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GIGAswitch/ATM Firmware Version 2.6

Release Notes

February 20, 1998

This document contains release notes for DIGITAL's GIGAswitch/ATM firmware Version 2.6. Version 2.6 of the GIGAswitch/ATM firmware is a fix package release over Version 2.5. The functionality and user interface (CLI) are identical to Version 2.5. Version 2.6 of the firmware provides the following enhancements:

- Handling of overload conditions
- CLIP counter display
- Improvement of OC-12 (DAGGL-CA/DAGGL-CB) line card behavior

Warning

Upgrading to this version 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 upgrade the CMM firmware properly 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 Version 1.59. The Version 1.59 CMM firmware is contained in GIGAswitch/ATM firmware Version 1.2. Follow the instructions in the GIGAswitch/ATM firmware Version 1.2 Release Notes. You can find Version 1.2 in the /pub/DEC/GIGAswitchATM directory at Digital's FTP site (ftp.digital.com).

Hardware Requirements

The master line card must be a QLC 2.0 (DAGGL-BA) or a QLC 2.1 (DAGGL-BB) with at least an 8M SIMM (DAGME-AA) – that is, 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 Version 2.6 firmware kit is located in a release area at the DIGITAL FTP Site, ftp.digital.com. Copy the image to your system using the following commands:

```
# ftp ftp.digital.com

username: anonymous
password: (your Internet address)
```

```
ftp> cd /pub/DEC/GIGAswitchATM
ftp> bin
ftp> get AN3V2_6.tar AN3V2_6.tar
ftp> bye
```

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

```
# tar -xvf AN3V2_6.tar
```

This command creates a subdirectory within your current working directory named AN3V2_6. The following files are unpacked into the AN3V2_6 sub-directory:

```
AN3_VER26.CTL     (sample control file)
LC15R26.BIN       (DAGGL-AA/AB/CA/CB application image)
LC15R26.ROM       (DAGGL-AA/AB kernel image)
LC20R26.BIN       (DAGGL-BA/BB application image)
LC20R26.ROM       (DAGGL-BA/BB kernel image)
CMM1_91.X         (CMM firmware)
```

Where to obtain GIGAswitch/ATM Documentation

There is no new documentation for Version 2.6. The Version 2.5 GIGAswitch/ATM 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	Version 2.5 14 slot Installation and Service Guide
dagwg-b1.ps	Version 2.5 5 slot Installation and Service Guide
qcv8d-te.ps	Version 2.5 GS/ATM System Management Guide

Upgrading Firmware

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 2.6.

If you do not currently have, at least, CMM Version 1.59, upgrade to Version 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 Version 2.6 contains a new clock card firmware image Version 1.91. Version 1.91 of the clock firmware has a minor, but important, fix that 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 Version 2.6. Note that it is necessary that the clock firmware revision be at least Version 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 Version 2.6 has some caveats. The ROM image of Version 2.6 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 2.6 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 Version 2.5 (or older) to Version 2.6

- 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, such as `size occupies more than it should`. Wait until the switch prompt on the master appears (after the slaves are downloaded with the new ROM). A message `Application not started` indicates that a second reboot is required.

- Reboot the switch. This time, the switch successfully loads both the ROM and application images. After the slaves are downloaded with the new images, the switch automatically reboots 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* to 0. Also, the route must be **exported** (For example, `decnni -sr -conf 47 -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 OC-3 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.

Handling Overload Conditions

Version 2.6 contains considerable improvements over Version 2.5 when handling large LANE configurations. Internal signaling queues have been partitioned, and resource allocations and queue sizes have been appropriately sized to handle a large concentration of SVC setups. Larger LANE configurations have been reliably tested in Version 2.6. The following problems that were observed in Version 2.5 have been resolved:

- The LANE service no longer stops any LECs from joining a particular ELAN (as a result of LECs falling out and trying to rejoin an ELAN repeatedly).
- Partitioning and sizing of signaling queues prevent an NNI link from falling into a dormant state because the linkup message at one end of an NNI link is lost in the congestion of SVC setups from other links.
- Problems are no longer caused with point to multipoint SVC setups across OC-12 NNI links in configurations where the LANE service is distributed in a multi-switch network.

CLIP Counters Display

The display of a CLIP client's counters, when that CLIP client is in a disabled state, has been fixed.

OC-12 (DAGGL-CA/DAGGL-CB) Line Card Behavior

The default setting for OC-12 interfaces has been changed from loop timing to local timing. For environments in which OC-12 links serve as NNI links, each end of the link must source its own clock. In previous versions, both ends of the links were set to loop timing (that is, the transmit clock is derived from the receive clock), which caused intermittent problems in OC-12 links.

However, note that a command to change the timing mode of a port is not available in Version 2.6. If an OC-12 interface needs to be set to loop timing mode (for example, when interfacing with an OC-12 SONET add/drop mux), the firmware must not be upgraded to Version 2.6. Version 2.7 will provide an option for the user to change the timing mode from the console.

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 Version 2.6. 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 version prior to Version 2.6 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 bootup, a switch might stop initialization with a message `waiting at barrier 2 … .` This is harmless and a reboot of the switch solves 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 false adpReceiveBuffer information for an inactive QLC V2 multimode fiber ATM port [15523].

LAN Emulation

LAN Emulation must not be used over T1/E1 links.

The rate limiting option `maxfwdrate` of the `bus` command is unavailable in Version 2.6.

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/ rtentryp = …`
- `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

Specify both the root and branch when you delete a branch of a Point-to-Multipoint circuit.

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 *GIGAswitch/ATM Installation and Service* manual. However, if the switch's IP address/netmask information is configured statically, that is, 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 following command:

```
ATMswitch-> setRoute("192.20.0.1")
```

To delete the default gateway, use the following command:

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

Signaling

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 set the UNI version manually.

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 set the UNI version manually, 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:

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

SLIP

Rebooting the switch while the CMM is in SLIP mode causes the switch to reboot multiple times [794]. The workaround for this problem is:

1. During switch reboot, enter CMM local mode by entering a BREAK on a direct terminal connection or (~#) from tip
2. Put the CMM into console forwarding mode by typing Ctrl-O
3. Wait for the message `switch initialization complete`
4. Enter SLIP mode using the normal procedure

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 version. 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.

The `status -l` option does not display the correct link status for line cards plugged in slot 14. Line cards plugged in other slots do not show the same behavior. 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 workaround is to reboot the ATMswitch 900.

Virtual Path (VP) Termination

VP termination support is only available on DAGGL-BA/BB line cards. Use the `switch` command to configure a line card to run in VP mode. For the VP mode to take effect, reboot the switch or remove and reinsert the slave line. Install a DAGVP-AA phy module into port 4 only after upgrading the firmware to Version 2.6. 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 results in firmware treating all configured VPs as unshaped VPs (that is, 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 = link BW/n, n = number of VPs on the link.

The following are the limitations of the VP termination functionality in Version 2.6. These limitations will be addressed in a future 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 (that is, 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 OC-3 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 (that is, `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 that 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 that 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 (that is, 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).

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 workstation 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 are 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 workaround is to execute the following commands if you need to delete a PVC attached to a CLIP client:

```
ATMswitch-> clip -dis

ATMswitch-> clearRecordType(866)
```

Executing `clip -a` after you disable the CLIP client on the GIGAswitch/ATM while using CLIP PVCs, will result in a display of false ARP entries. This is harmless and re-enabling the CLIP client restores 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

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.