7 LAN Commands

The HP-UX LAN commands provide the user with the ability to scan and administer LAN interfaces on an HP-UX system. In addition, HP-UX LAN commands can be used for troubleshooting purposes, such as verifying datalink level connectivity between two LAN interfaces.

For HP-UX 11i v1.0, there are three main HP-UX LAN commands:

1. `lanscan` — Used to determine the LAN interfaces installed in the system.
2. `lanadmin` — Used for managing a LAN interface, getting LAN interface statistics.
3. `linkloop` — Used for troubleshooting purposes and verifying data-link level connectivity.

Of the three commands listed, only the `lanscan` command recognizes and works with the HP and the Independent Hardware Vendor (IHV) network interface drivers. The `lanadmin` and `linkloop` commands, only work with HP network interface drivers and do not recognize IHV drivers. IHVs network driver developers are expected to provide their own `lanadmin` and `linkloop` commands and any associated shared libraries. As a part of the ENET sample network driver, fully functional sources are provided for these commands under the `enet/misc/cmds` subdirectory.
LANSCAN Command

The `lanscan` command may be used to display the list of LAN interfaces that are installed on a system. The `lanscan` commands display all the network interface drivers installed on a system, this includes the HP drivers as well as non-HP drivers. The `lanscan` commands communicates with HP-DLPI and gets the list that is displayed to the user. This also means that all IHV drivers must register with HP-DLPI during their initialization.

The HP-UX `lanscan` command displays a list of all LAN interfaces, irrespective of the type of driver (HP or IHV driver) or underlying physical medium (Ethernet, Fiber Channel, Token Ring and so forth) that is installed on a system. The `lanscan` command retrieves the list of LAN interfaces by communicating with HP-DLPI. For any LAN interface to appear in the `lanscan` output, the network interface driver for the LAN interface must be registered with HP-DLPI. For further details of the registration process, refer to Chapter 6, "Creating Networking Device Drivers."

The `lanscan` output contains the following information displayed in a fixed field format:

- Hardware path
- Active station address
- Interface instance number
- Hardware state
- Network interface
- Network management ID
- MAC type
- Status, whether HP-DLPI is supported or not
- Extended station address and encapsulation methods displayed under verbose output

The diagrams shown in Figure 7-1, "HP LANSCAN Command," depicts how the `lanscan` commands fit in the HP-UX networking stack.
Figure 7-1   HP LANSCAN Command

LANSCAN

/dev/dlpi

HP-DLPI

Repository of all LAN Interfaces

HP LAN DRIVERS

Register with HP-DLPI

/dev/enet

ENET DLPI

ENET LAN DRIVER
LANADMIN Command

The HP-UX `lanadmin` command is used to manage various network related settings for a LAN interface. The `lanadmin` command can be used to display and modify LAN interface settings, such as MAC/Physical address, MTU, speed, and so forth. The `lanadmin` command that is shipped with HP-UX 11i v1.0 operating system does not work with IHV network interface drivers. It is the responsibility of the IHV network driver developer to provide a command named, `driveradmin`, along with the driver. As an example, for the ENET sample driver, fully functional sources are provided for `enetadmin` command. IHV drivers may modify `enetadmin` sources to get it to work with their specific network driver.

The IHV drivers, must implement the following `ioctl`s and primitives. Refer to Chapter 6, “Creating Networking Device Drivers,” for detailed information about writing network drivers.

The diagram shown in Figure 7-2, “HP and IHV LANADMIN Commands,” shows how the HP-UX `lanadmin` command and an IHV `driveradmin`, fits within the HP-UX networking stack. ENET is used as a representation of an IHV network interface driver.

Figure 7-2 HP and IHV LANADMIN Commands
The following sections show LAN interface attributes which may be displayed or modified using the HP-UX lanadmin or driveradmin command.

**Displaying a Physical Address**

The `lanadmin` command allows users to display the current physical address of an interface by using the `-a` option. The network interface driver must implement the `DL_PHYS_ADDR_REQ` primitive.

```
REQ: DL_PHYS_ADDR_REQ
ACK: DL_PHYS_ADDR_ACK
```

Usage:

```
lanadmin -a <ppa>
```

Example:

```
$ lanadmin -a 0
Station Address = 0x00306e1cb1f6
```

**Changing a Physical Address**

The `lanadmin` command allows users with super-user privilege to modify the current physical address of an interface by using the `-A` option. The network interface driver must implement the `DL_SET_PHYS_ADDR_REQ` primitive.

```
REQ: DL_SET_PHYS_ADDR_REQ
ACK: DL_OK_ACK
```

