

GIGAswitch/ATM Firmware Release 2.5 Release Notes

November 6, 1997

This document contains the release notes for Digital's GIGAswitch/ATM firmware Release 2.5. This release provides support for the following new hardware:

- DAGGL-BB - 4 Port Modular Line Card (QLC V2.1)
including support for the following single port modphys:
 - DAGE1-AA - E1 UTP/ScTP
 - DAGGE-AA - E3 Coax
 - DAGGT-AA - DS3/T3 Coax
 - DAGGU-AA - 155 Mbps UTP/ScTP
 - DAGGS-AA - OC-3 SMF
 - DAGGM-AA - OC-3 MMF
 - DAGT1-AA - T1 UTP/ScTP

GIGAswitch/ATM releases consist of 3 basic components: a LC Kernel image, a LC Application image, and CMM firmware. The table below identifies the major GIGAswitch/ATM releases and the associated component version numbers. .

GIGAswitch/ATM Firmware Release	LC Kernel Version (ROM)	LC Application Version (BIN)	CMM Firmware Version
2.5	575	575	1.91₂
2.4.2	569	569	1.90 ₂
2.4.1	568	568	1.90 ₂
2.1.3	356	359	1.82
2.1.1	354	356	1.82
2.0	300	300	1.80 ₁
1.4.5	205	205	1.74
1.3.1	102	102	1.62
1.2	16	22	1.59

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²DAGGL-BB (QLC 2.1) line card support available from Release 2.4.1 (CMM 1.90) onwards.

¹DAGGL-BA (QLC 2.0) line card support available from Release 2.0 (CMM 1.80) onwards.

Warning

Upgrading to this release requires CMM firmware version 1.59 or higher. If your CMM firmware version pre-dates version 1.59, **you MUST upgrade the CMM firmware to version 1.59 before** upgrading to version 1.90.

Failure to properly upgrade the CMM firmware will render the CMM card unusable

To determine the CMM firmware version currently in use, type B at the CLK> prompt. If the firmware version is earlier than version 1.59 you must first upgrade to 1.59. The 1.59 CMM firmware is contained in the GIGAswitch/ATM firmware Release 1.2. Follow the instructions in the GIGAswitch/ATM firmware Release 1.2 Release Notes. The V1.2 release can be found in the /pub/DEC/GIGAswitchATM directory at Digital's FTP site (ftp.digital.com).

Hardware Requirements

The master line card must be QLC 2.0 (DAGGL-BA) or a QLC 2.1 (DAGGL-BB) with at least an 8M SIMM (DAGME-AA) – i.e. with at least 16 Mbytes of DRAM. OC 12 (DAGGL-CA/DAGGL-CB) line cards and QLC 1.5 (DAGGL-AA) line cards may only be used as slaves.

How to Get a Copy of GIGAswitch/ATM Firmware

The Release 2.5 firmware kit is located in a release area at the Digital FTP Site ftp.digital.com. Copy the image to your system using these commands:

```
# ftp ftp.digital.com

username: anonymous
password: (your Internet address)

ftp> cd /pub/DEC/GIGAswitchATM
ftp> bin
ftp> get AN3V2_5.tar AN3V2_5.tar
ftp> bye
```

To unpack the new image, use the following Unix command:

```
# tar -xvf AN3V2_5.tar
```

This command creates a subdirectory within your current working directory named AN3V2_5. The following files are unpacked into the AN3V2_5 sub-directory:

AN3_VER25	(sample control file)
LC15V25.BIN	(DAGGL-AA/AB/CA/CB application image)
LC15V25.ROM	(DAGGL-AA/AB kernel image)
LC20V25.BIN	(DAGGL-BA/BB application image)
LC20V25.ROM	(DAGGL-BA/BB kernel image)
CMM1_91.X	(CMM firmware)

Where to obtain GIGAswitch/ATM Documentation

GIGAswitch/ATM Release 2.5 documentation is available at the following locations:

WEB site
<http://www.networks.digital.com/dr/gigaatm/manuals/>

Anonymous FTP:

host: www.networks.digital.com
directory: /pub/networks/gigaatm/manuals
file names:
qcv7b-te.ps Release 2.5 14 slot Installation and Service Guide
dagwg-b1.ps Release 2.5 5 slot Installation and Service Guide
qcv8d-te.ps Release 2.5 GS/ATM System Management Guide

Note that the 2 versions of the GIGAswitch/ATM System Management Guide are present in the /pub/networks/gigaatm/firmware directory. The 2.0 Management guide (qcv8c-te.ps) and the 2.5 Management guide (qcv8d-te.ps). The latter describes all the new features available with Release 2.5.

