



LynxOS Driver

with Embedded RAINlink Technology

Installation and User's Guide

Overview

The LynxOS driver for the ZNYX NetBlaster™ PCI, CompactPCI and PMC includes embedded RAINlink technology. RAINlink provides critical link services such as link aggregation (trunking), link failover and dynamic load balancing over multiple network ports. These ports can be a group of multiple single-channel or multi-channel ZNYX adapter ports, up to a maximum of 16 ports.

The ZNYX software set includes drivers for LynxOS 3.0.1 for PowerPC (MCP750 or MCPN750) and x86 systems. The appropriate driver can be obtained from the ZNYX web site:

<http://www.znyx.com>. The distribution is available as a compressed, tar file.

The ZNYX LynxOS driver is statically configured into the LynxOS kernel. The following steps will take you through the additions necessary to build a new kernel that includes the LynxOS driver. Refer to your LynxOS documentation for detailed information about installing drivers and rebuilding kernels.

Systems Requirements

| | |
|---------------------------|--|
| Platforms: | Motorola MCP750 or x86-based PC with standard PCI, PMC, or CompactPCI slots. |
| Operating Systems: | LynxOS 3.1.0A (MCP750/MCPN750) LynxOS 3.0.1 (MCP750 – MC1) LynxOS 3.0.1 (MCPN750 – MC2) LynxOS 3.0.1 (x86) |

Supported ZNYX NetBlaster Adapters:

| Model | Supported Platform | Bus | Number of Ports |
|--------------|--------------------|-----|-----------------|
| 212 | ppc, x86 | PMC | 2 |
| 214 | ppc, x86 | PMC | 4 |
| 222 | ppc | PMC | 2 |
| 244 rear i/o | ppc | PMC | 4 |
| 345, 345Q | x86 | PCI | 1 |
| 346, 346Q | x86 | PCI | 4 |
| 348, 348Q | x86 | PCI | 2 |

| | | | |
|-------------------------|----------|------|---|
| 412 | ppc, x86 | cPCI | 2 |
| 414 | ppc, x86 | cPCI | 4 |
| 422 | ppc | cPCI | 2 |
| 424 | ppc | cPCI | 4 |
| 442 hot-swap | ppc, x86 | cPCI | 2 |
| 444 hot-swap | ppc, x86 | cPCI | 4 |
| 474 rear i/o & hot-swap | ppc, x86 | cPCI | 4 |
| 478 rear i/o & hot-swap | ppc, x86 | cPCI | 8 |

Retrieving the ZNYX Drivers

1. Go to the ZNYX web site at www.znyx.com and navigate under the driver downloads area to get the LynxOS driver for your adapter. Be sure to choose the driver for the proper machine, either x86 or MCP750/MCPN750.
2. The driver is available as a compressed tar file. Retrieve the file to the `/src` directory of your LynxOS system. *Uncompress* and *untar* the file. You must have super-user privileges to complete this installation.

```
(Power PC)
  cd /src
  uncompress ZNYXnb.PowerPC.tar.Z
  tar xvf ZNYXnb.PowerPC.tar
```

```
(x86)
  cd /src
  uncompress ZNYXnb.i386.tar.Z
  tar xvf ZNYXnb.i386.tar
```

Installing the ZNYX Driver for LynxOS

1. If you have a previous version of the ZNYX driver, you should uninstall it first. Run,

```
/etc/rain/Uninstall.znb
```

2. The driver installation files will be extracted and placed into a subdirectory called *ZNYXnb*. Run the program *Install.znb* from that directory:

```
  cd ZNYXnb
  ./Install.znb
```

This program will copy the driver files into their appropriate locations, set up a directory `/etc/rain` for interface configuration information, and describe the remaining steps you must perform. The steps are detailed here.

