CHAPTER 1

Using the Configurator

This chapter provides general information on the StreamView configurator for the LightStream 2020 multiservice ATM switch (LS2020 switch).

Each LS2020 switch in a network requires its own configuration information. This information is structured as a series of attributes, or parameters, for which you supply values. The attributes determine the operation of the LS2020 switch in the network.

To help you define configuration attributes, the LS2020 has a set of three configuration programs, collectively called the StreamView configurator:

- Node configurator (CFG)
- Permanent virtual circuit configurator (PVC)
- Virtual LAN internetworking configurator (VLI)

The StreamView configurator resides on your network management system (NMS). The configurator features a user-friendly graphical user interface (GUI) that can reduce a complex configuration task to the clicking of a mouse button. It also performs consistency and error checking on the information that you enter.

What You Need

Before you can use the configurator, you must have the appropriate hardware and software installed. To communicate with LS2020 switches, your NMS must be connected to at least one LS2020 switch in an LS2020 network. Through that switch, you can configure all of the other LS2020 switches in the network.

How It Works

Initially, you will use the LS2020 configurator to create configurations for all the LS2020 switches in your network. You can then use the configurator to change existing configurations or to add new ones as your network grows.

The configurator is designed around a series of dialog boxes that let you perform such functions as

- Creating database objects that represent chassis (nodes), cards, and ports
- Setting the attributes of each object
- Saving database changes

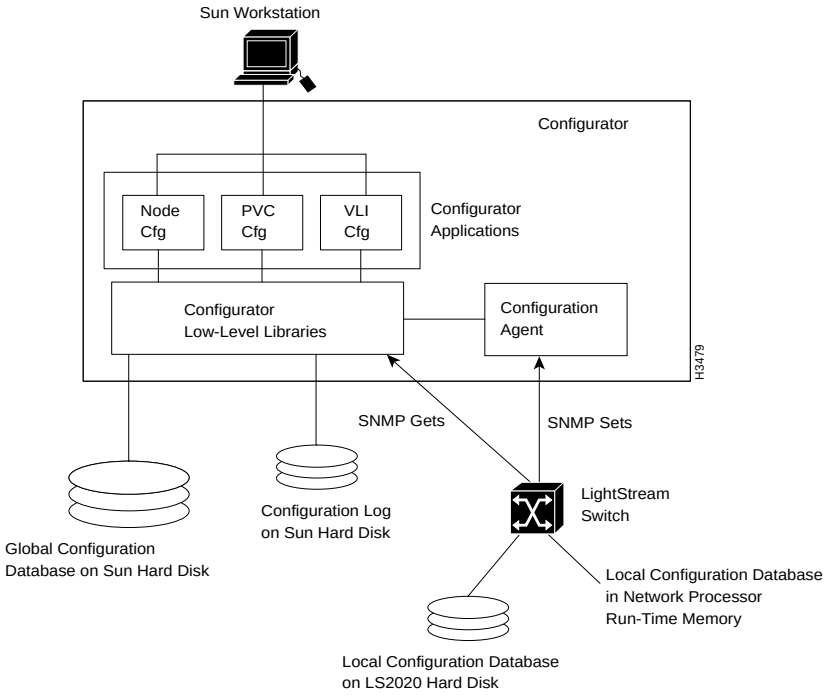
With the configurator, you can create, edit, or back up the configuration file of your LS2020 network.

The following sections concern the configurator and the database files that you create with it.

Configurator Software

The configurator applications run under Motif/X11 or HP OpenView. As shown in Figure 1-1, the configurator applications write to the configuration database on the Sun's hard disk through low-level libraries. The configuration agent, cfg_a, translates the database information into Simple Network Management Protocol (SNMP) **set** commands that send the information to an LS2020 switch; this is called an update. The configuration agent produces log files for each update of each switch, which are stored on the Sun's hard disk. The configurator applications can also retrieve configuration information from an LS2020 switch through SNMP **get** commands.

Figure 1-1 Configurator Block Diagram



About the Database

Configuration information for the entire LS2020 network is stored in a single logical database, called the global configuration database. The global database resides on the hard disk of the Sun workstation that you are using to run the configurator.

