

SECTION 9. NETWORK ADMINISTRATION BASICS

This section provides basic information on network administration. For Solaris and FTP errors see Appendix C.

9.1 Overview.

a. Networking is the process of linking computers and terminals so users can log in on a remote computer as well as a local one and exchange data between computers.

b. A Local Area Network (LAN) is a network of computer and peripherals limited to a room, building or site and interconnected with dedicated channels of communication. LANs provide several advantages over the single user personal computer in the workplace.

(1) *Distributed Data Processing.* Users can load applications software and process data at network stations, then download to a central mass storage device or store the data locally.

(2) *Shared Resources.* A whole company or division can share peripherals such as printers and disk drives as well as essential resources such as customer databases, thus reducing costs and enhancing productivity. Peer-to-peer networking allows high levels of mass storage and peripheral resources at the individual workstation level. Centralized networking shows a greater reliance on a powerful file server to manage the resources for an entire network.

(3) *Security.* Network managers can restrict access to sensitive data by limiting a user's rights to open, read, write and execute files.

9.2 Network Types.

a. UUCP - UNIX-to-UNIX system copy. UUCP copies files named by the source-file arguments to the destination-file argument.

b. TCP/IP – TCP/IP is underlying network protocol for much UNIX and non-UNIX networking software.

c. Streams – Streams is a flexible, modular facility for network development. The Streams driver (/dev/rawip) is the Transport Level Interface (TLI) transport provider that provides raw access to the IP.

d. LAN Manager/X – LAN Manager/X is a network protocol for OS/2, MS-DOS and UNIX.

e. X-Window – X-Window is a graphic system for Solaris.

9.3 Useful Terms.

a. *File Server.* A server is a system or a program on a system that provides some services to other systems across a network. A typical server is a file server, which provides remote file access to users somewhere else on the network.

b. *Client.* A client is the system or program that requests and receives some action from a server.

c. *Protocol.* A protocol is simply a method agreed upon by both the server and the client for exchange of data. It typically includes some way for the client to send requests or commands to the server and a way for the server to send replies and data back to the client. A protocol may also have an identification mechanism to determine where a request came from and where a reply is destined to, and may have an error correction mechanism so that corrupted requests and replies are detected and retransmitted.

d. *Provider.* A provider is anything that provides a specific network service; e.g., a Transport Layer provider gives service to programs at the Open Systems Interconnect (OSI) Transport Layer.

e. *International Standards Organization (ISO).* Defines seven layers of communications activities and the interfaces between them.

9.4 Adding Modems, Printers, and Other Serial Devices.

a. *Physical connections.* A physical connection from your computer to another computer terminal, or other remote device, is accomplished by using one of the following:

(1) A direct link by physically connecting a file server to a workstation.

(2) A modem installed and configured to interface with another modem.

b. *Logical connections.* Establish the logical connection between Solaris and your modem or direct link. This involves updating the appropriate support files to reflect the presence of a direct link or modem.

c. *Direct link.* An advantage of using a direct link is that the link is always available and the time required to access the link is short. Direct links are beneficial when the two machines transfer large amounts of data on a regular basis. The two machines are located no more than several hundred cable feet apart.

9.5 TCP/IP.

a. *Transmission Control Protocol/Internet Protocols (TCP/IP).* TCP/IP is one of the high-speed network protocols available on Solaris. TCP is the virtual circuit protocol of the Internet protocol family. It provides reliable, flow-controlled, in order, two-way transmission of data. It is a byte-stream protocol layered above the IP, which is the Internet protocol family's internetwork datagram delivery protocol.

b. *Remote Login.* Before networking, users were restricted to working on those machines to which they had physical access. In network environments, transport protocols provide virtual connections that replace the need for direct physical connections. Remote login service is the logical extension of the model in which terminals physically connect to one machine. The user executes a client program that establishes a TCP connection to a server on the remote host, and the client sends jobs to the server and reads responses that the server sends back.

9.6 Network Administration. The management and maintenance of large networks is sometimes complex and time consuming. There are special purpose computers and software programs for doing some of the work, such as protocol and traffic analysis.

a. Tools for checking and monitoring the operations of the network are part of most distributions of TCP/IP.

b. The simplest check for a good network connection is to use the **ping** program (which you must run as super-user). For example, assume that you are logged onto the host system and you want to check the TCP/IP installation and connections. You can start with testing the "loopback" by pinging the local host.