3. Change directories to the `/sys/devices` directory. Edit the Makefile. Add `"if_zxeinfo.x"` to the end of the `"TCPIP_FILES_prep = "` (`"TCPIP_FILES_ppc = "` in 3.1.0.A) list and to the end of the `"TCPIP_FILES_386sa = "` list to include the ZNYX devices. The lists should look similar to the following when you are finished:

```

TCPIP_FILES_386sa = if_wd3einfo.x if_3c509info.x \
    if_3c579info.x if_neinfo.x if_dec21040info.x \
    if_bdlaninfo.x dlpi_21040info.x if_amd970info.x \
    if_epicinfo.x if_pr0100binfo.x if_zxeinfo.x
TCPIP_FILES_prep = if_wd3einfo.x if_dec21040info.x \
    if_bdlaninfo.x dlpi_21040info.x if_bplaneinfo.x \
    if_amd970info.x if_neinfo.x if_zxeinfo.x

```

Save the Makefile.

- When multiple ethernet interfaces are added, additional system buffer resources will be needed to allow maximum performance. Edit the file `hbtcpip_info.c` to adjust this resource allocation by making the following changes:

- Increase the number of MBUFs to 1024 if 8 or more interfaces are installed.
- Increase the number of CLUSTERS to between 1/4 and 1/2 the MBUF value.

For better performance when RAINLINK trunking is used, the values for `tcp_sendspace` and `tcp_recvspace` should be increased to 49152. After making these changes, save the file.

- Execute a "make install" in the `/sys/devices` directory to build the new devices libraries, including the Znyx driver:

```
make install
```

- Change directories to the kernel build directory:

```
cd /sys/lynx.os
```

Edit `CONFIG.TBL` to include the configuration file for the ZNYX driver. We suggest adding a line to the section containing other standard ethernet references. Insert the following line before any other LAN drivers:

```
I:zxe.cfg
```

- The line `I:hbtcpip.cfg` should also be present and enabled (no # at the beginning.) The resulting section should look similar to the following:

```

#*****
#
I:hbtcpip.cfg
I:zxe.cfg
#I:wd3e.cfg
#I:ultra.cfg
#I:3c509.cfg
#I:3c579.cfg
#I:smc_dec21040.cfg /* may be enabled on x86 system */
#I:dec21040.cfg /* may be enabled on ppc system */
#I:amd970.cfg
#I:nullnux.cfg
#
#*****
#

```

After making these changes, save the `CONFIG.TBL` file.

NOTE: Some care is required to have more than one instance of a DEC-based driver installed at a time. LynxOS as it is distributed contains drivers for SMC DEC-based ethernet adapters, as well as a generic DEC21040 driver. In most PowerPC systems, the CPU board will contain an ethernet interface device. If this interface is to be used, leave the line for its driver enabled, but insert the `zxe.cfg` line before it. References to other DEC-based drivers must be after the `zxe.cfg` line in the `CONFIG.TBL` file.

8. You should now be ready to build the new kernel. Execute a "make install" in the `/sys/lynx.os` directory to build the new kernel. This process will also create a backup kernel named `/lynx.os.old` just in case. From the current directory (`/sys/lynx.os`), execute:

```
make install
```

9. The next step is to install the Znyx adapters in the system, then boot it with the new kernel. To do this, shutdown the system with the command:

```
reboot -hN
```

10. Turn the power off, and install the adapters in available slots. Then restart the system. If the adapters are already installed, reboot the system with the command:

```
reboot -aN
```

11. This generates a new `/dev` directory with an entry for the Znyx management interface (`/dev/zrm`). The Znyx adapter nodes should be found in the network interface list, which can be displayed with the command:

```
netstat -i
```

The Znyx adapter entries are `znb0`, `znb1`, etc.

12. Next, you will need to supply an IP address or name for each interface. See your network administrator for details about appropriate names. Add these entries to the `/etc/hosts` file.

13. The directory `/etc/rain`, has been created as part of the Znyx driver installation. It contains a startup file `rainrc`, which can be invoked at system startup to configure the Znyx adapter interfaces. Edit the file `/net/rc.network` to invoke `rainrc` by adding the following line to the section containing network controllers:

```
startit /etc/rain/rainrc
```

14. To define and configure RAINlink interfaces, run the program:

```
/etc/rain/rainlink -a
```

Basic RAINlink configurations are described in the next section. If you are not using any RAINlink features the individual interfaces can be setup manually.