Upgrading Firmware

The new firmware is not compatible with ELAN configurations created with older versions of firmware. This was necessary as a result of the new redundant-LANE functionality that will be released in Release 2.5. It is therefore necessary to delete all ELAN configuration before upgrading to the new firmware. It is recommended that a complete clean up of the non-volatile configuration data is performed before altering or creating configuration with the 2.5 firmware, but it is not necessary to do so (especially if large numbers of PVCs exist in the flash).

The GIGAswitch/ATM should be upgraded using the following process:

Upgrade the clock card firmware to 1.90 *before* updating the line card firmware to V 2.5. If you do not currently have, at least, CMM Version 1.59, upgrade to 1.59 first. Note that the new clock firmware (1.90) is backward compatible with the older revisions of line card firmware. Procedures to update the clock card are available in the GS/ATM manual.

The firmware package for Release 2.5 contains a new clock card firmware image version **1.91**. Version 1.91 of the clock firmware has a minor, but important, fix which checks for CRC errors on the internal ethernet backplane. It is recommended that the clock firmware image be upgraded to 1.91 while upgrading the line card firmware to 2.5. Note that it is necessary that the clock firmware revision be at least 1.90.

The procedures to upgrade the line card firmware are the same as before (specified in the GS/ATM management manual). However, upgrading from firmware revisions 2.1.5 (or older) to Release 2.5 has some caveats. The ROM image of Release 2.5 uses larger flash widths available with the QLC 2.0/2.1 hardware. This was necessary to fit in the larger image sizes of the application. The first attempt to load the new firmware will therefore produce error messages about the application being too big. However, after the first load procedure, reload the switch with the new firmware again. The second time, the switch uses the new ROM image, which will be able to accommodate the larger application images.

Note that 2.5 firmware does not require manual intervention to reboot the switch after the initial load when upgrading the switch firmware. In the past, this was necessary when the old ROM image and the new application image were incompatible. During future upgrades of the switch firmware, after loading the flash with the new ROM & application images, the switch automatically reboots itself to run the new images.

The following is a summary of steps to upgrade the firmware from 2.1.6 (or older) to 2.5

- Change the "Line card Start up mode" flag in the clock to "L", or *force_image_reload* from the master. Reboot the switch to load the new line cards with the new firmware. The boot control file should be modified to point to the new images.

- The master line card loads the new ROM image, and tries to load the new application image. Error messages will appear on the switch console - “*size occupies more than it should*” etc. Wait until the switch prompt on the master appears (after the slaves are downloaded with the new ROM). A message “*Application not started*” will indicate that a second reboot is required.
- Reboot the switch. This time the switch will successfully load both the ROM and application images. After the slaves are downloaded with the new images, the switch will automatically be rebooted again to run the new images.

For detailed instructions on how to download firmware images to your GIGAswitch/ATM, see the *Upgrading the Firmware* section of the GIGAswitch/ATM Installation and Service manual.

Configuration Recommendations

To allow access from other switches to the LECS, it is recommended that a static route be created on the LECS-enabled switch to the well-known LECS address. The static route’s *forwarding slot* should be set to the master line card’s slot number and the *forwarding port* be set to 0. Also, the route must be **exported**. (E.g.: *decnri -sr -conf47 -partial -port 1:0 -exp*)

When configuring constant bit rate (CBR) circuits for E1, E3, or T3 links set the CBR to a value that is less than 70% of the total allowable link rate. The following are the limits to CBR bandwidth allocations imposed by the switch.

The maximum allowed CBR reservation on an OC3 link is 126 Mbs of payload bandwidth.
The maximum allowed CBR reservation on an OC 12 link is 510 Mbs of payload bandwidth.

The maximum allowed CBR reservation per VC on an OC 12 link is 360 Mbs of payload bandwidth.

All bandwidth allocations are in multiples of 800 kilobits per second which is the minimum CBR granularity in a GIGAswitch/ATM.

