



Cisco ONS 15305 Installation and Operations Guide

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About this Guide

This section explains the objectives, intended audience, and organization of this publication and describes the conventions that convey instructions and other information.

This section provides the following information:

- [Document Objectives](#)
- [Audience](#)
- [Document Organization](#)
- [Related Documentation](#)
- [Document Conventions](#)
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Document Objectives

This Installation and Operations Guide explains the function of the Cisco ONS 15305 system. It also contains the information how to install a Cisco ONS 15305 system.

Audience

To use this publication, you should be familiar with Cisco or equivalent optical transmission hardware and cabling, telecommunications hardware and cabling, electronic circuitry and wiring practices, and preferably have experience as a telecommunications technician.

Document Organization

This Cisco ONS 15305 Installation and Operations Guide, R1.0 is organized in the following chapters:

- [Chapter 1, “Safety Summary”](#) provides required and recommended safety practices for working with electrical equipment and electro-optical equipment.

- [Chapter 2, “Product Overview,”](#) provides the functionality and the feature of the ONS 15302.
- [Chapter 3, “Pre-Installation Procedures,”](#) provides information concerning pre-installation equipment storage and handling, site verification of equipment, site preparation, and equipment unpacking.
- [Chapter 4, “Installation,”](#) provides specific installation procedures.
- [Chapter 5, “Features,”](#) provides descriptions of SDH, IP, and DCN features as well as alarm listings.
- [Chapter 6, “Physical Interfaces,”](#) provides information on alarm, auxiliary and synchronization interfaces.
- [Chapter 7, “Hex E3/T3 Tributary Module,”](#) provides a functional description of the 6xE3/T3 service module.
- [Chapter 8, “Single Optical S-16.1 Module,”](#) provides a functional description of the 8xSTM-1 optical service module.
- [Chapter 9, “Dual Optical S-4.1 Module,”](#) provides a functional description of the 2xSTM-4 SH optical service module.
- [Chapter 10, “Dual Optical LAN 1000Base-LX,”](#) provides a functional description of the 2xGE optical service module.
- [Chapter 11, “Octal LAN 10/100 Base TX Module,”](#) provides a functional description of the 8xFE service module.
- [Chapter 12, “Octal E1 Tributary Model,”](#) provides a functional description of the 8xE1 service module.
- [Chapter 13, “High-Density 63xE1 Module,”](#) provides a functional description of the 63xE1 service module.
- [Chapter 14, “Dual Optical S-1.1 Module,”](#) provides a functional description of the dual optical S-1.1 service module.
- [Chapter 15, “Octal Optical S-1.1 Module,”](#) provides a functional description of octal Ethernet/VC12 Map Module 8x map module.
- [Appendix A, “Shelf Assembly Specifications,”](#) provides mechanical and environmental parameters for the ONS 15305 and lists referenced specifications.

Related Documentation

Refer to the following standards documentation referenced in this publication:

- EN 50081-1
- EN 50082-1
- EN 55022
- EN 55024
- EN 60825
- EN 60950
- EN 61000-3-2
- EN 61000-3-3
- EN 61000-4-2

- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-6
- EN 61000-4-11
- EN/IEC 60950
- ETS 300 011
- ETS 300 019
- ETS 300 019-2-1
- ETS 300 019-2-2
- ETS 300 019-2-3
- ETS 300 019-4
- ETS 300 132-2
- ETS 300 147
- ETS 300 233
- ETS 300 246
- ETS 300 247
- ETS 300 253
- ETS 300 386
- ETS 300 752
- ETS 300 753
- ETS 300 019-2-1 Class 1.1
- ETS 300 019-2-2 Class 2.2
- ETS 300 019-2-3 Class 3.2
- IEC 600297-3
- IEC 600917-2
- ITU-T G.652
- ITU-T G.701
- ITU-T G.702
- ITU-T G.703
- ITU-T G.704
- ITU-T G.706
- ITU-T G.707
- ITU-T G.783
- ITU-T G.784
- ITU-T G.810
- ITU-T G.811
- ITU-T G.812

- ITU-T G.813
- ITU-T G.823
- ITU-T G.825
- ITU-T G.832
- ITU-T G.841
- ITU-T G.957
- ITU-T G.958
- ITU-T X.150
- SR-332 (Telcordia)

Document Conventions

This publication uses the following conventions:

Convention	Application
boldface	Commands and keywords in body text.
<i>italic</i>	Command input that is supplied by the user.
[]	Keywords or arguments that appear within square brackets are optional.
{ x x x }	A choice of keywords (represented by x) appears in braces separated by vertical bars. The user must select one.
Ctrl	The control key. For example, where Ctrl + D is written, hold down the Control key while pressing the D key.
screen font	Examples of information displayed on the screen.
boldface screen font	Examples of information that the user must enter.
< >	Command parameters that must be replaced by module-specific codes.



Note

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the document.



Caution

Means *reader be careful*. In this situation, the user might do something that could result in equipment damage or loss of data.

**Warning****IMPORTANT SAFETY INSTRUCTIONS**

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 translated safety warnings that accompanied this device.

Note: SAVE THESE INSTRUCTIONS

Note: This documentation is to be used in conjunction with the specific product installation guide that shipped with the product. Please refer to the Installation Guide, Configuration Guide, or other enclosed additional documentation for further details.

Where to Find Safety and Warning Information

For safety and warning information, refer to the *Cisco ONS 15305 Quick Installation Guide* that accompanied the product. This publication describes the international agency compliance and safety information for the Cisco ONS 15305 system. It also includes translations of the safety warnings that appear in the ONS 15305 system documentation.

Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

<http://www.cisco.com/univercd/home/home.htm>

You can access the Cisco website at this URL:

<http://www.cisco.com>

International Cisco web sites can be accessed from this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Optical networking-related documentation is available in a CD-ROM package that ships with your product. The Optical Networking Product Documentation CD-ROM is updated with incremental releases and may be more current than printed documentation.

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

<http://www.cisco.com/en/US/partner/ordering/index.shtml>

- Registered Cisco.com users can order the Documentation CD-ROM (Customer Order Number DOC-CONDOCCD=) through the online Subscription Store:

<http://www.cisco.com/go/subscription>

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit comments electronically on Cisco.com. On the Cisco Documentation home page, click **Feedback** at the top of the page.

You can email your comments to bug-doc@cisco.com.

You can submit your comments by mail by using the response card behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com, which includes the Cisco Technical Assistance Center (TAC) Website, as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from the Cisco TAC website. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC website, including TAC tools and utilities.

Cisco.com

Cisco.com offers a suite of interactive, networked services that let you access Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support

- Download and test software packages
- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

To obtain customized information and service, you can self-register on Cisco.com at this URL:

<http://www.cisco.com>

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC website and the Cisco TAC Escalation Center. The avenue of support that you choose depends on the priority of the problem and the conditions stated in service contracts, when applicable.

We categorize Cisco TAC inquiries according to urgency:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Cisco TAC Web Site

You can use the Cisco TAC website to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC website, go to this URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

<http://tools.cisco.com/RPF/register/register.do>

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

<http://www.cisco.com/en/US/support/index.html>

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC website so that you can describe the situation in your own words and attach any necessary files.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>



Note Toll-free numbers are not available in all countries.

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:
http://www.cisco.com/en/US/products/products_catalog_links_launch.html
- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary*, *Internetworking Technology Handbook*, *Internetworking Troubleshooting Guide*, and the *Internetworking Design Guide*. For current Cisco Press titles and other information, go to Cisco Press online at this URL:
<http://www.ciscopress.com>
- *Packet* magazine is the Cisco monthly periodical that provides industry professionals with the latest information about the field of networking. You can access *Packet* magazine at this URL:
http://www.cisco.com/en/US/about/ac123/ac114/about_cisco_packet_magazine.html
- *iQ Magazine* is the Cisco monthly periodical that provides business leaders and decision makers with the latest information about the networking industry. You can access *iQ Magazine* at this URL:
http://business.cisco.com/prod/tree.taf%3fasset_id=44699&public_view=true&kbns=1.html
- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in the design, development, and operation of public and private internets and intranets. You can access the *Internet Protocol Journal* at this URL:
http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html
- Training—Cisco offers world-class networking training, with current offerings in network training listed at this URL:
http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html



Safety Summary

This chapter provides safety considerations for operating the Cisco ONS 15305 system.

1.1 Critical Safety Warnings



Warning

Do not perform cabling on an electrically-live system. Ensure that all power is removed from the shelf before continuing with this procedure. Actual wire gauge should be determined based on local engineering standards and practices.



Warning

Before connecting 48 V power to the ONS 15305, remove the fuses from both the A and B sides of the power distribution panel (PDP). Failure to do so can cause serious injury or death. Actual wire gauge should be determined based on local engineering standards and practices.



Warning

Before connecting 230 V power to the ONS 15305, remove the fuse from the 230 V power supply. Failure to do so can cause serious injury or death. Actual wire gauge should be determined based on local engineering standards and practices.



Warning

Before installing the ONS 15305, remove the fuses from both the A and B sides of the PDP. Failure to do so can cause serious injury or death.



Warning

Touching electrical connectors or other exposed electrical circuitry inside the ONS 15305, when they are energized can cause serious injury or death.

1.2 General Safety Precautions

General safety precautions are not related to any specific procedures and do not appear elsewhere in this publication. Personnel must understand and apply the following precautions during installation and testing of the ONS 15305 system.

- Know standard electrical safety and electrical wiring and connection practices.

- Be familiar with cardio-pulmonary resuscitation (CPR). Obtain this information through the appropriate national authority (such as the Red Cross or the local equivalent). This knowledge is imperative for personnel working with or near voltages with levels capable of causing injury or death.

1.3 Recommended Safety Precautions

The following precautions are recommended when working on the ONS 15305 system:

- Keep your work area tidy and free of obstructing objects at all times.
- Do not wear loose clothing, jewelry, or other items that could be caught in the components during installation or use.
- Use the equipment only in accordance with the electrical power rating.
- Do not work alone if hazardous conditions may exist in your workplace.
- Install the ONS 15305 components in compliance with the following local and national electrical codes:
 - In the United States: National Fire Protection Association (NFPA) 70; US National Electrical Code
 - In Canada: Canadian Electrical Code, part I, CSA C22.1
 - Elsewhere: International Electrotechnical Commission (IEC) 364, part 1-7
- Properly ground the equipment.
- Connect only a DC power source that complies with the safety extra-low voltage (SELV) requirements in UL1950, CSA 950, EN 60950, and IEC950 to an ONS 15305 DC power supply input.
- Install DC power supplies used in restricted access areas in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code, ANSI/NFPA 70.
- Terminate all laser outputs properly before connecting laser inputs.
- Disconnect the input end of an optical fiber jumper cable before disconnecting the output end.
- Handle glass fiber with care. Glass fiber can be broken if mishandled. Using broken fiber can result in permanent equipment damage.
- Protect skin from exposed glass fiber. It can penetrate the skin.
- Limit the number of personnel that have access to lightwave transmission systems. Personnel should be authorized and properly trained if access to laser emissions is required.
- Limit the use of laser test equipment to authorized, trained personnel during installation and service. This precaution includes using optical loss test (OLT) set, optical spectrum analyzer, and optical time domain reflectometer (OTDR) equipment.
- Exclude any unauthorized personnel from the immediate laser radiation area during service and installation when there is a possibility that the system may become energized. Consider the immediate service area to be a temporary laser-controlled area.
- The ONS 15305 system functions in the 1270 – 1335 nm window, which is considered invisible radiation. You cannot see the laser light being emitted by a fiber, a pigtail, or a bulkhead connector. Use appropriate eye protection during fiber-optic system installation or maintenance whenever there is potential for laser radiation exposure, as recommended by the company's health and safety procedures. Observe this precaution whether warning labels have been posted.

1.4 Safety Symbols and Labels

The ONS 15305 equipment is clearly printed with warning about the equipment radiation level. Read and understand all warning notes before working with the equipment.

The ONS 15305 has a warning note located left from the optical connector. The warning note consists of warning text CLASS 1 LASER PRODUCT.

1.5 Electrostatic Discharge Cautions

Some ONS 15305 components are classified as Class 0 ESD-sensitive devices. Adhere to the following rules:

- Observe standard precautions for handling ESD-sensitive devices.
- Assume that all solid-state electronic devices are ESD-sensitive.
- Ensure that you are grounded with a grounded wrist strap or equivalent while working with ESD-sensitive devices.
- Transport, store, and handle ESD-sensitive devices in static-safe environments.

1.6 Translated Warnings

1.6.1 DC Power Disconnection Warning



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit.

Waarschuwing

Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom naar het gelijkstroom circuit uitgeschakeld is.

Varoitus

Varmista, että tasavirtapiirissä ei ole virtaa ennen seuraavien toimenpiteiden suorittamista.

Attention

Avant de pratiquer l'une quelconque des procédures ci-dessous, vérifiez que le circuit en courant continu n'est plus sous tension.

Warnung

Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß die Gleichstromschaltung keinen Strom erhält.

Figyelem!

Mielőtt a következő eljárások bármelyikét végrehajtaná, feltétlenül szakítsa meg az egyenáramú áramkör tápellátását.

Avvertenza

Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito CC non sia alimentato.

Advarsel	Før noen av disse prosedyrene utføres, kontroller at strømmen er frakoblet likestrømkretsen.
Aviso	Antes de executar um dos seguintes procedimentos, certifique-se que desligou a fonte de alimentação de energia do circuito de corrente contínua.
¡Advertencia!	Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) esté cortada (OFF).
Varning!	Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten.
Предупреждение	Перед выполнением любых описанных ниже действий убедитесь, что цепь питания постоянным током отключена.
警告	在进行下述任一操作过程之前，要确保将电源从直流电路上断开。
警告	次の手順を開始する前に、DC回路から電源が切断されていることを確認してください。

1.6.2 Main Disconnecting Device



Warning

The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device.

Waarschuwing

De combinatie van de stekker en het elektrisch contactpunt moet te allen tijde toegankelijk zijn omdat deze het hoofdmecanisme vormt voor verbreking van de aansluiting.

Varoitus

Pistoke/liitinkohta toimii pääkatkaisumekanismina. Pääsy siihen on pidettävä aina esteettömänä.

Attention

La combinaison de prise de courant doit être accessible à tout moment parce qu'elle fait office de système principal de déconnexion.

Warnung

Der Netzkabelanschluß am Gerät muß jederzeit zugänglich sein, weil er als primäre Ausschaltvorrichtung dient.

Figyelem!

A dugaszolóaljzat és a dugasz együttesének mindig hozzáférhetőnek kell lennie, mivel ez szolgál főmegszakítóként.

Avvertenza

Il gruppo spina-presa deve essere sempre accessibile, poiché viene utilizzato come dispositivo di scollegamento principale.

Advarsel

Kombinasjonen støpsel/uttak må alltid være tilgjengelig ettersom den fungerer som hovedfrakoplingsenhet.

Aviso	A combinação ficha-tomada deverá ser sempre acessível, porque funciona como interruptor principal.
¡Advertencia!	El conjunto de clavija y toma ha de encontrarse siempre accesible ya que hace las veces de dispositivo de desconexión principal.
Varning!	Man måste alltid kunna komma åt stickproppen i uttaget, eftersom denna koppling utgör den huvudsakliga fränkopplingsanordningen.
Предупреждение	Штепсельная розетка всегда должна быть доступна, поскольку она служит основным устройством отключения.
警告	插销和插座必须便于随时插拔，因为它是主要断电设备。
警告	主要な切断装置となるので、プラグとソケットは常に手が届く場所に置く必要があります。

1.6.3 Laser Radiation Warning



Warning

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.

Waarschuwing

Losgekoppelde of losgeraakte glasvezels of aansluitingen kunnen onzichtbare laserstraling produceren. Kijk niet rechtstreeks in de straling en gebruik geen optische instrumenten rond deze glasvezels of aansluitingen.

Varoitus

Irrotetuista kuiduista tai liittimistä voi tulla näkymätöntä lasersäteilyä. Älä tuijota säteitä tai katso niitä suoraan optisilla välineillä.

Attention

Les fibres ou connecteurs débranchés risquent d'émettre des rayonnements laser invisibles à l'œil. Ne regardez jamais directement les faisceaux laser à l'œil nu, ni d'ailleurs avec des instruments optiques.

Warnung

Unterbrochene Fasern oder Steckerverbindungen können unsichtbare Laserstrahlung abgeben. Blicken Sie weder mit bloßem Auge noch mit optischen Instrumenten direkt in Laserstrahlen.

Figyelem!

A nem csatlakoztatott üvegszálak és csatlakozók láthatatlan lézersugárzást bocsáthatnak ki. Ne nézzen bele a sugárba, és ne nézze közvetlenül, optikai berendezések segítségével!

Avvertenza

Le fibre ottiche ed i relativi connettori possono emettere radiazioni laser. I fasci di luce non devono mai essere osservati direttamente o attraverso strumenti ottici.

Advarsel

Det kan forekomme usynlig laserstråling fra fiber eller kontakter som er frakoblet. Stirr ikke direkte inn i strålene eller se på dem direkte gjennom et optisk instrument.

Aviso	Radiação laser invisível pode ser emitida de conectores ou fibras desconectadas. Não olhe diretamente para os feixes ou com instrumentos ópticos.
¡Advertencia!	Es posible que las fibras desconectadas emitan radiación láser invisible. No fije la vista en los rayos ni examine éstos con instrumentos ópticos.
Varning!	Osynlig laserstrålning kan avges från frånkopplade fibrer eller kontaktdon. Rikta inte blicken in i strålar och titta aldrig direkt på dem med hjälp av optiska instrument.
Предупреждение	Отключенные световоды и разъемы могут испускать невидимое лазерное излучение. Не допускайте попадания лазерного луча в глаза и не смотрите на него через оптические приборы.
警告	断开的光纤或接头有可能发出不可见的激光辐射。请勿直视光束或直接用光学仪器观看光束。
警告	光ファイバ ケーブルまたはコネクタを取り外した状態では、目に見えないレーザー光が放射されていることがあります。光線をのぞきこんだり、光学機器を使用して光線を直接見たりしないでください。

1.6.4 Unterminated Fiber Warning



Warning

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.

