HOW TO: Easily Configure TCP/IP on Your AIX System

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Summary: With AIX, you can configure your TCP/IP network with a single command, **mktcpip**. On other systems, setting up TCP/IP might involve creating and editing multiple files, executing a number of commands, setting various variables, locating values for persistence after reboot, and starting several daemons. The **mktcpip** command completes all the necessary TCP/IP configuration tasks for a typical system. The process is even easier when you use the System Management Interface Tool (SMIT) to prompt you for all necessary parameters to configure your network.

After you gather the prerequisite information, you can run the **mktcpip** command three ways: by using SMIT, the command line, or the Web-based System Manager.

Prerequisites

Gather your network configuration information:
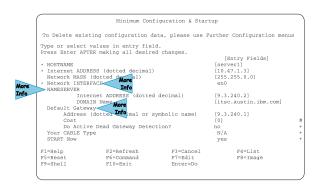- IP address
- Host name
- Domain Name
- Subnetmask (optional)
- Name server (optional)
- Gateway address (optional)

Procedure

Configuring TCP/IP is easiest when you use SMIT. On the command line, type the following fast path:

```
smitty mktcpip
```

A dialog box requests which type of interface you plan to use. Then, SMIT builds a screen that lists each required value, as shown in the following example. After you fill in the fields with the network information that you have collected, the tool runs the **mktcpip** command in the background and makes the network available. Your task is finished.

```
                    Minimum Configuration & Startup

  To Delete existing configuration data, please use Further Configuration menus

  Type or select values in entry field.
  Press Enter AFTER making all desired changes.
                                                          [Entry Fields]
  * HOSTNAME                                            [server1]
  * Internet ADDRESS (dotted decimal)                  [10.47.1.3]
    Network MASK (dotted decimal)                      [255.255.0.0]
  * Network INTERFACE                                    en0
    NAMESERVER
          Internet ADDRESS (dotted decimal)            [9.3.240.2]
          DOMAIN Name                                  [itsc.austin.ibm.com]
    Default Gateway
          Address (dotted decimal or symbolic name)    [9.3.240.1]
          Cost                                         [0]                    #
          Do Active Dead Gateway Detection?            no                     +
    Your CABLE Type                                    N/A                    +
    START Now                                          yes                    +

  F1=Help             F2=Refresh          F3=Cancel           F4=List
  F5=Reset            F6=Command          F7=Edit             F8=Image
  F9=Shell            F10=Exit            Enter=Do
```

If you prefer the command line approach, you can specify all the necessary parameters in a single instruction, as shown in the following example:

```
mktcpip -h server1 -a 10.47.1.3 -m 255.255.0.0 -i en0 \
-n 9.3.240.2 -d itsc.austin.ibm.com -g 9.3.240.1 -s -C 0 -A no
```

If you prefer a more graphical interface, you can use the Web-based System Manager tool to complete this task. This tool uses icons, windows, and wizards to guide you through the configuration. To start this interface, type the following on the command line:

`wsm`

No matter which method you choose, online help is available to assist you. For example, to access online help within SMIT, use the F1 key.

If you want to further configure your network, for example, if you want to select more than one interface type, SMIT has an easy interface for that, too. On the command line, type:

`smitty configtcp`

The "Further Configuration" section of this paper describes other network configuration options.

Additional Information

The following sections provide additional information to help you with configuring your network.

Further Configuration

Customizing your TCP/IP configuration beyond the minimal configuration is easily done through SMIT, the command line, or the Web-based System Manager. SMIT menus guide you through such tasks as:

- Managing static routes
- Flushing the routing table
- Setting or showing host names
- Managing network interfaces or drivers
- Managing domain names or the hosts table (**/etc/hosts** file)
- Managing network services for the client or server
- Starting or stopping TCP/IP daemons

Naming Conventions for Your Network Devices and Interfaces

When you install AIX, it automatically detects each adapter card and installs the corresponding interface software. AIX uses the following naming convention for network devices and interfaces:

Device Type	Device Name	Interface Name
Asynchronous Transfer Mode (ATM)	atm#	at#
Ethernet (IEEE 802.3)	ent#	et#
Ethernet (Standard, Version 2)	ent#	en#
Fiber Distributed Data Interface (FDDI)	fddi#	fi#
Loopback	N/A	lo#
Token-ring	tok#	tr#

The # sign represents the number of the device or interface you intend to use.

