Preparing for Installation

This chapter provides the requirements that are necessary to prepare for the installation of the Cisco 6015 system.

This chapter includes the following sections:

Caution Before you start the installation procedures, read the entire chapter for important information and safety warnings.

2.1 Safety Requirements

This section describes safety requirements for the Cisco 6015 system. Before you install the Cisco 6015 system, ensure that all of the criteria in this section are met. The section describes the following safety requirements:

2.1.1 Safety Guidelines

Before working on the equipment, be aware of standard safety guidelines and the hazards involved in working with electrical circuitry to prevent accidents. Adhere to the following guidelines, cautions, and warnings and those throughout the guide for safe and hazard-free installation.

Follow these guidelines to ensure general safety:

- Keep the equipment area clear and dust-free during and after installation.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten ties or scarves and roll up shirt sleeves.
- Wear safety glasses if you are working under conditions that might be hazardous to your eyes.
- Do not perform any action that makes the equipment unsafe or creates a potential hazard to yourself or others.

Caution Before you start the installation procedures, read the entire chapter for important information and safety warnings.

Caution Proper ESD protection is required whenever you handle Cisco equipment. Installation and maintenance personnel should be properly grounded using ground straps to eliminate the risk of ESD damage to the equipment. Modules are subject to ESD damage whenever they are removed from the chassis.

Caution Installing the cards in the chassis with the power leads reversed can damage the modules.

Caution If fuses are already installed in the fuse and alarm panel, remove them. You can replace the fuses after the system is installed. Do not power up the system while you install and connect the system.

Caution If the power connections are improperly connected and power is applied while the cards are installed, the cards and chassis could be damaged.

Caution It is important that the chassis cooling fans run continuously while the system is powered.

Caution Any card that is only partially connected to the backplane can disrupt system operation.

Warning **This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Waarschuwing **Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.**

Varoitus **Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).**

Attention **Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.**

Warnung **Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.**

Avvertenza **Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.**

Advarsel **Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.**

Aviso **Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.**

¡Advertencia! **Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.**

Varning! **Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.**

Warning **Two people are required to lift the chassis. Grasp the chassis underneath the lower edge and lift with both hands. To prevent injury, keep your back straight and lift with your legs, not your back. To prevent damage to the chassis and components, never attempt to lift the chassis with the handles on the power supplies or on the interface modules. These handles were not designed to support the weight of the chassis.**

Warning **Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages**

Warning **Do not work on the system or connect or disconnect cables during periods of lightning activity.**

Warning **Read the installation instructions before you connect the system to its power source.**

Warning **To prevent the switch from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 104 F (40 C). To prevent airflow restriction, allow at least 3 inches (7.6 cm) of clearance around the ventilation openings.**

Warning **To prevent the outside-plant environment DSLAM from overheating, do not operate it in an area that exceeds the maximum ambient temperature of 149°F (65°C). Verify that the remote terminal enclosure provides adequate cooling through the use of an appropriately sized heat exchanger or air conditioner.**

Warning **The power supply circuitry for the equipment can constitute an energy hazard. Before you install or replace the equipment, remove all jewelry (including rings, necklaces, and watches). Metal objects can come into contact with exposed power supply wiring or circuitry inside the DSLAM equipment. This could cause the metal objects to heat up and cause serious burns or weld the metal object to the equipment.**

Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.**

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

—This unit should be mounted at the bottom of the rack if it is the only unit in the rack.

—When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.

—If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Warning **The ports labeled “Ethernet,” “10BaseT,” “Token Ring,” “Console,” and “AUX” are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Because the BRI circuits are treated like telephone-network voltage, avoid connecting the SELV circuit to the telephone network voltage (TNV) circuits.**

Warning **Class 1 laser product.**

Warning **Do not stare into the beam or view it directly with optical instruments.**

Warning **This unit is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.**

Warning **When installing the unit, always make the ground connection first and disconnect it last.**

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.**

Warning **This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel.**

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.**

Warning **To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.**

Warning **Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.**

Warning **Use copper conductors only.**

Warning **Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

Warning **VCCI Compliance for Class B Equipment (Japan).**

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

警告
VCCI準拠クラスB機器（日本）
この機器は、Information Technology EquipmentのVoluntary Control Council for Interference（VCCI）の規格に準拠したクラスB製品です。この機器をラジオやテレビ受信機の近くで使用した場合、混信を発生する恐れがあります。本機器の設置および使用に際しては、取扱い説明書に従ってください。