Waarschuwing

Er kunnen onzichtbare laserstralen worden uitgezonden vanuit het uiteinde van de onafgebroken vezelkabel of connector. Niet in de straal kijken of deze rechtstreeks bekijken met optische instrumenten. Als u de laseruitvoer met bepaalde optische instrumenten bekijkt (zoals bijv. een oogloep, vergrootglas of microscoop) binnen een afstand van 100 mm kan dit gevaar voor uw ogen opleveren.

Varoitus

Päättämättömän kuitukaapelin tai -liittimen päästä voi tulla näkymätöntä lasersäteilyä. Älä tuijota sädettä tai katso sitä suoraan optisilla välineillä. Lasersäteen katsominen tietyillä optisilla välineillä (esim. suurennuslasilla tai mikroskoopilla) 10 cm:n päästä tai sitä lähempää voi olla vaarallista silmille.

Attention

Des émissions de radiations laser invisibles peuvent se produire à l'extrémité d'un câble en fibre ou d'un raccord sans terminaison. Ne pas fixer du regard le rayon ou l'observer directement avec des instruments optiques. L'observation du laser à l'aide certains instruments optiques (loupes et microscopes) à une distance inférieure à 100 mm peut poser des risques pour les yeux.

Warnung	Eine unsichtbare Laserstrahlung kann vom Ende des nicht angeschlossenen Glasfaserkabels oder Steckers ausgestrahlt werden. Nicht in den Laserstrahl schauen oder diesen mit einem optischen Instrument direkt ansehen. Ein Betrachten des Laserstrahls mit bestimmten optischen Instrumenten, wie z.B. Augenlupen, Vergrößerungsgläsern und Mikroskopen innerhalb eines Abstands von 100 mm kann für das Auge gefährlich sein.
Figyelem!	A lezáratlan optikai kábelek és a csatlakozók láthatatlan lézertényet bocsáthatnak ki. Ne nézzen bele a sugárba, és ne nézze közvetlenül, optikai berendezések segítségével! Ha a kibocsátott lézert 100 mm-esnél kisebb távolságból nézi bizonyos optikai eszközökkel (például nagyítóval vagy mikroszkóppal), látáskárosodást szenvedhet.
Avvertenza	L'estremità del connettore o del cavo ottico senza terminazione può emettere radiazioni laser invisibili. Non fissare il raggio od osservarlo in modo diretto con strumenti ottici. L'osservazione del fascio laser con determinati strumenti ottici (come lupette, lenti di ingrandimento o microscopi) entro una distanza di 100 mm può provocare danni agli occhi.
Advarsel	Usynlig laserstråling kan emittere fra enden av den ikke-terminerte fiberkabelen eller koblingen. Ikke se inn i strålen og se heller ikke direkte på strålen med optiske instrumenter. Observering av laserutgang med visse optiske instrumenter (for eksempel øyelupe, forstørrelsesglass eller mikroskop) innenfor en avstand på 100 mm kan være farlig for øynene.
Aviso	Radiação laser invisível pode ser emitida pela ponta de um conector ou cabo de fibra não terminado. Não olhe fixa ou diretamente para o feixe ou com instrumentos ópticos. Visualizar a emissão do laser com certos instrumentos ópticos (por exemplo, lupas, lentes de aumento ou microscópios) a uma distância de 100 mm pode causar riscos à visão.
¡Advertencia!	El extremo de un cable o conector de fibra sin terminación puede emitir radiación láser invisible. No se acerque al radio de acción ni lo mire directamente con instrumentos ópticos. La exposición del ojo a una salida de láser con determinados instrumentos ópticos (por ejemplo, lupas y microscopios) a una distancia de 100 mm puede comportar lesiones oculares.
Varning!	Osynlig laserstrålning kan komma från änden på en oavslutad fiberkabel eller -anslutning. Titta inte rakt in i strålen eller direkt på den med optiska instrument. Att titta på laserstrålen med vissa optiska instrument (t.ex. lupper, förstoringsglas och mikroskop) från ett avstånd på 100 mm kan skada ögonen.
Предупреждение	Световоды и разъемы без заглушек могут испускать невидимое лазерное излучение. Не допускайте попадания лазерного луча в глаза и не смотрите на него через оптические приборы. Нельзя смотреть на источник лазерного излучения через некоторые оптические приборы (например увеличительное стекло, лупу или микроскоп) с расстояния ближе 100 мм: это может привести к травме органов зрения.
警告	无终端接头的光纤的末端或接头有可能发出不可见的激光辐射。请勿直视光束或直接用光学仪器观看。在 100 毫米的距离内用某些光学仪器（例如小型放大镜、放大镜和显微镜）观看激光输出有可能伤害眼睛。
警告	終端されていない光ファイバ ケーブルまたはコネクタの開口部からは、目に見えないレーザー光線が放射されることがあります。光線をのぞきこんだり、光学機器を使用して直接見たりしないでください。ある種の光学機器（ルーペ、拡大鏡、顕微鏡など）を使用して 100 mm 以内の距離からレーザー光線を見ると、目を痛めることがあります。

1.6.5 Class 1 Laser Product Warning



Warning

Class 1 laser product.

Waarschuwing

Klasse-1 laser produkt.

Varoitus

Luokan 1 lasertuote.

Attention

Produit laser de classe 1.

Warnung

Laserprodukt der Klasse 1.

Figyelem!

Class 1 besorolású lézeres termék.

Avvertenza

Prodotto laser di Classe 1.

Advarsel

Laserprodukt av klasse 1.

Aviso

Producto laser de classe 1.

¡Advertencia!

Producto láser Clase I.

Varning!

Laserprodukt av klass 1.

Предупреждение

Лазерное устройство класса 1.

警告

这是 1 类激光产品。

警告

クラス1レーザー製品です。

주의

1급 레이저 제품.



Product Overview

This section describes the functionality and the features of the ONS 15305.

2.1 Functional Overview

The ONS 15305 is a traffic concentrator that supports different types of transmission media. It can be used in networks based on fiber and copper media.

The ONS 15305 concentrates both IP and TDM traffic and is able to interface to both TDM and IP backbone networks. The TDM portion of the ONS 15305 is a cross-connect that can work as a terminal mux, add and drop mux, or non-blocking cross-connect. The IP portion consists of a L2 switch.

The ONS 15305 is a small device with a high port density that is designed to be flexible and highly scalable. It is targeted for a number of different applications as shown in this chapter.

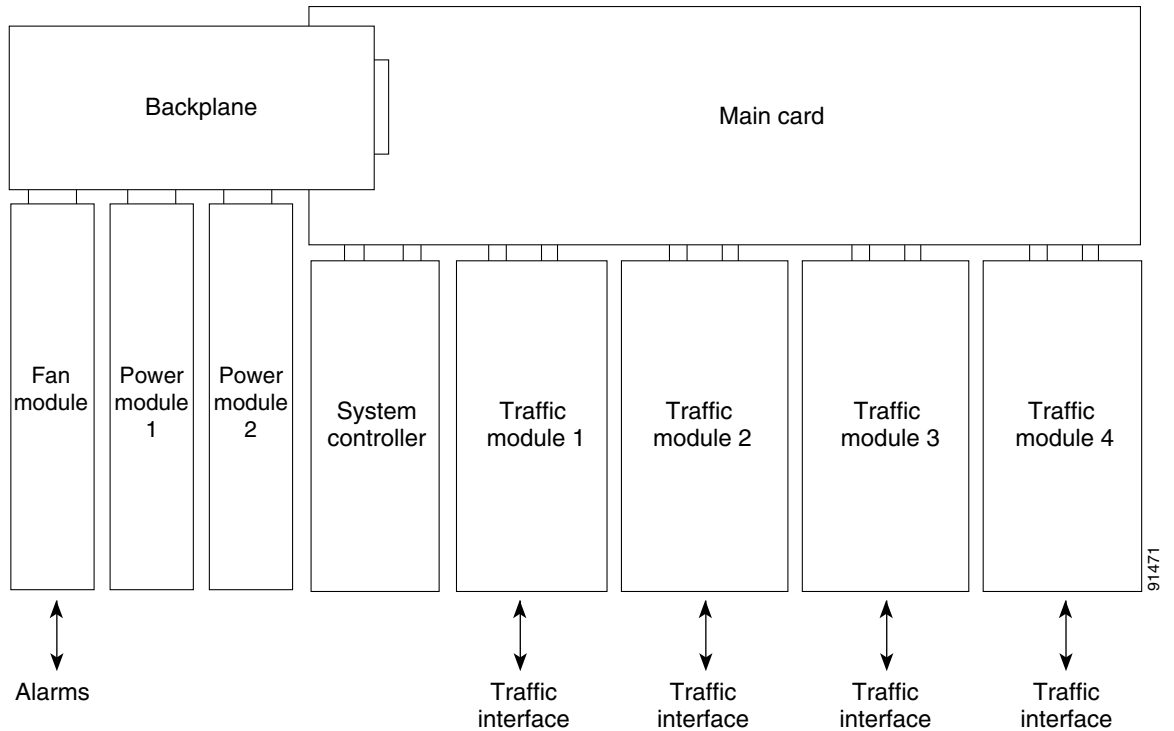
The ONS 15305 owes its flexibility to its modular design. The ONS 15305 consists of a chassis with a motherboard with room for up to eight plug-in modules. Four of the plug-in modules are used as interface modules. The remaining four modules are two redundant power supply modules, one fan module, and a system controller module.

The ONS 15305 can be used in star networks, ring networks, chained networks and meshed.

The following types of modules/boards exist:

- Alarm and fan module, FAN-ALARM
- Main card
- Back plane
- System controller module, SYSCONT-SD128-RJ45
- Power module, DC Power
- Service modules, up to four

Figure 2-1 System Overview



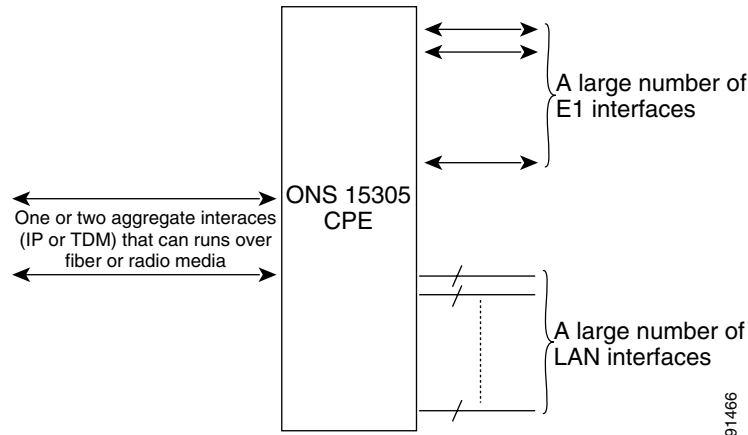
2.2 Applications

2.2.1 CPE Application

The ONS 15305 can be used as customer premise equipment (CPE). The unit has a large number of TDM interfaces (E1) and LAN interfaces (10/100/1000Base-T, 1000 Base-LX). This application is typically used for very large end customers or in a building with many smaller end customers.

The ONS 15305 can be connected towards the backbone network via fiber, radio, or copper. The application is shown in [Figure 2-2](#).

Figure 2-2 CPE Application

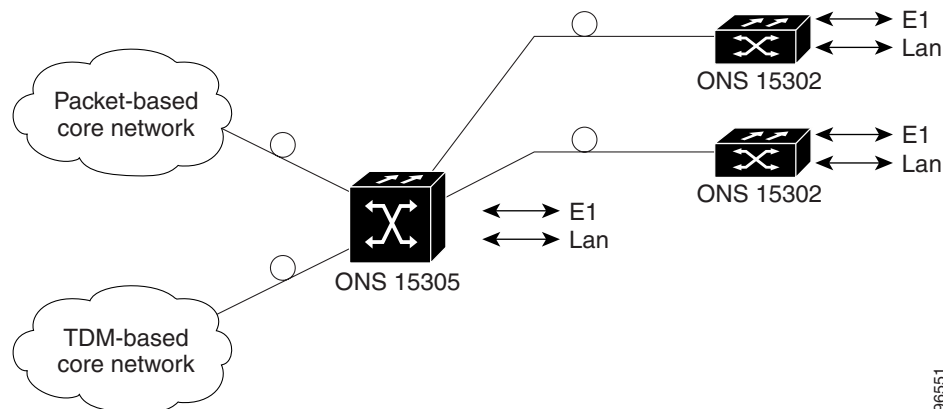


2.2.1.1 Small PoP Application

The ONS 15305 can also be used as a traffic concentrator in the point of presence (PoP) of the operator. The unit may support many different CPEs and may also support different types of transmission media. The unit is the interface between the core network and the access network. A typical application is shown in Figure 2-3.

In this application the ONS 15305 is used to connect up other Cisco products to the core SDH or IP network. It is also possible to connect equipment from other vendors to the ONS 15305.

Figure 2-3 PoP Application

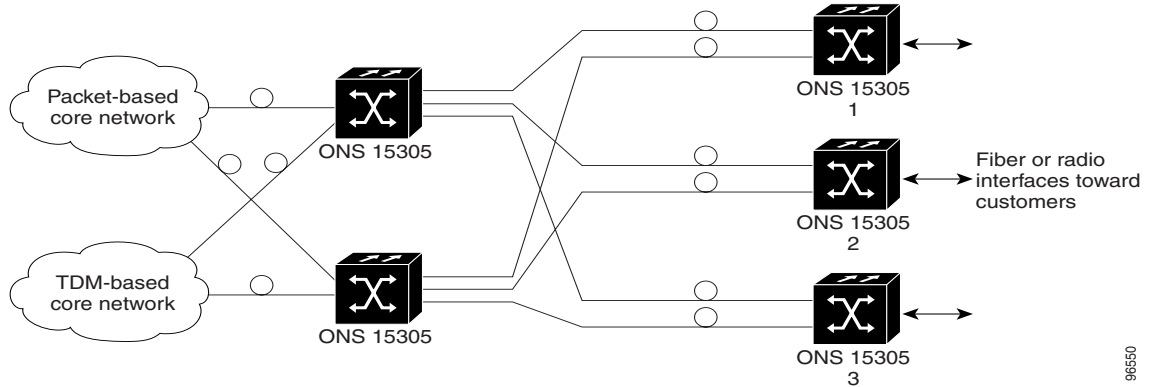


2.2.1.2 Large PoP application

If one ONS 15305 does not have enough performance or does not support enough interfaces, it is possible to stack a number of ONS 15305 nodes to create larger systems.

Typically an internal ONS 15305 is used to groom traffic from several ONS 15305s that are connected to the access network. The internal ONS 15305 is connected to the core network. Figure 2-4 shows a network where two ONS 15305s are used for redundancy.

Figure 2-4 Large PoP Application

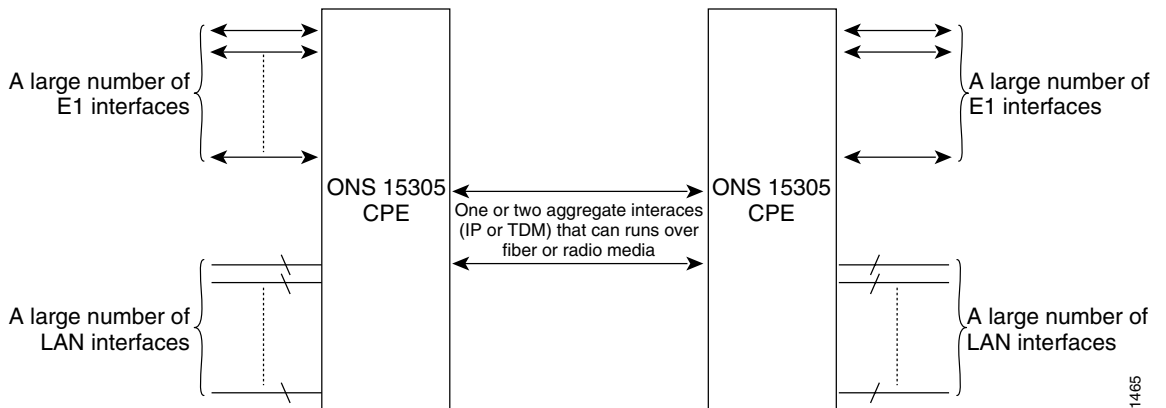


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2.2.1.3 Campus Application

The ONS 15305 can also be connected back to back without any connection to external networks, as shown in Figure 2-5.