Each switch in an LS2020 network has a database with only its own configuration information, called a local configuration database (resident locally on the LS2020 disk). The information in a local database is vital to the node's operation; without a local database, the node cannot bring up any of its interfaces—in other words, it cannot pass traffic.

You have to explicitly send a local configuration database to its intended LS2020 switch. The local database is extracted from the global database by the configurator when it performs the update. The local database is stored in run-time memory on the NP and on the NP's hard disk.

The information is transferred from the Sun workstation to the switch through SNMP **set** commands over an Ethernet interface. In order for you to send configuration information to LS2020 switches, the NMS must be connected to at least one LS2020 switch. It may be connected through the Ethernet port on an LS2020 network processor card (NP), or it may be connected through an LS2020 Ethernet port.

Note In configurations with backup NPs, the update is sent only to the primary NP. The primary NP periodically updates the backup NP's memory.

There are, then, actually three copies of a switch's configuration file in the system:

- On the NMS hard disk—the global database.
- On the node's hard disk—the local database. The version on the hard disk is considered permanent: its contents are changed only by an administrative action through the configurator or the command line interface (CLI). Power cycling or restarting the switch does not change its contents.
- In the node's run-time memory. This is what the node is actually running. The version in run-time memory is not considered permanent. If the switch is power cycled, crashes, reloads, or restarts, or if the NP card is reset, the attributes in run-time memory are reset.

There is only one way to change the global database file on the NMS hard disk: by using the configurator.

There are two ways to change the file in run-time memory and on the switch's hard disk:

- An update from the global database file. An update replaces the values on the hard disk with values from the global database.
- A CLI command. A special sequence of CLI commands can be used to make changes to attribute settings on the switch's hard disk.

The values in run-time memory are reset whenever the node or the NP is reset. In this case, NP software resets the attributes in the following sequence:

- First, it sets values to preprogrammed defaults.
- It then reads in values stored in EEPROM on the NP.
- Finally, it reads in values from the local database on the NP's hard disk.

If the same attribute is specified in more than one place, the setting in the last file read by the NP software during the reset process is the one that is used.

The EEPROM may contain attributes that are not specified in defaults or the local database. When the node is restarted, the values are written to run-time memory from the EEPROM. Therefore, values that you thought were temporary can show up in your run-time memory even though you did not commit them to your hard disk.

Management Information Base

The LS2020 configuration database is based on the SNMP management information base (MIB). In the SNMP model, a managed system is a collection of objects that can be read and/or written to by an external system. Internally, the objects may correspond to different parts of the managed system;

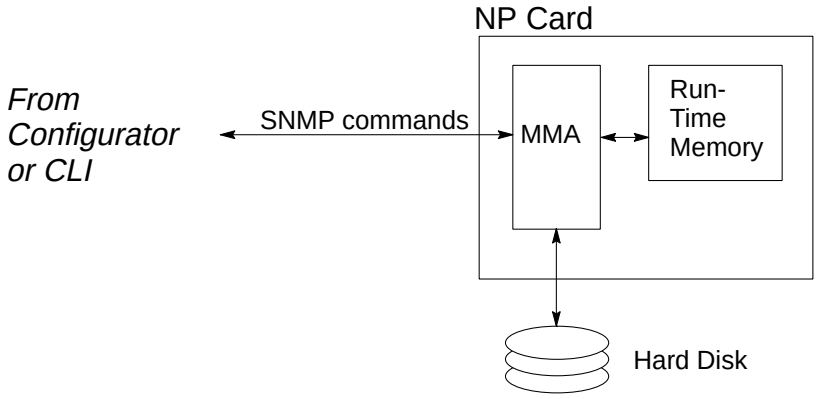
externally, however, they appear as a single coherent database, called a MIB. The local configuration database, or MIB, contains all information accessible to external management systems for the local switch.

The attributes you can set using the LS2020 configurator are specified in standard MIBs and in the LS2020 private section of the MIB.

Master Management Agent

The master management agent (MMA) is a software process running on the NP. The MMA binds the different objects in the local configuration database together in order to present the database as a unified image. The MMA acts as the local configuration database manager and provides access to the database for the CLI and configurator. Figure 1-2 shows the flow of configuration information through the MMA.