Warning **Connect the unit only to DC power source that complies with the Safety Extra-Low Voltage (SELV) requirements in IEC 60950 based safety standards.**

Warning **Do not use this product near water; for example, near a bathtub, washbowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.**

Warning **Never install telephone wiring during an electrical storm.**

Warning **Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.**

Warning **Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.**

Warning **Use caution when installing or modifying telephone lines.**

Warning **Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.**

Warning **Do not use a telephone to report a gas leak in the vicinity of the leak.**

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.**

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment. This equipment contains an energy hazard. Disconnect the system before servicing.**

Warning **To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on the port adapters; these types of handles are not designed to support the weight of the unit. Lift the unit only by grasping the chassis underneath its lower edge.**

Warning **This equipment needs to be grounded. Use a green and yellow 14 AWG ground wire to connect the host to earth ground during normal use.**

Warning **The DS3 ports are not intended to be connected to cables that run outside the building where it is installed. For any connections outside the building, the DS3 ports must be connected to a network termination unit (NTU). NTU devices should comply with appropriate national safety standards such as UL 1950, CSA 950, EN 60950, IEC 950, and AS 3260.**

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.**

Warning **High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.**

Warning **Do not reach into a vacant slot or chassis while you install or remove a module or a fan. Exposed circuitry could constitute an energy hazard.**

2.1.2 Maintaining Safety with Electricity

Follow these guidelines when working on equipment that is powered by electricity:

- Locate the emergency power-off switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn off the power.
- Disconnect all power by removing the fuses from the fuse and alarm panel before:
  - Installing or removing a chassis
  - Working near power supplies
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit; always check the circuit.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn off power to the system.
  - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then, take appropriate action.

2.1.3 Preventing Electrostatic Discharge Damage

Proper ESD protection is required whenever you handle Cisco equipment. ESD damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Use an antistatic strap during handling.

Tip Use the ESD grounding jack on the fan module for all maintenance except when you are removing the fan module. Use the ESD grounding jack on the DC power entry module (PEM) when you are removing the fan module.

Follow these guidelines to prevent ESD damage:

- Always use an ESD ankle or wrist strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to the ESD grounding jack. There are two ESD grounding jacks that are located on the following Cisco 6015 chassis modules:
  - Fan module
  - DC PEM
- When you install a component, use available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help ensure that bus connectors are properly seated.
- When you remove a component, use available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Avoid touching the printed circuit boards or connectors on the NI-2 cards or line cards.
- Handle the modules by the extraction handles only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap protects components from ESD voltages on the body only; ESD voltages on clothing can still cause damage.

Caution Periodically check the resistance value of the antistatic strap. Ensure that the measurement is between 1 and 10 megohms.

2.1.4 General Maintenance Guidelines

This section covers the following topics:

2.1.4.1 Hot Swapping Cards

Hot swapping allows you to remove and replace cards without disconnecting the system power. The Cisco 6015 chassis supports hot swapping for the following cards:

- The following line cards can be hot swapped: quad-port flexi ATU-C line card (4xflexi), octal-port discrete multitone (DMT) ATU-C line card (8xDMT), octal-port DMT ATU-C over ISDN line card (8xDMT over ISDN); octal-port single-pair high-speed digital subscriber line, also known as symmetric high bit-rate digital subscriber loop (G.SHDSL) line card (8xG.SHDSL). When the system detects that you have added or removed a line card, it automatically runs diagnostic and discovery routines and acknowledges the presence or absence of the line card. Hot swapping a line card will interrupt service for the subscribers assigned to that particular line card until the card is replaced.

  If you remove a line card and replace it with the same type of line card, the newly installed line card receives the same provisioning as the original line card. The system resumes operation without any operator intervention.

  If an unprovisioned line card is installed for the first time, the system identifies it as present but unprovisioned. Instructions for provisioning the line card are found in the appropriate software guide for your chassis.

Note Reseating the 8xDMT over ISDN during simultaneous DSL and ISDN traffic operation results in the ISDN signal being temporarily interrupted.

To reseat the 8xDMT over ISDN in the chassis, shut down all the subscriber ports on the line card, wait one minute, and then replace the line card.