15. Edit the `/etc/rain/rainrc` file to include a line for each of the interfaces you wish to bring up. The example below assumes 4 interfaces will be brought up and the names for each have already been appropriately placed into the `/etc/hosts` file.

```
/bin/ifconfig znb0 lynx-0  
/bin/ifconfig znb1 lynx-1
```

```
/bin/ifconfig znb2 lynx-2
/bin/ifconfig znb3 lynx-3
```

16. Once this file is modified, you can run it by entering the command:

```
/etc/rain/rainrc
```

The new interfaces should now be operational.

Installing RAINlink for LynxOS

All the necessary installation and configuration programs for RAINlink for LynxOS are placed on the system during the installation of the NetBlaster driver.

1. RAINlink for LynxOS includes utilities and example configuration files for standard configurations in order to get you up and running quickly. The necessary files are placed onto your system during the NetBlaster driver installation in */etc/rain*. Change directories to */etc/rain* to begin the installation:

```
cd /etc/rain
```

2. An installation script is included with RAINlink for LynxOS, called *rainlink*. The *rainlink* script can be used to activate, deactivate, or display the current RAINlink for LynxOS configuration. The first time the *rainlink* script is run, the script will give you a list of default configurations to choose from suitable for most basic configurations of two or four port trunks or failover groups. Detailed configuration instructions are included in the next section. Start the *rainlink* script by typing *rainlink -a* at the command prompt:

```
rainlink -a
```

3. The script dialogue will allow you to choose from a set of default configurations.

RAINlink

This script initializes or reinitializes the RAINlink layer within the ZNYX NetBlaster driver. An input script located at */etc/rain/rainlink.conf* is used as input to ZNYX's *rlconfig* application. Either choose one of the following prepared input scripts which will be copied to */etc/rain/rainlink.conf*, or exit and create your own custom script.

- 1 - System-to-System trunking between 4 ports.
- 2 - Fast EtherChannel trunking between 4 ports.
- 3 - Fast Failover between 4 ports.
- 4 - System-to-System trunking between 2 ports.
- 5 - Fast EtherChannel trunking between 2 ports.
- 6 - Fast Failover between 2 ports.
- 7 - Exit and create custom script.

Choose one of the above 7 choices(1-7):

4. Make your selection and continue. A note will be displayed informing you that the *rainlink* script will create a configuration file named, */etc/rain/rainlink.conf*, which will be the default configuration file used from this point forward. Details of the contents of the configuration file are provided later. Hit Enter to continue:

```
NOTE: /etc/rain/rainlink.conf has been created. If a rainlink.conf file
exists rainlink will not prompt for one of the previous 7 choices
To modify the RAINlink configuration in the future, edit
/etc/rain/rainlink.conf, and either run rainlink again, or reboot the
system.
```

```
Hit any key to continue:
Bringing down all Net Blaster interfaces now....
Running rlconfig ...
#####TRUNK0 Successfully Created
TRUNK0 mode set
```

5. The next series of questions relate to bringing up the interfaces. Next, bring up the RAINlink interfaces, and then the remaining non-RAIN interfaces if there are any. You will need to supply IP names or addresses for each configured interface you bring up.

```
Do you want to configure and bring up the RAINlink interfaces [y,n,?] y
Enter hostname for interface zrl0 [server-zrl0]: server1
```

```
The following host names must be in the hosts database.
Check with your Network Administrator for more information.
```

```
server1
```

```
Do you want to configure and bring up any non-RAINlink interfaces [y,n,?] y
```

```
Bring znb4 up [y,n,?] y
Enter hostname for interface znb4 [server-znb4]: access1
```

```
The following host names must be in the hosts database.
Check with your Network Administrator for more information.
```

```
access1
```

```
Bringing up available boards now....
```

The script then exits. Your RAINlink and non-RAINlink interfaces should now be configured.