Figure 1-2 Data Flow through the MMA



File and Path Names

If you have installed management software according to the *LightStream 2020 Installation Guide,* the global database files you create on the Sun are called configure.netdb.pag and configure.netdb.dir. The default database files are automatically opened when you start the configurator. If you are running under HP OpenView, the files are stored in /usr/OV/databases. If you are not running under HP OpenView, they are stored in /usr/LightStream-2.1/db.

The default database file name and path name are defined by the LSC_DATABASE environment variable. The file specified by the LSC_DATABASE variable is automatically opened when the configurator is started. It is also the file used to perform updates. If you want to rename your operational database files, you must change the name specified by the LSC_DATABASE variable.

The local database (the database on the node itself) consists of two files, mma.db.dir and mma.db.pag, which reside on the hard disk in each node in the directory /usr/app/base/config.

Changes made to a local database configuration by the configurator are recorded in log files. A separate log file is created for each update of each switch (or switch pair in the case of PVCs). If you are running under HP OpenView, the log files are stored on the Sun hard disk in the /usr/OV/log directory. If you are not running HP OpenView, they are stored in /usr/LightStream-2.1/log.

Environment Variables

Before you use the configurator, you must have several environment variables defined in a file that the shell reads on login—for example, the Bourne shell (sh), the C shell (csh), and GNU Bourne-Again shell (bash). The environment variables you need to define depend on whether you are running under HP OpenView or not and what shell is invoked when you log in.

Caution Configuration program tools get their environment values from the program that starts the configurator. For that reason, be careful if you change environment variables running under ovw. You must restart ovw to put the changes into effect.

Table 1-1 describes the material specified by each variable.

Table 1-1 Environment Variables

Variable	Material Specified
PATH	A standard shell variable that defines a search path of directories where executable files can be found.
UIDPATH	The directory where the UID files are located. The path terminates with /%U.
LSC_DATABASE	The path name of the default database file. Although you can create, open, and edit other database files, only the file specified by this variable is used by the configurator to update a switch. It is also used as the default file when the configuration application is started.
LSC_CFGLOGPATH	The directory where the configuration log files are stored.
LSC_CFGTCPPORT	The TCP port (socket number) the applications use to communicate with cfg_a. (The number you choose must be unique within the system.) All three applications (CFG, PVC, and VLI) use this variable.
OVSNMP_CONF_FILE	The file where SNMP parameters are stored. These include the SNMP community name, delay time and number of times to retry an SNMP operation. ♦ Note: This environment variable applies only to management software not running under HP OpenView.
XKEYSYMDB	The X file that provides key mapping. This file points to the standard XKeysymDB file that is included with the various versions of X. ♦ Note: If you have a problem running the application (if, for example, you are receiving translation table syntax errors or have a non-functioning Delete key), the XKeysymDB file may not be defined.

Configurator Compared with CLI

Configuration changes made with the LS2020 configurator are permanent; they are saved in the global and local configuration databases. The configurator provides an easy-to-use graphical interface, as well as consistency and error checking on the information that you enter. For these reasons, you should use the configurator for making permanent changes to your configuration.

You can also use the CLI to access configuration attribute values on a local switch. CLI commands enable you to change and display the settings of configuration attributes. They also enable you to make those changes in the NP's run-time memory only or to run-time memory and the switch's hard disk. Use the CLI for troubleshooting or for fine-tuning network performance.

When you use CLI to change any configuration attribute values, configuration values on the switch are out of synch with those in your global database. If you want to enter your local changes into the global database, you can do so with the configurator's Verify function. This function retrieves the attribute values from the run-time memory of a designated switch and allows you to save them to the global database.

On the other hand, if you want to restore the values on the switch to global database settings, you can delete the local database and use the configurator to update the local switch. Updating the switch replaces any local settings (in both run-time memory and the hard disk) with the global ones.

Note If you created new database objects with the CLI, those objects remain in the local database after you update it; they are not erased. Therefore, your local and global databases are still out of synch. If you want to delete the new objects, you can either delete them using the CLI or delete the entire local database file and update the switch. (You may want to make a copy of the local database file before you delete it.)

