CHAPTER 1

New Features and Enhancements

Hardware Platform Features • User Connectivity • Trunk Connectivity • Service Integration • Network Management • Infrastructure

This chapter describes features and enhancements of Release 2.0.7 of the LightStream 2020 ATM product that are new since Release 1.

Hardware Platform Features

New hardware platform features of Release 2.0.7 include the following:

- New switch card
  - Redundant-switch synchronization for switch cutover with minimal disruption
  - 10-port crossbar switch for time-slotted cell switching
  - Interconnects all function cards in a LightStream node
  - Contains the test and control system (TCS) Hub
  - 200 Mbps raw bandwidth per port through the switch
  - About 170 Mbps payload bandwidth per port (accounting for switch overhead, ATM cell header overhead, and contention for switch output ports)
  - About 1.7 Gbps aggregate payload bandwidth per chassis

User Connectivity

Release 1 provided the following user connectivity:

- 56Kb/s - 2Mb/s frame relay
- 56Kb/s - 2Mb/s frame forwarding
- T3 UNI
- E3 UNI

Ethernet, FDDI, and OC-3c UNI capabilities have been added to Release 2.0.7, as follows:

Ethernet

The Ethernet interface module comprises a packet line card (PLC) and an Ethernet access card. The access card supports eight IEEE 802.3 Ethernet ports, as follows:

- Six ports support 10Base-T twisted-pair Ethernet.
- Two attachment unit interface (AUI) ports support either 10Base5, or 10Base-T Ethernet.

FDDI

The FDDI line module comprises a packet line card (PLC) and an FDDI access card. The access card supports two FDDI ports. Each FDDI port supports a single-MAC station that can function in either dual-attached mode or dual-homed mode. The station management (SMT) software implements SMT version 7.3 as defined in ANSI X3T9.5.

OC-3c UNI

The OC-3c UNI module comprises a cell line card (CLC) and an OC-3c access card. Several hardware configurations support both single-mode and multimode optical interfaces and one or two ports. The ports can be selected to run in either SONET or SDH mode on a per-port basis. The OC-3c interfaces operate at 155.52 Bit/sec.

Trunk Connectivity

Release 1 provided the following trunk connectivity:

- 128 Kbps — 2 Mbps service
- T3
- E3/PLCP

Release 2.0.7 enhances trunk connectivity as follows:

E3/G.804

The E3/G.804 UNI/Trunk module comprises a medium-speed (MSC) function card and a G.804 medium-speed access card that supports two E3 G.804-compliant ports. In addition, Release 2.0.7 still supports two earlier types of medium-speed access cards, one supporting T3 PLCP and a second supporting E3 PLCP.

OC-3c for Singlemode or Multimode Fiber

Release 2.0.7 supports 1-port and 2-port versions of the 155.52 Mbit/sec OC-3c interface. For each version of the hardware, the software can be configured to operate the card as either an ATM UNI edge card (supporting a range of VCIs) or a LightStream trunk card (using only port 0). This interface can be selected to support either SONET STS-3c framing or SDH STM-1 framing.

Service Integration

Release 1 supports frame relay, frame forwarding, and ATM UNI services. Release 2.0.7 adds to these capabilities as follows:

OC-3 ATM UNI

The software for implementing ATM UNIs in the LightStream system has been enhanced in Release 2.0.7 in two ways.

- Support for ATM UNI PVCs has been implemented on the OC-3c interface modules. In this way, LightStream supports ATM UNI PVCs on both the multimode and the single-mode physical interfaces.
- The traffic policing function has been implemented on all LightStream ATM UNI interfaces (OC-3c, DS3, T3, and E3). This allows enforcement of traffic rates for PVCs according to class of service within the network. Consult the *LightStream 2020 Configuration Guide* for implementation details.

Bridging

Release 2.0.7 supports transparent bridging and translation bridging between FDDI and Ethernet LAN interfaces. Bridging features include the following:

- Spanning tree detection and prevention of loops and redundant paths (IEEE 802.1d).
- Reduction of broadcast traffic.
  - Administrative configuration of per-port maximum forwarding rate for broadcast frames.
  - Performance of Proxy ARP functions on a network-wide basis. This includes caching IP address to MAC address associations, and generating ARP replies rather than flooding ARP requests when an IP to MAC association is known.
  - Minimized flooding of bridge packets with unknown MAC address, by learning MAC addresses locally and using LightStream mechanisms to distribute this information to all of the nodes in the network.
- Packet filtering on LAN interfaces by the following fields:
  - Source address
  - Destination address
  - Protocol type
  - LLC DSAP
  - LLC SSAP
  - SNAP OUI
  - SNAP protocol type
- Filtering at full line speed on each port for Ethernet and FDDI.
- Forwarding at full line speed on all Ethernet ports for all packet sizes.
- Forwarding at up to FDDI line speed on one port for 64-byte packet length.
- Performing IP fragmentation in the course of translation bridging from FDDI to Ethernet when the frame length exceeds the maximum Ethernet MTU (1500 bytes).
- “Best effort” QoS for bridged traffic.
- ATM virtual channel connections are set up automatically to support internetworking between bridged ports.
- ATM virtual channel connections automatically age out if they remain idle for longer than 5 minutes.