(1) If the host responds, ping will print "host is alive". A sample of the ping command and response when a connection is made is shown below.

```
# ping ajt01
ajt01 is alive
```

(2) Otherwise, after the default timeout of 20 seconds, it will write "no answer from host". A sample of the ping command and the response when the connection is not made is shown below:

```
# ping ajt01
no answer from ajt01
```

(3) When the -s flag is specified, **ping** sends one datagram per second (unless adjusted with the -I flag) and prints one line of output for every response that it receives. No output is produced if there is no response. The **ping** program computes round trip times and packet loss statistics and displays a summary of this information upon termination or timeout. The default datagram packet size is 64 bytes. You can specify a size with the packetsize command-line argument. If an optional count is given, the **ping** program sends only that number of requests. Press the <Delete> key to stop the **ping** response. A sample of a **ping** request using the -s option and the response is outlined below.

Command:

```
# ping -s ajt01
```

Response:

```
PING ajt01: 56 data bytes
64 bytes from ajt01 (128.127.36.1): icmp_seq=0. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=1. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=2. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=3. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=4. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=5. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=6. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=7. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=8. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=9. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=10. time=1. ms
64 bytes from ajt01 (128.127.36.1): icmp_seq=11. time=1. ms
```

```
----ajt01 PING Statistics----
```

```
11 packets transmitted, 11 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/0/1
```

(4) Sometimes a packet takes longer time because other activity is on the network. Whenever you run ping, check to be sure that all the packets are getting through. Look at those statistics at the end of the report. If you are missing some packets, you may have a break in the cable, a bad transceiver, or a missing terminator.

9.7 Configuration SARSS for TCP/IP. The following instructions are provided for use in the setup and configuration of TCP/IP on the file server and workstations.

a. Determine the location for the LAN Hub. The hub may be located up to 100 meters from either the file server or the workstation.

b. Once the hub location has been established, a connection is set up between the hub and the file server. This is accomplished by connecting a length of twisted pair cable, with RJ-45 connectors on both ends, to one of the ports on the front of the hub. Connect the other end of the cable to the RJ-45 port on the LAN card on the back of the file server. Follow the same procedure for each workstation. When all workstations are connected to the hub, connect the hub's electrical power supply.

c. If using File Transfer Protocol (FTP) procedures over the Installation LAN, connect a length of twisted pair cable, with RJ-45 connectors on both ends, to the installation LAN drop assigned to the server and workstations. Connect the other end of the cable to the RJ-45 port of the LAN card on the back of the file server. Follow the same procedure for each workstation. You may also connect the file server and workstations to the SARSS hub and connect the hub to the installation LAN. Perform the tasks to configure the file server for FTP.

(1) Log in as "**root**" from the Solaris Signon screen.

(2) Click on the up arrow (^) above the notepad.

(3) Click on terminal.

(4) Edit the /etc/hosts file. **vi /etc/hosts** to add your assigned IP addresses.

```
127.0.0.1    local localhost
128.127.36.1 ajt01 ajt01
128.127.36.2 ajt02 ajt02
128.127.36.3 ajt03 ajt03
128.127.36.4 ajt04 ajt04
128.127.36.5 ajt05 ajt05
```

```
128.127.36.6  ajt06  ajt06
128.127.36.7  ajt07  ajt07
128.127.36.8  ajt08  ajt08
128.127.36.9  ajt09  ajt09
128.127.36.10 ajt10  ajt10
ftpcomm ftpcomm
```

(5) Then edit the `/etc/netmasks` file. **vi netmasks** to change the first two octets to your first two.

```
128.127.0.0 255.255.255.0
```

(6) Edit the `/etc/rc2.d/S72inetsvc` file to add the default router. **vi /etc/rc2.d/S72inetsvc** and find the `/usr/sbin/route add default` line. Change them to add your default router as shown below.

```
echo "Setting default interface for multicast: \c"
#/usr/sbin/route add -interface -netmask "240.0.0.0" "224.0.0.0" "$mcastif"
/usr/sbin/route add default 128.127.36.1 1
```

(7) Take out the `#` sign from the `add default` line and add a `#` sign to the line above it. The IP address is the router IP address you go through and then a space and a 1 for the number of hops to the router.

(8) Use the `/etc/shutdown -i0 -y -g0` command to powerdown the system and then power back up.