6. You can use *rainlink -s* to verify the status of your RAINlink configuration:

```
rainlink -s
```

```
trunk0<LAYER_3_MODE> = znb0<UP>, znb1<UP>, znb2<UP>,  
znb3<UP ==> zrl0
```

Configuring RAINlink for LynxOS

Typically you need to configure either trunks or failover groups for a given network. With RAINlink for LynxOS, you can also include trunks in failover groups. It is strongly recommended that you use trunking whenever your network adapters connect directly system-to-system, or to Cisco FEC compatible switch or router or other adapters. This is because trunking provides both increased bandwidth and improved fault-tolerance, whereas the failover service only provides improved fault-tolerance.

Configuring a trunk means to create (add) a trunk between two end stations and assign the member ports (links) to a trunk from EACH end station. A trunk should have at least two member ports (links.) Each port in a trunk can be a half or full duplex.

Configuring a failover group means to create (add) a failover group between two end stations and assign the member ports (links) to a group from each station. Either ports or trunks, or both can be members of a failover group. A failover group should have at least two members. Each port in a failover group can be a half or full duplex.

Quick Start

For most configurations, you will only need to pick the correct default configuration profile and run *rainlink -a*, as described previously.

If you wish to customize configuration for trunks or choose a different scheme for the dynamic load balancing, go to the "Advanced Trunking" section. If the link aggregation service is not suitable to your network configuration, then go to the "Advanced Failover" section to configure the failover groups instead of trunks. You can also configure failover groups of trunks themselves. Always configure trunks before failover groups.

Advanced Trunking

You can create link aggregation groups (trunks), assign ports to these trunks and select a scheme of dynamic load balancing. The most straightforward method for configuring RAINlink for LynxOS is to edit the */etc/rain/rainlink.conf* file and run *rainlink -a*. The script de-installs the current ZNYX interfaces, runs a configuration application *rlconfig* with the *rainlink.conf* input script, and brings up the RAIN links. The *rainlink -a* script can also bring up any regular non-RAIN interfaces, which were not configured into the RAIN links. All these steps can be done individually. Details of using the *rlconfig* application are included in a later section.

To add a trunk, edit the file */etc/rain/rainlink.conf*. The file is a plain text file that is extensively commented. Commented lines begin with a pound sign (#). Add a line for each trunk containing the

list of ports to be included in that trunk. End each line with a semicolon. For example, to include ports 0 through 3 in trunk0, add an entry:

```
trunk0=znb0, znb1, znb2, znb3;
```

The order of entries is not important. You can use any available ports in any order. Port entries should not be duplicated in trunks. A trunk must consist of at least two ports, and cannot contain other trunks. The following is an acceptable way to configure two trunks:

```
trunk0=znb0, znb3;
trunk1=znb1, znb2;
```

For system-to-system trunking, enable IP Trunking mode. Both systems should be setup identically. In IP Trunking mode, packets are sent to the driver as large datagrams and fragmented across the active links. To enable IP Trunking mode, uncomment/add the following line for each configured trunk:

```
trunk0=ip_trunking_mode;
```

For system-to-switch trunking, the default method of load balancing scheme uses Layer 3 Protocols. To use only the “Layer 2 Protocols” for dynamic load balancing, comment out the “layer_3_mode” option, and uncomment the “layer_2_mode” option. The options are mutually exclusive.

```
# trunk0=layer_3_mode;
trunk0=layer_2_mode;
```

To explicitly choose Layer 3, uncomment (or add) the “Layer 3 Protocols” option, and comment out the “Layer 2 Protocols” option:

```
trunk0=layer_3_mode;
# trunk0=layer_2_mode;
```

For system-to-switch trunking, you can disable Balance mode. Balance mode is on by default, and is normally left enabled. Balance mode dynamically distributes the load across the ports equally. It can be disabled by adding a “not equals” to the option:

```
trunk0 != balance_mode;
```

An “equals” sign explicitly enables balance mode:

```
trunk0 = balance_mode;
```

Once you have assembled your *rainlink.conf* file, run *rainlink -a* to bring up RAINlink for LynxOS with the new configuration.

```
rainlink -a
```

Advanced Failover

You can create link failover groups, assign ports and trunks to these groups and select a modes of failover. Failover groups are configured in the same manner as trunks: Edit the */etc/rain/rainlink.conf* file and run *rainlink -a*. *Rainlink -a* de-installs the current ZNYX interfaces, runs a configuration application *rlconfig* with the *rainlink.conf* input script, and brings up the RAIN links. The *rainlink -a*

script can also bring up any regular non-RAIN interfaces, which were not configured into the RAIN links. All these steps can be done individually. Details of using the *rlconfig* application are included in a later section.

