to continue. Adjust the Desktop Area and the Color Palette if desired, and click <Test>. Testing will begin after clicking <OK>. If the test bitmap was displayed properly and could be viewed clearly, click <Yes>, then <OK> to verify the instructions. Click <OK> to continue.<sup>8</sup> Additional file copying and system setup will occur.
61. A Windows NT Set Up dialog box will be displayed stating: “Windows NT has been successfully installed.” Remove the Windows NT CD-ROM disk and click <Restart Computer> to complete the baseline installation of Windows NT 4.0.
62. After selecting Windows NT\* 4.0 Server as the Operating System to start, a login screen will be presented. Press <Ctrl+Alt+Del> to login. Enter the Administrator password and press <Enter> to login.
63. When the “Welcome” screen appears, click <Close>. Windows NT 4.0 Server is now installed and running.
64. Install the Cirrus Logic video drivers. Select <Start>, <Control Panels>, <Display>, the tab <Settings> and click on the button for <Display Type>, under “Adapter Type,” click <change>. Select <Have disk> and when prompted, insert the Cirrus GD5480 driver diskette created earlier, and apply the driver. You will need to “test” the video display before proceeding and restart the server before the new changes take effect.

### ***Installing a SCSI Tape device***

In this example, a Sony\* SDX-300C 8mm AIT (Advanced Intelligent Tape) 25/50GB tape drive was used. The driver for Windows NT was tested by Sony to only be compatible with NTBackup\* and Seagate\* Backup Exec\* and software. However, no network tape backup software package was installed in this example.

1. After Windows NT installation is complete, install the SCSI Tape device drivers. Select <Start>, <Control Panels>, <Tape Devices>, and the tab “driver.” Click on <Have Disk> and when prompted insert the diskette with the appropriate driver for the SCSI tape device.

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<sup>8</sup> You cannot change the video driver at this point, it must be installed after the O/S install is complete.

2. Windows NT will recognize the driver as “NT 4.0 Sony SDX-300C 8mm AIT drive,” click <OK>.
3. NT will post the message “New SCSI Tape Device Found,” Click <OK>.
4. You must restart the server for the tape device driver to be started.
5. After restarting select <Start>, <Control Panels>, <Tape Devices>, verify device is recognized and then click on the “driver” tab to ensure that the driver is loaded.

### ***Obtaining and Applying the latest NT Service Pack<sup>9</sup>***

The latest Microsoft Windows NT Server 4.0 service pack (SP4), along with many other NT Server updates can be found at:

**<http://www.microsoft.com/ntserver/all/downloads.asp>**

This site also includes international versions of the service packs and hot fixes to problems that are discovered after the release of the latest service pack. These hot fixes generally tend to make up the contents of the follow-on Service Pack.

At the writing of this document Service Pack 4 was the latest and was used for completing the installation. Among other additions, Service Pack 4 includes Microsoft Internet Explorer\* 4.01.

**Note: The NT Service Pack 4 is too large to fit on floppy disks. Therefore, it is recommended that the downloaded files be copied to a high density media accessible by the server (e.g. CDROM).**

1. From your internet browser download the Service Pack 4 (SP4) zipped executable file **nph-ntfinal.exe** and extract them onto your hard drive or place them onto a CD. Alternatively, from a SP4 CD-ROM launch **SP4\i386\update\update.exe**.
2. The installation files will be unpacked and the Service Pack installation dialogue window will be displayed.
3. Read the welcome message and Click on <Next>.
4. Read the Software License Agreement and select <Yes> if you agree with the licensing agreement.
5. Ensure that the “Install the Service Pack” option is selected and click on <Next>.
6. Ensure that the “Yes, I want to create an uninstall directory” is selected, click on <Next>.
7. Upon completion of the install, apply the Y2K update for Internet Explorer 4.0 by launching **SP4\i386\update\y2ksetup.exe**
8. After some files and directories are updated, the message “Windows NT 4.0 has been updated; Remove any disks from floppy disk drives and choose OK to restart your computer” will be displayed. Remove disks and click <OK> to restart.

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<sup>9</sup> It is recommended to reapply the Service Pack after any significant applications have been installed on the server.