Figure 2-5 Campus Application

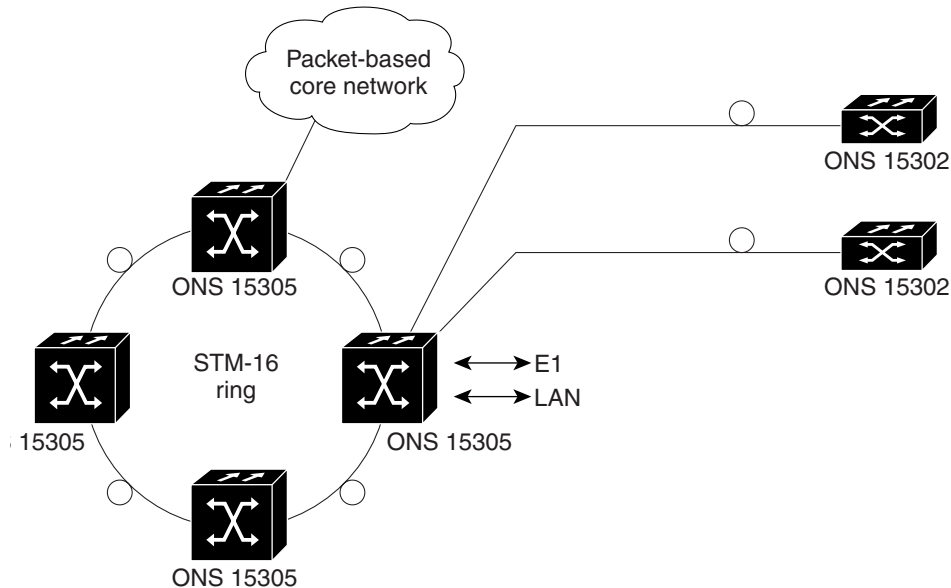


91465

2.2.1.4 ADM Application

The ONS 15305 can be used as a standard ADM that supports TDM tributaries and IP tributaries, as shown in Figure 2-6.

Figure 2-6 Typical ADM Application for the ONS 15305



2.3 Alarm and Fan Module, 4xFAN-ALARM-DSUB9

The fan unit ventilates the 19-inch 1U cabinet used for ONS 15305.

The fan unit is a plug-in device consisting of a circuit board with four fans. The air is sucked in via four circular openings in the left sidewall and emerges via holes in the right side cabinet wall. Four fans are used to improve reliability.

2.3.1 Protection

The fan unit consists of four fans. These act as the main and standby fans. The “main” and “stand-by” designations are swapped every 24 hours to evenly distribute wear on the fans.

In case of an abnormal temperature rise, all fans will operate simultaneously.

The fans operate in pairs; there are two standby fans and two main fans. The maximum temperature measured in the ONS 15305 controls the fans. The only modules not containing temperature sensing are the fan unit itself, the power modules, and the system controller card. The FAN module is connected to the main card through the backplane.

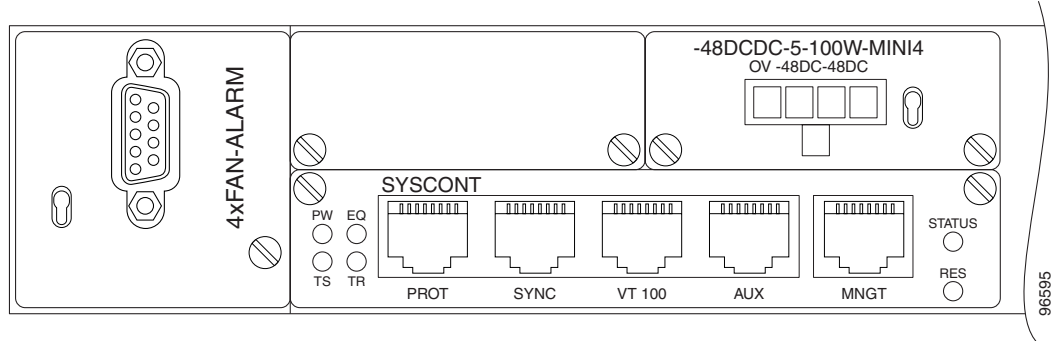
The O_TEMP_ALM alarm is detected on the main card when the temperature rises above 85 °C. The alarm, specific for each fan, is processed and presented as a Fan Failure Alarm.

2.3.2 External Alarms

The ONS 15305 provides facilities to report four auxiliary alarm inputs for associated equipment, for example power module failure, a battery condition, or an open cabinet door.

It also supports two alarm outputs used to signal equipment alarms and traffic related alarms. The alarm input/output connector is placed on the fan unit front cover, as shown in [Figure 2-7](#).

Figure 2-7 Location of Alarm and Fan Module, FAN-ALARM



2.3.3 POWER MODULE, 48DCDC-5-100W-MINI4

2.3.3.1 Introduction

The main feature of the power module is to convert and isolate primary power, 48 VDC, to 5,25 volts for the modules in the product.

The module has features that allow power sharing and hot plugging.

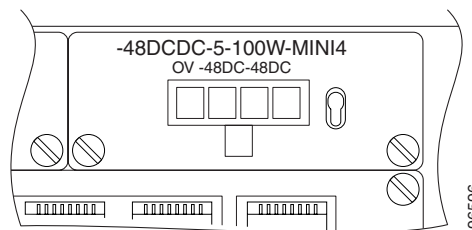
The module has separate alarms for two independent primary supplies (< 40 volts) and alarm for the secondary output (< 4,65 volts).

The secondary current is short circuit proof and the average s.c. current is less than 1 amp. The maximum secondary current is limited to ab. 26 amps.

A 3m long power cable is also provided with a Mini-fit connector in one end and no connector in the other end. This cable connects the ONS 15305 to the internal 48V power-rails inside the rack.

The cable and the power supply meet the safety requirements of the EN 60950 specification.

Figure 2-8 Location of DC Power



2.3.3.2 Technical Overview DC/DC

The -48V DC Power supply (-48DCDC-5-100W-MINI4) covers the -40,5 VDC to -57 VDC range, also referred to as -48 VDC.

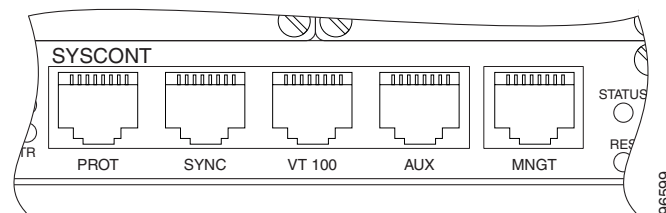
The module generates +5.25 VDC; all other voltages necessary are generated on each module. If two power modules are used, the current sharing between the two modules is between 40% and 60%.

2.3.4 System Controller Module (SYSCONT-SD128-RJ45)

2.3.4.1 Introduction

The system controller module contains the processor system for the ONS 15305, as shown in [Figure 2-9](#).

Figure 2-9 Location of SYSCONT-SD128-RJ45



The ONS 15305 software runs in 128 MB SDRAM. The amount of memory can be configured at the factory from 64 MB to 512 MB.

The software is stored in Flash memory devices. The ONS 15305 uses a Compact Flash card as the storage medium. The 32 MB CompactFlash is mounted in a connector on the system controller. The size of the Compact Flash cards can be from 8MB to 128MB; this is determined by the application.

The module supports a serial RS-232/VT.100 interface used by the craft terminal. The module also supports a 10Base-T LAN interface used for management purposes.

The module contains the local synchronization interface for the ONS 15305. This interface is directly connected to the SETS functionality on the motherboard.

The module contains the local user interface for the ONS 15305, the AUX port. The interface supports a framed E1 interface. It is possible to select different overhead bytes from all SDH interfaces to the 30 available time slots.

The physical connectors of the five interfaces are of the RJ-45 type.

The module also provides four LEDs to indicate the status of the ONS 15305. The LEDs are visible from the rear of the ONS 15305. The LEDs have the same functionality as the LEDs in the chassis. The fifth LED indicates the status of the management port.

Power consumption for the system controller module is 23 W maximum.

2.3.4.2 Technical Overview

A local Ethernet port (10/100BaseT), called the Management Port, is available for connecting to a management DCN. The management signals go to an Ethernet Controller in the MPC8265 processor situated on the module.

The ONS 15305 offers a VT100 interface for connection of AXXCRAFT Terminal/CLI interface. The interface is running at a data rate of 19,200 baud.

The synchronization port is used for SETS functionality on the main card. The 2 Mbps AUX signals go to the SETS FPGA.

The proprietary protection interface will be used for equipment protection in a future release.

The voltages are generated on board with the exception of the +5.2 V that comes directly from the power modules. The power consumption should not exceed 23W.

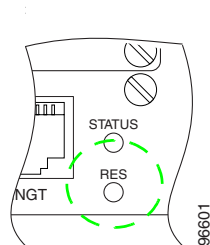
The module is equipped with a reset circuit that resets the card in case of a fault in one of the voltages.

**Note**

The reset switch that is accessible in front of the system controller module will reset the ONS 15305.

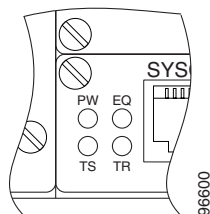
Figure 2-10 shows the reset switch. A special tool such as a small screwdriver or a pencil may be used to activate the switch.

Figure 2-10 Location of the Reset Push Button



Visual indicators (LEDS) are provided to indicate an ONS 15305 failure condition. These LEDs are placed on the System Controller Unit front cover and the front of the ONS 15305, as shown in Figure 2-11.

Figure 2-11 Locations of LEDs on the System Controller Front



The LEDs on the main card have the same functionality as the LEDs on the system controller card. The color and functionality of the LEDs are described in Table 2-1.

Table 2-1 System Controller Module LEDs

Identity	Color	Function
Power	Green	Indicates that power is present and the unit is operating correctly
Equipment	Red	Indicate that an error is present with the equipment

Table 2-1 System Controller Module LEDs (continued)

Identity	Color	Function
Traffic	Red	Indicates that a traffic alarm is present at one of the interfaces
Test	Yellow	Indicate that test-loops are activated on the unit

The LEDs are controlled by the SETS FPGA and are not affected by the external alarms.

A fifth, green LED is also mounted in the front of the system controller card. This LED indicates the link status of the management port.

2.4 Service Modules

2.4.1 Introduction

The ONS 15305 consists of a unit with a main card with space for up to four plug-in service modules. The plug-in modules support a number of different external interfaces and different transmission medias. The internal interface with the main card is identical for all service modules.

2.4.2 Common Functions

2.4.2.1 Memory

All modules store inventory data in non-volatile memory, e²prom.

2.4.2.2 FPGA Configuration

The modules containing one or more FPGAs also contain a local flash used to store FPGA configuration data in two banks.

The FPGA configuration is automatically loaded from the active flash bank after power-up. New FPGA files can be downloaded from the management system. The flash bank selection is controlled by the management system.

2.4.2.3 Processor Interface

The modules are connected to the main card via a 16-bit wide time multiplexed address and data bus. The DXC devices on the main card are responsible for generating module chip select and the translation from a time multiplexed bus towards the modules to a separate data and address bus towards the processor.

2.4.2.4 DCC

The modules terminating one or more STM-N lines are able to terminate both the DDC-R (192 Kbps) and DCC-M (576 Kbps) channels.

2.4.2.5 G.Link

All modules with IP switching capability are interconnected with a high-speed link to a central switch on the main board. The link is called G-link.

2.4.2.6 TDM

The mapping of IP traffic into VC12 containers is performed at service module level. There is no connection between the IP and SDH traffic on the main card (in the base unit).

All modules with IP switching capability are interconnected with a high-speed link to a central switch on the main' card. All modules with TDM functionality are connected to the cross-connect on the main board.



Pre-Installation Procedures

This chapter provides pre-installation procedures for the Cisco ONS 15305. Chapter topics include shipment verification, site preparation, and equipment unpacking.

3.1 Shipment Verification

When you receive ONS 15305 system equipment at the installation site, immediately verify that the shipment is correct.



Note

Cisco does not recommend shipping equipment that is mounted in racks. To ship equipment from one site to another, pack the equipment in the original box.




Note

If you store the ONS 15305 before installing it, keep the ONS 15305 system equipment in the original shipping containers. The storage period should not exceed 12 months. Store the packed equipment indoors in a well-ventilated and static-safe environment.

3.1.1 ONS 15305 Shipping Container Label

The ONS 15305 shipping container label provides specific information about the shipped item. The label displays information in alphanumeric bar code format. [Figure 3-1](#) shows a sample of a shipping container label.

Figure 3-1 Example of a Shipping Container Label

		<div style="border: 1px solid black; padding: 2px; width: fit-content;">Bar Code</div>	
(3S) PKG ID:			
<div style="border: 1px solid black; padding: 2px; width: 80%; margin: auto;">Bar Code</div>			
(K) Cust PO:			
<div style="border: 1px solid black; padding: 2px; width: 60%; margin: auto;">Bar Code</div>			
(P) Cust P/N:			
(1P) Prod. #:			
<div style="border: 1px solid black; padding: 2px; width: 60%; margin: auto;">Bar Code</div>			
(S) Serial #:			
<div style="border: 1px solid black; padding: 2px; width: 30%; margin: auto;">Bar Code</div>			
(Q) Qty.:			
<div style="border: 1px solid black; padding: 2px; width: 20%; margin: auto;">Bar Code</div>			
Notes:			
S.O.#:		<div style="border: 1px solid black; padding: 2px; width: 40px;">Bar Code</div> <small>Carton#:</small>	
<div style="border: 1px solid black; padding: 2px; width: 60%; margin: auto;">Bar Code</div>			
Shipset:	FC-Date:		
<div style="border: 1px solid black; padding: 2px; width: 60%; margin: auto;">Bar Code</div>			
60126			

3.1.2 Preliminary Inventory Check

Compare the packing list information with the alphanumeric information provided on the shipping labels. The packing list and shipping labels should contain the same information. If there are any discrepancies between the shipping label information and the packing list information, call the Cisco Technical Assistance Center (TAC). See the [“Obtaining Technical Assistance”](#) section on page xx.

3.1.3 Reporting Damage

To report damage to shipped articles, contact the Cisco TAC to open a Return Material Authorization and Fault Symptom Report (RMA). See the [“Obtaining Technical Assistance”](#) section on page xx for information.

3.2 Site Preparation

Verify that the installation site meets the following criteria:

1. The site conforms to all environmental specifications provided in [Chapter 2, “Product Overview.”](#)

- The floor or mounting area where you will install the equipment can support the equipment.

**Caution**

The maximum recommended ambient temperature is 45 degrees C; the minimum is -5 degrees C.

The following tables are based on typical ONS 15305 system configurations. Floor loading, power consumption, heat dissipation, and clearances may vary in specific customer configurations.

- The installation site meets the power supply requirements provided in [Table 3-1](#).

Table 3-1 Power Supply Requirements by ONS 15305 Equipment Type

Equipment Type	Power Supply Requirements
-48 VDC	-40.5 to -57 VDC

- The installation site meets the power consumption requirements provided in [Table 3-2](#).

Table 3-2 Power Consumption Requirements by ONS 15305 Equipment Type

Equipment Type	Power Consumption Requirements
ONS 15305	Maximum 120 W

- The installation site meets the circuit breakers requirements provided in [Table 3-3](#).

Table 3-3 Circuit Breakers Requirements by ONS 15305 Equipment Type

Equipment Type	Circuit Breakers Requirements
ONS 15305	7 A (slow)

- The minimum recommended clearance for accessing bays from the front and back, opening front covers, and clearing the top of the racks is provided as listed in [Table 3-4](#).

Table 3-4 Recommended Access Clearance

Item	Recommended Clearance
Bay access needed for maintenance	Front access only, 500 mm (19.7 in.)
Back clearance to bays (if necessary)	500 mm (19.7 in.)

- The installation site meets the ground requirements listed in [Table 3-5](#).

Table 3-5 Recommended Ground Capacity

Item	Recommended Capacity
Total weight	Maximum 5 Kg

3.3 Unpacking

Use the following considerations when unpacking and storing ONS 15305 equipment:

- Leave equipment packed until it is needed for immediate installation.
- Store packed equipment in the temperature and environmental conditions described in the [Chapter 2, “Product Overview.”](#)
- After unpacking the equipment, save and store the packaging material in case the equipment must be returned.
- If the packaging is damaged and possible equipment damage is present, preserve as much of the packaging as possible to allow Customer Service and the shipper to analyze the damage. To report damage to shipped articles, contact the Cisco Technical Assistance Center (TAC) to open an RMA. See the “[Obtaining Technical Assistance](#)” section on page xx for information.

The following procedures contain specific instructions for unpacking ONS 15305 system equipment.

Procedure: Unpack the ONS 15305



Caution

When opening the shipping container, use caution to avoid damaging the contents.



Caution

Static electricity can damage electro-optical equipment. While unpacking and handling optical and electrical modules, wear a grounding wrist strap to discharge the static buildup. Before unpacking and installing modules or making system interconnections, connect the grounding wrist strap. The grounding wrist strap is designed to prevent equipment damage caused by static electricity.



Note

If any optical adapters are included in the container, remove them and save them for use while installing the module front-panel optical fiber jumper cables.

Step 1 Open the top of the cardboard shipping container.

Step 2 Remove the ONS 15305 accessory kit and documentation CD.

Step 3 Take the ONS 15305 out of the shipping container.

Step 4 Take the ONS 15305 out the plastic protective bag.

The ONS 15305 shipping container should contain the following items:

- One ONS 15305 configured as ordered
- One Accessory kit (15305-SHIPKIT=, Cisco Part number 74-3106-01), which includes brackets and screws for 19" and 23" rack, disposable ESD wrist straps, one release hook for card extraction, one ONSCLI cable, one blade terminal with screw and blade jack, a registration and warranty card, and a Quick Installation Guide.



Installation

This chapter provides instructions for installing the Cisco ONS 15305.



Note

The instructions in this section primarily address the installation of the ONS 15305, and modules supplied by Cisco Systems. When installing racks, electrical wiring, raceways, and other equipment not covered in this manual, you should follow all local, state, federal, or international (if applicable) codes and regulations.



Caution

Static electricity can damage electronic equipment. While unpacking and handling electronic modules, wear a grounding wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap.

4.1 Installation Overview

You should be thoroughly familiar with the instructions in this manual before starting any work. Use the following sequence when installing the ONS 15305.