To add a failover group, edit the file */etc/rain/rainlink.conf*. The file is a plain text file that is extensively commented. Commented lines begin with a pound sign (#). Failover groups can contain individual ports, trunks, or both ports and trunks. Always configure trunks before failover groups. Add a line for each failover group containing the list of ports and trunks to be included in that group. End each line with a semicolon. For example, to build a failover group of ports 0 and 1:

```
failover0 = znb0, znb1;
```

To build a failover group of two trunks, first build the trunks, then the failover group:

```
trunk0 = znb0, znb1;
trunk1 = znb2, znb3;
failover0 = trunk0, trunk1;
```

The following order will not work. You must build the trunks first:

```
failover0 = trunk0, trunk1;
trunk0 = znb0, znb1;
trunk1 = znb2, znb3;
```

You can also mix trunks and ports in failover groups, as long as the trunks are built first:

```
trunk0 = znb0, znb1;
failover0 = trunk0, znb2, znb3;
```

To remove a failover group, simply remove it, or comment it out, and run *rainlink -a*.

The default mode of failover is fast failover. In this mode, RAINlink for LynxOS moves the traffic over to a redundant stand-by link in case of a link failure in as little as 500 milliseconds. In addition to fast failover, Timeout mode can be enabled for a failover group. By enabling Timeout Mode, if no traffic is received in the specified time interval, the active port is automatically switched to another available link. You can choose different failover modes for different groups. You can also specify the timeout interval. To set Timeout Mode on a failover group with a timeout of 30 seconds, add a line for the failover group:

```
failover0 = timeout_mode 30000;
```

Using Rlconfig

The *rlconfig* application views or changes the RAINlink for LynxOS configuration. *Rlconfig* is installed into */etc/rain* during the NetBlaster driver installation. You can view the current RAINlink for LynxOS configuration at any time, but the interfaces must be “down” in order to change the configuration. See *ifconfig(1M)* for more explanation of how to bring an interface down.

Options for *rlconfig* include:

| Option: | Use: |
|--------------------|--|
| -s | Displays the current RAIN configuration. Commands are not read from standard input with this option. |
| -t | Tear down all previously configured RAIN ports. Commands are not read from standard input with this option. |
| -l [#] file_name | Creates a file containing a list of the configured ZRL devices and the available ZNB devices. The “#” is used for version identification. This option is not intended for use by the user; it is used by the rainlink script to configure RAIN |
| -p ppa | Displays hardware level statistics for specified ppa device. |

To view the current configuration at any time, enter:

```
rlconfig -s
```

The resulting display shows you the status of the RAIN configuration.

```
trunk0<IP_TRUNKING> = znb0<UP>, znb1<UP>, znb2<UP>,
znb3<UP ==> zrl0
```

Lines can be input directly to *rlconfig* from standard input, or from a script like */etc/rain/rainlink.conf*. To start *rlconfig*, enter:

```
rlconfig
```

Enter commands one line at a time and conclude with Ctrl-d.

To use a previously prepared file of commands, redirect the file into *rlconfig*. For example:

```
rlconfig < /etc/rain/rainlink.conf
```

Typical usage would be to redirect a script of commands into *rlconfig* which instruct *rlconfig* to build and set modes on trunks and failover groups. Semicolons delimit commands. Spaces and new lines are ignored. Commands take the following form:

```
trunk<number> = znb<number> [ , znb<number> ... ] ;
failover<number> = znb | trunk<number> [ , znb|trunk<number> ...]

trunk<number> = mode ;
trunk<number> != mode ;

failover<number> = mode ;
failover<number> != mode ;
```

where <number> is a value between 0 and the maximum number of ports in the system. Trunks can consist of ports denoted by a comma-delimited list of znb<number>. A failover group can consist of ports or trunks. You must build a trunk prior to its use in a failover group.

