Confiquring An IPX Network For The 7318

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About This Document

This document is designed to assist an RS/6000 system administrator in configuring an IPX network on an AIX host. This involves configuring a communications interface on the host for IPX.

It was designed for AIX System Administrators with a knowledge of AIX administration and the 7318. Using this document, configuring an IPX network takes approximately 15 minutes.

Note: This document does not cover configuration of Novell network services and protocols which are not required by the 7318.

Remote Configurations:

To communicate with devices (and other hosts) on remote IPX networks, your host must be configured for an IPX network, and the router that connects the remote IPX network must be configured to pass IPX packets between the two networks. The steps for RS/6000 IPX network configuration listed below are the same for a local or remote network configuration.

Document Scope

This document is designed to configure a communication adapters interface for IPX. The document is comprised of modules that contain specific configuration steps. The modules have been arranged from general to specific configuration issues. This document does not contain detailed explanations about the modules and steps used in the IPX configuration. This document is applicable for AIX levels 3.2.5, 4.1.4, 4.1.5, and 4.2.

Assumptions And Terms

Before using this document, it is assumed that:

- The appropriate communication interfaces are configured and active (i.e.: Ethernet, Token-Ring, or FDDI interfaces are operational)
- IPX software and drivers are installed on the host (ipx.obj for AIX 3.2.5, and ipx.rte for AIX 4.x)
- The cnsview daemon is not running

Terms used in this document:

- host--the computer (RS/6000)
- environment--computer network
- inter-network--a network of individual LAN segments (all connected together)

Requirements

To use this document effectively, you must know:

- The IPX network number for each IPX network which is physically attached to the host (see your network administrator)
- The internal IPX numbers for each IPX host on the network (located in the /etc/netware/NPSConfig file).
- If connecting to remote IPX networks, know the remote network addresses and make sure the router or gateway is configured to recognize each independent network.

Procedure

The outlined procedure in this document includes:

1. Check for Conflicting Software
2. Check for an Active Interface
3. Configure an IPX network
4. Recycle the IPX Daemons
5. Verify the IPX Network Configuration

1. Check for Conflicting Software

AIX Connections uses an IPX protocol stack (denoted IPXd) that is slightly different than the IPX (denoted IPX) software that is used for NetWare and the 7318 Terminal Server. Both IPX protocol stacks (IPX and IPXd) CANNOT be

active on a host at the same time. Therefore, to configure IPX for NetWare or the 7318, verify that AIX CONNECTIONS is not active on the host.

Note: Other hosts running AIX CONNECTIONS can reside on the same physical network without any incompatibility problems.

1. Check if AIX CONNECTIONS is active, execute:

   ```
   # ps -ef | grep nw
   ```

   Sample Output:

   ```
   root 11676     1   0   Oct 11      -  0:00 /usr/tn/nw/NWfile
   root 23948     1   0   Oct 11      -  0:00 /usr/tn/nw/NWbinderyd
   root 33958     1   0   Oct 11      -  0:00 /usr/tn/nw/NWprint
   user 34264 47824   2 16:30:01 pts/22  0:00 grep nw
   root 43820 11676   0   Oct 11      -  0:00 /usr/tn/nw/NWfile
   root 46740     1   0   Oct 11      -  0:00 /usr/tn/nw/NWlockd
   root 48002     1   0   Oct 11  pts/0  0:15 /usr/tn/nw/IPXd
   root 48558     1   0   Oct 11      -  0:00 /usr/tn/nw/NWdiagd
   ```

2. Verify that AIX CONNECTIONS is inactive (AIX Connections is inactive if none of the processes listed above are running).

   If any AIX CONNECTIONS processes are active, you cannot configure an IPX network for Netware or the 7318 on this host.

   If AIX CONNECTIONS is NOT active, please continue with the next section.

2. Check the Interface

The host communicates with the network through an interface (tr0, en0, et0, fi0). To configure an interface for IPX, the interface must already be active (the words <UP, RUNNING> appear in the flags when the 'ifconfig' command is run).