Usage:

```
lanadmin -A value <ppa>
```

Example:

```
$ lanadmin -A 0x00047639E284 6
Old Station Address = 0x00047639e283
New Station Address = 0x00047639e284
```

```
$ lanadmin -A DEFAULT 6
Old Station Address = 0x00047639e284
New Station Address = 0x00047639e283
```

**Displaying Source Routing Option**

The `lanadmin` command can be used to display source routing option. This feature may only be used with Token Ring network interfaces. The `lanadmin` command sends the `DLPI_GET_SRC_ROUTE_FLAG` ioctl to fetch the information from the driver.

```
IOCTL: DLPI_GET_SRC_ROUTE_FLAG
```

Usage:

```
lanadmin -b <ppa>
```

This option is used only for Token Ring interfaces.

Example:

```
$ lanadmin -b 1
lan1 Source Routing = on
```
Changing Source Routing Option

Users with superuser privilege can use the `lanadmin` command to modify the source routing option. This feature may only be used with Token Ring network interfaces. The `lanadmin` command sends the `DLPI_SET_SRC_ROUTE_FLAG` ioctl to set the information.

**IOCTL: DLPI_SET_SRC_ROUTE_FLAG**

**Usage:**

```
lanadmin -B on|off <ppa>
```

This option is used only for Token Ring interfaces.

**Example:**

```
$ lanadmin -B off 1
Old lan1 Source Routing = on
New lan1 Source Routing = off
```

Displaying MTU Size

The `lanadmin` command allows users to display the current Maximum Transmission Unit (MTU) size of a network interface by using the `-m` option. The network interface driver must implement the `DL_HP_GET_DRV_PARAM_IOCTL` ioctl for the `DL_HP_DRV_MTU` request.

**IOCTL: DL_HP_GET_DRV_PARAM_IOCTL**

**IOCTL request: DL_HP_DRV_MTU**

**Usage:**

```
lanadmin -m <ppa>
```

**Example:**

```
$ lanadmin -m 0
MTU Size = 1500
```

Changing MTU Size

Users with superuser privilege can set the MTU size of an interface by using the `-M` option of the `lanadmin` command. The network interface driver must implement the `DL_HP_SET_DRV_PARAM_IOCTL` ioctl for the `DL_HP_DRV_MTU` request.

**IOCTL: DL_HP_SET_DRV_PARAM_IOCTL**

**IOCTL request: DL_HP_DRV_MTU**

**Usage:**

```
lanadmin -M value <ppa>
```

**Example:**

```
$ lanadmin -M 1200 0
Old MTU Size = 1500
New MTU Size = 1200
```
Resetting MTU Size

Users with superuser privilege can reset the MTU size of a network interface to the default value by using the `-R` option of the `lanadmin` command. The network interface driver must implement the `DL_HP_SET_DRV_PARAM_IOCTL` ioctl for the `DL_HP_DRV_RESET_MTU` request.

```
IOCTL: DL_HP_SET_DRV_PARAM_IOCTL
IOCTL request: DL_HP_DRV_RESET_MTU
```

**Usage:**

```
lanadmin -R <ppa>
```

**Example:**

```
$ lanadmin -R 0
Old MTU Size = 1200
New MTU Size = 1500
```

Displaying Link Speed

The `lanadmin` command allows users to display the current speed of an interface by using the `-s` option. For this to work, the interface driver must implement the `DL_HP_GET_DRV_PARAM_IOCTL` ioctl for a `DL_HP_DRV_SPEED` request.

```
IOCTL: DL_HP_GET_DRV_PARAM_IOCTL
IOCTL request: DL_HP_DRV_SPEED
```

**Usage:**

```
lanadmin -s <ppa>
```

**Example:**

```
$ lanadmin -s 0
Speed = 10000000
```

Changing Link Speed

Users with superuser privilege can change the speed value of an interface by using the `-S` option of the `lanadmin` command. The interface driver must implement the `DL_HP_SET_DRV_PARAM_IOCTL` ioctl for a `DL_HP_DRV_SPEED` request.

```
IOCTL: DL_HP_SET_DRV_PARAM_IOCTL
IOCTL request: DL_HP_DRV_SPEED
```

**Usage:**

```
lanadmin -S <ppa>
```

**Example**

```
$ lanadmin -S 10000000 0
Old Speed = 100000000
New Speed = 10000000
```
LAN Commands
LANADMIN Command

MIB-II and Interface Specific Statistics

The lanadmin command allows the users to display interface level MIB-II statistics (RFC 1213) by using the -g option. The network interface driver must implement the DL_GET_STATISTICS_REQ primitive. Users can also use lanadmin to display MIB-II statistics in Menu Mode.

