CHAPTER 1

Site Preparation

This chapter tells you how to prepare your site for the installation of a LightStream 2020 multiservice ATM switch (LS2020 switch). It provides a convenient checklist that you can use to ensure an orderly, step-by-step installation process.

An LS2020 switch can be installed in any area that meets the specifications outlined in this chapter. A dedicated computer room with raised floors, controlled temperature and humidity, and clean air is desirable, but not required.

Note The LS2020 switch is an FCC Class A device.

Site Preparation Checklist

Use the checklist provided in Table 1-1 to prepare your LS2020 site and to ensure that you make adequate plans to obtain appropriate ancillary equipment.

If you are planning to install more than one LS2020 switch, you can photocopy the blank site preparation checklist in Table 1-1 and use it as a means for collecting appropriate information for each switch.

Note You should complete checklist in Table 1-1 several weeks before taking delivery of your LS2020 switch.

Table 1-1 LS2020 Site Preparation Checklist

Checkmark Column	Task Description
	Select a rack that meets the characteristics and dimensional requirements described in the section “Rack Selection Guidelines” that appears later in this chapter.
	Place the rack in an area that accommodates the cable routing and chassis clearance requirements described in the section “Site Selection and Space Considerations.”
	Ensure that the floor is capable of supporting the weight of the LS2020 switch (see the section entitled “Floor Loading Considerations”).
	Ensure that your LS2020 switch will be placed in an area that meets the environmental requirements described in Table 1-4.
	Ensure that your LS2020 switch will be placed in an area that accommodates the power consumption and component heat dissipation factors listed in Table 1-5.
	Ensure that your power supply meets the site power, AC power, or DC power requirements presented in the section entitled “Electrical Requirements.” Ensure that each LS2020 switch has its own dedicated branch power circuit with a circuit breaker and grounded outlet. For LS2020 switches equipped with redundant power trays, you must have two separate power circuits.
	If you plan to use DC power, schedule a licensed electrician to wire the LS2020 chassis to the DC power source.
	To provide connectivity to each LS2020 switch in the event of network problems, obtain a modem for each switch card in your LS2020 network. Select a modem according to the information provided in the section entitled “Modem Recommendations.”
	Read the section entitled “Miscellaneous Site Preparation Considerations” for information about safety factors, acoustic emissions, and applicable standards.
	For network management purposes, obtain a Sun workstation that meets the hardware and software requirements outlined in the chapter entitled “Network Management System Requirements.”
	Order data cables appropriate to your LS2020 switch configuration, using the connector and cabling information provided in the chapter entitled “Connectors and Cables.”
	Order the appropriate country power kit or DC mounting kit, using the information provided in the section entitled “Country Kits and Power Cordsets” the “Connectors and Cables” chapter.
	Using the appendix entitled “IP Addresses,” provide the information listed below for each LS2020 switch that you plan to install. Each switch requires unique information.
	Chassis ID: _____ Node Name: _____ Primary IP Address: _____ Primary NP Address Subnet Mask: _____ Secondary NP Address: _____ Secondary NP Address Subnet Mask: _____ NP Ethernet Address: _____ NP Ethernet Address Subnet Mask: _____ Default Router: _____

Rack Selection Guidelines

This section provides guidelines for selecting an equipment rack to house your LS2020 switch.

Rack Characteristics

The rack you select for your LS2020 switch should be a TIA- or EIA-compliant, 19-inch (48.3 cm) wide rack having the following characteristics:

- Rails with a RETMA hole pattern. Mounting screws, clip nuts, and dress washers are shipped with each LS2020 system. If the rack has metric-threaded rails, you must provide your own metric screws.
- Leveling feet
- Perforated top
- Open bottom
- Solid side panels
- Front and rear doors (optional); if present, they must be fully louvered.

Note For stability when an LS2020 chassis is installed in a rack, the rack/chassis combination should comply with UL Standard 1950, Par. 4.1.1, and with IEC 950, 4.1.1.

LightStream 2020 Switch Dimensions

Table 1-2 lists the physical dimensions of the LS2020 switch and its shipping crate.

Table 1-2 LightStream 2020 Switch/Shipping Crate Dimensions

Dimension	Chassis		Shipping Crate	
Height	26.07 in.	66.2 cm	36 in.	91.4 cm
Width	18.91 in.	48.0 cm	24 in.	61.0 cm
Depth	24.73 in.	62.8 cm	31 in.	78.7 cm

All chassis dimensions are within a manufacturing tolerance of plus or minus .02 in. (.05 cm).

An LS2020 chassis requires 26.25 inches (15 rack units, or 66.7 cm) of vertical rack space. An LS2020 rack should be at least 30 inches (76.2 cm) deep. A depth of 36 inches (91.4 cm) is recommended to ensure adequate clearance at the rear of the chassis for installing fantails and interface cables.