Switch Initialization

Release 2.5 has security features enabled (by default) for the 5 slot chassis. The security features of a 14 slot chassis may be controlled, as before, using the switch on the front panel of the chassis as described in the manual. The user will hence be prompted to type in a login/password before the CLI can be accessed. The default values for login and password are “*user*” and “*username*” respectively. The password may be changed using the *passwd* command as described in the GS/ATM management manual. [If you forget your password for the 5 slot chassis, change the “Line card Start up mode” flag in the clock to “N”, reboot the switch and at the switch prompt execute the command `clearRecordType(819)`. This will reset the password back to the default.]

The console prompt is now “ATMswitch-> ”.

Release 2.5 supports redundant power supplies in a 5 slot chassis. It also supports sending SNMP traps when a power supply or a fan fails. To receive these traps, an IP address should be configured via the *snmp* command. If a trap address is not configured, one or more messages are printed out at the end of initialization. For eg. “*Could not send trap decATMPscSwap - no trap destinations!*”. These are informational messages, and should be ignored if you don’t expect to receive SNMP traps.

CLI Changes

Release 2.5 comes with a new command language interpreter (CLI). The OBM interface has been retained for backward compatibility, but all the new features are only available via the CLI. Description of the various commands and options of the CLI are available in the new GS/ATM management manual available on the web.

Hot swap

Release 2.5 supports hot swapping (insertion/removal) of slave line cards on a running GIGAswitch/ATM 14-slot system only. The Switch detects line card insertion/removal and updates its configuration. Master line card hot swapping is not supported on a running switch. Removal of master line card will result in a switch reboot.

Since the left-most line card in a switch is elected as the master, slave line cards must be inserted and/or removed only to the right of the master line card. Also, only one slave line card can be inserted/removed at a time. Slave line card insertion/removal should be done only after the previous hot swap operation is complete, and messages displayed on the console indicate that switch configuration update is complete.

Slave Line Card Removal:

To remove slave line card from a running switch, use the following procedure:

1. Disconnect all the cables connected to the line card ports.
2. Press the RESET button on the line card to be removed, e.g. slot5.
All supported line cards have a RESET button below the 4 link LEDs, above all the phy ports.

Wait until all the line card LEDs (Module, Link and PHY) are turned OFF and the following message is displayed.

“Line card in slot5 may now be removed from the chassis.”

After the line card is removed from the chassis, the following message is displayed.

“Line card in slot5 has been removed from the chassis.”

An alternative to pressing the RESET button on the line card is to type the command “*removeLC(5)*” at the switch prompt.

```
ATMswitch->  
ATMswitch-> removeLC(5)  
ATMswitch->
```

Another slave line card can be inserted only after all the above steps are completed.

Slave Line Card Insertion:

To insert a slave line card into a running switch, use the following procedure:

1. Insert the line card into the desired slot (must be to the right of the master line card), e.g. slot 5.
2. Wait for the following messages to be displayed on the console.

“Slot5 joining switch configuration: portStatus[4]=1”
“Slot5 joined switch configuration: portStatus[4]=7”

3. Check that the line card is operational by connecting a loop back cable or a cable between two ports on the inserted line card. If the line card insertion process completed successfully the line card's link LEDs corresponding the port(s) will stay flashing amber.

Only after the above steps are completed, and the line card fully joins switch configuration, another hot-swap operation (insertion or removal) is allowed.

Other Notables

Release 2.5 has changes which allow support of large configurations. Performance improvements have been made to increase the effective throughput of the LANE broadcast server resident in the switch. Depending on the amount of DRAM installed in the master line card, the number of calls supported is automatically scaled. With 16 M bytes of memory in the master (i.e. an 8 M SIMM installed, which is the minimum requirement), the number of point-to-point calls supported is 8192. If a 16 M SIMM is installed (i.e. 24 M of total memory), the number of calls supported scales automatically to 16384.

Release 2.5 supports up to 29 ELANs per switch.

The number of point-to-multipoint parties that are supported is 3200 (with an 8M or 16M SIMM). This is greater than the maximum number of parties required to support 29 ELANs with a party on every link in a 14 slot chassis.

Release 2.5 also includes enhancements to the GIGAswitch/IP firmware. Details of the IP switching enhancements may be obtained from the latest Gigaswitch/IP release notes.

Known Problems

Upgrading the Switch Firmware

Please see the Section on “Upgrading Firmware” for details about upgrading from an older line card firmware release to Release 2.5. If you still see problems with loading new firmware, make sure that the boot-file is correct and all the firmware images are in place as specified in the boot-file.