Name Services

If you use name services, you can provide the minimal information needed through the **mktcpip** command. Typically, the **/etc/resolv.conf** file stores your domain name and name server IP address. The **mktcpip** command creates or updates the **/etc/resolv.conf** file for you. By default, the resolver routines on hosts running TCP/IP use the following lookup sequence:

1. Domain Name Server (DNS)

2. Network Information Service (NIS or NIS+), if active

3. Local **/etc/hosts** file

But you can override the default lookup by editing the **/etc/netsvc.conf** file. (See the *AIX Files Reference* for details.) Also, you can set the **NSORDER** environment variable to override the host settings in the **/etc/netsvc.conf** file.

Gateways

A machine can communicate to the network through a gateway. A gateway contains the addressing and routing information for each host on its network, and can use routing daemons to broadcast routing information to, and receive routing information from, other gateways. TCP/IP routes information to the appropriate computer on the network using address information carried in a packet or stream of information.

AIX version 5.0 allows a host to discover if one of its gateways is down (called *dead gateway detection*) and, if so, choose a backup gateway, if one has been configured. Dead gateway detection can be *passive* (the default) or *active*.

- In passive mode, a host looks for an alternate gateway when normal TCP or ARP requests notice the gateway is not responding. Passive mode provides a "best effort" service and requires very little overhead, but there may be a lag of several minutes before a dead gateway is noticed.

- In active mode, the host periodically pings the gateways. If a gateway fails to respond to several consecutive pings, the host chooses an alternate gateway. Active mode incurs added overhead, but maintains high availability for your network.

In either mode, the host chooses the alternate gateway with the lowest associated cost value. You determine the cost value, using any criteria you wish, when configuring TCP/IP. The value can be any number from 0 (the default) to 2147482647.

Flags for the mktcpip Command

The **mktcpip** command can do much more than minimal TCP/IP configuration. The following table defines all the flags available for the **mktcpip** command.

-A yes/no	Active dead gateway detection (AIX Version 5.0 and later). If set to **no** (the default), dead gateway detection remains in passive mode.
-a *Address*	Sets the Internet address of the host. Specify the address in dotted decimal notation. Each network interface on the host should have a unique Internet address. The following is the standard format for setting the Internet address:
	`127.10.31.2`
-C *number*	Specifies the cost of using the selected interface type. This value affects which alternate gateway is chosen when dead gateway detection (AIX Version 5.0 and later) determines the current gateway is down. The value can be any number from 0 (the default) to 2147482647.