Usage:

lanadmin -g <ppa>

Example:

$ lanadmin -g 0

LAN INTERFACE STATUS DISPLAY
Mon, Mar 17,2003 13:55:34

PPA Number = 0
Description = lan0 Intel PCI Pro 10/100Tx Server
Adapter [100BASE-TX, FD, AUTO,
Type (value) = ethernet-csmacd(6)
MTU Size = 1500
Speed = 100000000
Station Address = 0x347c08663
Administration Status (value) = up(1)
Operation Status (value) = up(1)
Last Change = 240
Inbound Octets = 36537058
Inbound Unicast Packets = 4789
Inbound Non-Unicast Packets = 474939
Inbound Discards = 14
Inbound Errors = 0
Inbound Unknown Protocols = 180185
Outbound Octets = 380027
Outbound Unicast Packets = 4605
Outbound Non-Unicast Packets = 14
Outbound Discards = 0
Outbound Errors = 0
Outbound Queue Length = 0
Specific = 655367
Ethernet-like Statistics Group
Index = 1
Alignment Errors = 0
FCS Errors = 387
Single Collision Frames = 0
Multiple Collision Frames = 0
Deferred Transmissions = 0
Late Collisions = 0
Excessive Collisions = 0
Internal MAC Transmit Errors = 0
Carrier Sense Errors = 0
Frames Too Long = 0
Internal MAC Receive Errors = 0

The statistics that the Hewlett-Packard LAN drivers maintain and that lanadmin displays are the MIB-II statistics defined in RFC 1213. These statistics are common to all Hewlett-Packard LAN links, Ethernet, Token Ring, FDDI, and Fiber Channel. In addition, most Hewlett-Packard LAN drivers maintain the link specific MIB statistics. For example, Hewlett-Packard Ethernet/802.3 drivers maintain the Ethernet-like MIB statistics defined in RFC 1398.
Clearing LAN Interface Statistics Registers

Users with superuser privilege can clear the network interface statistics registers to zero using `lanadmin`. The interface driver must implement the `DL_HP_RESET_STATS_REQ` primitive. This feature is available in Menu Mode only.

```plaintext
REQ: DL_HP_RESET_STATS_REQ
ACK: DL_OK_ACK
```

Resetting LAN Interface

Users with superuser privileges can reset a LAN interface card using `lanadmin`. The interface driver must implement the `DL_HP_HW_RESET_REQ` primitive. This feature is available in Menu Mode only.

```plaintext
REQ: DL_HP_HW_RESET_REQ
ACK: DL_OK_ACK
```

Shared Library for LANADMIN

It may be necessary to provide a driver-specific shared library for `driveradmin` if a network interface driver provides user access to card-specific attributes, parameters or features. Since there is no standard set of such features, it is up to driver developers to decide which attributes to make accessible to the users. The `driveradmin` command allows users to modify specific features for different cards; this maintains a level of uniformity.

The `driveradmin` command provides support for driver-specific features by `-x` or `-X` options. When `driveradmin` is invoked with the `-x` or `-X` option, it loads the driver-specific shared library and calls the appropriate function to interact with the driver. The length of each keyword passed with an `-x` or `-X` option must not exceed 30 characters, and the total length of all the keywords including the separator characters (a space character) must not exceed 255 bytes. A network interface driver can define its own keywords as arguments for the `-x` and `-X` options.

The name of the shared library must be `libds<driver name>.sl` and `libds<driver name>.so` for Precision Architecture (PA) and Itanium Architecture (IA) platforms, respectively. For example, the shared library from the ENET driver would be `libdsenet.sl` (on a PA platform) or `libdsenet.so` (on an IA platform). The shared library must be located in the subdirectory, `/usr/lib/lanadmin`.

The `driveradmin` option `-x` is used for displaying the driver-specific features, attributes or settings.

Usage:

```
lanadmin -x [keyword1] [keyword2] ... <PPA>
```

When `driveradmin` is invoked with the `-x` option without any argument, `driveradmin` must displays the current speed and duplex value of the network interface. This behavior is standard for the HP `lanadmin` command for all HP network interface drivers. HP recommends that the IHVs `driveradmin` command mimic this behavior.

Examples:

```
lanadmin -x help <PPA>
```

Displays the driver’s help menu for information retrieval.