Downgrading the Switch Firmware

After downgrading the switch to any release prior to Release 2.5 of the GIGAswitch/ATM firmware, the user MUST perform an 'nvdataErase' from the switch console [2809].

Boot up

Occasionally (about once in 50 to 100 reboots), during boot up a switch might stop initialization with a message “waiting at barrier 2 ...”. This is harmless and a reboot of the switch will solve the problem. This problem will be fixed in the next fix package release.

MultiChassis Manager

MultiChassis Manager will occasionally report a "no response from agent" error when attempting to communicate with the switch [2506]. The workaround for this is to increase the MultiChassis Manager retry timer.

MultiChassis Manager displays bogus adpReceiveBuffer information for an inactive QLC V2 multimode fiber ATM port [15523].

LAN Emulation

1. LAN Emulation must not be used over T1/E1 links.
2. The rate limiting options of the “bus” command, i.e. the maxfwdrate, are unavailable in release 2.5.

Redundant LANE

Failure of a switch (serving as the Master LANE service for a large number of LECs) forces all the LECs to rejoin the switch providing Standby LANE service. This process may result in the following (recoverable) error messages.

```
“Add failed for host 47:00:79:00:00:00:00:00:00:00:00:00:00:.. ”  
“STATUS: rrp_exactly_once: max timeout reached on lc 2 procid 101 name tNCCd task”  
“Failed to locate export route w/ rtenryp = ...”  
“Delete failed for host 39:99:99:00:00:00:00:08:00...”
```

Note that these error messages occur because of the sheer volume of messages that the processor has to process in such an overload condition. The system, however, will recover and all LECs will join successfully.

PVCs

1. When deleting a branch of a Point-to-Multipoint circuit, both the root and branch must be specified.

Network Configuration

To access the GIGAswitch/ATM switch from outside of its IP subnet, a default gateway address can be set using BOOTP via the “gw” field, as documented in the Installation and Service manual. However, if the switch’s IP address/netmask information is configured statically, i.e. using the OBM interface, the default gateway address must be set using the *setRoute(“gateway_address”)* command from the switch console. For example, if the default gateway is 192.20.0.1, use the command:

```
ATMswitch-> setRoute(“192.20.0.1”)
```

To delete the default gateway, use the following command:

```
ATMswitch-> clearRecordType(832)
```

Signaling

Configurations involving large number of LAN Emulation Clients (greater than 50) connected to a switch, while LANE services are provided by a second switch, should execute the following command/patch after the switch boots up on the console

```
ATMswitch-> sig_wait_count=1000
```

UNI auto-sensing on links attached to SunATM-622/MMF S-bus Adapter V2.1 does not work because of ILMI interoperability problems. The workaround is to manually set the UNI version.

The switch does not correctly auto-sense the UNI version of an OpenVMS ATM end system that is connected to a QLC V2 line card [15892]. The workaround is to manually set the UNI version, using the *sig* command, from the switch console.

Some implementations of UNI 3.0 signaling reject calls that are sent with the Default DEC Address Prefix. This problem can be avoided by modifying the prefix using the *decnni* command or via OBM as shown below:

- Entering OBM
- Accessing OBM menu 6.1.4 (*Set/Show DEC Switch ID*)
- Showing the current ID using option 3 (*Show Configured DEC Switch ID*)
- Using option 1 (*Configure DEC Switch ID*), enter the new 6-byte ID substituting the first byte 08 with 00
- Accessing OBM menu 6 to save the new DEC Switch ID to Flash using option 4

SLIP

1. Rebooting the switch while the CMM is in SLIP mode causes the switch to reboot multiple times [794]. The workaround for this problem is:
 - During switch reboot, enter CMM local mode by entering a BREAK on a direct terminal connection or (~#) from tip
 - Put the CMM into console forwarding mode by typing Ctrl-O
 - Wait for the message “switch initialization complete”
 - Enter SLIP mode using the normal procedure
2. Attempting to “ping” the switch through the host/SLIP port while the switch is NOT in SLIP mode will cause the switch to reboot. To prevent this problem, ensure that the switch is in SLIP mode before attempting this operation [795].

SNMP

E1 ModPhy MIB objects `dsx1CurrentDMs`, `dsx1IntervalDMs`, and `dsx1TotalDMs` are not supported in this release. Displayed values will always be zero, regardless of the actual number of degraded minutes [5770].

