CHAPTER 1

Site Preparation

This chapter tells you how to prepare your site for installing 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 LightStream 2020 multiservice ATM 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 plan to install more than one LS2020 switch, you may want to photocopy the blank site preparation checklist in Table 1-1 as a vehicle for collecting appropriate information for each switch.

Note You should complete this checklist several weeks before taking delivery of your LS2020 switch.

Table 1-1 LS2020 Switch 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 Requirements."
	Ensure that the floor is capable of supporting the weight of the LS2020 system, as described in the section "Floor Loading Requirements."
	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 "Electrical Requirements." Ensure that each LS2020 system has its own dedicated branch power circuit with a circuit breaker and grounded outlet. For LS2020 systems 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 node in the event of network problems, Cisco Systems recommends that you obtain a modem for each switch card in your LS2020 network. Select a modem according to the information provided in the section "Modem Recommendations."
	Read the section "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 provided 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 "Country Kits and Power Cordsets" section of the chapter entitled "Connectors and Cables."
	Using the information provided in the appendix entitled "IP Addresses," derive the information below for each LS2020 switch that you plan to install. Note that each LS2020 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 with the following characteristics:

- Rails with a RETMA hole pattern. Mounting screws, clip nuts, and dress washers are shipped with each LS2020 system. If your 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 physical 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 IEC 950, 4.1.1.

LightStream 2020 Switch Dimensions

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

Table 1-2 LightStream 2020 Switch/Shipping Crate Dimensions

Dimension	Chassis		Shipping Crate	
Height	26.07 inches	66.2 cm	36 inches	91.4 cm
Width	18.91 inches	48.0 cm	24 inches	61.0 cm
Depth	24.73 inches	62.8 cm	31 inches	78.7 cm
All chassis dimensions are within a manufacturing tolerance of plus or minus .02 inch (.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.

Fantail Vertical Space Requirements

If your LS2020 system contains low-speed access cards, serial access cards, T3/E3 access cards, or E1 circuit emulation access cards (CEMACs) in a 75-ohm configuration, you must consider the vertical space requirements for the fantails associated with these cards in planning the use of rack space. These requirements are discussed under separate headings below.

Fantails for Low-speed Serial Interfaces

If you fully configure your LS2020 switch with nine low-speed or serial interface cards, the rack can accommodate a total of 18 V.35 and/or RS-449 fantails in some combination—two such fantails per card. However, in the case of X.21 fantails, the same 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). Hence, in an LS2020 switch using V.35 or RS-449 fantails in some 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 adjacent to each other (without intervening space) or distribute them over the rack in a manner that best suits your particular cabling and interconnection requirements.

Note References to RS-449, a popular physical layer interface standard, appear frequently in this document. RS-449 is now called EIA/TIA-449. However, to avoid confusion, the "RS-449" nomenclature, as presently implemented for the LS2020 switch, will be retained in this document in the descriptions of associated fantails, cables, and connectors.

Fantails for T3/E3 Interfaces

An LS2020 switch fully configured with nine T3/E3 access cards 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 position the T3/E3 fantails physically adjacent to each other, or you can disperse them over the available vertical space on the rack.

Note Medium-speed cards do not use fantails.

Fantails for CEMAC Interfaces

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

As with other fantails, you can disperse the E1 fantails over the available rack space to suit your particular cabling and interconnection requirements or to accommodate the presence of other types of fantails in the LS2020 rack.

Site Selection and Space Requirements

Consider the factors described below in selecting 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. Cisco Systems recommends that you develop a plan for managing external data cables. Such a plan might entail running cables under a raised floor or through a dropped ceiling, or placing the system in a low-traffic area where cables are less likely to be disturbed.