When to Use It

You use the StreamView configurator tool set to configure or reconfigure whenever you

- Install a new node
- Remove a node
- Add a new line card or NP
- Reallocate trunk lines within the network
- Attach or detach access devices or lines at the edge of the network
- Add or modify custom filters, static bridge filters, workgroup membership, traffic profiles, multicast groups, or spanning tree bridge attributes
- Change configuration attributes
- Add or modify logical channels (PVCs)

How to Use It

This section describes the graphical elements that make up the dialog boxes of the configurator and explains how to use them. It also provides an overview of the types of task you can perform with the configurator.

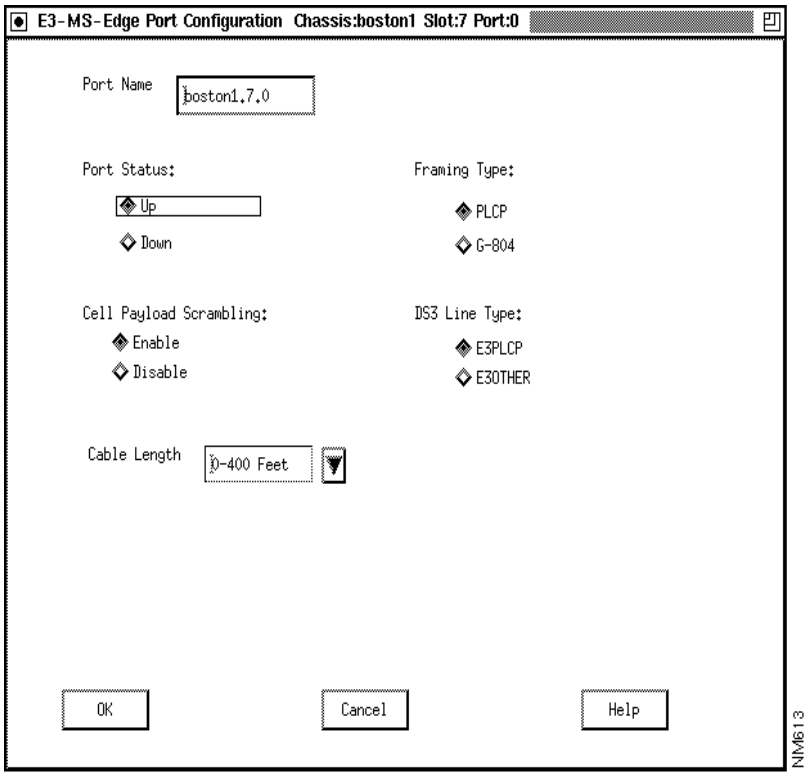
Getting Around in a Dialog Box

The configurator displays a variety of dialog boxes that you can use to enter or change information. The dialog boxes are made up of a number of different graphical elements, which are used to display, enter, and change information. These graphical elements include buttons, fields, and lists.

- Buttons are used to execute a command or select attribute options.
- Fields are used to type in configuration information.
- Lists are used to display and select from preset values for a field.

Each of these elements is described in the following subsections. Figure 1-3 shows a sample dialog box, the one for E3 port configuration.

Figure 1-3 Sample Dialog Box



Note Grayed-out labels or buttons in a dialog box indicate that the element is not currently available for use. The element may be unavailable for any of the following reasons: (1) a required database object has not been created, (2) the element is not appropriate for the selected object, or (3) the element is not supplied in the current release of the configurator.

Buttons

Buttons are used to provide a quick way to perform commands or select an attribute setting. If a button is not available for use, it is shown in gray. Table 1-2 describes the various types of buttons used in the configurator.

Table 1-2 Button Types

Button	Function
Push button	Used to execute an operation (such as add, delete, or cancel) or to select another dialog box.
Radio button	Used to select among mutually exclusive settings, such as enabled and disabled.
Check button	Used to select several options at the same time and in any combination.
Option button	Used to display a list of defined values. Use arrows to scroll through the list; use the mouse to select values.

Button	Function
OK	Used to accept changes to information in a dialog box. The changes are retained, and you are returned to the preceding dialog box.
Help	Used to obtain a list of items for which online help is available.
Cancel	Used to discard changes made in a dialog box. Closes the dialog box and returns you to the preceding dialog box. (If you performed a save during the changes you were making, only those changes made after the save are lost.)