## ***Instructions for Mirroring Boot (C:) Drive and Configuring RAID disk array using Disk Administrator***

1. Start the Disk Administrator utility by clicking Start, Programs, Administrative Tools, Disk Administrator .
2. Click <OK> at the Disk Administrator dialog box after reading it.
3. Click <Yes> to create a signature on any/all disks if prompted. This allows the operating system to see the disk as on-line.
4. Change the CD-ROM drive letter to E: drive by right-clicking on D:. Select <Assign Drive letter>. Click on the down arrow and select E:. Click <OK> and <Yes> to continue. Verify CD-ROM is now E: drive.
5. Select drive C: by single-clicking on Disk 0. Hold down the <Ctrl> key and single-click on the 'Free Space' of Disk 1. Release the <Ctrl> key.
6. Select the <Fault Tolerance> pull-down menu, <Establish Mirror>. The following note will be displayed: "This will be a mirror set of the system boot partition. Please refer to the Windows NT Server Concepts and Planning Guide for information of how to create a fault tolerant boot floppy disk. Disk 1 will change to drive C, like Disk 0, and change appearance so as to be shaded with a purple stripe across the top of both 'C:' drives.
7. Right click on either drive C: and select <Commit Changes Now>.
8. Click <Yes> to save changes.
9. Click <Yes> to restart computer and click <OK> at the Disk Administrator dialog box.
10. After system has restarted, log on and start the Disk Administrator utility again.
11. Select the 'Free Space' of Disk 2 by right-clicking on it. Select <Create Primary Partition>, enter desired size (entire available array) and click <OK>. Right-click on Disk 2, select <Assign Drive letter>. Click on the down arrow and select D:. Click <OK> and <Yes> to continue. Verify RAID-pack is now drive D: right-click on the RAID pack and select <Commit Changes Now.> Right-click again on drive D, selecting <Format>. Select 'Quick Format,' change the File System to NTFS, type in an appropriate volume label and click on Start in the Format D: dialog box. A blue status bar will appear at the bottom of dialog box indicating format progress. Click <OK> when finished and click <Close> .
12. Follow the procedure "Creating an Emergency Repair Disk with the RDISK utility".

## ***Installing Windows NT 4.0 Option Pack***

The Windows NT Option Pack includes Internet Information Server (IIS) 4.0 and may be downloaded from the downloads website listed above. You must have Service Pack (SP3) 3 or 4 (SP4) installed and running on your server before you can install IIS 4.0. Microsoft\* recommends installing the service pack, then the Windows NT Option Pack, and then reinstalling Service Pack 4.

1. First, download the “download wizard” that assists you in performing a “connected install” or in simply saving the application to disk.
2. Listed below, are the major components of the NT Option Pack.  
You should only install those options that you will use, as they will consume system resources even if they are not used. You can always add additional components later as needed.

## **Option Pack Components**

### **Internet Information Server (IIS)**

This is the main IIS component and must be installed.

### **Transaction Server**

Simplifies the development and deployment of 3-tiered, server-centric applications built using COM technologies. Not required for a basic web server. For more info visit [http://www.microsoft.com/ntserver/guide/trans\\_intro.asp?A=2&B=2](http://www.microsoft.com/ntserver/guide/trans_intro.asp?A=2&B=2)

### **Active Server Pages**

The server-side execution environment that enables you to run ActiveX Scripts and ActiveX Server Components on the server allowing you to create dynamic content and powerful web-based applications easily. For more info visit <http://www.microsoft.com/iis/guide/aspfaq.asp>

### **Data Access Components 1.5**

A set of database access components.

### **FrontPage 98 Server Extensions**

Extensions which allow added functionality for web sites created with Microsoft FrontPage

### **Microsoft Management Console**

An administrative tool that provides a centralized management console. Required for administering the IIS server.

### **Internet Service Manager Snap-In for MMC**

An MMC snap-in used to administer all aspects of your Web services. Also required.