Vertical Rack Space Requirements for Fantails

If you include access cards in your LS2020 chassis for any of the following types of interfaces, you must take into account the vertical rack space required for the fantails associated with these cards:

- Serial interfaces (for X.21, RS-449, or V.35)
- T3/E3 interfaces
- Constant bit rate (CBR) interfaces (for 75-ohm circuit emulation applications)

The vertical rack space requirements for these types of interfaces are discussed in the following sections.

Fantails for Serial Interfaces

If you fully configure your LS2020 switch with nine low-speed interface modules or none serial interface modules (SIMs), the rack can accommodate a total of 18 V.35 and/or RS-449 fantails in some combination—two such fantails per card.

In the case of X.21 fantails, an LS2020 system requires only nine X.21 fantails—one per low-speed or serial interface card.

Each V.35, RS-449, or X.21 fantail requires 1.75 inches of vertical rack space (one rack unit, or 4.45 cm). Thus, in an LS2020 switch using V.35 or RS-449 fantails in any fantail combination totaling 18, 31.5 inches (80 cm) of vertical rack space are required.

If you configure the rack with less than the maximum number of V.35, RS-449, or X.21 fantails, or with a mixture of such fantails, you can install them physically adjacent to each other, or you can distribute them over the rack in a way that best suits your cabling and interconnection requirements.

Note References to RS-449, a popular physical layer interface standard, appear frequently in certain sections of this document. RS-449 is now called EIA/TIA-449. However, to avoid confusion in discussing LS2020 fantails, cables, and connectors, the term “RS-449” is retained for descriptive purposes in this document.

Fantails for T3/E3 Interfaces

An LS2020 switch that is fully configured with nine T3 or E3 access cards (T3AC or E3AC) can accommodate up to nine T3/E3 fantails (see Figure 3-18). Each fantail requires 1.75 inches of vertical rack space (one rack unit, or 4.45 cm).

You can arrange the T3/E3 fantails so that they are physically adjacent to each other, or you can disperse them over the available vertical rack space.

Note A T3 or E3 medium-speed access card (MSAC) does not use a fantail.

Fantails for Constant Bit Rate (CBR) Interfaces

An LS2020 switch fully configured with a total of nine CEMAC access cards in any combination can accommodate a maximum of nine E1 fantails for 75-ohm applications (see Figure 3-21). Each E1 fantail requires 3.5 inches of vertical rack space (two rack units, or 8.9 cm).

Depending on the presence of other types of fantails in the LS2020 rack, you can position the E1 fantails on the rack to suit your particular cabling/interconnection requirements.

Site Selection and Space Considerations

You should consider the factors described in the following sections when you select a location for your LS2020 switch.

Cable Routing

Choose a location convenient to the data cables that you plan to connect to the LS2020 switch.

You should develop a plan for routing the external data cables. Such a plan might include the following:

- Running data cables under a raised floor
- Running data cables through a dropped ceiling
- Placing the system in a low-traffic area where cables are less likely to be disturbed

Hardware Placement

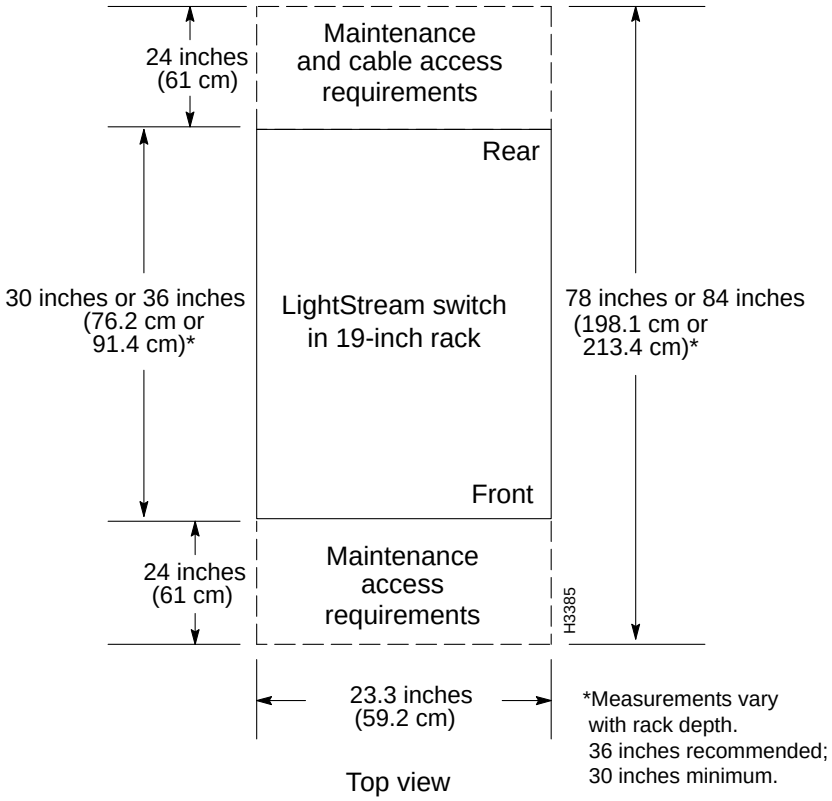
An LS2020 chassis takes in cooling air through the bottom of the front panel and exhausts it at the top rear and top right side of the enclosure. The air vents on the right side can safely be covered with rack side panels, but they should not otherwise be blocked.