- DS3+T1/E1 inverse multiplexing over ATM (IMA), industrial temperature (ITEMP) DS3+T1/E1 IMA NI-2 card, or the OC-3/OC-3c NI-2 card—Hot swapping the NI-2 card will interrupt service for the entire system until the NI-2 card is replaced.

2.1.4.2 Hot Swapping Modules

Hot swapping allows you to remove and replace a module without disconnecting the system power. The Cisco 6015 chassis supports hot swapping for the fan module. Hot swapping the fan module will not interrupt the service for any subscribers.

Caution The input/output (I/O) module, DSL interface module, and DC PEM are field replaceable units (FRUs); however, they are not hot swappable. The system must be powered down when these modules are replaced. These modules must be installed and removed by a trained technician only.

2.1.4.3 Installation and Replacement Suggestions

The following bullets list examples of recommended installation and replacement practices for the Cisco 6015 system cards and modules.

Caution Any card or module that is only partially connected to the backplane can disrupt system operation.

- Do not force the card or module into its slot. This action can damage the pins on the backplane if they are not aligned properly with the card or module.
- Ensure that the card or module is straight and not at an angle when you install it in the slot. Installing the card or module at an angle can damage it. Use the guide rails to install the card or module correctly.
- Fully depress the ejector tabs to ensure that the card connector mates with the backplane correctly. Firmly seat the card in the slot by locking the card.

2.2 Site Requirements

This section describes requirements for the site where the Cisco 6015 system will be installed. Before you install the Cisco 6015 system, ensure that all the criteria in this section are met. The section describes the following:

- Environmental Requirements, page 2-11
- DC Power, page 2-16
- Cables, page 2-18
- Rack-Mounting, page 2-18

2.2.1 Environmental Requirements

Proper operation of the Cisco 6015 system depends on a proper environment. This section describes environmental requirements for the site where you will install the Cisco 6015 system. The section describes the following requirements:

- Temperature, Altitude, and Humidity, page 2-12
- Ventilation, page 2-13
- Space, page 2-14

2.2.1.1 Temperature, Altitude, and Humidity

The system can tolerate a wide range of temperatures. Table 2-1 provides the Cisco recommendations for temperature, altitude, and humidity conditions in a commercial environment.

Table 2-1 Commercial Operating Environment Requirements

Environmental Specifications	Description
Temperature	41 to 104ºF (5 to 40ºC)—Operating 23 to 131ºF (–5 to 55ºC)—Short-term operating
Altitude	–197 to 13,123 feet (–60 to 4000 meters)
Humidity	5 to 90% (noncondensing)

Warning **To prevent the switch from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 104 F (40 C). To prevent airflow restriction, allow at least 3 inches (7.6 cm) of clearance around the ventilation openings.**

Table 2-2 provides the Cisco recommendations for temperature, altitude, and humidity conditions in an outside-plant environment.

Table 2-2 Outside-Plant Operating Environment Requirements

Environmental Specifications	Description
Temperature	–40 to 149ºF (–40 to 65ºC)—Operating
Altitude	–197 to 13,123 feet (–60 to 4000 meters)
Humidity	5 to 95% (noncondensing)

Note Electrical equipment generates heat. Ambient air temperature might not be adequate to cool equipment to acceptable operating temperatures without adequate circulation. Ensure that the room in which you operate your system has adequate air circulation. The Cisco 6015 system can be used in any environment that meets Network Equipment Building Systems (NEBS) requirements.

Enclosed racks must have adequate ventilation. Ensure that the rack is not overly congested, since each unit generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air.

Before you install a Cisco 6015 system in an outside-plant environment, verify that the remote terminal enclosure meets the following compliance requirements: GR-487, UL 50, Type 4X, EN60529 IP 55, and NEMA 4X.

The enclosure must also provide adequate cooling through the use of an appropriately sized heat exchanger or air conditioner, which dissipates the heat generated by existing remote terminal system components and by the installed Cisco 6015 chassis.