### **Index Server 2.0**

A search engine capable of indexing a wide variety of document types. Setup is integrated right into IIS, there's no separate setup program. For more info visit <http://www.microsoft.com/iis/guide/index.asp?A=2&B=6>

### **Script Debugger**

Allows web developers to browse, edit, and debug scripted HTML pages (.htm, .html, and .asp files) on both the client and the server. For more info visit <http://www.microsoft.com/scripting/default.htm?/scripting/debugger/>

### **Windows Scripting Host**

### **Certificate Server**

Provides customizable services for issuing and managing certificates used in software security systems employing public-key cryptography. For more info visit [http://premium.microsoft.com/msdn/library/sdkdoc/pconcept\\_3msy.htm](http://premium.microsoft.com/msdn/library/sdkdoc/pconcept_3msy.htm)

### **Connection Services for RAS**

Enhancements to the current Windows NT 4.0 Server remote access service which enable corporations to further reduce remote access costs through customizable client software,

centrally managed phone book services, integrated authentication services, and simple administrative tools. Not required. For more info visit <http://www.microsoft.com/communications/RASOverview.htm>

### **Message Queue Server**

Provides **loosely-coupled** and **reliable** network communications services based on a messaging queuing model. MSMQ makes it **easy** to integrate applications, implement a *push-style* business event delivery environment between applications, and build reliable applications that work over unreliable but cost-effective networks. Used for web application development, not required for a basic web server. For more info visit <http://www.microsoft.com/ntserver/guide/msmq.asp?A=2&B=2>

### **Site Server Express 2.0**

Offers basic functionality versions of Microsoft Site Server's Analysis and Publishing features. The analysis features include both usage and content and the publishing features allow for the posting of web content to the server. For more info visit <http://www.microsoft.com/iis/guide/ssx.asp>

### **InterDev RAD Remote Deployment Support**

Used with Visual InterDev, not required. If you use and are familiar with Visual InterDev, then you will probably know what this is.

## **Microsoft\* Internet Information Server Setup**

1. Make sure that you are logged into the machine with an account that has Administrator privileges.
2. Close all other programs.
3. Run Setup.exe from either the CD or the files that you downloaded.
4. Click <Next> at the initial setup screen.
5. Read and accept the license agreement.
6. Choose the installation type 'Custom'.
7. Select or deselect those components you need. For the purpose of this demo installation, default components will be accepted by clicking on <Next>.
8. Change the drive letter from 'c' to 'd' for the location of the WWW service and the FTP service. This will ensure your web pages and data are stored on the RAID 5 disk array created earlier in the installation.
9. Leave the "Application Installation Point" at the default location, typically "C:\Program Files"
10. Click <Next>.
11. Accept the default location for "Microsoft Transaction Server" and click <Next>.
12. Ensure 'Local' is checked and click <Next> to continue. If you want to remotely administer MS Trans Server, then you will need to set up an account and password here.
13. Next box should indicate that the folder "d:\Inetpub" is the default index directory. Click <Next> to continue.
14. Click <Next> to select "d:\Inetpub\Mailroot as the mailroot dir.
15. Installation will now begin. Setup will copy files; install services and start services. When done, you will be prompted to click <Finish> and reboot the system. Click <Yes> to restart the system.

16. Once the computer has rebooted, you are done.

### ***Configuring the Microsoft Management Console***

By default, every component that you install sets up its own MMC console to manage it. It's easier to manage all of your components from one console screen. To set this up, follow the instructions below:

1. Open the main IIS console by opening the Start menu and going to Programs | Windows NT 4.0 Option Pack | Microsoft Internet Information Server | Internet Service Manager. You will notice that not all of the components that you installed are listed. You should definitely have Internet Information Server, but possibly not the others.
2. To add them, choose Console, Add/Remove Snap-in. Be sure that Console Root is selected in the "Snap-ins added to" field and choose Add at the bottom of the dialog.
3. The next dialog will show you a list of all available snap-ins. Just double-click on the one you want to add. You can only add one snap-in at a time, so if you have more you want to install, just add them the same way.
3. When done, choose OK and you can administer all of your services from one console. When you exit MMC, be sure to answer 'Yes' when prompted if you want to save the console settings.