Telnet

Invoking a telnet session to a switch that is already engaged by TIP, will cause the initial session to be locked out until the second session is terminated [3320].

User Interface

While using some OBM and CLI menu options, on a GIGAswitch/ATM 5-Slot Chassis, the switch will display 14 slot positions. Ignore slot positions greater than 5.

“status -l” option does not display the correct link status for line cards plugged in slot 14. Line cards plugged in other slots don’t suffer from the same problem. Use the CLI commands “sig” and “decnni” to get the UNI/QSAAL state and the registered ATM addresses. Note that the “status -s” option works fine.

ATMswitch 900 Interoperability

When an NNI link between an ATMswitch 900 port and a GIGAswitch/ATM port is disconnected and reconnected to another port, the ATMswitch 900 crashes occasionally with the error message - “*assert_failed: rm_ngi_calc_remlink: rvcavail mismatch*”. The work around is to reboot the ATMswitch 900.

Virtual Path Termination

VP termination support is only available on DAGGL-BA/BB line cards. The “switch” command must be used to configure a line card to run in VP mode. A reboot of the switch, or a removal and re-insertion of the slave line card is necessary for the VP mode to take effect.

Install a DAGVP-AA phy module into port 4 only after upgrading the firmware to 2.5. The older firmware fails diagnostics of the (new) unrecognized DAGVP-AA module. Presence of the DAGVP-AA is necessary for shaped VPs to be created. Absence of the DAGVP-AA phy will result in firmware treating all configured VPs as unshaped VPs (i.e. all VPs including VP 0 will be given an equal share (SCR) of the link bandwidth). Unshaped VPs in this context does not imply that every VP can burst up to the maximum available bandwidth on the link. It only means that the total link capacity is divided equally among all the configured VPs, and the VPs will be shaped to an $SCR = \text{link BW}/n$, $n = \text{number of VPs on the link}$.

The following are the limitations of the VP termination functionality in Release 2.5. These limitations will be addressed in the next software release. Most of the problems are likely to be irrelevant to the typical usage of VP shaping through public network tunnels.

VCI ranges

If 4 VPs exist on a link (i.e. 3 non-zero VPs and VP 0), then the VP mapped to logical port 4 (this will be the third non-zero VP created on the link) can only have VCIs less than 2048 ($0 < VCI < 2048$). The VPI to logical port mapping may be obtained using the "pvp -a" command. All other VPs including VP 0 may have up to 4 K VCs ($0 < VCI < 4096$).

VP Throughput

The maximum throughput that may be obtained on a non-zero VP is limited to 325000 cells/sec. A fix will be available in the next release to increase the effective throughput to the OC3 maximum.

MBS

The maximum burst size of VPs must be less than 241.

Modifying VP attributes

Traffic on all VPs terminating in a port must be stopped, before attempting to change the attributes of any of the VPs on that port (i.e pvp -mod command to change SCR/MBS of a VP terminating in line card *L* must only be executed when no traffic is flowing through the VP port in line card *L*).

VP 0 anomalies

VP 0 is also implemented as a shaped VP. VP 0 is assigned an SCR equal to the link bandwidth minus the sum of the SCRs of all the non-zero VPs. Traffic on VP 0 is shaped to its assigned SCR as well.

When non-zero VPs are created on a link, VP 0 is assigned an SCR equal to the remaining bandwidth on the link. Creation of CBR VCs in VP 0 with bandwidth close to the SCR of the VP may have undesirable side-effects. CBR traffic in the switch is governed by a schedule which guarantees the requested bandwidth, and shapes traffic to that bandwidth. If there exist other UBR/ABR VCs in VP 0, then the total bandwidth consumed by the UBR & CBR VCs may be more than the computed SCR of VP 0 (depending on the incoming traffic pattern, since the different VPs throughput bandwidth of a shaped non-zero VP. Note that the CBR VCs will be restricted to the reserved bandwidth of the VCs, it is only the UBR VCs which burst beyond the SCR of the VP. If only UBR VCs exist on VP 0, or if the bandwidth of the CBR VCs on VPI 0 is less than half the available SCR, then the problem does not exist.