Fields

Field boxes are used to enter information. They look like push buttons except they contain a cursor and are labeled either above or beside the box. You click inside the field box with the mouse and then type in your information. Use either an associated command button or the OK button to store the information.

To move around a field box, use the left and right arrows on the right keypad. To select an entry, you can either double-click on the entry or press the left mouse button and, keeping it down, drag it over the text you wish to select. To delete a selected entry or a character, use the Backspace key.

Lists

Lists are used to display a set of choices currently available for a field, for example chassis names. You modify a list by using its associated field box and push buttons. You can add to the Chassis list on the Configuration Manager dialog box, for instance, by typing in its associated field box and then clicking on the Add push button.

You can select multiple and non-contiguous entries in some lists. To select multiple contiguous items, press the mouse button and, keeping it down, drag it over the desired entries. To select multiple non-contiguous entries, press the Control key and click the mouse button on the desired entries. You can also press the Control key and press the mouse button and, keeping it down, highlight the desired entries.

Configuration Tasks

The remainder of this chapter discusses, in general, the types of configuration tasks you can perform using the configurator.

Creating a Configuration for a New Switch

Figure 1-4 shows the steps you follow to create a configuration for a new switch. You begin configuration by creating a chassis object, assigning it a name, and filling in the chassis ID, IP addresses, and so on. You then create card objects within the chassis and ports for the cards.

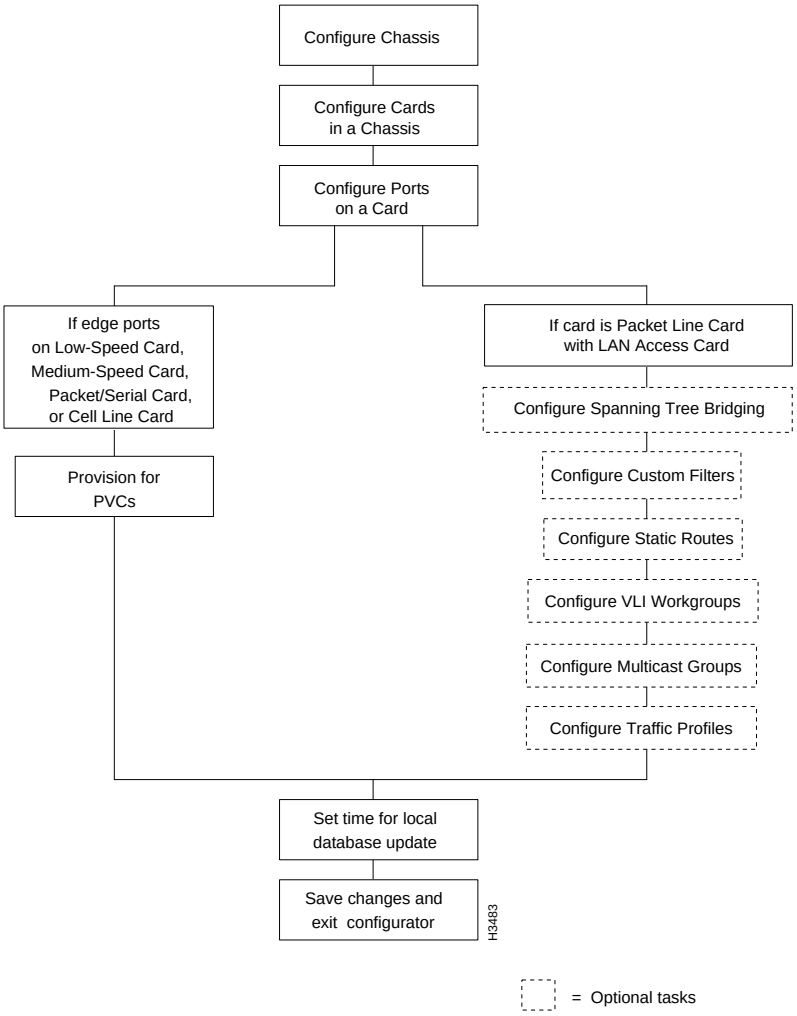
Note If the switch is installed and running in the network, you can use the configurator's Verify function to obtain this information from the switch.