### ***Creating an Emergency Repair Disk with the RDISK utility***

The Emergency Repair Disk contains data necessary to reconstruct a configuration if you NT system is no longer able to boot. The Repair Disk utility saves all of the current system settings to a floppy. You can then use this floppy disk to restore the server system in the unlikely event of the files being damaged. Depending on when you wish to create a Repair Disk, there are two different procedures which can accomplish this:

1. Insert a blank floppy disk labeled "Emergency Repair Disk" into the 3.5" floppy drive.
2. Click Start, then Run. Type `<rdisk>` in the Open box and press `<Enter>`
3. Click 'Create Repair Disk' button. Click `<OK>` to continue.
4. When complete, click `<exit>`.

Note: Microsoft recommends updating this repair disk whenever you make significant changes to the server.

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1. Finish adding all required, value-added software and configuration modifications to the server system.
  2. Insert the floppy diskette you created and labeled *Emergency Repair Disk* into the 3.5-inch floppy drive.
  3. Click Start, then Run. Type `rdisk` in the Open box and press `<Enter>`.
  4. Click the `<Update Repair Info>` button. A message box will be displayed warning you about deleting the old repair information. Click `<Yes>` to continue.
  5. A message box will appear next warning you that all the data on the floppy will be erased. Click `<OK>` to continue. You will see progress indicators titled 'Formatting Floppy' and 'Saving Configuration'.

6. Click <Exit> and remove the Emergency Disk from the drive.

## **Network Server Configuration For File & Printer Sharing**

### ***Introduction***

This document provides instructions for configuration of a small network environment that allows file and printer sharing. Network services and management are provided by an Intel Architecture server running *Microsoft Windows NT Server 4.0* operating system. Users are able to share data, applications, and file services by using PCs running *Microsoft Windows NT Workstation* or the *Windows 95* operating systems.

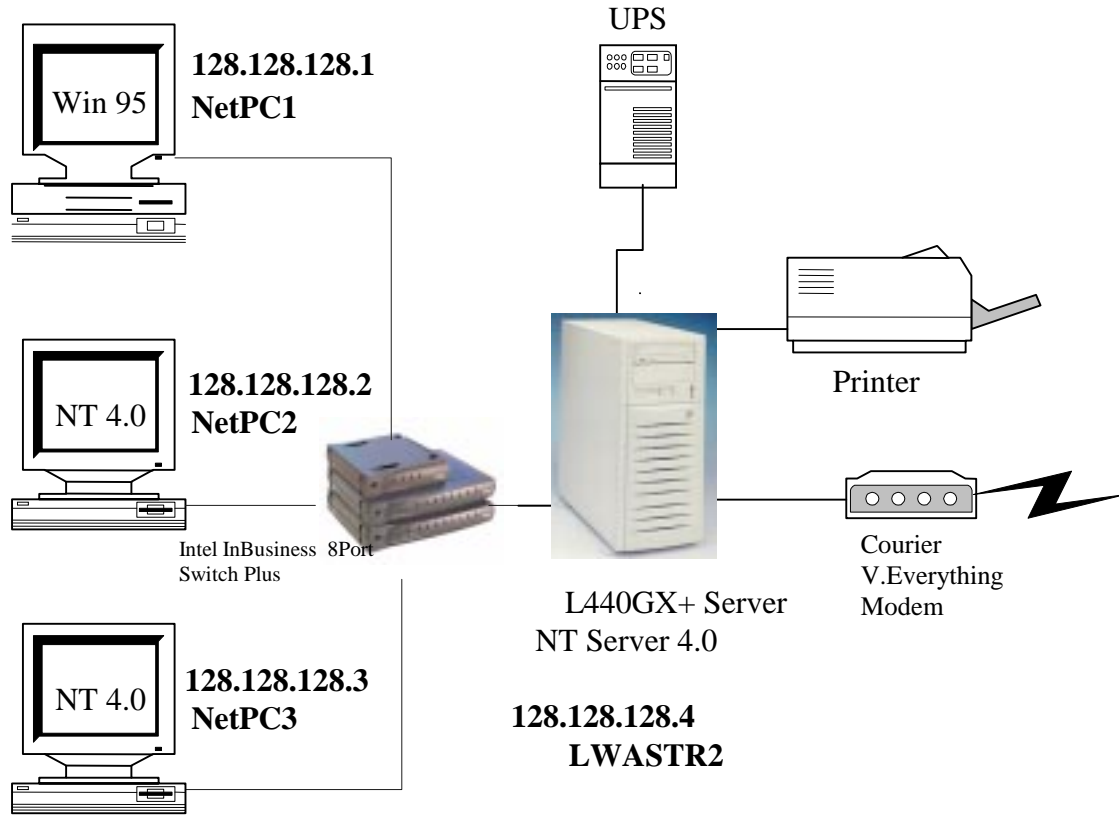
To keep the configuration instructions simple and easy to follow, this document refrains from explaining networking terms and concepts. A basic understanding of networking concepts and familiarity with *Windows NT Server* is helpful although not entirely necessary.