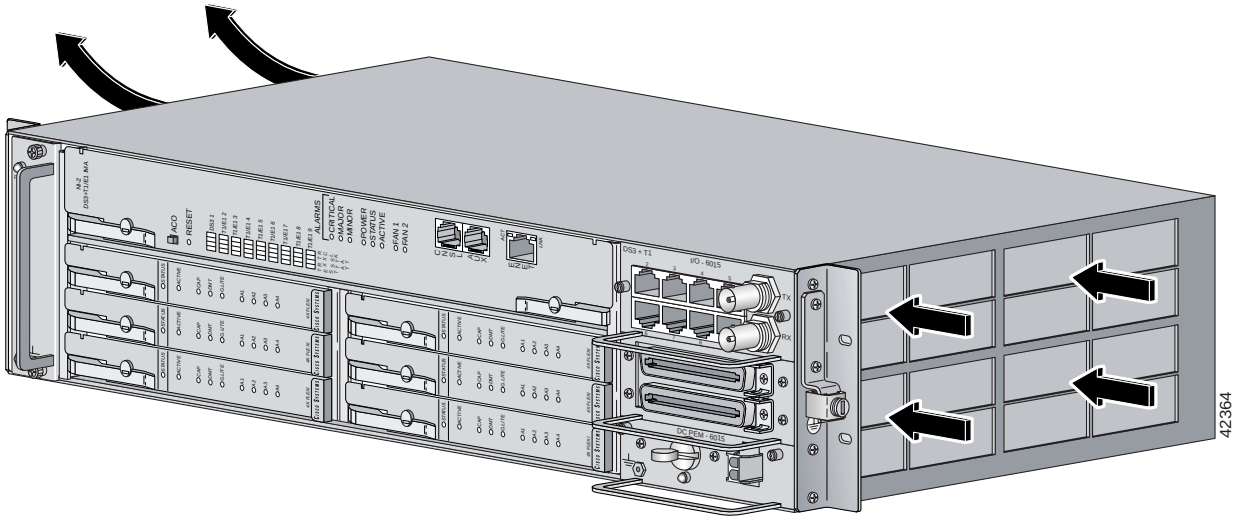
2.2.1.2 Ventilation

The following practices ensure proper ventilation for the Cisco 6015 system:

- Fan module installation—A fan module must be installed in the Cisco 6015 chassis.
- POTS splitter location—The POTS splitters do not dissipate heat and should be positioned at the bottom of the rack.

The Cisco 6015 fans maintain a suitable operating temperature for the internal circuitry. Ensure that the air intake vent at the right of the chassis and the air exhaust vent at the left side of the chassis (viewed from the front) are not obstructed in any way. Figure 2-1 shows the air flow through the Cisco 6015 chassis.

Figure 2-1 Air Flow Through Intake and Exhaust Vents on the Chassis



Note Enclosed racks must have adequate ventilation. Ensure that the rack is not overly congested, because each unit generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air.

Before you install a Cisco 6015 system in an outside-plant environment, verify that the remote terminal enclosure meets the following compliance requirements: GR-487, UL 50, Type 4X, EN60529 IP 55, and NEMA 4X.

The enclosure must also provide adequate cooling through the use of an appropriately sized heat exchanger or air conditioner, which dissipates the heat generated by existing remote terminal system components and by the installed Cisco 6015 chassis.

2.2.1.3 Space

You can install a combination of the following Cisco 6015 system components in a rack:

- Cisco 6015 chassis
- AC/DC converter and converter tray—Optional and used only in a commercial environment
- POTS splitter (third-party POTS splitter)—Required only in a Cisco 6015 with a POTS splitter configuration

The Cisco 6015 system fits in either a 19-inch wide rack or a 23-inch wide rack (with extenders installed). See Table 2-3 for individual rack space requirements.

Table 2-3 Rack Space Requirements

Component	Rack Space	Height	Depth
Cisco 6015 chassis	3 RUs[1]	5.25 in. (13.34 cm)	11.02 in. (27.99 cm)
AC/DC converter tray, optional	1 RU	1.75 in. (4.45 cm)	13 in. (33.02 cm)
POTS splitter, optional[2]	1 RU	1.75 in. (4.45 cm)	12 in. (30.48 cm)

1. An RU is equal to 1.75 inches (4.45 cm).
2. Third-party POTS splitters can be used. Please verify compatibility with your Cisco representative.

Note In a Cisco 6015 with a POTS splitter configuration using 4xflexis, install only one POTS splitter.

In a Cisco 6015 with a POTS splitter configuration using 8xDMTs and 8xDMT over ISDNs, the system requires a POTS splitter that expands the system capacity to 48 subscriber ports. Depending on the POTS splitter selected for your configuration, the installation of an additional POTS splitter may be necessary.