-c *Subchannel*	Specifies the subchannel address for a System/370 channel adapter.
-D *Destination*	Sets the destination address for a static route. Specify the address in dotted decimal notation. The following is the standard format for setting the destination address for a static route:
	`192.9.52.1`
-d *Domain*	Specifies the domain name of the name server the host should use for name resolution, if any. The domain name should be in the following format:
	`subdomain.subdomain.rootdomain`
-g *Gateway*	Sets the gateway address for a static route. Specify the address in dotted decimal notation. The following is the standard format for setting the gateway address for a static route:
	`192.9.52.0`
-h *Hostname*	Sets the name of the host. If using a domain naming system, the domain and any subdomains must be specified. The following is the standard format for setting the host name:
	`hostname`
	The following is the standard format for setting the host name in a domain naming system:
	`hostname.subdomain.subdomain.rootdomain`
-i *Interface*	Specifies a particular network interface, for example:
	`tr0`
-m *SubnetMask*	Specifies the mask that the gateway should use in determining the appropriate subnetwork for routing. The subnet mask is a set of 4 bytes, as in the Internet address. The subnet mask consists of high bits (1s) corresponding to the bit positions of the network and subnetwork address, and low bits (0s) corresponding to the bit positions of the host address.
-n *NameserverAddress*	Specifies the Internet address of the name server that the host uses for name resolution, if applicable. The address should be entered in dotted decimal notation, for example:
	`127.1.0.1`
-r *RingSpeed*	Specifies the ring speed for a token-ring adapter. Valid values for the *RingSpeed* variable are either 4- or 16-Mbps.
-S *Interface*	Retrieves information for System Management Interface Tool (SMIT) display.
-s	Starts the TCP/IP daemons.
-t *CableType*	Specifies cable size for Standard Ethernet or IEEE 802.3 Ethernet networks. Valid values for the *CableType* variable are **dix** for thick cable, **bnc** for thin cable, or **N/A** for Not Applicable. The **-t** *CableType* flag should be used only for Standard Ethernet (en) and IEEE 802.3 Ethernet (et) interfaces.

TCP/IP Subsystems

The **mktcpip** command runs a shell script called **rc.tcpip** to start the TCP/IP daemons for your configuration. The script contains start stanzas for the following daemons:

autoconf6, **ndpd-host**	Internet Protocol version 6 (IPv6)
dhcpcd, dhcprd, dhrcpsd	Dynamic Host Control Protocol (DHCP) daemons

inetd	Internet daemon that starts related services such as **telnet** and **ftp**
lpd	Print server daemon
mrouted	Multicast routing daemon
named	Domain name server in a domain network
portmap	Port lookup facility used for remote procedure calls (RPCs)
routed or **gated**	Dynamic routing (both daemons cannot run simultaneously)
rwhod	Remote uptime and users daemon
sendmail	Mail transfer agent
snmpd, **dpid2**	Simple network management protocol (SNMP) daemons
syslog	Log server for standard UNIX error logs
timed, **xntpd**	Time synchronization daemons

By default, the script starts the **syslogd**, **portmap**, **inetd**, **lpd**, and **sendmail** daemons and puts their entries into the **/etc/inittab** file so the subsystems begin automatically after every reboot. To automatically start any of the other listed daemons, simply uncomment their corresponding lines in the **rc.tcpip** file. You can add start stanzas for other daemons, too.

Useful TCP/IP References

Configuration, Status, and Troubleshooting Commands	
lsdev -Cc *adapter* **and** **lsdev -Cc if**	List system adapters and IP interfaces
netstat -in	Show status of IP interfaces with numeric addresses
netstat -rn	Show status of TCP/IP routes with numeric addresses
arp -a	Display local ARP cache
no -a and **no -o**	Display/set kernel variable values, such as ipforwarding
ifconfig and **route**	Display status and configure temporarily
mkdev (**chdev**, **rmdev**, etc.) and SMIT	Configure permanently
lsattr -El	Display ODM database attributes for the specified interface or adapter
nslookup	Troubleshoot DNS
host	Resolve host name to IP address and vice versa
hostname	Display current local host name

System Files	
/etc/hosts	Local hosts table
/etc/rc.*	Scripts for TCP/IP, NFS, and so forth
/etc/resolv.conf	Name resolver
/etc/netsvc.conf	Name resolution order
/usr/sample/tcpip/named.*	Sample files that can be copied and edited
/etc/named.*	DNS resolution files

/etc/hosts.equiv, /etc/rhosts, and /etc/hosts.lpd	Remote user access files

For detailed information about the AIX operating system, refer to the following Web address: http://www.ibm.com/servers/aix/library/.

AIX library information is listed under *Technical Publications*.

Of key interest are the *System Management Guide: Communications and Networks* and the *Commands Reference*.

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