Acceptable modes for trunks are:

| Mode: | Appropriate for: |
|---------------------|--|
| ip_trunking_mode | System-to-system trunking |
| layer_2_mode | System-to-switch trunking |
| layer_3_mode | System-to-switch trunking |
| balance_mode | System-to-switch load balancing enabled/disabled |
| timeout_mode <time> | Failover mode; time parameter in milliseconds |
| hub_mode | Failover mode; Only receives on the ACTIVE port. Use when connecting failover ports in the same collision domain, like to a hub. Do not use when connecting system-to-system, or system-to-switch. |

To tear down the existing RAIN configuration, the interface must first be down. See ifconfig(1M):

```
ifconfig zr10 down
rlconfig -t
```

Removing Drivers

The program /etc/rain/Uninstall.znb will remove all Znyx driver files except itself. It will optionally rebuild the LynxOS kernel without the driver.

Appendix

A: RAINlink for LynxOS Man Page Reference

RAINlink includes the following files and utilities to aid in configuration and monitoring:

- rainlink
- rlconfig
- rlalarm
- rlstats

This section includes Unix-style man pages to be used as reference.

rainlink(1M)

NAME

rainlink – Activate/Deactivate RAINlink

SYNOPSIS

```
/etc/rain/rainlink [ -a | -d | -s | -u ]
```

DESCRIPTION

The *rainlink* command script initializes and reinitializes the RAINlink layer within the ZNYX NetBlaster driver. An input script located in */etc/rain/rainlink.conf* is used as input to ZNYX's *rlconfig* application. A list of default choices is presented if the */etc/rain/rainlink.conf* input script does not exist. The script can be used to bring up the RAINlink and non-RAINlink interfaces. It can also be used to display the current RAINlink configuration.

OPTIONS

- a Activate RAINlink features. Creates an */etc/rain/rainlink.conf* file if it doesn't exist from a list of default choices, brings down the existing NetBlaster interfaces, tears down the existing RAINlink configuration, builds the new RAINlink configuration, brings up the RAINlink interfaces, and finally any other NetBlaster interfaces.
- d Deactivate RAINlink features. Tears down the existing RAINlink interfaces, and brings up NetBlaster interfaces.
- s Show RAINlink configuration (same as */etc/rain/rlconfig -s*)
- u Display usage (same as no parameters)

FILES

/etc/rain/rainlink.conf

SEE ALSO

rlconfig(1M)

rlconfig(1M)

NAME

rlconfig - Configure ZNYX Redundant Array of Independent Netports (RAIN).

SYNOPSIS

```
/etc/rain/rlconfig [ -s ] [ -t ] [ -p ppa ]  
[ -l # list_file ] < input_file
```

DESCRIPTION

The *rlconfig* application is used to configure multiple ZNYX NetBlaster ports into trunks or failover groups. With exception of the *-s* option, all interfaces affected by *rlconfig* must be in the down states. See *ifconfig(1M)* for explanation on bringing down interfaces. The application reads standard input for commands.

A trunk is a grouping of two or more ports that can do port aggregation. Port aggregation can be put in a mode where multiple clients connecting to a server can utilize the bandwidth of multiple ports seamlessly, or in a mode where a server connecting to a server can seamlessly utilize the higher bandwidth of multiple ports.

A failover group is a grouping of ports where only one port is active at any one time. The remaining ports in the failover group are in standby in case the active port goes down. Typically, a failover group would only switch from one link to another if the physical link were lost. By enabling timeout mode, if no traffic is received in the specified time interval, the active port is automatically switched to another available link. The timeout mode time interval is settable by the user in increments of milliseconds.