To minimize the potential for thermal problems with LS2020 circuitry, position the LS2020 chassis so that the air intake panel is not adjacent to the exhaust of other equipment. In addition, ensure that the LS2020 exhaust air is not near the air intake of other equipment.

LightStream 2020 Clearance Requirements

To facilitate LS2020 maintenance and cable access, allow at least 2 feet of clearance at the front and rear of the LS2020 chassis. Figure 1-1 illustrates the overall clearance requirements of an LS2020 switch.

Figure 1-1 LightStream 2020 Clearance Requirements



Floor Loading Considerations

Ensure that the floor on which the LS2020 switch is to be placed can support its weight.

Using the information in Table 1-3, you can calculate the overall weight of your system. Add the weight of each optional component (interface module or fantail) to the weight of the base system, or redundant base system, to derive the total floor loading requirement.

Table 1-3 Weight of LS2020 Switch and Optional Components

System Configuration	Weight
Base system with AC power[1]	96.0 lb (43.6 kg)
Redundant base system with AC power[2]	118.0 lb (53.6 kg)
Base system with DC power	91.0 lb (41 kg)
Redundant base system with DC power	108.0 lb (49 kg)
Optional components:	
Interface module (up to nine modules)	3.75 lb (1.7 kg)
Fantail[3] (up to 18 fantails)	1.9 lb (0.9 kg)
Example calculation:	
Base system with AC power	96.0 lb
With four medium-speed modules (4 x 3.75 lb)	15.0 lb
With two low-speed modules (2 x 3.75 lb)	07.5 lb
With four fantails (4 x 1.9 lb)	07.6 lb
Total Weight	126.1 lb

1. Base system includes chassis, two blowers, power supply, disk assembly, NP module, and switch card.
2. Redundant base system includes chassis, two blowers, two power supplies, two disk assemblies, two NP modules, and two switch cards.
3. All low-speed and serial interface modules require fantails. T3, E3, and E1 CEMAC interface modules require fantails for 75-ohm mode of operation.

Warning *Never* attempt to lift the chassis with the handles on the power supplies, disk assemblies, faceplates, or chassis enclosures. These handles are not designed to support the weight of the chassis. Using them to lift or support the chassis can result in severe damage to the equipment and serious bodily injury.

Environmental Considerations

The LS2020 physical environment during storage, transport, and operation must meet the specifications outlined in Table 1-4.

To ensure that your HVAC system is capable of maintaining the proper operating temperature range for your LS2020 switch, refer to the LS2020 power consumption and heat dissipation characteristics outlined in Table 1-5.

Table 1-4 LS2020 Environmental Specifications

Factor	Requirement
Operating temperature at sea level (760 mm Hg)[1]	41° to 104° F (5° to 40° C)
Relative operating humidity	10% to 90% noncondensing
Altitude[1]	Up to 10,000 feet (3048 m)
Nonoperating temperature	–4° to 140° F (–20° to 60° C)
Nonoperating humidity	10% to 95% noncondensing
Air quality	The LS2020 switch is designed to run in a noncorrosive, relatively dust-free environment.

1. Reduce the maximum operating temperature by 1° F (.56 ° C) for every 1000 feet (304.8 m) of altitude above 10,000 feet (3048 m).

Table 1-5 LS2020 Power Consumption/Heat Dissipation Characteristics

Component	Power Consumption	Heat Dissipation
Base system	335W	1145 Btu/hr
Redundant base system	445W	1525 Btu/hr
Optional components:		
Low-speed modules	65W	225 Btu/hr
Medium-speed modules	65W	225 Btu/hr
Packet modules	55W	190 Btu/hr
Cell modules	30W	105 Btu/hr
Maximum configuration[1]	965W	3325 Btu/hr

1. Redundant base system with 8 low-speed or 8 medium-speed modules.

Electrical Requirements

Each LS2020 chassis requires a dedicated branch circuit. If you equip your LS2020 switch with a dual power cord, you must provide an independent power source for each cord.