Experienced systems/network administrators may opt to utilize or enable additional network protocols and implement services such as WINS, DHCP, NT Domains and DNS as their needs dictate

For additional information please refer to Microsoft Press publications on Windows NT server 4.0, Windows NT Workstation and Windows 95. If you have access to the Internet try [www.microsoft.com](http://www.microsoft.com) for product information, updates, and more information. A number of books on NT and Windows 95 administration have been published you may wish to look at:

- Microsoft Windows NT Resource Kit from Microsoft PRESS ISBN 1-57231-343-9
- Mastering Windows NT Server 4 from NETWORK PRESS ISBN 0-7821-2067-9
- Complete Guide to WINDOWS 95 From SAMS ISBN 0-672-30791-X.

Figure 1 Small network environment with clients connected to a server via a 10/100Mbit/s network switch.



**Pre-Installation Steps**

Complete the following tables for all clients and your server:

Client Name	IP address

Server Name	IP address

Work Group Name: \_\_\_\_\_  
 Network Mask: \_\_\_\_\_

Client Name	IP address
NetPC1	128.128.128.1
NetPC2	128.128.128.2
NetPC3	128.128.128.3

Server Name	IP address
LWASTR2	128.128.128.4

Work Group Name: localnet  
Network Mask: 255.255.255.0

The IP addresses used in this example are invalid for access to the Internet. If you will be using this network to access the Internet you should contact an Internet Service Provider who will provide you with unique IP addresses, a network mask and instructions for connecting your network to the ISP. Please refer to the Internet Gateway Server document for further detail. If this is an isolated (ie: not connected to the public internet) network the IP addresses used in this example may be used.

Machine names are limited to 15 characters; share names are limited to 12 characters; user names may be up to 20 characters.

Note: All examples will be placed in {}.

1. Install your network by connecting all PC's and the Server to your network hub.<sup>10</sup>
2. Install NT on the server as described by the Microsoft Windows NT 4.0 Server Installation guide. You may enter network configuration parameters during installation<sup>11</sup> or follow procedure below to correct any information entered during the NT install.
3. Install your client's operating systems, allow any Network Interface Card to be identified and configured. You may enter network configuration parameters during installation or follow procedure below.

### ***Configuring the Server***

1. Log on as Administrator.
2. From the "Control Panel" double click on the "Network" icon.
3. In the "Identification" tab enter your server's host name{earth}.
4. Highlight any work group text and click on the "Change"; Enter the workgroup name that you have selected {localnet}. Click on <OK>.
5. Welcome to workgroup message is displayed; Click on <OK> to continue.
6. Select the "Protocols" tab. You only need TCP/IP; you may remove all others.
7. From the "Protocols" dialog box, select TCP/IP and click on "Properties". The "Microsoft TCP/IP Properties" dialog box appears.
8. Select the "Specify an IP address" entry and enter the server's IP address {192.001.001.005}.

<sup>10</sup> An Intel® InBusiness™ 8 Port Switch Plus (10/100 Mbit) was used in this particular configuration. Category 5 unshielded twisted pair (UTP) Ethernet cable was used for all connections.

<sup>11</sup> The network configuration information such as IP address and Network mask may not be known during NT install, however the NT install procedure requires them to be entered during the initial NT install. It is possible to skip network configuration during NT installation and perform the installation once the server is at final destination or when attached to a network. In such a case network services can be installed by following the instructions outlined in the network installation section of the Microsoft Windows NT 4.0 Server installation guide (from start select settings, then control panel; double click on Network to begin installation). You will need the Intel EtherExpress PRO drivers diskette created during the pre-installation step and the NT 4.0 Server Installation CD.