1. Read and observe all safety cautions and warnings in [Chapter 1, “Safety Summary.”](#)
2. Before inspecting the ONS 15305, first verify the ONS 15305 equipment according to the procedures in [Chapter 3, “Pre-Installation Procedures.”](#) If there is a problem with the equipment, contact the Cisco Technical Assistance Center (TAC). See the [“Obtaining Technical Assistance” section on page xx](#) for information.
3. If you do not install the equipment immediately, store it as specified in [Chapter 3, “Pre-Installation Procedures.”](#)
4. Unpack equipment only after preparing the site as described in [Chapter 3, “Pre-Installation Procedures.”](#)
5. When installing equipment at a site, follow the procedures in this chapter in the order presented.
6. Make connections using the information in [Chapter 6, “Physical Interfaces.”](#)

4.2 Installation Planning

Based on the configuration to be installed, determine the size, number, and location of racks, as well as the ONS 15305 installation requirements. Take the following unit dimensions into consideration when installing the ONS 15305:

- The ONS 15305 can be installed in 485 mm (19-in.) equipment racks.
- The ONS 15305 can be adapted for 600 mm ETSI (23.6-in.) racks.
- The racks must be accessible from the front and rear for equipment installation.


Note

You need 500 mm (19.7-in.) of rear access space for installation.

Use the following considerations when installing an ONS 15305 in a rack.

- Install the lowest unit in a rack first.
- Wire size and dimension requirements are based on cable length and local engineering standards and practices.
- Route the power cable from the power distribution panel (PDP) to the ONS 15305, along the edge of the equipment rack.
- Route the grounding cable from the station ground to the ONS 15305, proceeding down along the edge of the equipment rack.
- Route the electrical cables from the ONS 15305 along the edge of the rack to the overhead cable transport tray.
- Route the optical cables from the ONS 15305 along the edge of the rack to the overhead cable transport tray.


Note

The interface cables should not run in the same pipes as the power cables.

4.2.1 Required Items

In addition to a standard installation tool kit, the following items are also required:

- Phillips screwdriver (PH3) to attach the ONS 15305 to the rack, and a Phillips screwdriver (PH1) to attach the brackets to the ONS 15305
- 2.5-mm Allen key (to attach the external grounding)
- 4 mounting screws, M6 (#12-24 x 3/4 pan head Phillips) and nuts
- Power cable (from fuse to power connector), #18 AWG (0.75 mm²) up to #16 AWG (1.5 mm²) with four rigid wires
- Yellow-green flexible ground cable, #16 AWG (1.25 mm²) up to #14 AWG (2.50 mm²) (for the external grounding)
- Cletop cleaning cassette (Type A for SC connectors)
- Video fiber connector inspection instrument
- Caps for optical connectors
- Plugs for optical adapters

- Tie wraps

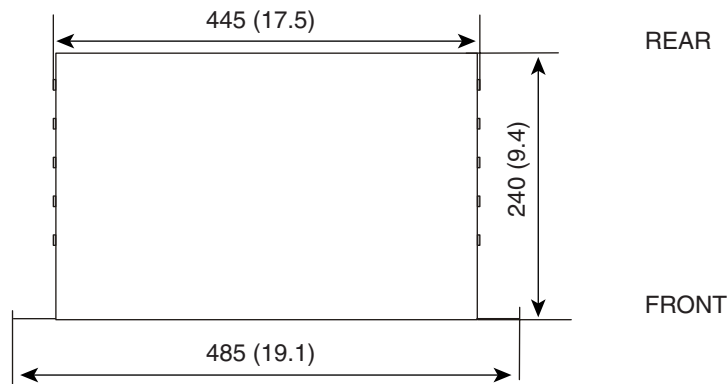
4.2.2 Installation Guidelines

When installing ONS 15305 equipment in a rack, follow these guidelines:

- Consider the effect of additional electronic equipment and its generated heat on the ONS 15305 system equipment.
- Make sure the equipment rack is properly bolted to the ground, and if required, to the ceiling. Ensure that the weight of the equipment does not make the rack unstable.
- When mounting the equipment between two posts or rails, ensure that the minimum clearance between the sides is 485 mm (19 in.).
- Maintain a minimum clearance of 500 mm (19.7 in.) in front of the equipment and 500 mm (19.7 in.) at the back of the equipment.

Figure 4-1 shows the outer dimensions of the ONS 15305 system equipment.

Figure 4-1 Outer Dimensions of the ONS 15305 System



All dimensions are in mm (and in.)

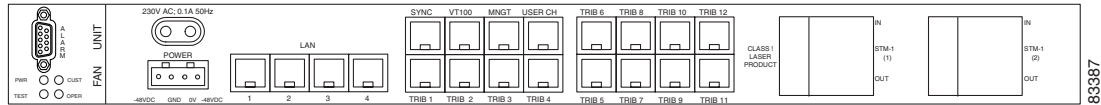
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4.2.3 Install Ground to 48 V

The ONS 15305 must be properly grounded. The ONS 15305 is grounded via the 48 V power connector to the rack ground. See the [“4.4.2 Install the ONS 15305 –48 VDC Power”](#) section on page 48 for more information.

The location of the power connector on the ONS 15305 is shown in [Figure 4-2](#).

Figure 4-2 ONS 15305 Faceplate (Connector Array)



4.2.4 Install External Ground to the 15305

This ground connection is only used when the system is not installed in a rack.

The ONS 15305 should be grounded via the external ground connector to the rack ground. The location of the ground connector on the ONS 15305 is shown in

[Insert Ground Connector Position on the ONS 15305 illo]

Procedure: Install the Ground Connector

- Step 1** Remove the Phillips screw from the ONS 15305 as shown in [Figure 4-3]
- Step 2** Affix the flat connector with the washer and the socket screw.
- Step 3** Insert the grounding cable in the flat cable plug and crimp the plug with a crimping tool as shown in [Figure 4-4].
- Step 4** Verify that the ground cable plug is inserted into the flat cable plug.
- Step 5** Connect the flat cable plug to the flat connector.
- Step 6** Route the ground cable securely to the local ground connector and connect it according to local site practice.

[Insert the “Connection of the Ground Cable with a Crimp Tool” illustration]

4.2.5 Power Considerations

The ONS 15305 can be powered using a regular telecommunication power supply of -48 VDC with a VDC return. The ONS 15305 supports redundant 48 VDC power supplies but the two supplies should be independently powered.

4.3 Fiber Cleaning

Cleto cleaning cassettes (type A for SC connectors) must be used to clean the fiber connectors and adapters before installing fiber. A video inspection instrument and optical adapters for SC connectors are also required to inspect the fiber connectors and adapters before installing fiber.



Note

Before powering the ONS 15305, clean and inspect the fiber to prevent equipment damage. Dust particles and damaged fiber connectors will affect the optical transmission. Replace damaged fiber connectors immediately.

**Warning**

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.

**Warning**

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.

**Warning**

Class 1 laser product.

Procedure: Clean Fiber Connectors

-
- Step 1** Remove the dust cap from the fiber connector.
 - Step 2** Inspect the connector for damage or dirt with a proper inspection tool.
 - Step 3** Insert the connector into the Cletop cleaning cassette slot, rotate one quarter turn, and gently swipe downwards. Repeat until the connector is clean.
 - Step 4** Insert the fiber connector into the applicable adapter.
 - Step 5** Place dust caps on the fiber connectors when not in use.
-

Procedure: Clean Fiber Adapters

-
- Step 1** Remove the dust plug from the fiber adapter.
 - Step 2** Inspect the connector for damage or dirt with a proper inspection tool.
 - Step 3** Insert a cleaning stick into the adapter opening.
 - Step 4** Inspect results and repeat [Step 3](#) until the adapter is clean.
 - Step 5** Put dust plugs on the fiber adapters when not in use.
-

4.4 ONS 15305 Installation

Use the following procedures to install the ONS 15305 in an equipment rack.

When installing the ONS 15305, you can also use the extension brackets included in the ONS 15305 accessory kit to convert a 485-mm (19-inch) rack to a 600-mm (23.6-inch) rack.

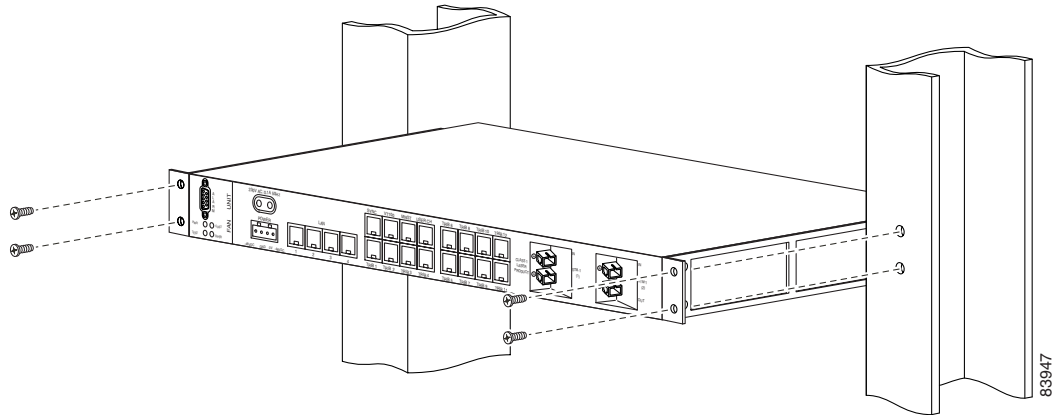
**Caution**

Static electricity can damage electronic equipment. While unpacking and handling electronic modules, wear a grounding wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap.

Procedure: Mount the ONS 15305 in an Equipment Rack

- Step 1** Verify that at least 3 RU of rack space is available. 1 RU is 44.45 mm.
- Step 2** Remove the four Phillips screws on the left and right sides of the ONS 15305 and install the brackets with the longer Phillips screws that are provided.
- Step 3** Move the ONS 15305 to the desired rack position, as shown in [Figure 4-3](#).
- Step 4** Affix the ONS 15305 to the rack with four M6 (#12-24 x3/4 pan head Phillips) screws and nuts.

Figure 4-3 Install the ONS 15305 with the Connector Array in Front in a 19-in. Rack



Procedure: Mount the ONS 15305 in an Equipment Rack Using Extension Brackets

The ONS 15305 can be installed in a 600-mm (23.6-in.) rack using the extension brackets. You need two 1 RU extension brackets for this procedure.

- Step 1** Remove the four Phillips screws on the left and right sides of the ONS 15305 and install the brackets with the longer phillips screws that are provided.
- Step 2** Move the ONS 15305 to the desired rack position, as shown in [Figure 4-3](#).
- Step 3** Affix the ONS 15305 to the equipment rack with four M6 (#12-24x3/4 pan head Phillips) screws and nuts.

4.4.1 Installation in Restricted Access Locations

The ONS 15305 can be installed in a restricted access location (RAL) or outside of an RAL.

4.4.1.1 Restricted Access Location

A restricted access location is a site location for equipment where the following criteria apply:

- Access can only be gained by service persons or by users who have been trained on the restrictions and the precautions for this specific site.
- Access is by means of at least one of the following, special tool, lock and key, or other means of security.

After installation in a RAL, such as in a telecommunications center, the ONS 15305 must be properly installed in a rack with brackets or in other ways properly connected to a safety ground. The ONS 15305 48-VDC power must not be powered from a source external to the RAL. The E1 interface used should be limited to SELV.

4.4.1.2 SELV Circuits

Safety Extra-Low Voltage (SELV) circuits are ports that have maximum DC working voltage level less than 60 V (42.4 VAC). In addition, the ports must not be connected to telecommunication networks as defined in EN 60950 (see CEI/ IEC 60950-1 2001-10, standard clause 1.2.13.8).

In practice, the electrical cables do not exit the building; electrical cables connect to equipment that meets one of the following requirements:

- Installed in the RAL
- Does not have electrical cables that exit the building unless those ports are TNV (Telecommunication Networks Voltage) circuits
- Has a written consent (or in other evidence) that its connecting port towards the SELV circuit port is not a telecommunication network

4.4.1.3 Telecommunication Network

A telecommunication network is a metallically terminated transmission medium intended for communication between equipment that might be located in separate buildings, excluding:

- Main system for supply, transmission and distribution of electrical power, if used as a telecommunication transmission medium
- Cable distribution system
- SELV circuits connecting units of information technology equipment

4.4.1.4 TNV Circuit

A TNV circuit in the equipment to which the accessible area of contact is limited. A TNV circuit is designed and protected that, under normal operating conditions and single fault conditions (see CEI/IEC 60950-1 2001-10, standard clause 1.4.14), the voltages do not exceed specified limit values.

4.4.1.5 Installation Outside of a Restricted Access Location

After installation in a non-RAL location, the ONS 15305 -48 VDC power and all communication ports must be connected to SELV circuits, for example, a port on a personal computer or 10/100-Mb Ethernet hub/router or other information technology (IT) equipment. The 48-VDC power must not exceed 60 VDC, and must be powered from a certified external power supply unit (PSU) or a battery unit (with no connection to -48 V telecommunications voltage).

The optical ports and 230-VAC power plug have no limitations regarding safety recommendations.

4.4.2 Install the ONS 15305 -48 VDC Power

The following procedure explains how to install ONS 15305 power connections.

Procedure: Connect the ONS 15305 A-side and B-side Power Connections to the PDP



Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit.



Warning

The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device.



Caution

Static electricity can damage electronic equipment. While unpacking and handling electronic modules, wear a grounding wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap.

Table 4-1 shows the wire colors and functions.

Table 4-1 Power Cable

Wire Color Coding	Wire Carrying
Black wire with red label	0V
Black wire	-48 VDC
Black wire	-48 VDC
Green yellow wire	GND

Step 1 Remove the A- and B-side fuses from the power distribution panel (PDP).

Step 2 Make sure that -48 VDC (tolerance -36 to -72 VDC) power is present.



Note

Be sure that the power cable is connected and verify the correct polarity. Verify that it is properly fused (1.5-A recommended).



Note Note that the ONS 15305 power cannot be switched off with a separate power switch.

- Step 3** Remove the A- and B-side fuses from the PDP.
- Step 4** Connect the ONS 15305 power cable (with the ground) to the power connector of the ONS 15305 connector array, as shown in [Figure 4-2](#).
- Step 5** Connect the first –48 VDC power cable to the A-side of the PDP.
- Step 6** Connect the first 0 VDC power cable to the A-side of the PDP.
- Step 7** Connect the second –48 VDC power cable to the B-side of the PDP.
- Step 8** Connect the second 0 VDC power cable to the B-side of the PDP.



Note Verify that the poles are correct when you connect the power cable.

- Step 9** Reinsert the A-side and B-side PDP fuses.
- Step 10** Verify that the A- and B-side –48 VDC and –48 VDC return (0 VDC) of the ONS 15305 are connected to the proper poles at the power source. The –48 VDC return must be connected to ground the PDP on both the A and B sides.
- Step 11** Verify that the incoming power is within the range of –40.5 VDC to –57 VDC before applying power.



Note The power supply has been connected correctly when the green LED is on.

4.5 Installation of Service Modules

This section describes installation procedures that are common to all service modules. For details on each service module, see the separate chapters.

There are no fixed positions for specific modules. It is possible to freely mix the four interface modules.



Note Due to a heat/power dissipation related to the 8xS-1.1-LC module, only two 8xS-1.1-LC modules can be installed in the ONS 15305 chassis. This restriction only applies to the 8xS-1.1-LC module.

Insertion or withdrawal of new modules does not affect the other modules. No manual configuration is needed if a module is replaced with a module of the same type.

It is possible to protect a module by adding a redundant module in the chassis.

All modules store inventory data in non-volatile memory. The inventory data is accessible from the system controller and the management system.

All modules contain a LED that indicates the status of the module. The LED is green when the module is active. The LED is red if the module has failed. The LED is extinguished when the module is deactivated.

All modules supports hot insertion and removal. When replacing a module, activate the switch and wait for the LED to extinguish before removing the module. It is also possible to deactivate the module from the CiscoEdgeCraft terminal. The Card Extraction Tool is required.

The following service modules are described in separate chapters:

- Octal optical S-1.1 module (8xS-1.1-LC)
- Dual optical S-4.1 module (2xS-4.1-LC)
- Single optical S-16.1 module (1xS-16.1-LC)
- Dual optical LAN 1000Base-LX module (2xGE-SM-LC/RJ45)
- Octal LAN 10/100Base-TX module (8xFE-RJ45)
- Octal E1 tributary module (8xE1-RJ45)
- Hex E3/T3 tributary module (6xE3/T3-1.0/2.3)
- High density 63xE1 module (63xE1-LFH)
- Dual Optical S-1.1 module (2xS-1.1-LC)

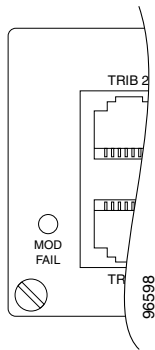
4.5.1 LEDs

Each service module has one status LED indicator on the front of the module.

A red LED indicates a faulty module. The module can be removed. A red indication is also given during power-up or re-booting of SYSCONT.

A green LED indicates that a module is in service. If the green LED is turned off, the module is out-of-service and can be removed.

Figure 4-4 LED for Module Failure Located in Lower Left Corner



A module is taken out-of-service by an operator shutdown command or by activation of the shutdown button.

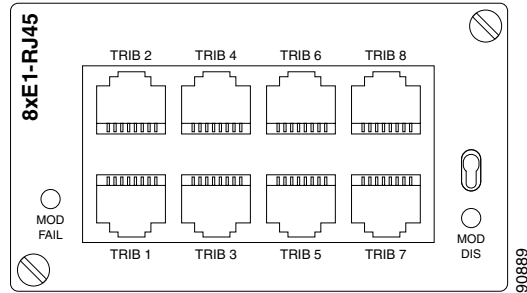


Note On Ethernet-related modules, the LEDs flash green during shutdown.