OPTIONS

- | | |
|--------------------|---|
| -s | Displays the current RAIN configuration. Commands are not read from standard input with this option. |
| -t | Tear down all previously configured RAIN ports. Commands are not read from standard input with this option. |
| -l [#] file_name | Creates a file containing a list of the configured ZRL devices and the available ZNB devices. The “#” is used for version identification. This option is not intended for use by the user; it is used by the <i>rainlink</i> script to configure RAIN |
| -p ppa | Displays hardware level statistics for the specified ppa. |

USAGE

Typically, a script of commands is directed into *rlconfig*, which instruct *rlconfig* to build and set modes on trunks and failover groups. Semicolons delimit commands. Spaces and new lines are ignored. Commands take the following form:

```
trunk<number> = znb<number> [ , znb<number> ... ] ;  
failover<number> = znb<number> | trunk<number> [ , znb<number> |  
trunk<number> ... ] ;
```

```
trunk<number> = mode ;
trunk<number> != mode ;

failover<number> = mode ;
failover<number> != mode ;
```

where <number> is a value between 0 and the maximum number of ports in the system. Trunks can consist of ports denoted by a comma-delimited list of znb<number>. A failover group can consist of ports or trunks. You must build a trunk prior to its use in a failover group.

Acceptable modes for trunk and failover configurations:

| Mode: | Appropriate for: |
|---------------------|--|
| ip_trunking_mode | System-to-system trunking |
| layer_2_mode | System-to-switch trunking |
| layer_3_mode | System-to-switch trunking |
| balance_mode | System-to-switch load balancing enabled/disabled |
| timeout_mode <time> | Failover mode; time parameter in milliseconds |
| hub_mode | Failover mode; Only receives on the ACTIVE port. Use when connecting failover ports in the same collision domain, like to a hub. Do not use when connecting system-to-system, or system-to-switch. |

DISPLAYS

The “-s” option of the *rlconfig* displays the current status of the RAINlink interfaces. The display includes any configured modes for trunks or failover groups, and the status of the interfaces in the form:

```
trunk<number> <mode> = znb<number>, znb<number> ... ==> zrl<number>
```

Where number is the trunk, group, or interface identifier, and mode is one of the acceptable modes. For example:

```
trunk0<IP_TRUNKING> = znb0<UP>, znb1<UP> ==> zrl0
```

The interface status can be:

| Name: | Meaning: |
|---------|--|
| UP | Interface is UP |
| DOWN | Interface is down |
| ACTIVE | The interface is UP, and is the ACTIVE member of a failover group |
| STANDBY | The interface is UP, but is not the ACTIVE member of a failover group. |

The “-p” option of `rlconfig` displays the hardware level statistics for the specifies `ppa`. The display includes current `ppa` state, fault state, link configuration and current link state. Transmit and receive statistics are also displayed.

The following are valid values for the above states:

| Name: | Possible states: |
|---------------------|--|
| State: | HS_STATE_NOT_INIT HS_STATE_STOPPED HS_STATE_RUNNING |
| Fault: | HS_FAULT_NONE HS_FAULT_INTERNAL HS_FAULT_EXTERNAL |
| Link configuration | HS_LINK_AUTO HS_LINK_TP HS_LINK_BNC HS_LINK_AUI HS_LINK_TPFD HS_LINK_TX HS_LINK_TXFD HS_LINK_T4 |
| Current link state: | HS_LINK_DOWN HS_LINK_TP HS_LINK_BNC HS_LINK_AUI HS_LINK_TPFD HS_LINK_TX HS_LINK_TXFD HS_LINK_T4 |

FILES

/etc/rain/rainlink.conf

SEE ALSO

rainlink(1M)

rlalarm(1M)

NAME

`rlalarm` – RAINlink switch and event monitoring application

SYNOPSIS

```
/etc/rain/rlalarm [-d <debug_level>] [-s <dev_id> <ppa>] [-r <dev_id>] [-m <ppa>]
                    [-p <dev_id> <ppa> <ppa> ...] [-h <host_name>]
```

DESCRIPTION

rlalarm is a utility based on the RAINlink Management API (RMAPI) that allows manipulation of RAINlink devices as well as a method for event notifications of a specified device. The device can be either a RAINlink or MAC level device, and can be located locally or reachable remotely via a RAINlink server daemon (`rlsd`).