Note: A communication INTERFACE is configured on a communication ADAPTER (i.e. the tr0 interface is configured on the tok0 adapter card, similarly, the en0 (or et0) interfaces are configured on the ent0 adapter card). Note that a communication adapter can have multiple interfaces. IPX networks can be configured on the following adapters.

```
ent0    Available 00-02    Ethernet High-Performance LAN Adapter (8ef5)
fddi0   Available 00-03    FDDI Primary Card, Single Ring Fiber
tok0    Available 00-04    Token-Ring High-Performance Adapter (8fc8)
rhp0    Available 00-05    Network Terminal Accelerator
```

Verify that the communications interface is active using the 'ifconfig' command and the adapter name for a Standard Ethernet Interface configured on ent0, execute:

```
# ifconfig en0
```

Sample output.

```
en0: flags=8080863<UP,BROADCAST,NOTRAILERS,RUNNING,SIMPLEX,MULTICAST>
        inet 9.3.6.32 netmask 0xfffffc0 broadcast 9.3.6.63
```

for a Standard Token Ring Interface on tok0, execute:

```
        # ifconfig tr0
```

Sample Output.

```
   tr0: flags=80a0043<UP,BROADCAST,RUNNING,ALLCAST,MULTICAST>
            inet 9.3.6.68 netmask 0xfffffc0 broadcast 9.3.6.127
```

If the interface is active (the words <UP, RUNNING> appear in the flags list), then continue to the next Section.

If the words <UP, RUNNING> do not appear in the flags list, then configure the interface through SMIT (fastpath "inet").

3. Configure an IPX network

The /etc/netware/NPSConfig file contains configuration entries for the IPX network. To configure an IPX network, you must modify the interface's stanza in the /etc/netware/ NPSConfig file.

1. Open the /etc/netware/NPSConfig file with your favorite editor.
2. Search on 'spx'.
3. Verify that the spx line is uncommented and reads: 'spx = active'. (There can be spaces on either side of the '=' sign.)
4. Verify that the sap line is uncommented and reads: 'sap = active'. (There can be spaces on either side of the '=' sign.)
5. Search on 'internal_network'.
6. Verify that the internal network number for this IPX host is unique.

   Note: The host's internal_network number must be DIFFERENT from ALL other IPX hosts throughout the entire IPX inter- network and DIFFERENT from ALL other external network numbers. Check all other IPX hosts on the network to make sure no TWO hosts have the same internal network number. By default, the internal_network is "00000001" but it can be any eight digit hexadecimal number other than "00000002". "00000002" is reserved. We recommend that you use the last eight digits of the RS/6000s hardware address to insure uniqueness from other hosts.
7. Scroll down the file and locate the interface configuration stanzas (Standard Ethernet, Token Ring, and FDDI). All of these interface stanzas are example stanzas and should not be modified. Choose the interface stanza on which to configure the IPX network.

8. Copy the example stanza and paste it at the end of the NPSConfig file. By default, a Standard Ethernet stanza is already uncommented and setup as the lan_1_network (the first IPX network on the host).

9. Uncomment (remove * and /*) each line in the interface configuration stanza.

   Note: Each communication interface must be configured as a different IPX network. Therefore, a host can have multiple IPX network connections if a different interface is configured for each IPX network. If the IPX network you are now configuring is an additional IPX network (another interface is already configured for an IPX network), the 'X' in the lan_X_network of the interface configuration stanza must be modified to reflect the additional IPX network. (i.e. X is incremented as more interfaces are configured for IPX. lan_1_network is for the first IPX network, lan_2_network is for second IPX network, the third is lan_3_network, etc.).

10. Modify the X in each lan_X_number line to reflect additional IPX networks (if any) on the host.

11. Modify the lan_X_ppa field to reflect additional LAN interfaces. (i.e. 1 for en1; 2 for en2)

12. Specify the external IPX network address as the lan_X_network number in the configuration stanza. This number is the network address of the IPX network and is used by all hosts connected to that IPX network. Check with your Network Administrator if you are unsure of the correct IPX network number. By default the lan_1_network number is "00000002" but the number can be any eight digit hexadecimal number.

    REMOTE CONFIGURATIONS:

    The lan_X_network number can NOT be the same IPX network number as the remote IPX network. Different physical LAN segments (like two Ethernet segments separated by a router) must use different IPX network numbers. Once we configure an IPX network, the host will 'see' the remote IPX network if the router (or gateway) passes IPX packets.

13. If other configuration parameters in the stanza need to be modified, change them now. If unsure of further configuration, either leave the parameters to their default values or ask your network administrator.