4.5.2 Hot Insertion and Removal

The ONS 15305 service modules supports hot insertion and removal. Each module contains a switch that should be activated before the module is removed. A special tool, called the Card Extraction Tool, must be used to activate the switch.

Figure 4-5 Removal Switch



When the LED has extinguished the module can be removed.



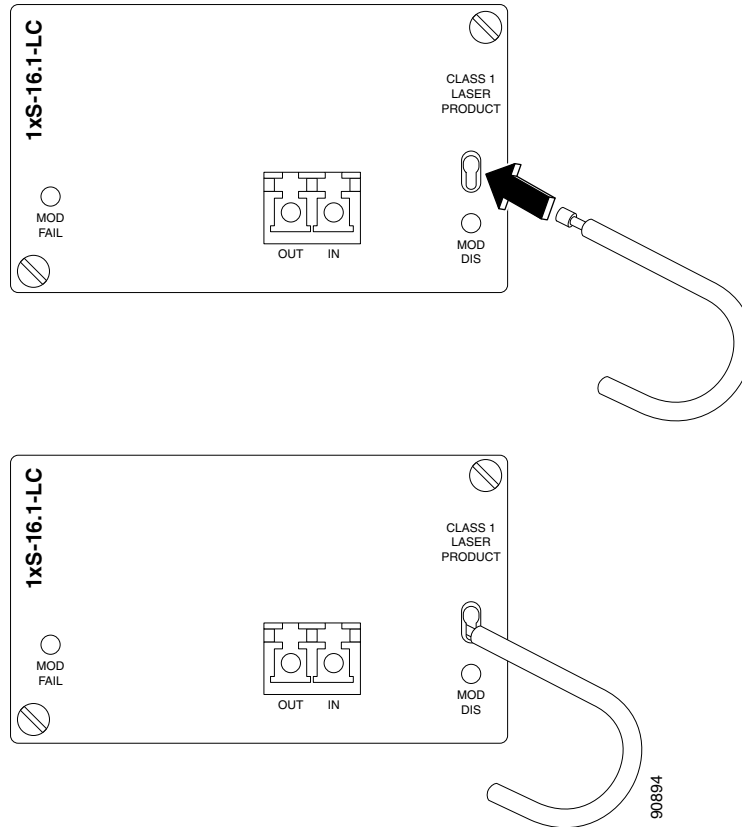
Caution

When activating the switch, ensure that it is not pressed too far in.

It is also possible to deactivate the module from the craft terminal, CiscoEdgeCraft.

When the switch is activated, the module is disabled in SW, and the MOD FAIL LED is switched off (for modules carrying IP, the LED blinks during SW cleanup and extinguishes afterwards). The module can now be removed. [Figure 4-6](#) shows the card (module) extraction tool.

Figure 4-6 Card Extraction Tool



4.6 Interconnections and Cable Handling

This section explains how to install the 15305 fiber-optic and electric cables.

4.6.1 Install the ONS 15305 Fiber Cable



Caution

Static electricity can damage electronic equipment. While unpacking and handling electronic modules, wear a grounding wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap.

To install fiber-optic cables in the ONS 15305, connect a fiber cable with an LC connector type to the transmit and receive ports of the transmission system. On the ONS 15305 module, the transmit and receive ports are located at the connector array of the unit. The receive port is named IN and the transmit port is named OUT.

Cisco recommends that you label the transmit and receive fiber (before installation) to and from the optical transmission system at each end of the fiber span to avoid confusion with cables that are similar in appearance.

**Warning**

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.

**Warning**

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.

**Warning**

Class 1 laser product.

Procedure: Connect the Fiber Cable

- Step 1** Remove the dust plugs from the SC (STM-1) connectors.
- Step 2** Clean and inspect the LC jumper cable connectors.
- Step 3** Connect the SC module input and output to the fiber termination rack.
- Step 4** Repeat [Step 1](#) to [3](#) for the protection fiber if applicable.
- Step 5** Guide the fiber through the cable ties mounted on the sides of the rack. The cable ties affix the fiber to the side of the rack to reduce the risk of fiber pinching.

4.6.2 Install the ONS 15305 Electrical Cable

**Caution**

Static electricity can damage electronic equipment. While unpacking and handling electronic modules, wear a grounding wrist strap to discharge the static buildup. Grounding wrist straps are designed to prevent equipment damage caused by static electricity. Before making the necessary interconnections, connect the grounding wrist strap.

To install electrical connection cables in the ONS 15305, connect the electrical cable with the corresponding ports of the transmission system. On the ONS 15305 module, the electrical ports are located at the connector array of the system. All electrical cables are equipped with RJ-45 connectors. The alarm cable is equipped with a DS-9 connector. Cisco recommends that you label the electrical cable at each end before installation to avoid confusion with cables that are similar in appearance.

**Caution**

Follow all directions and warning labels when working with electrical cables.

Connect the Electrical Cables with RJ-45 Connector

- Step 1** Carefully connect the electrical cables to the customer-specified point.
- Step 2** Repeat [Step 1](#) to for all other electrical cables.

- Step 3** Guide the cables through the cable ties mounted on the sides of the rack. The cable ties are used to hold the cables to the side of the rack to reduce the risk of fiber pinching.
-

4.7 Initial Configuration

Configuration is described in the *Cisco Edge Craft Software Guide*. Please see Chapter 1 in this guide for instruction on how to set up the necessary communication parameters to access the element via Cisco Edge Craft over the management port.

Other management features for the Cisco ONS 15305 are also described in the *Cisco Edge Craft Software Guide*.



Features

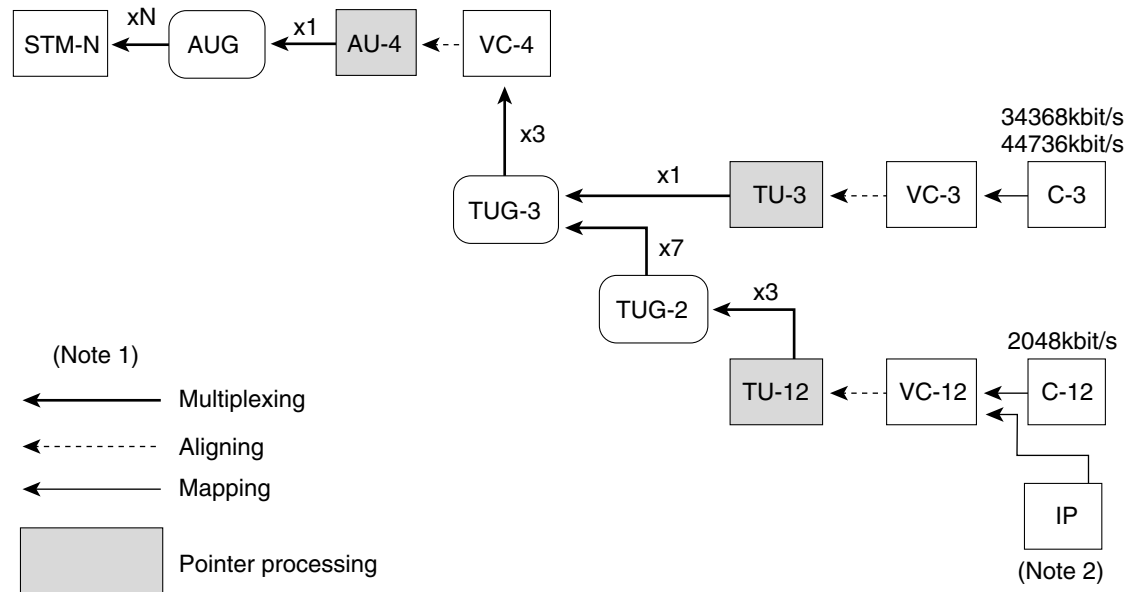
This chapter provides an overview of the ONS 15305 features.

5.1 SDH Features

5.1.1 Multiplexing Structure and Mapping Modes

The ONS 15305 supports the multiplexing structure shown in the figure below. This is a subset of the possible multiplexing structures defined in ITU-T G.707 clause 6, according to ETS300147. The multiplexing complies with ITU-T G.707 clause 7.

Figure 5-1 Multiplexing Mapping Structure



Note 2: This is a proprietary mapping scheme for mapping of IP traffic into a number of VC-12 containers.

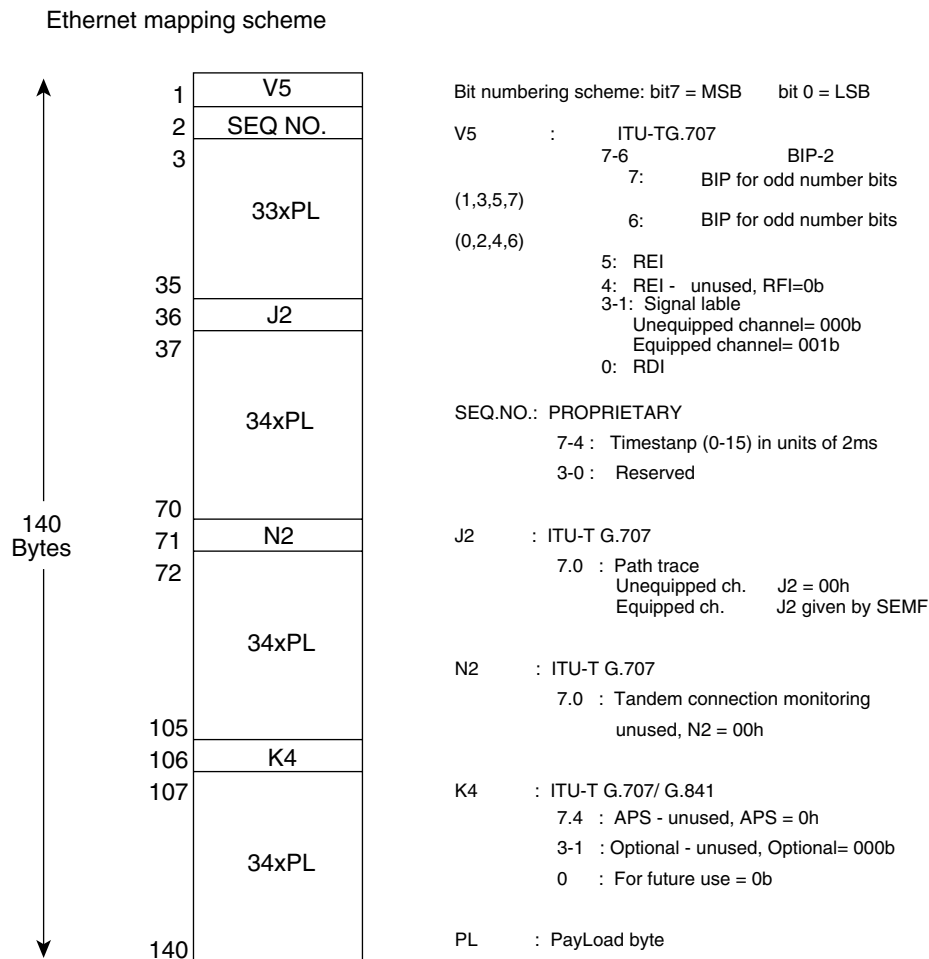
91469

The ONS 15305 support asynchronous mapping of E3 (34 368 kbps) signals and T3 (44 736 kbps) signals into a VC-3 according to ITU-T G.707 clause 10.1.2, and asynchronous mapping of E1 (2 048kbps) signals into a VC-12 according to ITU-T G.707 clause 10.1.4.1.

The ONS 15305 also provides a mapping scheme for transporting Ethernet traffic in a number of VC-12s. The mapping is performed in a round-robin fashion with an inverse multiplexer function. The mapping between Ethernet and SDH is performed in WAN ports that are located on the 8xSTM-1 module.

The proprietary mapping scheme used is described in Figure 5-2. Only the mapping is proprietary; all POH in the VC-12 complies with ITU-T G.707.

Figure 5-2 Ethernet Mapping Scheme



Capacity for WAN traffic:
 $(33 = (34 \times 3)) \times 8 \text{ bit} / 500 \text{ ms} = 2.160 \text{ Mbit/s}$

91467

The total bandwidth for one WAN channel cannot be greater than 100 Mbps or 50xVC-12 containers. The mapping between the tributary interfaces and the WAN port is fully flexible, and controlled in the same way as a VC-12 cross connect.

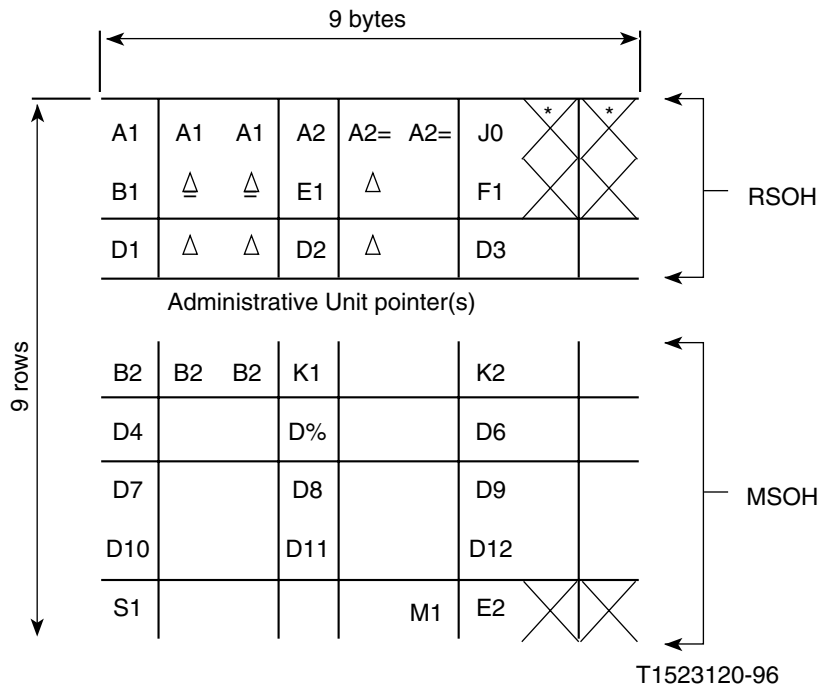
5.1.2 SOH and POH Termination

5.1.2.1 RSOH and MSOH

The ONS 15305 terminates and generates a subset of the SOH-overhead specified in ITU-T G.707 clause 9.

The SOH for an STM-1 is reproduced in Figure 5-3.

Figure 5-3 SDH Overhead Bytes



- X Bytes reserved for national use
- * Unscrambled bytes. Therefore care should be taken with their content.
- △ Media dependent bytes

NOTE: - All unmarked bytes are reserved for future international standardization (for media dependent, additional national use and other purposes).

91472

The ONS 15305 generates and terminates the following bytes:

Table 5-1 Bytes Generated by the ONS 15305

Bytes	Explanation
A1, A2	Frame sync word, according to ITU-T G.707
J0	It is possible to edit both the transmitted, received and expected value of the J0 byte from the NM system.
B1	According to ITU-T G.707, available as an error performance counter at the NM level.
E1	Terminated/generated According to ITU-T G.707 and available on an output port upon request from the NM level.
F1	Terminated/generated According to ITU-T G.707 and available on an output port upon request from the NM level.
D1-D3	Terminated/generated According to ITU-T G.707.
B2	According to ITU-T G.707, available as an error performance counter at the NM level.
K1,K2(b1-b5)	Terminated/generated according to the MSP protocol defined in ITU-T G.841. The protocol used is the one defined in clause 7.1.4.5.1, 1+1 bidirectional switching compatible with 1:n bidirectional switching.
K2(b6-b8)	Terminated/generated according to ITU-T G.707 clause 9.
D4-D12	Terminated/generated according to ITU-T G.707.
S1	Terminated/generated according to ITU-T G.707 clause 9
M1	Terminated/generated according to ITU-T G.707 clause 9.
E2	Terminated/generated According to ITU-T G.707 and available on an output port upon request from the NM level.
POH VC-4/VC-3 and VC-12 level	The ONS 15305 offers termination/generation of a subset of the POH bytes defined in ITU-T G.707 clause 9. The ONS 15305 terminates/generates the following POH bytes at VC-4/VC-3 level:
J1	A 16 byte frame is defined for the transmission of the Path Access Point Identifier. The format of the frame is in accordance with ITU-T G.831 clause 3 and ITU-T G.707 clause 9. It is possible to edit both the transmitted, received and expected value of the J1 byte from the NM system.

Table 5-1 Bytes Generated by the ONS 15305 (continued)

Bytes	Explanation
B3	According to ITU-T G.707, shall be available as an error performance counter at the NM level.
C2	Terminated/generated according to ITU-T G.707 clause 9.
G1:	Terminated/generated according to ITU-T G.707 clause 9.
F2/F3	Not used.
H4	Payload dependent, terminated/generated according to ITU-T G.707.
K3	Not used
N1	Not used
The ONS 15305 terminates/generates the following POH bytes at VC-12 level:	
V5	Terminated/generated according to ITU-T G.707 clause 9.
J2	A 16 byte frame is defined for the transmission of the Path Access Point Identifier. The format of the frame is in accordance with ITU-T G.831 clause 3 and ITU-T G.707 clause 9. It is possible to edit both the transmitted, received and expected value of the J2 byte from the NM system.
N2	Not used
K4	Not used

5.1.3 Cross-Connect

The ONS 15305 implements a full non-blocking 64x64 STM1 cross-connect with VC12, VC-3, and VC-4 granularity.

The cross-connect supports bidirectional cross-connections on all levels.