The following notice applies to every LS2020 switch:

This device complies with FCC Rules, Part 15. Operation is subject to the following conditions:

— *This device may not cause harmful interference, and*

— *This device must accept any interference that may be received, including interference that may cause undesired operation.*

The LS2020 switch is designed to operate with all boards, bulkheads, filler panels, covers, and components (disks and blowers) in place and securely attached to the LS2020 chassis. When in place, these elements form an enclosure that:

- Limits access to hazardous voltages and currents inside the chassis.
- Confines electromagnetic interference (EMI) within the chassis. An LS2020 switch that is not fully enclosed is not compliant with EMI standards and, therefore, may interfere with the operation of other equipment in the environment.
- Helps maintain the flow of cooling air through the LS2020 chassis. Air flow disturbances can result in thermal overloading of components and induce failures.

Caution Do not operate an LS2020 switch without securing all boards, bulkheads, filler panels, covers, and components to the chassis. You should operate the LS2020 switch in a way that limits access to hazardous voltages and currents, prevents EMI radiation outside the chassis, and maintains the flow of cooling air through the chassis.

Power Requirements and Ratings

Each LS2020 chassis requires at least one dedicated branch circuit. If your LS2020 system accommodates redundant power cords, you must provide a dedicated branch circuit for each cord. Table 1-6, Table 1-7, and Table 1-8 summarize the power requirements of an LS2020 switch.

Table 1-6 LS2020 Site Power Requirements

Power Option	Voltage	Current
AC	100 to 240	20A to 10A
DC	48	24A

Table 1-7 LS2020 AC Power Ratings

Characteristic	Rating
Inlet power connector	IEC 320 C20
Input voltage frequency phase	100 to 240VAC, 50 to 60 Hz single
Input current	16A to 8A
Power consumption[1]	975W maximum
Heat dissipation[1]	3330 Btu/hr maximum
1. See Table 1-5 for additional power-related information.	

Table 1-8 LS2020 DC Power Ratings

Characteristic	Rating
Input connections	Support for up to 2 separate –48VDC input feeds via 3-position terminal blocks
Input voltage	–43 to –60VDC
Input current	24A
Power consumption[1]	975W maximum
Heat dissipation[1]	3330 Btu/hr maximum
1. See Table 1-5 for additional power-related information.	

Modem Recommendations

To ensure the reachability of every LS2020 switch in the network in the event of unforeseen problems, you should obtain a modem for every switch card present in the chassis of every LS2020 switch in the network. (Each LS2020 chassis can accommodate up to two switch cards.)

The modem must be V.42 Hayes-compatible unit that is capable of operating at a minimum of 2400 baud.

The following modems have been tested and are known to be compatible with the LS2020 switch:

- Zoom Telephonics Inc.—Model 9624V
- Zoom Telephonics Inc.—Model FXV (FX9624V)
- Hayes Microcomputer Products Smartmodem 2400 V.42

The following modems have been tested and are known to be incompatible with the LS2020 switch:

- Identity System Technology—Model ID2400-C
- Hayes Microcomputer Products—Smartmodem 1200
- Telebit Corp.—TrailBlazer Plus
- MultiTech Systems—MultiModem V32B

Note The above modem lists should not be understood as exhaustive.

Miscellaneous Site Preparation Considerations

Electrical Safety

Caution If you are installing a DC-powered LS2020 system, arrange to have an electrician or other qualified individual present during installation to connect the chassis to an appropriate DC power source.

Acoustic Emissions

An LS2020 switch emits a maximum of 68 db(A) of noise.

Applicable Standards

Table 1-9 lists the environmental standards applicable to the LS2020 switch, while Table 1-10 lists the applicable interface standards for the switch.

Table 1-9 Environmental Standards for LS2020 Switch

Environmental Factor	Applicable Standard
Safety	UL 1950 (for AC systems) UL 1459 (for DC systems) TUV (EN 60950) CSA 22.2 #950[1]
Emissions	FCC Part 15 Class A CISPR 22 Class A (EN 55022)

1. Certified by Underwriters Laboratories to Canadian requirements.

Note Certifications or standards may undergo development or revision at any time. Consult your LS2020 vendor for the latest applicable information.

Table 1-10 Interface Standards for LS2020 Switch

Interface	Applicable Standard
V.35 interface[1]	NET 2 Layer 1
RS-449 interface[1]	NET 2 Layer 1
X.21 interface[1]	NET 1 Layer 1
E3 interface[1]	G.703 at 34 Mbps (Germany) SIN 219 (UK)

1. Host-independent approval.

Compliance with European Directive

The LightStream 2020 switch and its subassemblies are labeled with the CE mark. This mark has been affixed to indicate compliance with the following European directive:

Directive 89/336/EEC—Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to the Electro-Magnetic Compatibility (EMC) as amended by Directive 93/68/EEC – Council Directive of 22 July 1993.