The 8xDMT over ISDN is designed for use in a configuration with a POTS splitter only.

Depending on your configuration type, plan accordingly so that the rack accommodates your needs. Use Table 2-4 to calculate the rack space necessary for your Cisco 6015 system configuration.

Note In a commercial (central office [CO]) environment, the total amount of rack space should not exceed 42 RUs. If your total configuration exceeds 42 RUs, either replan your configuration or use more than one rack to house the Cisco 6015 system components.

In an outside-plant environment, the total amount of rack space should not exceed the available space inside the equipment bay of your remote terminal enclosure (typically 26 RUs). If your total configuration exceeds the available space, either replan your configuration or use more than one equipment bay (or a larger capacity cabinet) to house the Cisco 6015 system components.

Table 2-4 Rack Space Calculation for the Cisco 6015 System Configurations

Line	Instructions	Calculation
Cisco 6015 with a POTS Splitter Configuration		
1	Total number of Cisco 6015 chassis in the rack • If you are installing 4xflexis in a commercial environment, the maximum is nine chassis per rack (include subtending host and subtended node chassis) for a seven-foot. rack. • If you are installing 8xDMTs or 8xDMT over ISDNs in a commercial environment, the maximum is six chassis per rack (include subtending host and subtended node chassis) for a seven-foot. rack. **Note** In an outside-plant environment, Cisco recommends installing no more than three Cisco 6015 chassis in a four-foot (1.22 meters) remote terminal enclosure.	
2	Total number of AC/DC converter trays in the rack. **Note** The AC/DC converter can be used only in a commercial environment. It cannot be used in an outside-plant environment.	
3	Total number of POTS splitters[1] in the rack. **Note** In a system configuration using 4xflexis, install only one POTS splitter. In a system configuration using 8xDMTs or 8xDMT over ISDNs, the system requires a POTS splitter that expands the system capacity to 48 subscriber ports. Depending on the POTS splitter selected for your configuration, the installation of an additional POTS splitter may be necessary.	
4	Multiply 3 RUs by the total number of chassis on line 1.	
5	Multiply 1 RU by the total number of AC/DC converter trays on line 2.	
6	If you are installing 4xflexis, add 1 RU of space between each group of two Cisco 6015 chassis. If you are installing 8xDMTs or 8xDMT over ISDNs, add 1 RU of space between each chassis.	
7	If you are installing a third-party vendor POTS splitter, multiply the total RUs for the POTS splitter by the total number of POTS splitters on line 3.	
8	**Add lines 4 through 7 for the total number of RUs that are needed for your Cisco 6015 with a POTS splitter configuration.** **Note** In an outside-plant environment, the number of RUs calculated is the additional rack space required in a remote terminal enclosure to install the configured Cisco 6015 system.	
Cisco 6015 Without a POTS Splitter Configuration		
9	Total number of Cisco 6015 chassis in the rack • If you are installing 4xflexis in a commercial environment, the maximum is nine chassis per rack (include subtending host and subtended node chassis) for a 7-ft. rack. • If you are installing 8xDMTs or 8xG.SHDSLs in a commercial environment, the maximum is six chassis per rack (include subtending host and subtended node chassis) for a seven-foot. rack. **Note** In an outside-plant environment, Cisco recommends installing no more than three Cisco 6015 chassis in a four-foot (1.22 meters) remote terminal enclosure.	

Table 2-4 Rack Space Calculation for the Cisco 6015 System Configurations (continued)

Line	Instructions	Calculation
10	Total number of AC/DC converter trays in the rack. **Note** The AC/DC converter can be used only in a commercial environment. It cannot be used in an outside-plant environment.	
11	Multiply 3 RUs by the total number of chassis on line 9.	
12	Multiply 1 RU by the total number of AC/DC converter trays on line 10.	
13	If you are installing 4xflexis, add 2 RUs of space between each group of three Cisco 6015 chassis. If you are installing 8xDMTs or 8xG.SHDSLs, add 2 RUs of space between each chassis.	
14	**Add lines 11 through 13 for the total number of RUs that are needed for your Cisco 6015 without a POTS splitter configuration.** **Note** In an outside-plant environment, the number of RUs calculated is the additional rack space required in a remote terminal enclosure to install the configured Cisco 6015 system.	