9. Enter your subnet mask {255.255.255.0}.
10. There is no need to enter a default gateway at this point.<sup>12</sup>
11. The DNS, WINS, and Routing tabs should be clear at this stage.
12. Click on <OK>.
13. A message indicating that at least one of the adapter cards has an empty WINS address will be displayed. Click on <Yes> to continue.
14. Close the network configuration window.
15. Reboot the server.

### ***Configuring PCs running Windows NT 4.0 Workstation***

1. Log on as Administrator.
2. From the Control Panel double click on “Network” icon.<sup>13</sup>
3. In the “Identification” tab enter your workstation’s client name {Antarctica or Amazon}.
4. Highlight any work group text and click on the “Change”. Enter the workgroup name that you have selected {localnet}. Click on <OK>.
5. Welcome to workgroup message is displayed; Click on <OK> to continue.
6. Select the “Protocols” tab. You only need TCP/IP; you may remove all others.
7. Select TCP/IP and click on “Properties”. The “Microsoft TCP/IP Properties” dialog box appears.
8. Select the “Specify an IP address” entry and enter the client’s IP address {192.001.001.021 for amazon} and {192.001.001.022 for Antarctica}.
9. Enter your subnet mask {255.255.255.0}.
10. There is no need to enter a default gateway at this point.
11. The DNS, WINS, and Routing tabs should be clear.
12. Click on <OK>.
13. Close the network configuration window
14. Reboot the client.

#### **Test point**

See if you can communicate with the server or other PCs (which have been configured and rebooted.) This can be done using the “ping” command from a DOS window {ping 192.001.002.005}. If this works you may also double click on the Network Neighborhood icon and observe that that you can see your server under the specified workgroup.

### ***Configuring Windows\* 95 clients***

1. From the “Control Panel” double click on “Network”.
2. In the “Configuration” tab you only need to install “Client for Microsoft Networks”, “Intel EtherExpress PRO/100 (PCI)”<sup>14</sup> and “TCP/IP” network components.<sup>15</sup>

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<sup>12</sup> The instructions on connecting to the Internet will provide additional detail otherwise this information will not be required given network topology described in Fig 1.

<sup>13</sup> This procedure assumes that network has been installed and configured during NT workstation install.



3. Select the “Client for Microsoft Networks” and click on “Properties”.
4. In the “Network Logon Options” select “Logon and restore network connections”.
5. Click on <O.K.> to go back to the main “Network configuration” window.
6. Select TCP/IP and click on Properties. The “TCP/IP Properties” window appears.
7. Select the “IP Address” tab and enter the client’s IP address {192.001.001.020}. Do not select the “obtain an IP address automatically” option.
8. Enter your subnet mask. This number will be the same for all nodes on the network {255.255.255.0}. After entering the network mask Click on <O.K.>
9. Select the “WINS Configuration” tab and ensure that the “Disable WINS Resolution” is selected.
10. Select the “DNS Configuration” and ensure that the Disable DNS is selected.
11. There is no need to enter a default gateway at this point.
12. Click <O.K.> to return to the main “Network” dialog box.
13. Under the “Primary Network Logon” select “Client for Microsoft Networks”.
14. Select the “Identification” tab and enter your PC’s computer name {Gobi}. Enter the Workgroup name that you have selected {localnet}.
15. Select the “Access Control” tab. Select the Share-level access control.
16. Reboot the client.

#### Test point:

See if you can communicate with the server or other PCs (which have been configured and rebooted.) This can be accomplished using the “ping” command from a DOS window {ping 192.001.002.005}. If this works you may also double click on the Network Neighborhood icon and observe that you can see your server under the specified workgroup.

### ***Creating Network user accounts***

1. Log on as the administrator on the server. Use the “User Administrator” interface to create user accounts, which belong to “user” group. You must create an account for each user, which will be accessing the shared resources of the server.
2. On each PC (network client) create user accounts for the users who will be using the PC. Ensure that the user names and passwords on the server and the PCs are identical.