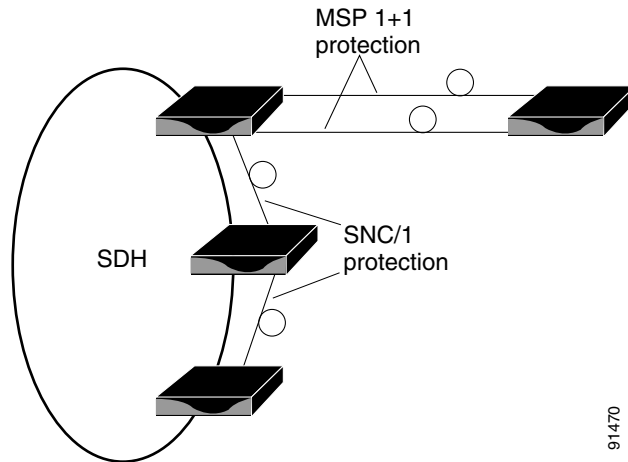
5.1.4 Protection

5.1.4.1 1+1 Linear MSP

The ONS 15305 offers 1+1 Linear Multiplex Section Protection (MSP). The protocol used for K1 and K2 (b1-b5) is defined in ITU-T G.841, clause 7.1.4.5.1. The protocol used is 1+1 bidirectional switching compatible with 1:N bidirectional switching.

The MSP protection is not linked to a pair of ports on the same module; ports on modules 1 and 2 can protect each other and ports on modules 3 and 4 can protect each other if they are the same type.

Figure 5-4 Protection Scheme for the ONS 15305



5.1.4.2 SNC/I

The ONS 15305 also support Subnetwork Connection Protection with Inherent Monitoring (SNC/I) on both LO and HO VCs. The Application architecture supported is 1+1 unidirectional switching according to ITU-T G.841, clause 8.3.2.



Note This protection scheme is called SNCP by ETSI.

5.1.5 Performance Monitoring

The ONS 15305 offers full G.826/G.829 performance monitoring on all levels in the SDH hierarchy, including B1 monitoring in RSOH, B2 near and far end in MSOH, B3 near and far end at VC-4/VC-3 level and BIP-2 near and far end at VC-12 level.

The ONS 15305 calculates excessive error and degrade signal defects assuming Poisson distribution of errors, according to ITU-T G.826.

The excessive error defect (dEXC) is detected if the equivalent BER exceeds a pre-set threshold of $10E-5$, and is cleared if the equivalent BER is better than $10E-6$, according to ITU-T G.806.

The degraded signal defect (dDEG) is detected if the equivalent BER exceeds a pre-set threshold of $10E-X$, where $x=6,7,8$ or 9 . The dDEG is cleared if the equivalent BER is better than $10E-(X+1)$, according to ITU-T G.806. The threshold is individual configurable for the different levels in the SDH hierarchy, from $10E-6$ to $10E-9$.

5.1.6 Synchronization

The ONS 15305 offers synchronization from a range of different interfaces:

- STM-16
- STM-4
- STM-1

- 2MHz sync input
- E1 interface configured in PRA mode

Through the SETS (Synchronous Equipment Timing Source), the synchronization signals are distributed to the equipment ports.

The ONS 15305 offers a list of 5 possible synchronization sources for the T0; selection of the sync source is based upon the quality level.

The ONS 15305 supports SSM messaging on the STM-N interfaces, which is not supported on the E1 interface.

5.2 IP Features

ONS 15305 supports a transparent multiport remote Ethernet bridge as specified in IEEE 802.3. The number of interfaces depends on the inserted modules. The plug-in modules support 10Base-T over copper, 100Base-TX (fast Ethernet) over copper, gigabit Ethernet (GE) over fiber, and a proprietary STM-1 interface for connection to the ONS 15302 product.

The bridge supports the following features:

- MAC switching
- Self-learning MAC Addresses
- Static MAC entries
- Support of up to 24k MAC addresses
- Automatic Aging for MAC addresses
- MAC Multicast
- Transparent Bridging
- Port-based virtual LANs (VLANs)
- VLAN by Port and VLAN by Port and Protocol
- Full IEEE 802.1Q VLAN tagging compliance
- Head of Line Blocking prevention
- Back pressure and flow control handling
- Internet group management protocol (IGMP) support
- IGMP snooping
- Spanning Tree Protocol (STP) per device
- STP per VLAN
- Mirroring Port
- IEEE 802.1p priorities
- GARP VLAN registration protocol (GVRP)

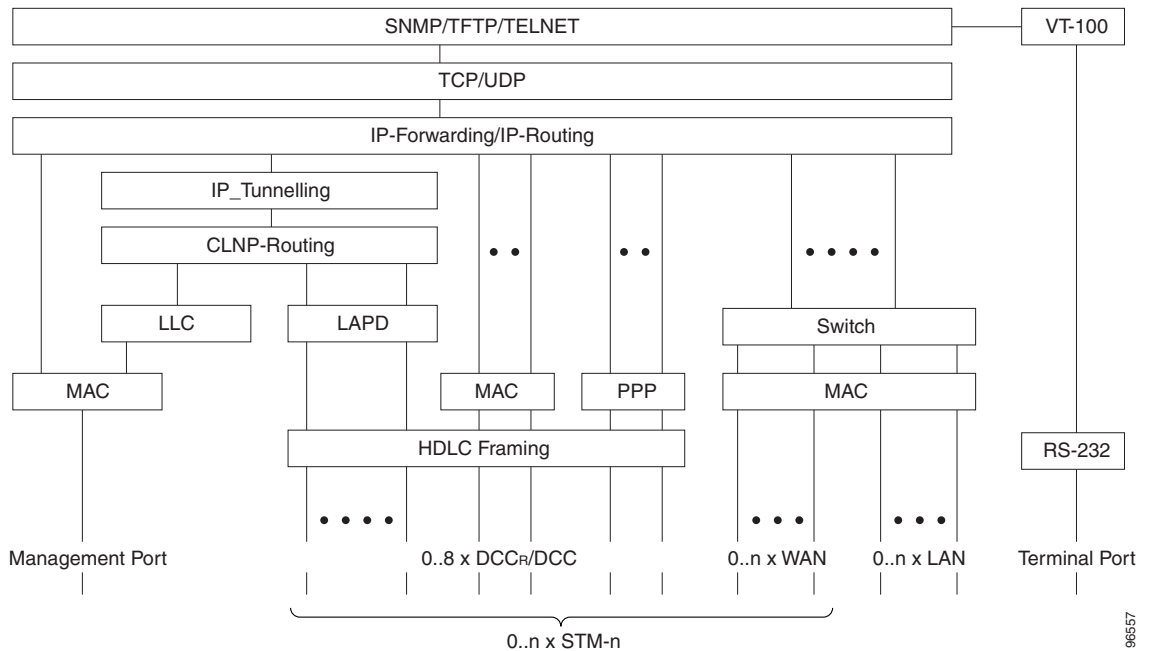
The filtering rate of the bridge can operate at full wire speed (up to 1 Gbps). The forwarding rate is only limited by the forwarding interface speed. BootP is used to get one IP address for the ONS 15305 during the installation process.

5.3 DCN Features

This section presents the ONS 15305 protocol stack, interfaces, and communication functions used for management communications.

5.3.1 Protocol Stack

Figure 5-5 DCN Protocols



The following standards apply:

Table 5-2 Protocol Standards

Abbreviation	Standard
Switch	IEEE 802.1d - Media Access Control Bridges, 1998 Edition Revision (incorporating IEEE 802.1p). The requirements in Chapter 2.2.3 apply.
MAC / LLC	IEEE 802.x - Information Processing Systems - Local Area Networks
PPP	RFC 1661 Point to Point Protocol NSIIF-DN-0101-001
HDLC	ISO 4335 - High-level Data Link Control (HDLC) procedures RFC 1662 PPP in HDLC-like framing.
IP	RFC 791 - Internetwork Protocol
RS-232	EIA-232

Table 5-2 Protocol Standards

Abbreviation	Standard
TCP	RFC 793 - Transmission Control Protocol (TCP)
UDP	RFC 768 - User Datagram Protocol (UDP)

5.3.2 Management Interfaces

The purpose of the Management DCN is to carry management traffic between a management system and the managed devices. The ONS 15305 supports SNMP over IP, Telnet, and TFTP application protocols. To support management connectivity in any possible topology and application, the ONS 15305 supports management traffic on the following interfaces:

5.3.2.1 Management Port

The ONS 15305 has a dedicated Ethernet port for management, called the “Management Port.” This port can be used for connecting to a craft terminal or for connecting to a separate external management network. The management port can be turned off to avoid unauthorized local access. The management port cannot be a member of a VLAN.

5.3.2.2 LAN Ports

The LAN ports are Ethernet ports used for connecting end customer IP traffic to the ONS 15305. The LAN ports can be members of VLANs that have IP addresses, or the LAN ports can have their own IP addresses. A LAN port can be used for carrying management traffic to and from the ONS 15305 if it is assigned to an IP address. This is called IP-Inband; some of the end-user IP bandwidth is used for management traffic.

5.3.2.3 WAN Ports

The WAN ports are device internal Ethernet ports that can be mapped into one or more VC-12s of an SDH STM-N signal. The WAN ports can be members of VLANs that have IP addresses, or the WAN ports can have their own IP addresses. A WAN port can be used for carrying management traffic to and from the ONS 15305 if it is assigned to an IP address. This is called IP-Inband; some of the end-user IP bandwidth is used for management traffic.

5.3.2.4 SDH Ports

The SDH architecture defines data communication channels (DCC) for transport of management traffic in the regenerator section (DCC_R - 192 kbps) and in the multiplexer section (DCC_M - 512 kbps).

The ONS 15305 supports the NSIF-DN-0101-001-R1 Draft Specification which defines IP in PPP over DCC.

The ONS 15305 also offers non-standard DCC communication that can be used in subnets of Cisco devices only. Ethernet frames are encapsulated in HDLC-like frames and sent on the DCC channel (i.e. not using CLNP and LAP-D). Both DCC_R (Regenerator Section) and DCC_M (Multiplexer Section) channels are supported.

Both DCC channels can be enabled on a port at the same time. Activation/deactivation of DCC channels is configurable on a per port basis. The maximum number of DCC channels that can be enabled in an ONS 15305 is eight.

5.3.2.5 Local VT-100 Serial Port

The local VT100 serial port provides the command line interface (CLI) for basic set-up of the ONS 15305. The port can also be accessed via Telnet.

5.3.3 Communication Features

5.3.3.1 IP-Forwarding

The IP-Forwarding implies that the device can have multiple IP interfaces, that is, it can be a multi-homed IP host. In addition, it is able to perform forwarding of IP datagrams between the interfaces, and the routing protocols (RIP, OSPF) are available. IP-Forwarding is software based and low capacity and is intended for management traffic only.

Typical use of IP-Forwarding is to support OSI Gateway functions and forwarding between the different management channels of a device.

IP-Forwarding is enabled by default in the ONS 15305.

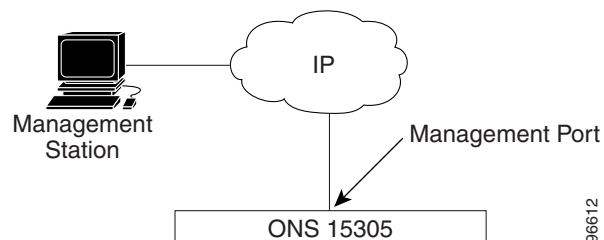
5.3.3.2 IP-Routing

IP-Routing is a downloadable feature that can be enabled in the ONS 15305. By enabling the IP-Routing feature, all routing related functions are enabled in the device and the forwarding of IP datagrams between LAN/WAN ports are performed in hardware (Fast Forwarding Table). Forwarding of IP datagrams to and from the Management Port and DCC interfaces are still software based.

5.3.3.3 External DCN

This configuration is applicable for users connecting an IP-based DCN directly to the ONS 15305 or for connecting a craft terminal. For this type of connection, the management port is used. The configuration is described [Figure 5-6](#).

Figure 5-6 Network Configuration

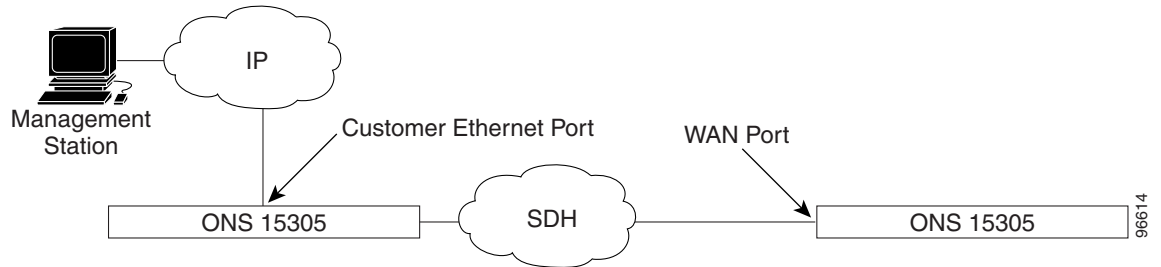


5.3.3.4 IP-Inband

IP-Inband means that LAN and WAN ports are carrying management traffic together with customer traffic. The configuration is described in [Figure 5-7](#).

When using IP-Inband, the management traffic can be routed or switched using VLANs. If the traffic is routed, the routing is carried out in hardware (FFT) if IP-Routing is enabled. Otherwise, IP-Forwarding is used (software based).

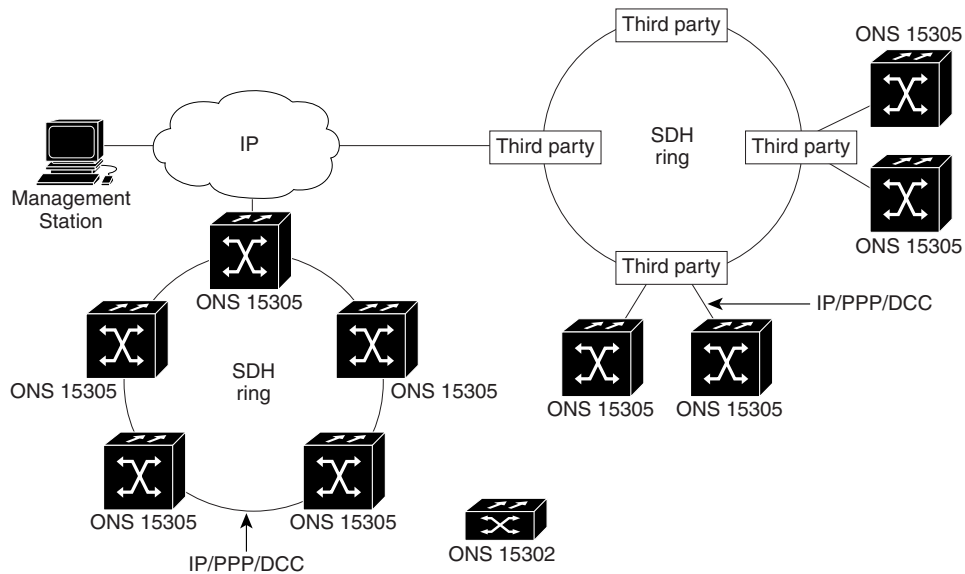
Figure 5-7 Network Configuration



5.3.3.5 IP/PPP

IP/PPP means IP is carried in PPP on the SDH DCC channel according to NSIF-DN-0101-001. Typical configurations are described in [Figure 5-8](#). When MSP is enabled, the management traffic over DCC follows the user traffic, that is, traffic is sent over the working and protect links but received only from the active link.

Figure 5-8 Network Configuration

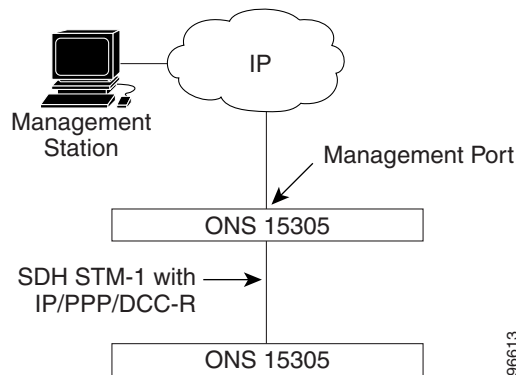


5.3.3.6 IP/DCC

IP/DCC is a non-standard mechanism used for conveying management information on the SDH DCC channels in a network of Cisco devices only. This mechanism can be used together with the IP/DCC-Broadcast mechanism of other Cisco devices emulating a shared media on the SDH DCC channel. The IP datagrams are encapsulated in HDLC frames before being sent out on the SDH DCC.

This configuration is applicable for a user having a subnet of Cisco devices (with the ONS 15305 in the center) and an IP based DCN connected to the ONS 15305 management port. The configuration is described [Figure 5-9](#).

Figure 5-9 Network Configuration



5.3.4 Management Security

The following security features apply to management communications.

5.3.4.1 CLI Access Control

User name and Password mechanisms.

5.3.4.2 SNMPv1 Access Control

For each user (SNMP Community), the following can be configured:

- Read or Read/Write access
- The IP addresses from which SNMP requests are accepted

5.3.4.3 Management Port Control

The Management Port can be enabled and disabled. This gives the operator control of the local access.

5.4 Alarm Definitions

The alarm and event definitions and their relations to the managed object types are listed in [Table 5-3](#), [Table 5-4](#), [Table 5-5](#), and [Table 5-6](#).