(9) To configure your system for FTP user interfaces, login to SARSS-1 and execute "**FTPUSER**" or SARSS-2A and execute "**FTPADD**".

9.8 Setting the Network Interface Card for the File Server. The following instructions are provided for use in the setup of the Network Interface Card for file server.

- a. Boot the machine with a "Bootable DOS" diskette.
- b. After the machine has booted, remove the diskette, then place the diskette labeled "EtherEZ ISA LAN Adapters" into the disk drive. Type `ezstart` and press `<Enter>`. This diskette is included with each new set of hardware.
- c. Select "Custom".

- d. Select "Setup".
- e. Set each of the following settings to the parameters listed below:

Addressing Mode: Memory Mapped

Ram Base: D000 (zeros)

Plug and Play Adapter Feature: Disabled

Required Settings: I/O Base: 240

IRQ: 10

Boot Rom: Rom Base: DC00 (zeros)

Rom Size: 8K

Network Interface: Automatic Media Detection

- f. Save the settings and Exit.

9.9 Setting the Network Interface Card for the Workstation. The following instructions are provided for use in the setup of the Network Interface Card for the workstation.

- a. Boot the machine with a "Bootable DOS" diskette.
- b. After the machine has booted, remove the diskette, then place the diskette labeled "EtherEZ ISA LAN Adapters" into the disk drive. Type ezstart and press <Enter>. This diskette is included with each new set of hardware.
- c. Select "Custom".
- d. Select "Setup".
- e. Set each of the following settings to the parameters listed below:

Addressing Mode: I/O

Plug and Play Adapter Feature: Disabled

Required Settings: I/O Base: 300
IRQ: 10

Boot Rom: Rom Base: DC00 (zeros)
Rom Size: 8K

Network Interface: Automatic Media Detection

f. Save the settings and Exit.

g. The point of contact for assistance, if any problems are encountered, is Customer Support. Contact Customer Support by calling CAO at (AV) 687-1051, commercial (804) 734-1051, or FAX (804) 734-2974.

9.10 Reset a System's Configuration Using sys-unconfig. The sys-unconfig command packs up a machine to make it ready to be configured again. It restores a system's configuration to an "as-manufactured" state. A system's configuration consists of host name, Network Information Service (NIS) domain name, time zone, IP address, IP subnet mask, and root password. The sys-unconfig is a potentially dangerous command and can only be run by the super-user. The following instructions are provided for use in executing the sys-unconfig command.

a. Log on to the server as user root.

b. Enter the command "sys-unconfig" and press enter.

c. The system will be un-configured and then will shut down.

d. Reboot the server by pressing any key.

e. The following screen instructions will appear during the re-configuration of the SOLARIS Operating System:

Select a Language

- 0) English
- 1) German
- 2) Spanish
- 3) French
- 4) Italian
- 5) Swedish

?

Type "0" (Zero) for English, and Press <Enter>. DO NOT SELECT ANY OTHER CHOICE; SARSS IS ONLY COMPATIBLE WITH ENGLISH.

f. The Locale or Region selection screen is displayed as shown below.

- | | |
|-------------------------------------|--------------------------------|
| 0) USA - English (ASCII Only) | 12) Lithuania |
| 1) Australia - English (ISO-8859-1) | 13) Latvia |
| 2) Canada - English (ISO-8859-1) | 14) Netherlands |
| 3) UK - English (ISO-8859-1) | 15) Netherlands/
Belgium |
| 4) USA - English (ISO-8859-1) | 16) Norway |
| 5) Czech Republic | 17) Poland |
| 6) Denmark | 18) Portugal |
| 7) Greece | 19) Portugal/
Brazil |
| 8) Ireland - English (8 bit) | 20) Russia |
| 9) New Zealand - English (b bit) | 21) Finland |
| 10) Estonia | 22) Turkey |
| 11) Hungary | 23) Go Back to Previous Screen |

Type a number and press Return or Enter [0]:

Type '0' and press <Enter>. YOU MUST NOT SELECT ANY OTHER CHOICE.

g. You are given the opportunity to read the Introduction to kdmconfig screen. Read the instructions carefully, and make sure you understand them before proceeding. A window is displayed with the following information.

kdmconfig - Introduction

kdmconfig has attempted to identify the devices necessary for the windows system. If the configuration is incorrect or incomplete you will not be able to use the window system
Press F2 to view and edit the current configuration.