1. Third-party POTS splitters can be used in a Cisco 6015 with a POTS splitter configuration.

The location of the Cisco 6015 system and the layout of your rack or wiring room are extremely important for proper system operation. Equipment that is placed too close together, inadequate ventilation, and inaccessible panels can cause system malfunctions and shutdowns, which can make maintenance difficult.

When planning your site layout and equipment locations, keep in mind the precautions that are described in the "Safety Requirements" section on page 2-1 and the "Site Requirements" section on page 2-11 to help avoid equipment failures and reduce the possibility of environmentally-caused shutdowns. If you are currently experiencing shutdowns or unusually high errors with your existing equipment, these precautions might help you isolate the cause of failures and prevent future problems.

2.2.2 DC Power

The CO power source or rectifier supplies external power to the system as –48/–60V DC from the fuse and alarm panel. Power connections from the fuse and alarm panel are wired to the DC PEM in the Cisco 6015 chassis. The nominal voltage is –48V DC; the minimum operating value is –40V DC; and the maximum operating value is –72V DC.

Before you connect the system to a power source, verify that the power source is properly grounded and falls within the internal power supply rating.

Calculate the typical power requirement for each Cisco 6015 component in your configuration type. Use Table 2-5 to calculate the typical power requirement that is necessary to operate your Cisco 6015 system.

Table 2-5 Power Consumption Calculation for Cisco 6015 System Components

Line	Instructions	Calculation
Cisco 6015 Chassis[1]		
1a	If you are using 4xflexis (CAP mode), multiply 13.5W by the total number of 4xflexis (CAP mode) in the Cisco 6015.	
1b	If you are using 4xflexis (DMT mode), multiply 17.5W by the total number of 4xflexis (DMT mode) in the Cisco 6015.	
1c	If you are using 4xflexis (G.lite mode), multiply 13W by the total number of 4xflexis (G.lite mode) in the Cisco 6015.	
1d	If you are using 8xDMTs, multiply 24W by the total number of 8xDMTs in the Cisco 6015.	
1e	If you are using 8xDMT over ISDNs, multiply 24W by the total number of 8xDMT over ISDNs in the Cisco 6015.	
1f	If you are using 8xG.SHDSLs at 136 kbps, multiply 11.3W by the total number of 8xG.SHDSLs in the Cisco 6015.	
1g	If you are using 8xG.SHDSLs at 1.554 Mbps, multiply 15W by the total number of 8xG.SHDSLs in the Cisco 6015.	
1h	If you are using 8xG.SHDSLs at 2.312 Mbps, multiply 16.5W by the total number of 8xG.SHDSLs in the Cisco 6015.	
2	Add the amounts for lines 1a through 1g.	
3	Enter 33.5W for each NI-2 card.	
4	Enter 9W for the fan module.	
5	Enter 20W for the DC PEM.	
6	Add lines 2 through 5. This is the typical power required for the Cisco 6015.	
7	Divide line 6 by 48. This is the nominal current for the Cisco 6015.	

1. Complete this table for each Cisco 6015 system.

2.2.3 AC Power

An optional AC/DC converter must be installed and connected to the DC PEM if the system is powered by AC power. The AC/DC converter converts 120/240V AC power to –48V DC power for the Cisco 6015 system.

Note The AC/DC converter can be used only in a commercial environment.

An AC/DC converter tray is available to house up to three AC/DC converters. The AC/DC converter tray is installed directly below the Cisco 6015 chassis.

Note For more information about the AC/DC converter, see the "AC/DC Converter" section on page 1-37.

Tip Check the power at your site to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

2.2.4 Cables

For detailed information about required cables, refer to Appendix B, "Cable and Port Mapping Specifications."

2.2.5 Rack-Mounting

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

—This unit should be mounted at the bottom of the rack if it is the only unit in the rack.

—When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.

—If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Cisco recommends that you mount the Cisco 6015 system in a rack. Ensure that the vertical hole spacing on the rack rails meets standard EIA-310-C requirements—1 inch (2.54 cm) spacing. All portions of the rack are equal to or less than the NEBS maximum allowances of 12 inches (30.48 cm).

When you install the Cisco 6015 system in a rack, allow enough room to access the backplane of the unit for wiring purposes. The building integrated timing supply (BITS) clock input and the facility alarm input headers are located on the backplane.