- ATM virtual channel connections are automatically torn down and re-established on demand:
  - with changes in LightStream internal network topology, such as trunk failure and recovery
  - with changes in LightStream external network topology, such as moving a station from one LAN interface to another
- Release 2.0.7 supports statistical multiplexing for bridged flows, based on the fact that at any given moment only a relatively small fraction of the traffic sources within the network are expected to be sending at the maximum rate.

Reduced Latency for High Priority Traffic

In Release 2.0.7, the software for the low-speed line card has been modified to reduce the latency for high-priority traffic using low-speed ports.

Smaller Minimum Enforceable Rate for “Insured” Traffic

In Release 2.0.7, the slowest rate for which a low-speed line card interface can allocate frame relay or frame forwarding “insured” traffic has been lowered from 14 Kbps to about 6 Kbps, the minimum rate enforceable by the traffic policing hardware. This is known as the minimum enforceable traffic rate. The smaller minimum makes it possible to multiplex a larger number of insured virtual circuits onto a single port.

Workgroups

Release 2.0.7 supports port-level workgroups. Per-port workgroup membership lists define communities of interest restricting intercommunication. By default, all ports are assigned to a default workgroup (no restriction).

Network Management

Release 1 provided an intelligent SNMP agent and a command line interface (CLI). To this, StreamView Release 2.0.7 (the workstation software) adds a graphical configurator and graphical monitor, remote software download capability, and various enhancements to existing capabilities. StreamView Release 2.0.7 also supports the configuration and management of workgroups, the first of a planned suite of virtual LAN internetworking (VLI) features.

Communication with Network Management Station

An SNMP-based network management station (NMS) may be connected to the LightStream network by any of the following interfaces:

- The Ethernet interface on the NP access card (as in Release 1)
- Either of the interfaces on the FDDI access card
- Any of the eight interfaces on the Ethernet access card.

Graphical Configurator

StreamView Release 2.0.7 provides a graphical configurator that runs under the Motif window manager on a SPARCstation running SunOS 4.1.x or Solaris 1.1.x. It may run either as a stand-alone application or integrated with the UNIX-based HP OpenView network management system. It supports configuration on a per-port, per-card, and chassis-wide basis. It includes the following features:

- Extensive error checking of configuration parameters
- Checking of parameter dependencies during configuration
- Creation of configuration database
  - for future re-use
  - for verification against current operational attributes
  - by saving configuration changes made by SNMP sets
- Downloading of configuration updates by SNMP
- Scheduling of downloaded configuration updates
- Setting of administratively desired port and card status
- PVC configuration
  - ATM UNI
  - Frame relay
  - Frame forwarding
- Packet filter configuration
- Workgroup configuration
- On-line help screens

Graphical Monitor

StreamView Release 2.0.7 provides a graphical monitor that runs under the Motif window manager on a SPARCstation running SunOS 4.1.x or Solaris 1.1.x. It may run either as a stand-alone application or integrated with the UNIX-based HP OpenView network management system.

Note The monitor requires a color display.

- The application displays an image of the front of a LightStream node, with the bulkheads for the cards shown as they appear on the actual machine.
- Chassis-wide information is displayed in the area above the card bulkheads.
- To see information about an individual card and the ports on it, the user “opens” the image of the bulkhead for that card.

Node, card, and port attributes displayed include the following:

- LED states
- Port and card status

- Temperature readings

PVC Tuning Enhancements

Release 2.0.7 includes the following tuning enhancements for frame relay PVCs:

- Per-PVC transfer priority settings
- Per-PVC secondary bandwidth scaling factor

Remote Software Download

In Release 2.0.7, only one node on the LightStream network must be upgraded to a new release of software directly from the distribution diskettes. Other nodes on the LightStream network may then be upgraded remotely from this first node over the network. The remote download software uses the LightStream virtual internal network, a logical IP network built using the network's trunks. The command to switch from one software version to another is issued on site through the console port, remotely via dial-in modem, or remotely through the NP Ethernet port on each node.

Verification of Software Installation

In Release 2.0.7, a network administrator can use the **ckswinstall** utility to identify distribution files that have been deleted or modified since the software was installed. This utility uses a set of "check" files that identify directories, files, and links that make up the distribution, together with the owner, group, checksum, file protections, file size, link target, and device file information for each.

Command Line Interface (CLI)

In Release 2.0.7, the CLI has been extended to support MIB changes and new card and port types. The Release 1 CLI configure command is not included in Release 2.

Infrastructure

Release 1 provided traffic management, neighborhood discovery, hot-swap capability, test and control system (TCS) support, switch redundancy, automatic routing and rerouting, and buffer management. To these capabilities, Release 2.0.7 adds the following:

Switch Cutover

Release 2.0.7 supports two types of switch cutover, as follows:

- Planned, user-initiated cutover permits hot-swap replacement of switch cards in a redundant system.
- Unplanned cutover occurs when dedicated hardware logic in attached cards detects a problem in the active switch card, such as clock loss failure or TCS slave failure.

Release 2.0.7 includes a new switch card and associated software. With two Release 2 switch cards in a redundant configuration, planned cutover between the primary and backup switch is lossless, and unplanned cutover results in limited cell loss.

Login Access

In Release 2.0.6 and prior releases, an administrator can log in to the node during a single-user boot sequence without a password. To improve security for unattended nodes, Release 2.0.7 includes an option that requires a password during a single-user boot.