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<sup>14</sup> PC’s used for this illustration were equipped with the Intel Ether Express PRO/100 Network Interface cards. If you are using a different network card you must ensure that the network card installed on your PC is listed in place of the Intel Network Interface card.

<sup>15</sup> This procedure assumes that the Network services have been installed and the installed NIC identified during initial setup. The procedure outlined in this section provides instructions on the minimum steps required to quickly setup a network. If the Network configuration was skipped during initial Windows 95 installation, double clicking on the network icon will result in an interactive Windows 95 network install and configuration. You may follow the instructions and enter client’s network configuration information as prompted by the Windows 95 network services installation procedure. If this happens you will need drivers for your network card (if not found by Windows) and Windows 95 installation CD.

## ***File Sharing***

Drives or directories are not visible on the network until they are marked “shared”. The procedure below will accomplish this for drive D: (RAID pack) of the server.

1. Double-click the “My Computer” icon in the upper-left section of the desktop.
2. Single-right-click on the D: icon to present a menu of choices.
3. Click on ‘Sharing’.
4. Select ‘Shared As’ and select <New share>. Enter a share name and a comment if desired.
5. If desired, access rights and permissions can be assigned to individual network users by clicking on the “Permissions” button. The default is to allow “everyone” full access rights to the data on drive D: To make any changes to the “Permissions,” select the users you want to change and the type of access you want to give them.
6. Click <Apply> and <OK>.
7. Network clients can now use the “Network Neighborhood” to browse the server and attach to the sharable drive or directory or they can use the “Map Network Drive” option from “My Computer” browser. Users must log on to their PC with the new accounts otherwise they will be asked for user names and password every time they try to access a shared file.

## ***Printer Sharing***

### **Server Instructions**

1. Install and configure your printer as instructed by the printer installation guide.<sup>16</sup>
2. Click on Start->Settings->Printers-><new printer>.
3. Click on the “Properties” tab and then select “Sharing”.
4. Select the “Shared” option and then provide a share name {Printer1 }.
5. Click <O.K.>
6. You have now created a network printer resource, which can be shared by users.

Note: Only the network users who have been defined/created, with sufficient permissions, on the site server may gain access or share the printer device on the server.

### **Client Instructions**

1. Log on to any client using an assigned user ID and assigned network password.
2. Click on Start->Settings->Printers->Add Printer.
3. Select the “Network Printer Server” option, then click on <Next>.

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<sup>16</sup> You must ensure that the printer is compatible with NT4.0 and Windows 95. It is recommended that Windows 95 printer drives be installed as alternate drivers. This will allow the server to provide Windows 95 drivers when a Windows 95 PC adds the printer as a network printer.

4. Enter <\\servername>\<printername> in printer field or browse the network by double clicking on the “Network Neighborhood” icon, double click on your workgroup, then the server, and finally the printer.
5. Click on <O.K.>.
6. Click on <Finish>.
7. After some activity, a dialogue box asking if you want Windows to set up this printer for use on this system appears. Click on <Yes>.
8. The printer status window appears. Close it.
9. Close all windows until you get back to the Connect Network Printer Window.
10. You will be asked if you prefer to “Make this the default printer?”. Click on <Yes>.
11. Complete the installation by clicking on <Finish>.
12. You are done.

**Note: Microsoft recommends updating the Emergency Repair Disk whenever you make significant changes to the server. For information on how to update/build a repair disk see Microsoft Windows NT 4.0 Server Creating An Emergency Repair Disk.**

### ***Installing Intel Server Control (ISC) 1.8***

Intel Server Control has a number of install and employment options from local installation and operation on the server to be managed, to remotely installing ISC and managing the server from another node in the network. For purposes of this example we will complete the local install.