2.3 Required Tools and Equipment

Table 2-6 lists the tools and equipment that are required to install and remove the Cisco 6015 system components.

Table 2-6 Tool and Equipment Requirements Checklist

Check	Tools and Equipment
	Hardware Components and Cables
	Cisco 6015 chassis, which will have the following components already installed: • Line cards (one or more types) – 4xflexis—Commercial environment only. – 8xDMTs—Commercial environment or outside-plant environment. – 8xDMT over ISDNs—Commercial environment only. – 8xG.SHDSLs—Commercial environment only. • One of the following NI-2 cards: – DS3+T1/E1 IMA NI-2 card—Commercial environment. – ITEMP DS3+T1/E1 IMA NI-2 card—Outside-plant environment. – OC-3c/OC-3c SMF[1] NI-2 card—Commercial environment. – OC-3c/OC-3c MMF[2] NI-2 card—Commercial environment. • Fan module. • One of the following I/O modules: – DS3+T1. – E1. • DSL interface module. • DC PEM.
	Third-party POTS splitters can be installed in a Cisco 6015 with a POTS splitter configuration. Please verify the compatibility with your Cisco representative. In a system configuration using 4xflexis, install only one POTS splitter. In a system configuration using 8xDMTs or 8xDMT over ISDNs, the system requires a POTS splitter that expands the system capacity to 48 subscriber ports. Depending on the POTS splitter selected for your configuration, the installation of an additional POTS splitter may be necessary.
	AC/DC converter, optional for AC power and available for use only in a commercial environment.

Table 2-6 Tool and Equipment Requirements Checklist (continued)

Check	Tools and Equipment
	AC power cord for AC/DC converter, optional for AC power and available for use only in a commercial environment • Argentina: CAB-ACR, part number 37-0095-01. • Australia: CAB-ACA, part number 72-0746-01. • Europe: CAB-ACE, part number 72-0460-01. • Italy: CAB-ACI, part number 72-0556-01. • South Africa: CAB-ACSA, part number 72-1694-01. • Switzerland: CAB-ACS, part number 72-1483-01. • UK: CAB-ACU, part number 72-0557-01. • USA: CAB-AC, part number 72-0259-01.
	DC PEM Power cable • DC power cable to connect to the AC/DC converter—Supplied by Ascom, part number 72-2178-01. • DC power cable to connect to the fuse and alarm panel—Supplied by Cisco, part number 72-2223-01.
	Before you install a Cisco 6015 system in an outside-plant environment, verify that the remote terminal enclosure meets the following compliance requirements: • GR-487 • UL 50, Type 4X • EN60529 IP 55 • NEMA 4X
	One of the following cables for POTS splitter connections • Y-cable for DSL interface module to third-party POTS splitter connection (part number 72-1973-01) or equivalent. • 24 AWG, 25-twisted pair, solid core shielded telco cable with shielded RJ21X (Champs) connector[3]. **Note** See Appendix B, "Cable and Port Mapping Specifications" for cable information. The Y-cable is used when only one POTS splitter is installed. Unshielded cable cannot be used in an FCC/CISPR Class B compliance environment.
	24 AWG, 25-twisted pair, solid core shielded telco cable with shielded RJ21X (Champs) connector[2] for MDF[4] (commercial environment) or enclosure protection block (outside-plant environment) connections.

Table 2-6 Tool and Equipment Requirements Checklist (continued)