The following is the output displayed from the `igelan` driver:

```
$ lanadmin -x help 5
The supported -x options are:
speed Display the speed and duplex value of the link
fctrl Display whether Receive Flow Control is enabled or not
```
LAN Commands

LANADMIN Command

- send_max_bufs: Display the value of send buffer coalescing threshold
- recv_max_bufs: Display the value of receive buffer coalescing threshold
- send_coal_ticks: Display the value of send interrupt coalescing ticks
- recv_coal_ticks: Display the value of receive interrupt coalescing ticks
- stats drv: Display driver and adapter statistics
- card_info: Display the adapter and driver revision and settings

The supported -X options are:
- auto_on: Set the card in autonegotiation mode
- auto_off: Turn off Auto-Negotiation mode for a 1000Base-SX card
- fctrl on: Turn on receive flow control
- fctrl off: Turn off receive flow control
- 10hd: Set the speed of a 1000Base-T card to 10 Mbps half-duplex
- 10fd: Set the speed of a 1000Base-T card to 10 Mbps full-duplex
- 100hd: Set the speed of a 1000Base-T card to 100 Mbps half-duplex
- 100fd: Set the speed of a 1000Base-T card to 100 Mbps full-duplex

- send_max_bufs: Set send buffer coalescing threshold [1 - 128] default 10
- recv_max_bufs: Set receive buffer coalescing threshold [1 - 256] default 1
- send_coal_ticks: Set send interrupt coalescing ticks [0 - 10000000] default 150
- recv_coal_ticks: Set receive interrupt coalescing ticks [0 - 10000000] default 0
- stats clear: Clear all driver and adapter statistics

```
lanadmin -x speed <PPA>
```

Displays the speed and duplex values, and Autoneg status.

```
$ lanadmin -x speed 5
Speed = 1000 Full-Duplex.
Autonegotiation = On
```

In the previous examples, help and speed keywords are used for the -x option.

The -X option is similar to the -x option, but is used to set the values.

Usage:

```
lanadmin -X [keyword1] <value> [keyword2 <value>] ... <PPA>
```

Example:

```
$ lanadmin -X auto_on 5
```

Writing the Driver Specific Shared Library

When driveradmin is invoked with the -x option, it loads the driver-specific shared library and calls the driver-specific function. This function must be named with the following convention:

```
ds<driver name>_get_special(int fd, int ppa, char *driver_special_arg, char *ret);
```

- `fd`: File descriptor for the opened device file of the driver.
- `ppa`: Current Physical Point of Attachment (PPA) number.
- `driver_special_arg`: Arguments passed for the -x option. The arguments are separated by “space” characters. The length of `driver_special_arg` must not exceed 255 characters.
- `ret`: Pointer to a string which `lanadmin` displays if the function did not return an error.

This deprecated argument is currently not being used by any driver. Do not use this argument, it has been retained for backward compatibility only.
Return value:

- Zero on success, a non-zero value on failure.

The `<driver name>` must be the same as the name of the driver. The `driveradmin` command gets this name from the HP-DLPI's list of PPAs. When `driveradmin` is invoked with the `-X` option, it loads the driver specific shared library and calls the driver-specific function. This function must be named with the following convention:

```c
dl<driver name>_set_special(int fd, int ppa, char *driver_special_arg);
```

- `fd` File descriptor for the opened device file of the driver.
- `ppa` Current PPA number.
- `driver_special_arg` Arguments passed for the `-x` option. The arguments are separated by “space” characters. The length of `driver_special_arg` must not exceed 255 characters.

Return value:

- Zero on success, a non-zero value on failure.

The `<driver name>` must be the same as the name of the driver, which must be the same as the driver special file used to open the driver.
LINKLOOP Command

The linkloop command can be used to verify the link level connectivity between two LAN interfaces. The linkloop command that ships with HP-UX 11i v1.0 only works with HP network interface drivers. The IHVs network driver developers are expected to provide their own version of this command. The ENET sample network driver sources also come with fully functional the enetlinkloop command sources. These can be easily modified by IHVs to get it to work with their network interface driver.

The diagram shown in Figure 7-3, “HP and IHV LINKLOOP Commands,” shows how the HP linkloop and IHV driverlinkloop command fit within the HP-UX 11i v1.0 networking stack.

Figure 7-3 HP and IHV LINKLOOP Commands
The `enetlinkloop` expects the underlying driver to implement the following DLPI primitives and uses them to verify link level connectivity.

- REQ: DL_TEST_REQ
- ACK: DL_TEST_CON
- REQ: DL_INFO_REQ
- ACK: DL_INFO_ACK

Usage:

`enetlinkloop -i <ppa> <physical address of target interface>`

Example:

```
$ enetlinkloop -i 0 0x0060B0B63657
Link connectivity to LAN station: 0x0060B0B63657
-- OK
```