You need to configure permanent virtual circuits (PVCs) using the PVC GUI tool for the edge ports in your LS2020 network. This is called provisioning.

If you have configured any packet line cards (PLCs), it is likely that you are planning to use the LS2020 network as an extended bridge. In this case, you can configure bridge and virtual LAN internetworking (VLI) attributes. The PLC automatically establishes switched virtual circuits (SVCs) for bridged interfaces; this is called implicit setup.

When you complete a configuration, you must save it to the global database. You can then deploy it to the switches in your network. You specify the update time and date, and the configurator updates every target switch's local configuration database, one at a time.

Figure 1-4 General Steps in Configuration



Changing or Adding to a Configuration

You can use the configurator to change or add to the global database file. When you set the update time and save the configuration, additions are sent to the local switch to update local database files as scheduled.

Manipulating Objects

The configurator lets you perform other simple operations, including the renaming or deletion of some database objects. The subsections that follow describe these actions and their effects on existing circuits.

If you update an operating node and the new data changes the attributes of existing ports or lines, the flow of traffic can be briefly interrupted. Therefore, the configurator allows you to specify a convenient time for the update.

Renaming

You can change the name of any chassis, card, or port. Renaming has no effect on circuits.

Deleting

You can remove any chassis or card from the configuration database. However, if any PVCs have been configured for the object, you must first delete the PVCs.

Note Deleting a card is effective only for the global database. The card attributes retain their values until the card is removed from the chassis and the chassis is rebooted.

Changing Types

You cannot change the type of a card or port. For example, instead of changing an edge card to a trunk, or a low-speed line card to a medium-speed line card, you must delete the unwanted object and create a new one. (There is one exception to the preceding statement: you can change between frame forwarding and frame relay for a low-speed or PLC/serial card edge port.)

Updating the Local Database

If you make changes to an existing configuration or create a new one, you must update the local database affected by the changes. Otherwise, the global database will not be synchronized with the local database. To update a local database, you must select the update time and the type of update. You can choose an immediate update, in which case the configurator updates the local database immediately after you have saved the configuration. You can also specify some time in the future for the update. In that case, the configurator updates the switch at the specified time.

Note If you are specifying a time for an update, you can enter any year up through 2037.

You must also choose the type of update. If you choose a full update, all attribute values are updated from the global database. If you choose to update only the changed attributes, then the configurator compares the global attribute values against the previous values in the global database that were either (1) last sent to the switch or (2) last successfully received from the switch through a Verify operation.

When a local database on an LS2020 switch is updated, the new information becomes active immediately. Updating a local database of an operating node with a new configuration can cause brief interruptions of service on lines whose configurations are affected; therefore, the configurator

can also be set to update the local database at a specified time. This allows you to select the most convenient time to make the changes. Only one update can be outstanding for a node (or node pair in the case of PVC configurations).

Verifying the Database

You can use the configurator's verify function to retrieve information from run-time memory on a switch. You can either update the global database to incorporate all local changes or discard the local changes to keep the global database as it is. If you want to replace the local database setting with the global ones, you update the local database (see the previous section).

Using Expert Mode

Some attributes can affect network performance and operation in subtle ways, and you must have an in-depth knowledge of the LS2020 network to change them. An expert user, such as a system administrator, would typically use these attributes to fine-tune system or circuit performance.

In order to adjust these attributes, you must access the expert mode screens from the configuration tools. The configurator dialog boxes then provide access to these attributes. The appendix "Expert Mode" presents information on expert mode functions.

What You Configure

You can configure an LS2020 switch for a wide variety of attributes. An attribute may be as straightforward as the chassis name and identification or a card type. It may also be more complicated and require an understanding of network operations—for instance, configuring endpoints of PVCs. In general, the types of information that you must configure fall into the following categories:

- Physical component attributes: chassis, line cards, ports
- Network-level attributes: endpoints for PVCs, Nettime, services offered (frame forwarding, frame relay, ATM UNI, etc.)
- Internetwork-level attributes: bridging, custom filtering for bridging, multicast groups, traffic profiles, and workgroups
- Network management-level attributes: management interfaces, SNMP trap filtering, and trap recipients