Press F4 to bypass viewing and editing. If you choose this option, you can subsequently review and edit the window configuration by rebooting the system or running kdmconfig from the command line.

NOTE: If you are installing Solaris you do not have to install the window system at this time. Choosing this option will cause the installation to run in the non-window-system mode.

Press F6 or <ESC> for help. The help information covers kdmconfig screens as well as navigation and how to substitute Escape key sequences for function keys.

F2_Continue

F4_Bypass

F6_Help

- h. Press <F2> to Continue.
- i. The “View and Edit Window System Configuration” screen will be displayed. Place an “X” in the box next to "Change Graphics Device/Monitor" and press <F2> to continue.
- j. The “Graphics Device Selection” screen will be displayed. Place an "X" in the box next to "ATI 3D RAGE PRO (8MB)" and press <F2> to continue.
- k. The “Monitor Type Selection” screen will be displayed. Place an "X" in the box next to "Super VGA 35.5 kHz (800x600 @56Hz and 1024x768 Interlaced) and press <F2> to continue. **NOTE:** You may have to use the down arrow key to get to this entry.

l. The “Screen Size Selection” screen will be displayed. Place an "X" in the box next to the appropriate screen size. **Do not set the screen for a larger size than it actually is.** Press <F2> to continue.

m. The “Resolution/Colors Selection” screen is displayed. Place an "X" in the box next to "1024x768 - 256 Colors Interlaced" and press <F2> to continue.

n. The “View and Edit Window System Configuration” screen will be displayed again. This time, place an "X" in the box next to "No changes needed - Test/Save and Exit" and press <F2> to continue.

o. The “Window System Configuration Test” screen is displayed. Press <F2> to perform the test. Do not select <F4> to bypass this test.

Kdmconfig Window System Configuration Test

You can test the current window system configuration now by pressing F2. DO NOT BYPASS THIS TEST. If the configuration is correct, you will see the sample image, be able to move the pointer and click on a button. If you see a blank screen and kdmconfig does not regain control within a minute or two, you will have to reboot your system.

Press F4 to bypass the test. If you bypass the test and you have an incorrect to incomplete configuration, you will not be able to use the windowing system.

F2_Continue F4_Bypass F6_Help

p. Press <F2> to continue.

NOTE: Sixteen Colors appear on the screen. Do the colors look right? If so, use the mouse to point to [Yes], otherwise point to [No] to make necessary changes. **If you do not respond within a few seconds, you will be returned to the Kdmconfig screen.**

q. The “Host Name” screen will be displayed. Type the host name, “ajt01” for SARSS-1 or “ajq01” for SARSS-2AD. Press <F2> to continue.

r. The “Network Connectivity” screen will be displayed. Place an "X" in the box next to "Yes" and press <F2> to continue.

s. The “IP Address” screen is displayed. Type in the IP address for your server and press <F2> to continue.

t. The “Confirm Information” screen is displayed. Verify that your host name and IP address are correct and that “Networked” equals (=) “Yes”. If everything is correct, press <F2> to continue or press <F4> to go back and re-enter the information.

u. The “Name Service” screen is displayed. Place an "X" in the box next to "None" and press <F2> to continue.

v. The “Confirm Information” screen is displayed. If “Name Service” is set to “None” then press <F2> to continue, else press <F4> to go back and set Name Service to None.

w. The “Subnets” screen is displayed. Place an "X" in the box next to "Yes" and press <F2> to continue.

x. The “Netmask” screen is displayed. Enter the appropriate netmask for your network. In most cases, use 255.255.255.0. Press <F2> to continue. "Configuring parameters, XX seconds left to complete" is displayed.

y. The “Time Zone” screen is displayed. Place an "X" in the box that is appropriate for your location, i.e. United States. Press <F2> to continue. Place an "X" in the appropriate time zone for your location, i.e. Eastern. Press <F2> to continue.

z. The “Date and Time” screen is displayed, verify and or correct the date and time displayed and press <F2> to continue.

aa. The “Confirm Information” screen is displayed. If all data is correct press <F2> to continue, else press <F4> to go back and make changes.

bb. Set your root password. You will be required to enter it twice to verify that it is correctly typed. After you type the password in for the second time and press <Enter>, a message stating that “the System Identification is complete” will be displayed and the machine will reboot. The sys-unconfig/reconfiguration is complete.