OPTIONS

- s *dev_id* *ppa* Switch ACTIVE *ppa* of device *dev_id* to the specified *ppa*.
- r *dev_id* Display RAINlink notifications from specified *dev_id*.

| | |
|-----------------------|---|
| -m ppa | Display MAC level notifications from specified <i>ppa</i> . |
| -p dev_id ppa ppa ... | Set precedence of device <i>dev_id</i> on failover group to order of <i>ppa</i> list. First entry in list has highest precedence. |
| -d debug_level | Sets debug level (1 through 4). Larger number increases verbosity. |
| -h host_name | Connect to remote host. |

USAGE

Rlalarm allows manipulation and monitoring of RAINlink devices. To switch the active port in a failover group (zrl0) from port0 to port1, enter:

```
rlalarm -s 0 1
```

The 0 references the RAINlink (zrl) device, the 1 references the port (or ppa, znb1) to make ACTIVE in the failover group.

The "-r" and "-m" options allow you to receive notifications of event changes at either the RAINlink level or MAC level.

The "-p" option allows a method for setting a precedence within a failover group. This allows the user to configure a failover group to always return to a specified ppa, if it becomes available later. The default operation for a RAINlink failover group is to only switch when the ACTIVE port no longer is available. For example, once you've configured a failover group of two ports,

```
failover0=znb0, znb1;
```

Use "rlalarm" to specify that whenever znb0 is available, it should be the ACTIVE port:

```
rlalarm -p 0 0 1
```

You can also connect to a remote host running the RAINlink server daemon *rls*. Provide the remote hostname or ip address as an argument to rlalarm:

```
rlalarm -h 10.0.0.1 -m 0
```

This would attempt a TCP connection to remote host with IP address 10.0.0.1, and if successful retrieve the MAC level statistics for znb0 (ppa 0).

FILES

None

rlstats(1M)

NAME

rlstats – Displays statistics for NetBlaster or RAINlink devices

SYNOPSIS

```
/etc/rain/rlstats [[-m|-s|-o|-i] <ppa>] [-d <level>] [-z]
```

DESCRIPTION

The *rlstats* application is used to display statistics and configuration information for RAINlink devices.

OPTIONS

| | |
|----------------|--|
| -m ppa | Displays MAC layer statistics for specified <i>ppa</i> . |
| -s ppa | Turns speedometer on for specified <i>ppa</i> . |
| -r ppa | Sets speedometer polling rate (in ms) for specified <i>ppa</i> . Use in conjunction with <i>-s ppa</i> . |
| -i ppa | Retrieve hardware information for specified <i>ppa</i> |
| -o ppa | Display speedometer statistics for the specified <i>ppa</i> |
| -d debug_level | Sets debug level (1 through 4). Larger number increases verbosity. |
| -z | Displays RAINlink configuration |

USAGE

Use `rlstats` to display statistics for a particular port or RAINlink configuration.

FILES

None

Other Items

- The current release of the driver is v2.3.7. To determine the version of driver installed, use the `strings` command. For example,

```
strings /lynx.os | grep Version
```

Included in the output should be the version string for the ZNYX driver.

An alternate method is to use the `rlstats` command,

```
/etc/rain/rlstats -i 0
```

- The default media speed for all interfaces is set to autonegotiate to 10 or 100 Mbits/sec, full or half duplex. To force a particular speed, edit `/sys/devices/if_zxeinfo.c`. Edit the first element, commented as `MEDIA_AUTO`. After modifying the file, run `make install` in `/sys/devices` to update the devices library, then build a new kernel.

The following values set the mode for all interfaces:

| Value | Mode |
|-------|------------------------|
| 0 | Auto-Negotiation |
| 1 | 10BaseT, Half Duplex |
| 4 | 10BaseT, Full Duplex |
| 5 | 100BaseTx, Half Duplex |
| 6 | 100BaseTx, Full Duplex |

Where to go for Technical Support

The best way to obtain technical support is to email support@znyx.com.

Please include:

1. Exact model number of ZNYX hardware.
2. Exact version of the operating system.
3. A very detailed description of your problem.
4. Attaching console output in the vicinity of the problem is a big plus.

| Resource | Address |
|-----------|--|
| Telephone | (510) 249-0800 |
| Toll-Free | (800) 724-0911 (USA Only) |
| FAX | (510) 656-2460 |
| Website | www.znyx.com |
| E-mail | support@znyx.com |



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