Check	Tools and Equipment
	Wire for the following connections: • T1 trunk—Industry standard T1 twisted-pair wire (use two-pair stock only). • T1 subtend—RJ-48 to RJ-48 industry standard T1 twisted-pair wire (use two-pair stock only). • E1 trunk—Industry standard E1 twisted-pair wire (use two-pair stock only). • E1 subtend—RJ-48 to RJ-48 industry standard E1 twisted-pair wire (use two-pair stock only). • BITS interface—12 AWG twisted-pair black and red copper solid or stranded wire. • Facility alarm input—26 AWG UTP[5]. • Ground the Cisco 6015 chassis—12 AWG or thicker green or green with yellow stripes stranded copper wire. • Ground the POTS splitter and remote terminal enclosure, as necessary—Refer to the vendor documentation.
	Coaxial cable for a DS3 connection—Type 734A or equivalent (75 ohm double shielded, minimum coverage 80% braid and 100% foil). Use AIM Electronics BNC Coaxial Type 3 Piece Connector (part number 27-9023) or equivalent only.
	Fiber cable—Used to connect the OC-3c/OC-3c NI-2 card
	Console and auxiliary cables—Unshielded RJ-45 serial cable that complies with the EIA/TIA-232 standard and provides connection to a system console.
	Ethernet connection[6]—Cat 5 UTP or Cat 5 STP[7] cable with an RJ-45 connector that complies with Ethernet standards.
	Necessary equipment for ESD protection—Required whenever you handle Cisco equipment, which includes the chassis and modules.
	Mounting screws—To mount the Cisco 6015, optional AC/DC converter tray, and POTS splitter to the rack.
	Extenders for the Cisco 6015 and AC/DC converter tray (when using a 23-inch wide rack).
	Ferrites that yield an impedance of 53 ohms at 25 MHz and 177 ohms at 100 MHz are to be used under the following conditions: • Cisco 6015 to POTS splitter connection—If unshielded cable is used for FCC Class A or EN55022 Class A compliance, ferrites are needed. • Cisco 6015 to MDF (commercial environment) or enclosure protection block (outside-plant environment)—If unshielded cable is used for FCC Class A or EN55022 Class A compliance, ferrites are needed. • T1/E1 trunk or subtended—If unshielded cable is used for FCC Class B or EN55022 Class B compliance, ferrites are needed. • Ethernet cable.
	Ring lug for the grounding wire. **Note** The hole in the ring lug should be large enough for the screw to pass through.
	Tie wraps.
	Tools

Table 2-6 Tool and Equipment Requirements Checklist (continued)

Check	Tools and Equipment
	No. 1 flat-head screwdriver.
	A Phillips-head screwdriver.
	Wire stripper.
	Wire-wrapping tool, optional.
	Software Components
	Cisco IOS or CDM[8]. **Note** See Appendix A, "Technical Specifications," for minimum software and network management release requirements per Cisco 6015 chassis component.

1. SMF = single-mode fiber.
2. MMF = multimode fiber.
3. If unshielded cable is used for FCC Class A or EN55022 Class A compliance, ferrites are needed.
4. MDF = main distribution frame.
5. UTP = unshielded twisted pair.
6. Ferrites are required for the Ethernet connection.
7. STP = shielded twisted pair.
8. CDM = Cisco DSL Manager.

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

2.4 Unpacking the Cisco 6015 System

Each Cisco 6015 system chassis is securely packaged in a shipping box. The Cisco 6015 chassis ships with the modules installed and any additional modules packaged separately.

Caution Proper ESD protection is required whenever you handle Cisco equipment. Installation and maintenance personnel should be properly grounded using ground straps to eliminate the risk of ESD damage to the equipment. Modules are subject to ESD damage whenever they are removed from the chassis.

To unpack the Cisco 6015 system, complete the following steps:

Step 1 Inspect the packing containers. If any damage or other signs of mishandling are evident, inform both the local freight carrier and Cisco before unpacking. Your freight carrier can provide you with the procedures necessary to file a claim for damages.

Step 2 Carefully open the box.

Step 3 Remove all packing material.

Step 4 Remove the chassis from the box.

Step 5 Open the accessory kits and boxes that contain the cables, ferrites, documentation, management software, and any additional modules. Do not use a knife to open these boxes.

2.5 Verifying Contents

To verify that all equipment, cables, documentation, and so forth are received, compare the packing list to your shipment and to your order. If any items are missing or if you need additional information, contact the Cisco Technical Assistance Center (TAC) at one of the following:

- 800 553-2447
- 408 526-7209
- tac@cisco.com

2.6 Inspecting for Damage

After you verify that all of the equipment is included, carefully examine the assemblies, modules, and cables for any damage resulting from shipping. If you suspect any damage from shipping, contact your local freight carrier for procedures on damage claims.

If you observe any physical defects in the items you ordered, obtain standard warranty service by delivering the defective part, accompanied by a copy of the dated proof-of-purchase, to the Cisco Systems Corporate Service Center or an authorized Cisco Systems service center during the applicable warranty period. Contact the Cisco TAC for the location of your nearest service center.

See the back of the title page for the Cisco Systems warranty information for hardware and software products.