1. To install Intel Server Control on your L440GX+ server, insert the L440GX+ server board resource CD, after you are logged in as the administrator on the server.
2. Please review the Intel Server Control Manual also available from this screen on the resource CD by selecting <Intel Server Control User’s Guide> from the pop-up menu in the lower left corner of the screen. There are complete details on the installation and utilization of the capabilities of Intel Server Control.
3. After the “autorun” gui “Intel Server Building blocks” application launches, select <utilities> from the menu on the left side of the screen and then <Intel Server Control> from the pull down menu at the top of the screen. Click on the <Run Installer> icon.
4. Click <next> to continue after ensuring that no other application is running, besides the resource CD’s gui application.
5. Review the licensing agreement and click <Yes> if you agree.
6. Deselect the check box for “Remote Server Instrumentation” and click <next>. Refer to the ISC user’s guide for details on remote employment of ISC.
7. Select the directory in which to install ISC and click <next>.
8. The next screen confirms the components you are about to install. Click <next>.
9. After ISC has installed all components, click <Finish>. You must restart the server to properly operate ISC. Before you restart the server, exit the resource CD application and remove the resource CD from the CD-ROM drive. If you do not, and your server

is configured to boot to the CD before your boot drive, the server will reboot to the ROM-DOS operating system on the CD.

### ***Using Intel Server Control 1.8***

1. When you restart the server, select <Start>, <Programs>, <Intel Server Control Tools>, <Intel Server Control>.
2. From the pull down menu in ISC, select <Server>, <Discover>.
3. You will be asked to identify the range of IP address that you would like ISC to scan to find servers with ISC installed. If you know the IP address of a single server you wish to discover, as in this example, enter the IP address and then an IP address at which to stop discovery. Be sure to enter the next IP address after that of the server in question so the discovery process will cease after finding the server you wish to manage.
4. You should see the name and IP address of the server you wish to manage appear under “Windows NT Servers” in the left hand pane of the ISC window.
5. In the right hand pane you will see two icons: Intel DMI Explorer and Intel Server Control. Double click on either and experiment with the capabilities, you’re done!

## Appendix A: Detailed Equipment List

### Hardware

Server board	Intel® L440GX+ Server Board
Chassis	Intel® Astor II server chassis
Processors	2 Intel® Pentium III microprocessors operating at 500 MHz
Memory	4 Samsung 128MB PC/100 compliant DIMMS for a total of 512MB SDRAM (Always check approved memory list before buying DIMMS) <a href="http://support.intel.com/support/motherboards/server/L440GX">http://support.intel.com/support/motherboards/server/L440GX</a>
SCSI Cntrlr	Integrated Adaptec AIC-7896 dual channel Ultra2 SCSI controller
NIC	Integrated Intel® 82559 controller (Intel® PRO/100+)
Video	Integrated Cirrus Logic GD 5480 PCI w/2MB of SGRAM
Switch	Intel® InBusiness™ 8 Port Switch Plus (10/100) Ethernet
IDE Cntrlr	Integrated dual channel IDE controller
Floppy Cont.	Integrated floppy controller
Floppy drive	TEAC* FD235HF
CD-ROM	IDE ATAPI Hitachi* 8330 connected as master on 2 <sup>nd</sup> IDE channel
Hard Drives	
IDE	2 Western Digital* Caviar* 12100 2.1GB capacity, configured as mirrored boot drive, connected as master and slave on primary IDE channel.
SCSI	5 Quantum* Viking II* Ultra2 SCA2 4.5GB capacity, 4 configured in a hardware RAID Level 5 disk array, 1 configured as a “hot spare”
RAID Cntrlr	Mylex* AcceleRAID 250 (DAC960PTL-1) with 16MB cache memory
Tape Drive	Sony* SDX-300C 8mm AIT (Advanced Intelligent Tape) 25/50GB drive
Monitor	21” CTX* Ultrascreen with integrated USB hub
Mouse	Logitech* Trackman 3-button PS/2
Keyboard	Microsoft* 104 Key Natural* keyboard

### Software

O/S	Microsoft Windows NT* 4.0 Server with Service Pack 4
Management	Intel Server Control 1.8 (Included on the L440GX+ Server Board Resource CD-ROM)

### Misc

BIOS:	Production Release 2.0
Firmware:	BMC Revision 12 HSC Revision 8

### Clients

Systems	3 CN430TX “NetPCs”
Processor	Intel® Pentium processor operating at 166MHz
Memory	32MB EDO DRAM
NIC	Intel® 82557 EtherExpress™ Pro100B
O/S	2 with Windows NT 4.0 Workstation, 1 with Windows* 95