Hardware Placement

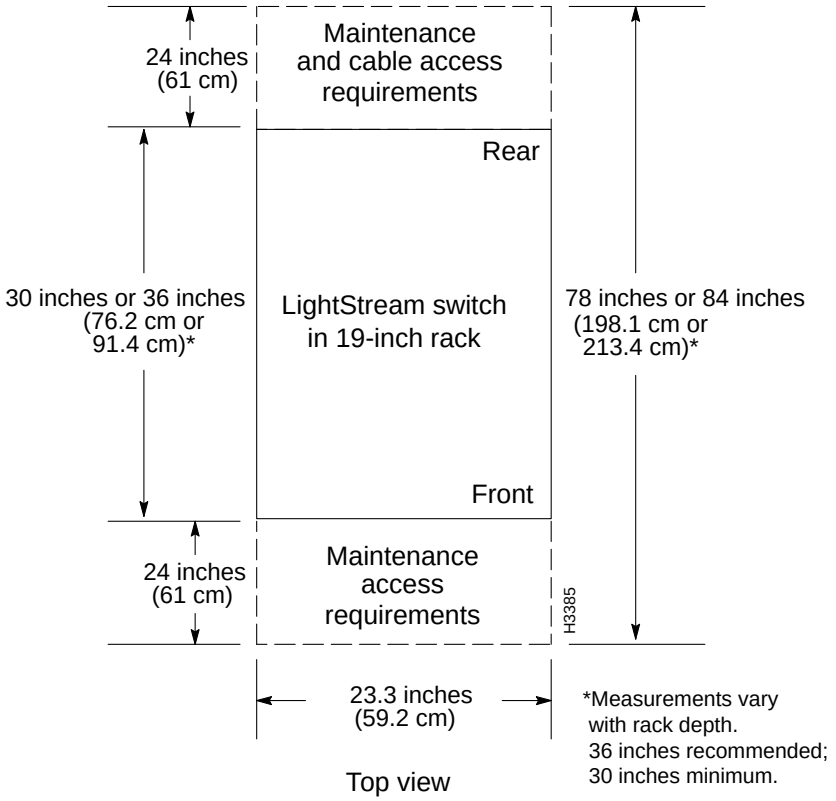
An LS2020 chassis takes in cooling air through the bottom of the front panel and exhausts it at the top rear and the top right side of the enclosure. The air vents on the right side can safely be covered with rack side panels, but they should not otherwise be blocked.

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 two feet of clearance at the front and rear of the LS2020 chassis. Figure 1-1 illustrates the overall LS2020 clearance requirements.

Figure 1-1 LightStream 2020 Clearance Requirements



Floor Loading Requirements

Ensure that the floor on which the LS2020 will stand can support the weight of the system. Using the information in Table 1-3, calculate the weight of your system. Add the weight of each optional component (interface modules or fantails) to the weight of the appropriate base system or redundant base system to derive total system weight.

Table 1-3 Calculating Weight of LS2020 Switch

System Configuration	Weight
Base system/AC power[1]	96.0 lb (44 kg)
Redundant base system/AC[2]	118.0 lb (53.6 kg)
Base system/DC power	91.0 lb (41 kg)
Redundant base system/DC	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:	
Base system/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 modules may also require fantails, depending on mode of operation.

Warning An LS2020 system is heavy. Do not attempt to move the system alone. Avoid personal injury or equipment damage by using proper lifting and transport techniques.

Environmental Requirements

The physical environment during storage, transport, and operation of the LS2020 switch 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 heat dissipation information provided in Table 1-5.

Table 1-4 LS2020 Environmental Requirements

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

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 medium-speed modules.

Electrical Requirements

Each LS2020 chassis requires a dedicated branch circuit. If you choose to 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 ensures the following:

- 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 immediate environment.
- Helps maintain the flow of cooling air through the LS2020 chassis. Air flow disturbances can result in thermal overloading and induce component failures.

Caution Do not operate an LS2020 switch without firmly securing all boards, bulkheads, filler panels, covers, and components to the chassis. You must operate the LS2020 properly to limit access to hazardous voltages and currents, to confine EMI radiation within the chassis, and to maintain 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 is built to accommodate redundant power cords, you must provide a dedicated branch circuit for each power cord. Table 1-6, Table 1-7, and Table 1-8 summarize the power requirements for your LS2020 system.

Table 1-6 Site Power Requirements

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

Table 1-7 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 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 provide connectivity to each node in the event of network problems, Cisco Systems recommends that you obtain a modem for each LS2020 switch card in your network. (Each LS2020 chassis can have one or two switch cards.) The modem must be a V.42 Hayes-compatible device 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 are not intended to be exhaustive.

Miscellaneous Site Preparation Considerations

Safety Considerations

Caution If you are installing a DC-powered LS2020 system, arrange to have an electrician present during installation. An electrician or some other qualified person must wire the chassis to a 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 for the LS2020 switch. 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 be undergoing 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 labelled with the CE mark. This mark has been affixed to demonstrate compliance to 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.