    Three sample interface stanzas for IPX configuration and different interfaces are listed below.

```
Token Ring example (frame type TOKEN-RING):
lan_1_network = "00000002"
lan_1_adapter = "/dev/dlpi/tr"
lan_1_adapter_type = "TOKEN-RING_DLPI"
lan_1_ppa = 0
lan_1_if_name = "tr"
lan_1_frame_type = "TOKEN-RING"
lan_1_module = "NULL"

FDDI example (frame type FDDI):
lan_1_network = "00000002"
lan_1_adapter = "/dev/dlpi/fi"
lan_1_adapter_type = "FDDI_DLPI"
lan_1_ppa = 0
lan_1_if_name = "fi"
lan_1_frame_type = "FDDI"
lan_1_module = "NULL"

Standard Ethernet example:
lan_1_adapter = "/dev/dlpi/en"
lan_1_adapter_type = "ETHERNET_DLPI"
lan_1_ppa = 0
lan_1_if_name = "en"
lan_1_frame_type = "ETHERNET_II"
lan_1_module = "NULL"
lan_1_network = "00000002"
```

14. Save any modifications and exit.

    Continue to the next section.

4. Recycle IPX Daemons

To implement any changes made to the /etc/netware/ NPSConfig file (add our new IPX network), the IPX daemons must be recycled.

WARNING: When the IPX daemons are recycled, any IPX communication with the host will be stopped.

1. First verify that all applications which use IPX have been shutdown before recycling the protocol stack/drivers. (i.e. the 7318 daemon -- cnsview; NetWare applications, etc.)
2. To recycle the IPX daemons, execute the command sequence:

   ```
   # /usr/lpp/netware/bin/stopnps
   # /usr/lpp/netware/bin/startnps
   ```

3. Verify command success.

   Check the /tmp/rc.netware.out file for any error messages. The following messages typically appear in this file:

```
"strload:  cannot load ncp:  A file or directory in the
path name does not exist.
/usr/lpp/netware/bin/startnps:  started Streams Architecture
Daemon (npsd) and SAPD Daemon (sapd)
/usr/lpp/netware/bin/startnps:  successfully brought up the
Novell Protocol Suite"
```

Note: The above ncp error can be ignored as the 7318 is the only driver/application using IPX.

Also, run the commands, "ps -ef | grep sapd" and "ps -ef | grep npsd"; both of these daemons should be running as a result of the above "startnps" command.

If the commands fail, please check the /etc/netware/NPSConfig file for syntax errors with the IPX interface configuration. If the commands still fail, please contact an IBM AIX Technical Support Representative.

If the command is successful, the interface is now configured for our new IPX network. Proceed to the next section to verify the IPX network configuration.

5. Verify the IPX Network

The host's IPX routing table can be viewed by executing the program, '/usr/lpp/netware/bin/drouter'. If the IPX network is configured properly, it will be listed in the IPX routing table.

REMOTE CONFIGURATIONS:

All remote IPX networks will appear in the hosts IPX routing table if there is an active IPX communication channel in between the two IPX networks (i.e.: router or gateway is configured correctly and passes IPX packets).

1. To view the host's IPX routing table, execute:

   ```
   # /usr/lpp/netware/bin/drouter
   ```

   Sample Output:

   ```
   NETWORK    HOPS  TIME    NODE          NETWORK   HOPS  TIME  NODE

   -------    ----  ----    -------       --------  ----  ----  ---------
   00000001   0000  0001    000000000001  00000002  0000  0001  02608C2F7119
   00000003   0000  0001    02608C2F1591  00000004  0001  0002  00406E0002F5
   00000005   0001  0002    00406E0002DB
   END OF TABLE      5 known networks

   [root@levesconte] /#>
   ```

   where:

NETWORK is the network number, internal or external. There should be one entry in this table for each network segment in the overall network and one for each host on the inter-network.

HOPS is the number of routers which must be passed through to get to this network.

NODE is the ethernet address of the station used to get to the network.

2. Verify that the IPX network is shown in the listing.

   If the IPX network is listed, then you have successfully configured an IPX interface on the host.

   If the newly created network is not listed, carefully review the configuration steps listed above. If still unsuccessful, please contact an IBM AIX Technical Support Representative.

   Note: Routers and gateways which are part of the IPX inter-network must be configured to use the same frametype as specified in the hosts /etc/netware/NPSConfig file. They must also be configured to use the RIP (Routing Information Protocol) and SAP (Service Advertising Protocol) protocols correctly. Their configuration is beyond the scope of this document.

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