5.4.1 Clearable Alarms

Table 5-3 Managed Objects with Related Alarms and Clearable Alarms

Managed Object	Severity	Probable Cause	Probable Cause Qualifier
ONS 15305	indeterminate	unknown	Unknown alarm id
sdh.MS	minor	ais	Alarm indication signal
sdh.AU4			
sdh.TU3			
sdh.TU12			
pdh.E1	minor	aisRx	Alarm indication signal on network side
pdh.E3			
pdh.E1	minor	aisTx	Alarm indication signal on customer side
pdh.E3			
sdh.RS	critical	lof	Loss of frame alignment
pdh.E1	major	lofRx	Loss of frame alignment on network side
pdh.E1	major	lofTx	Loss of frame alignment on customer side
device.AuxPort			
sdh.AU4	critical	lop	Loss of pointer
sdh.TU3			
sdh.TU12			
device.AuxPort	major	los	Loss of signal
pdh.E1	critical	los	Loss of signal
pdh.E3			
sdh.SDHPort			
sdh.RS	minor	deg	Degraded signal defect
sdh.MS			
sdh.VC4			
pdh.VC3			
pdh.VC12			
sdh.VC4	critical	lom	Loss of multiframe alignment
pdh.VC3			
sdh.MS	minor	rdi	Remote defect indication
sdh.VC4			
pdh.VC3			
pdh.VC12			
sdh.RS	critical	tim	Trace identifier mismatch
sdh.VC4			
pdh.VC3			

Table 5-3 Managed Objects with Related Alarms and Clearable Alarms (continued)

Managed Object	Severity	Probable Cause	Probable Cause Qualifier
pdh.VC12			
sdh.VC4	critical	plm	Payload mismatch
pdh.VC3			
pdh.VC12			
sdh.VC4	critical	uneq	Unequipped
pdh.VC3			
pdh.VC12			
sdh.RS	major	exc	Excessive error defect
sdh.MS			
sdh.VC4			
pdh.VC3			
pdh.VC12			
sdh.DCC	minor	csf	Communication subsystem failure
sdh.DCC			
sdh.VC4	minor	ssf	Server signal failure
pdh.VC3			
pdh.VC12			
device.AlarmPort	warning	alarmInp	Alarm condition detected on an alarm input port
device.Device	critical	uFail	Device main unit failure
device.Device	major	temp	High temperature alarm
device.Device	major	fan	Fan failure
device.Power	critical	pwrIn	Power input failure
device.Power	critical	pwrOut	Power output failure
slot.Slot	critical	modMis	Module mismatch
slot.Slot	critical	modOut	Module removed
slot.Slot	critical	modFail	Module failure
sdh.MSP	critical	mSP	MSP signaling problem
device.Power	critical	pwrFail	Power module failure
ethernet.LANPort	warning	lan	Ethernet port is not working
ethernet.WANPort			
ethernet.WANPort		wanDelay	Delay on WAN channel is too large
ethernet.WANPort		seqFail	Sequence number fail on WAN channel
device.Device	major	t0HoldOver	No sync. source available
device.Device	critical	t0Defect	Defecting HW impacting internal T0 clock
device.Device	critical	t4Squelch	No T4 sync. src available with QL >= QL min

5.4.2 Non-Clearable Alarms

Table 5-4 Managed Objects with Related Alarms, Non-Clearable Alarms

Managed Object	Severity	Probable Cause	Probable Cause Qualifier
device.Device	warning	rxOverflowHWFault	RX buffer overflow in LAN or link interface
device.Device	warning	txOverflowHWFault	Interport queue overflow in LAN or link interface
device.Device	warning	resetRequired	Reset of the router/bridge required
ONS 15305	warning	abortTftp	Device aborted TFTP session
device.Device	warning	faultBackUp	Automatic switch to backup link. Main link fault
device.Device	cleared	faultBackUp	Automatic switchover to backup link. Main link fault
device.Device	warning	forwardingTabOverflow	Overflow layer 2 Forward Table
device.Device	warning	framRelaySwitchConnectionDown	Connection failed: Frame Relay Switch and WanGate
device.Device	warning	framRelaySwitchConnectionUp	Connection establish: Frame Relay Switch and WanGate
device.Device	warning	errorsDuringInit	Error occurred during initialization
device.Device	warning	rsSDclientsTableOverflow	Overflow in the clients table
device.Device	warning	rsSDinactiveServer	Server not responding to dispatcher polling
device.Device	warning	rsSnmpSetRequestInSpecialCfgState	SNMP SET request was rejected
device.Device	warning	rsPingCompletion	Ping sequence completed
device.Device	warning	rsWSDRedundancySwitch	Backup taken over for main server or server up after failure
device.Device	warning	rsDhcpAllocationFailure	DHCP failed to allocate IP address to requesting host
device.Device	warning	rlIcmpTableOverflow	Overflow IGMP Table
device.Device	warning	rlPimTableOverflow	Overflow PIM Table
device.Device	warning	routeTableOverflow	Overflow condition in Routing Table
device.Device	warning	ipxRipTblOverflow	OpenGate IPX RIP table overflow
device.Device	warning	ipxSapTblOverflow	OpenGate IPX SAP table overflow
device.Device	warning	factsAccessVoilation	FACS statenebt with operation blockAndReport
device.Device	warning	rsIpZhrConnectionsTableOverflow	Zero Hop Routing connections table overflow

Table 5-4 *Managed Objects with Related Alarms, Non-Clearable Alarms*

Managed Object	Severity	Probable Cause	Probable Cause Qualifier
device.Device	warning	rsIpZhrReqStaticConnNotAccepted	No available IP virtual address
device.Device	warning	rsIpZhrVirtualIpAsSource	Virtual IP address appeared as a source IP
device.Device	warning	rsIpZhrNotAllocVirtualIp	source IP address sent an ARP specifying a virtual IP
device.Device	warning	pppSecurityViolation	PPP link got an unrecognized secret
device.Device	warning	frDLCIStatudChange	
device.Device	warning	chapFailedCommunication	
device.Device	warning	rlIpxFftStnOverflow	IP SEFT overflow
device.Device	warning	rlIpmFftSubOverflow	IPM NEFT overflow

5.4.3 Standard, Non-Clearable Alarms

Table 5-5 *Managed Objects with Related Standards, Non-Clearable Alarms*

Managed Object	Severity	Probable Cause	Probable Cause Qualifier
ONS 15305	major	linkDown	Failure in communication link
device.Device	major	authenticationFailure	Addressee of a protocol message not properly authenticated
device.Device	major	coldStart	Reinitializing. Configuration or the protocol entity implementation may be altered
device.Device	major	warmStart	Reinitializing. Neither configuration nor protocol entity implementation altered
ONS 15305648	minor	risingAlarm	RMON alarm has crossed its rising threshold
ONS 15305648	minor	fallingAlarm	RMON alarm has crossed its falling threshold
device.Device	minor	pimNeighborLoss	Loss of an adjacency with a PIM neighbor

5.4.4 Managed Objects and Related Events

Table 5-6 Managed Objects and Related Events

Managed Object	Severity	Probable Cause
ONS 15305	info	Informational event
device.Device	info	t0SyncSwitch
device.Device	info	t0QIFailed
device.Device	info	t0QIDnu
sdh.MSP	info	switchToProt
sdh.MSP	info	switchToWork
sdh.MSP	info	mspComTimeOut
sdh.MSP	info	mspComOverruled
pdh.E1	info	loopClosed
pdh.E1	info	loopOpened
ONS 15305	info	Device finished TFTP transaction
ONS 15305	info	Device initiated TFTP session
device.Device	info	Auto configuration completed successfully
bridge.Bridge	info	VLAN port dynamically added
bridge.Bridge	info	VLAN port dynamically removed
device.Device	info	Physical description device changed
ethernet.LANPort	info	Port transition from Learning to Forwarding
ethernet.LANPort	info	Port transition from Forwarding to Blocking
ethernet.WANPort	info	Port transition from Learning to Forwarding
ethernet.WANPort	info	Port transition from Forwarding to Blocking

5.5 Internet Index Reference Numbers

Table 5-7 Ethernet Indexes Numbers

DCC Channels Ethernet Interface Numbers	
Management-port	1000
OSI	1001
Slot-1	1 - 16
Slot-2	17 - 32
Slot-3	33 - 48
Slot-4	49 - 64
Trunk ports (link aggregation)	65 - 72
VLAN	100000 - 104000

Table 5-8 DCC Channels Ethernet Indexes Numbers

DCC Channels Ethernet Interface Numbers	
Slot-1	1002 - 1017
Slot-2	1018 - 1033
Slot-3	1034 - 1049
Slot-4	1050 - 1065



Physical Interfaces

6.1 Power Module, DC Power

The power module provides a -48 V DC supply.

6.1.1 Connectors

The -48 VDC supply input is provided via a 4 pin power connector (Molex Mini-fit 2x2); the pinouts are shown in [Table 6-1](#).

Table 6-1 Pin Out -48 VDC

Pin	Signal
1	GND
2	0V
3	-48V (supply 1)
4	-48V (supply 2)

6.1.2 Parameters

The -48VDC input conforms to the specifications in [Table 6-2](#).

Table 6-2 Electrical Specifications at DC input

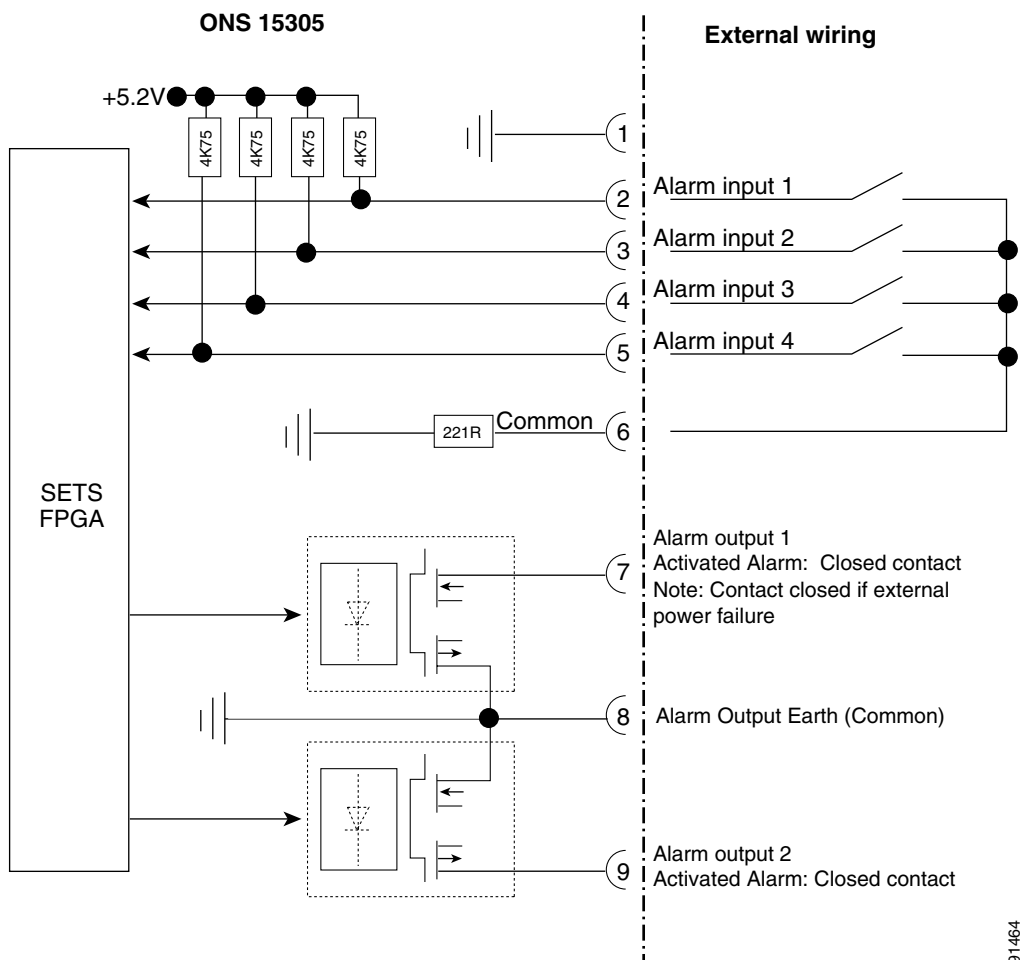
Parameter	Limit
Power dissipation	Less than 120W
Fuse	7A
Battery voltage range	-40,5 to -72V DC

6.2 Alarm Interface, FAN-ALARM

6.2.1 Description

The ONS 15305 provides facilities to report a minimum of four auxiliary alarm inputs for associated equipment, for example, a power unit failure battery condition and an open cabinet door. It also provides two dedicated alarm outputs. The alarm outputs are related to the unit alarm indicator and the traffic alarm indicator. The input alarms are reported to the management system and are activated by a closed or open loop condition between a pair of contacts.

Figure 6-1 Alarm Input and Output Overview



6.2.2 Connectors

The alarm interface uses a 9-pin DSUB type connector. [Table 6-2](#) lists the pin outs.

Table 6-3 Pin Out Alarm Connector

Pin	Signal
1	GND
2	Alarm input 1
3	Alarm input 2
4	Alarm input 3
5	Alarm input 4
6	Alarm input return
7	Alarm output 1 (Unit)
8	Alarm output return
9	Alarm output 2 (Traffic)
Fuse	7A
Battery voltage range	-40,5 to -72V DC

6.2.3 Electrical Parameters Alarm Input

Table 6-4 Electrical Specification at Alarm Input

Parameter	Value
Nominal open contact voltage	5 V
Nominal closed contact current	1 mA
Max. closed contact resistance	0.5 k ohm
Min. open contact resistance	10 k ohm

6.2.4 Electrical Parameters Alarm Output

Table 6-5 Electrical Specification at Alarm Output

Parameter	Value
Maximum load bias referred to common return	+/-75V
Maximum load current	50mA
Common return to earth	+/-250V
Maximum contact resistance	50 ohm

6.3 Auxiliary Interface

6.3.1 Description

The ONS 15305 offers a proprietary auxiliary interface for termination of overhead bytes selected from the different STM-N interfaces. The auxiliary interface is located on the system controller module, SYSCONT-SD128-RJ45.

Each STM-N interface can be configured to terminate one of the following overhead bytes: E1, F1, or E2. The byte to be terminated is selected from the network management system together with a unique time slot number *n*, where *n* equals 1-15 or 17-31. The auxiliary interface is a framed E1 interface, according to ITU-T G.704, where time slot 1-15 and 17-31 can carry one overhead byte each, according to the configuration described above.

The interface is synchronous which means that the incoming STM-N need to be synchronized with the T0 reference clock in the ONS 15305 and the incoming framed E1 need to be synchronized with the outgoing framed E1. Bit slips will occur if one of the interfaces is free running.

6.3.2 Connector

The auxiliary interface has an RJ-45 connector; [Table 6-6](#) lists the pin outs.

Table 6-6 Pin Out Auxiliary interface

Pin	Signal
1	AUX_DO+
2	AUX_DO-
3	GND
4	AUX_DI+
5	AUX_DI-
6	AUX_SHIELD
7	NC
8	NC



Note

Pin 6 is always AC connected to ground. The outer screen is always direct connected to ground.

6.4 VT-100 Terminal Interface

6.4.1 Description

The ONS 15305 offers a VT-100 interface for connection of a CiscoEdgeCraft Terminal/CLI interface. The interface is running at a data rate of 19.200 baud and is located on the system controller module, SYSCONT-SD128-RJ45.

6.4.2 Connector

The RS232 interface for the ONS 15305 is provided via an RJ-45 connector; [Table 6-7](#) lists the pinouts.

Table 6-7 Pin Out VT-100 Connector

Pin	Signal
1	GND
2	TxD
3	RxD
4	DB-TxD
5	GND
6	VT_CTS
7	DB_RxD
8	VT_RTS



Note

Pins 4 and 7 are used only for debug purposes.

6.5 Synchronization Interface

6.5.1 Description

The interface is a 120 ohm 2048 kHz synchronization input and output port, with specifications according to ITU-T G.703; the interface is located on the System controller module, SYSCONT-SD128-RJ45.

6.5.2 Connectors

Input and output are provided on an 8-pin RJ-45 connector; [Table 6-8](#) lists the pinouts.

Table 6-8 Pin Out Synchronization Port

Pin	Signal
1	Sync output +
2	Sync output --
3	GND
4	Sync input +
5	Sync input --
6	Screen, Note 1
7	NC
8	NC



Note Pin 6 is always AC connected to ground. The outer screen is always direct connected to ground.

6.5.3 Other Interfaces

Other interface descriptions are found in the chapters describing each service module.

6.5.4 Prot Interface

For future release.



Hex E3/T3 Tributary Module

7.1 Functional Description of Module

The E3T3-6 module contains six E3 interfaces. The E3 traffic is mapped into VC-3 containers and multiplexed together as described in [Chapter 5, “Features.”](#) The interfaces can be configured to E3 or T3.

The physical connector for the interface is the miniature 1.0/2.3 type. The module does not contain any IP functionality. The interface supports transparent data (G.703).

7.2 Power Consumption

The power consumption of the E3T3-6 module is 11 W.

7.3 E3/T3 75 Ohm Electrical Interface

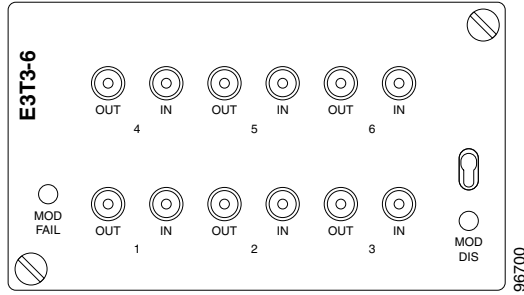
7.3.1 Description

The interface is a 34 Mbps E3 or 45 Mbps T3 interface (configurable) according to ITU-T G.703, 75 ohm coaxial interface.

7.3.2 Connectors

The connector used is a 75 ohm coaxial connector type 1.0/2.3. The screen on the input and output connectors is always DC coupled to ground.