VP Link Failures

If a link goes down at the remote end of a VP tunnel (i.e. the logical neighbor in an ILMI link is not physically adjacent), then one needs to wait at least 45 seconds before the link is restored. Likewise, if a VP is deleted at the remote end (which is akin to taking down a logical link), at least a 45 second wait is necessary before the same VP is created again. This wait is to allow both sides to time-out on the ILMI and keep alive thereby ensuring an ILMI variable exchange when the logical link is restored. The problem is due to the fact that if a COLD-TRAP is not sent from the remote side, ILMI data exchange is not done. Hence if the remote end of an ILMI link (tunneled through an ATM cloud), goes down temporarily - the local side times-out and gets into the TRAP, GET_NEXT cycle. However, the TRAP sent by the remote side when it comes back up, does not make it through the cloud to the local switch, there is a problem. Thus, if the remote side happens to come back alive when the local switch is doing a GET_NEXT, the remote side would reply to the GET_NEXT as usual. The local goes on does the GET_ADDR and transitions to REGISTERED - without ever syncing up the ILMI variables. Hence, we get stuck in a UNI mismatch scenario. This has been fixed to trigger an ILMI data exchange even if a COLD_TRAP is not received. However, this only happens if the local side times out on the keep-alive.

PVP Replay

The line card number displayed during boot up while replaying the PVPs in flash is 0-based (not counting the clock module).

Hot Swap

Hot swap of slave line cards is supported in version 2.5. Hot swap of line cards is available only in the 14 slot GS/ATM chassis. Hot swap of a master line card is not supported and leads to a reboot of the switch. The procedures/restrictions are described in detail in the 2.5 manual. The following is a summary.

Remove all links from a line card before attempting to remove it from a chassis.

Press the reset button in the front of the line card and wait for the LEDs to go dark before removing the card. Alternatively, type in the command “removeLineCard *slot#*” on the master and wait for the LEDs on the slave to turn off.

Re-insertion of a new line card into a slot from which a line card was removed will only be processed 90 seconds after card removal. This is to allow the UNI to time out.

CLIP

The CLIP client in the switch allows access to the IP stack over an ATM link. The CLIP connection may be used to create a telnet session over ATM and access all console commands. Likewise it may be used to manage the switch over ATM via ClearVISN. However, flooding the switch’s CLIP client with IP data is not allowed and it might cause the switch to crash. For example, flooded pings from a work station to the switch over CLIP for an extended period of time would lead to such a predicament.

Simultaneous telnet sessions on the ATM path (via CLIP) and the ethernet path is not possible. Connectivity is, however, still available on one path (i.e. ping) when telnetted via the other path.

However, sustained simultaneous pinging on both the ethernet and the CLIP paths to the switch might lead to lock out of the switch console. A reboot of the switch is required to get out of this state. It is hence advised that activity on the ethernet path be kept to a minimum when the CLIP client is in use and receiving data.

Disabling and re-enabling the CLIP client in the switch will cause it to pick a new ATM address for the CLIP end point. Ensure that the ARP entries in the end stations have aged out (or deleted), if there is no communication between the end stations and the switch's CLIP client after the disable/enable sequence.

CLIP SVCs

Do not attempt to disable a CLIP client on a GS/ATM using SVCs while sending data from a client. The following error message is displayed when executing "*clip -a*" after a CLIP client is disabled while receiving data on its SVCs.

```
Data bus error  
Exception Program Counter: 0x802613d0  
Status Register: 0x3000ff01  
Cause Register: 0x0000001c  
Error address: 0x00000000, Error ID: 0x0000
```

The error message is recoverable and re-enabling the CLIP client restores the client to its original state.

CLIP PVCs

There is no clean way to delete a PVC connection to a CLIP client. The work around is to execute the following commands if you need delete a PVC attached to a CLIP client.

```
ATMswitch-> clip -dis  
  
ATMswitch-> clearRecordType(866)
```

Executing "*clip -a*" after disabling the CLIP client on the GIGAswitch/ATM while using CLIP PVCs, will result in a display of garbage ARP entries. This is harmless and re-enabling the CLIP client will restore the ARP cache to its normal state.

Changing the IP address of the CLIP client will require a switch reboot for the new IP address to take effect, if the new IP address belongs to a different subnet than the old CLIP IP address.

Anomalies

1. Internal error messages displayed during switch failures use a zero-based numbering scheme for both slot and port. Furthermore, the CMM module is not included, so slot 8 is reported as 6, slot 9 as 7, etc.