Figure 7-1 E3T3-6 Connectors



7.3.3 Compliance

Table 7-1 E3 Interface Compliance

Standard	Comment
ITU-T G.703	Cable attenuation Input reflection loss Input port immunity against reflection Output pulse mask
ITU-T G.783	Output jitter in the absence of input jitter Output combined jitter
ITU-T G.823	Max. tolerable input jitter



Single Optical S-16.1 Module

8.1 Functional Description of Module

The S16.1-1-LC module contains one optical STM-16 interfaces that meets the S-16.1 specification in ITU-T G.957. The physical connector is a LC connector.

The module supports TDM traffic only.

8.2 Power Consumption

The power consumption of the S16.1-1-LC module is 13 W.

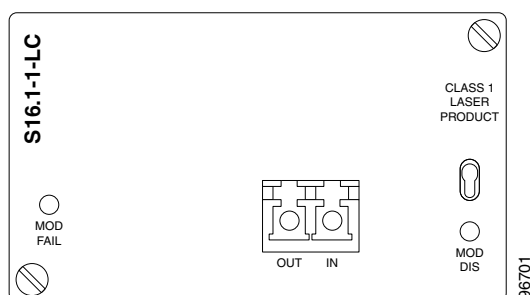
8.3 External Interface

The interface is an optical STM-16 short haul interface, according to clause 5 ITU-T G.957. The definitions of optical parameters and reference points S and R refer to ITU-T G.957. Reference point S refers to the transmit direction and R refers to the receive direction of the fiber.

8.4 Connector Type

The physical connector is a LC connector.

Figure 8-1 Single Optical S-16.1 Module, S16.1-1-LC



8.5 Optical Budget

Table 8-1 Optical Budget S-16.1

Parameter	Value
Modulation rate on optical line	2488 380 kbps
Wavelength range	1261 - 1360 nm
Transmitter at reference point S	
Source type	SLM
Maximum -20dB width	1nm
minimum side mode suppression ratio	30dB
Mean launched power (max.)	0dBm
Mean launched power (min.)	-5 dBm
Min. extinction ratio	8.2 dB
Optical path between S and R	
Attenuation range	0 - 12 dB
Max. tolerable dispersion	NA
Min. optical return loss at S inc. any connectors	24dB
Max. discrete reflectance between S and R	-27dB
Receiver at reference point R	
Min. sensitivity (BER < 1 in 1010)	-18 dBm
Min. overload	0 dBm
Max. optical path penalty	1 db
Max. reflectance at R	-27dB

8.6 Traffic Alarms

- Rx direction
 - Loss of signal (LOS): Traffic Alarm. Optical power of input signal is below receiver sensitivity level.
 - Loss of lock (LOL): Indicates clock recovery of de-serializer is out of lock. Signal must be present for indication to be valid. Indication to be reported as unit failure alarm.
 - Transmit failure: Laser degradation



Dual Optical S-4.1 Module

9.1 Functional Description of Module

The S4.1-2-LC module contains two optical STM-4 interfaces that meets the S-4.1 specification in ITU-T G.957. The physical connector is an LC connector.

The module supports TDM traffic only.

9.2 Power Consumption

The power consumption of the S4.1-2-LC module is 9,5 W.

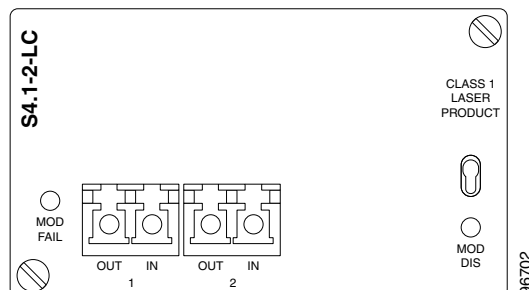
9.3 External Interface

The interface is an optical STM-4 short haul interface, according to clause 5 ITU-T G.957. The definitions of optical parameters and reference points S and R refer to ITU-T G.957. Reference point S refers to the transmit direction and R refers to the receive direction of the fiber. The following descriptions refer to both single mode fiber and multimode fiber. Bidirectional transmission on a single fiber is possible using an external 3dB directional coupler with the S4.1-2-LC module.

9.4 Connector Type

The physical connector is a LC connector.

Figure 9-1 Dual Optical S-4.1 Module, S4.1-2-LC.



9.5 Compliance

Table 9-1 Optical Interface Compliance

Standard	Comment
ITU-T G.652	Single Mode fiber specification 10/125
ITU-T G.651	Multimode fiber specification 50/125 μm
IEC 793-2	Multimode fiber specification 62.5/125 μm
ITU-T G.707	Optical line signal
ITU-T G.783	RX pull-in and hold range
ITU-T G.813	Optical output jitter
ITU-T G.825	Optical input jitter
ITU-T G.957	Optical spectrum, Optical output power, Optical eye diagram, Optical extinction ratio.

9.6 Optical Power Budget S4.1-2-LC Two-Fiber

Table 9-2 Optical Power Budget STM-4 S4.1 SH and LH

Parameter	Short-Haul		
Types of fiber:	ITU-T Rec. G.652 SM	10/125	μm
	ITU-T Rec. G.651 MM	50/125	
	IEC 739-2 MM	62.5/125	
Modulation rate on optical line		622 080	kbps
Wavelength range		1274 - 1356	nm
Transmitter at reference point S			
Source type		MLM	
Spectral characteristics (max. RMS width)		2.5	nm
Mean launched power (max.)		-8	dBm
Mean launched power (min.)		-15	dBm
Min. extinction ratio		8.2	dB
Optical path between S and R			

Table 9-2 Optical Power Budget STM-4 S4.1 SH and LH

Parameter	Short-Haul		
Attenuation range		0 - 12	dB
Max. tolerable dispersion		200	ps/nm (SM fiber)
Min. optical return loss		NA	
Max. discrete reflectance between S and R		NA	
Receiver at reference point R			
Min. sensitivity (BER < 1 in 10 ¹⁰)		-28	dBm
Min. overload		-8	dBm
Max. optical path penalty		1	dB
Max. reflectance at R		NA	

9.7 Optical Power Budget S4.1-2-LC, Single-Fiber Transmission

Bidirectional transmission on a single fiber is possible using an external 3dB directional coupler with the S4.1-2-LC module.

STM-4 S4.1 single fiber has the same specification on the S and R interfaces as the two fiber SH version.

Cisco recommends using mode-conducting cord for offset launch when the quality of multimode fiber is unknown.

Table 9-3 Directional Coupler Properties

Directional Coupler Properties	Short-Haul	
Directivity	>40	dB
Maximum insertion loss in coupler	4	dB

Table 9-4 Optical Power Budget Single Fiber Parameters

Parameter	Value	
Type of fiber: ITU-T Rec. G.652	10/125	μm
Modulation rate on optical line	622 080	kbps
Wavelength range	1274 - 1356	nm
Transmitter at reference point C		
Source type	MLM	
Spectral characteristics (max. RMS width)	2.5	nm
Mean launched power (max.)	-11	dBm
Mean launched power (min.)	-19	dBm
Min. extinction ratio	8.2	dB
Optical path between C and remote C		

Table 9-4 *Optical Power Budget Single Fiber Parameters*

Parameter	Value	
Attenuation range	0 - 4	dB
Max. tolerable dispersion	260	ps/nm
Min. optical return loss of cable plant at C	30	dB
Max. discrete reflectance between C points	-36	dB
Receiver at reference point C		
Min. sensitivity (BER < 1 in 1010)	-24	dBm
Min. overload	-5	dBm
Max. optical path penalty	1	dB

**Note**

The STM-4 S4.1 power monitoring of mean Rx power is measured on the R interface.



Dual Optical LAN 1000Base-LX

10.1 Functional Description of Module

The GigE-2-LC module contains two Gigabit Ethernet (GE) interfaces that meet the 1000Base-LX specification in IEEE 802.3. This interface is a long haul interface based on single-mode fiber. The physical connector is an LC connector.

The module contains no TDM interfaces.

10.2 Power consumption

The power consumption of the GigE-2-LC module is 11 W.

10.3 External Interface

The interface offered is a Gigabit Ethernet (GE) interface that meets the 1000Base-LX specification in IEEE 802.3. This interface is an optical long haul interface based on single-mode fiber.

The optical LAN interface for 1000BASE-LX on the module uses a dual fiber interface LC style connector. With one fiber in each direction, it provides 1310nm wavelength and single mode fiber of type 10/125mm.

10.4 Connector

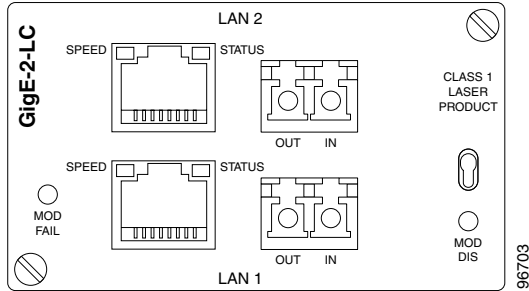
The physical connector is an LC connector, type LC SFF PTH.



Note

The two RJ-45 connectors on the GigE-2-LC module must not be used.

Figure 10-1 Dual Optical LAN 1000BASE-LX, GigE-2-LC



10.5 Compliance

Table 10-1 1000Base-LX Interface Compliance

Standard	Comment
IEEE 802.3	Clause 38, PDM sublayer and baseband medium Clause 37, Auto negotiation Clause 36, PCS and PMA sublayer
IEC 60825-1	Laser safety

10.5.1 Jitter Optical Interface

Table 10-2 gives the output jitter as specified in the data sheet for the optical transceiver.

Table 10-2 Output Jitter for Optical Transceiver

Transmit Signal Interface (from host to SFF-PTH-1250-LW-2X5)					
Symbol	Parameter	Min.	Max.	Unit	Notes
DJ elec-xmit	PECL Deterministic Jitter (1.0625Gb/s)		0.12	UI	1
TJ elec-xmt	PECL Total Jitter		0.25	UI	1



Note

Deterministic jitter (DJ) and total jitter (TJ) values are measured according to the methods defined in appendix A [1]. [1UI (Unit Interval) = 800ps at 1.25Gb/s, and 1 UI = 941ps at 1.0625Gb/s]. Listed values apply to 1.0625Gb/s, 1.25Gb/s transceivers accept TJ < 0.24 UI.

Table 10-3 gives the input jitter as specified in the data sheet for the optical transceiver.

Table 10-3 Input Jitter for Optical Transceiver

Receive Signal Interface (from SFF-PTH-1250-LW-2X5 to host)					
Symbol	Parameter	Min.	Max.	Unit	Notes
DJ elec-rcv	PECL Deterministic Jitter (1.0625Gb/s)		0.36	UI	1
TJ elec-rcv	PECL Total Jitter		0.61	UI	1

**Note**

Deterministic jitter (DJ) and total jitter (TJ) values are measured according to the methods defined in appendix A [1]. Jitter values assume worst case input jitter. [1UI (Unit Interval) = 800ps at 1.25Gb/s, and 1UI = 941ps at 1.0625Gb/s]. Listed values apply to 1.0625Gb/s, 1.25Gb/s transceivers have TJ < 0.749 UI.

10.6 References

- IEC/IEEE
 - IEC 60825-1: Laser safety.
 - IEEE 802.3, 1998 Edition: Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications.
 - IEEE 802.3z: GE Network Standard.
- ANSI

American National Standards Institute Inc. (ANSI), T11.2/Project 1230/Rev10, Fibre Channel-Methodologies for Jitter Specifications (MJS) Drafts of this standard are available to members of the standards working committee. For further information see the T11.2 web site at www.t11.org.

 - ANSI/EIA/TIA-455-127-1991 [B8].
 - ANSI/EIA-455-95-1986 [B7].
 - ANSI/TIA/EIA-526-4A-1997 [B13].
 - ANSI X3.230-1994 [B19] (FC-PH), Annex A, A.5, Relative intensity noise (RIN) measuring procedure.
 - ANSI X3.230-1994 [B19] (FC-PH), Annex A, A.4.2, Active output interface eye opening measurement.
 - ANSI X3.230-1994 [B19] (FC-PH), Annex A, A.4.3, DJ Measurement.
 - ANSI/EIA/TIA-526-14A [B14].



Octal LAN 10/100 Base TX Module

11.1 Functional Description of Module

The E100-8 module contains eight Ethernet interfaces that support both 10Base-T and 100Base-TX according to the IEEE 802.3 specification. The interface supports both the half-duplex and the full-duplex modes.

The interfaces are connected to an integrated Ethernet switch.

The physical interface uses a RJ-45 connector. Every interface also has a LED that indicates the status of the link.

The module supports IP interfaces only.

11.2 Power Consumption

The power consumption of the E100-8 module is 5,5 W.

11.3 External Interface

The interface is a 10Base-T and 100Base-TX Ethernet interface according to the IEEE 802.3 specification.

The cable type must be CAT5-STP.

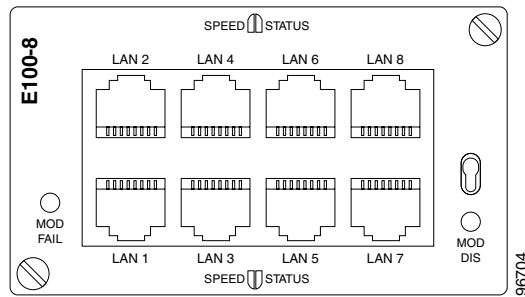
The connectors are RJ-45 connectors; [Table 11-1](#) lists the pin-outs.

Table 11-1 Pin-Out Ethernet Port

Pin	Signal
1	TxD+
2	TxD--
3	RxD+
4	NC
5	NC
6	RxD--

Table 11-1 Pin-Out Ethernet Port

Pin	Signal
7	NC
8	NC

Figure 11-1 Octal LAN 10/100Base TX module, E100-8

11.4 Compliance

Table 11-2 10/100BASE-T Interface Compliance

Standard	Comment
ISO/IEC8877	MAU MDI connector
IEEE 802.3	Clause 14, Twisted pair MAU and baseband medium type 10BASE-T Clause 25, PMD sublayer and baseband medium type 100BASE-TX Clause 24, PCS and PMA sublayer, type 100BASE-X Clause 28, Auto-negotiation on Twisted pair
ANSI X3.263:1995	Physical medium 100BASE-TX

11.5 Connector Type

8x RJ-45 Fast Ethernet

- Pins available: 8x 8pin
- Spare pins: 8x 4

LAN1 to LAN8 are numbered from upper left corner.

Traffic and link status are indicated in a LED (light pipe) which is formed as an arrow, pointing on the actual port.

Table 11-3 Fast Ethernet Port Pinouts

Signal name	Pin	I/O	Signal Description
LAN 1			
RJ_TX1+	1	O	Transmit+ LAN 1
RJ_TX1-	2	O	Transmit- LAN 1
RJ_RX1+	3	I	Receive+ LAN 1
RJ_RX1-	6	I	Receive- LAN 1
LAN 2			
RJ_TX2+	1	O	Transmit+ LAN 2
RJ_TX2-	2	O	Transmit- LAN 2
RJ_RX2+	3	I	Receive+ LAN 2
RJ_RX2-	6	I	Receive- LAN 2
LAN 3			
RJ_TX3+	1	O	Transmit+ LAN 3
RJ_TX3-	2	O	Transmit- LAN 3
RJ_RX3+	3	I	Receive+ LAN 3
RJ_RX3-	6	I	Receive- LAN 3
LAN 4			
RJ_TX4+	1	O	Transmit+ LAN 4
RJ_TX4-	2	O	Transmit- LAN 4
RJ_RX4+	3	I	Receive+ LAN 4
RJ_RX4-	6	I	Receive- LAN 4
LAN 5			
RJ_TX5+	1	O	Transmit+ LAN 5
RJ_TX5-	2	O	Transmit- LAN 5
RJ_RX5+	3	I	Receive+ LAN 5
RJ_RX5-	6	I	Receive- LAN 5
LAN 6			
RJ_TX6+	1	O	Transmit+ LAN 6
RJ_TX6-	2	O	Transmit- LAN 6
RJ_RX6+	3	I	Receive+ LAN 6
RJ_RX6-	6	I	Receive- LAN 6
LAN 7			
RJ_TX7+	1	O	Transmit+ LAN 7
RJ_TX7-	2	O	Transmit- LAN 7
RJ_RX7+	3	I	Receive+ LAN 7
RJ_RX7-	6	I	Receive- LAN 7

Table 11-3 Fast Ethernet Port Pinouts

Signal name	Pin	I/O	Signal Description
LAN 8			
RJ_TX8+	1	O	Transmit+ LAN 8
RJ_TX8-	2	O	Transmit- LAN 8
RJ_RX8+	3	I	Receive+ LAN 8
RJ_RX8-	6	I	Receive- LAN 8

11.6 References

11.6.1 IEEE Documents

- IEEE 802.3
 - Clause 14, Twisted pair MAU and baseband medium type 10BASE-T
 - Clause 25, PMD sublayer and baseband medium type 100BASE-TX
 - Clause 24, PCS and PMA sublayer, type 100BASE-X
 - Clause 28, Auto-negotiation on Twisted pair

11.6.2 ETSI Documents

- **EN 50081-1**, January 1992 “Electromagnetic compatibility-Generic emission standard, Part 1: commercial and light industry (CE marking requirements)”
- **EN50082-1**, January 1992 “Electromagnetic compatibility- Generic immunity standard, Part 1: Residential, commercial and light industry”
- **EN 60950** Safety of Information Technology Equipment Including Electrical Business Equipment
- **ETS 300 019** European Telecommunications Standard for Environment

11.6.3 ANSI Documents

- **ANSI X3.263**, 1995 Physical medium 100BASE-TX

11.6.4 ISO/IEC Documents

- **ISO/IEC8877** MAU MDI connector



Octal E1 Tributary Model

12.1 Functional Description of Module

The E1-8 module contains eight E1 interfaces. The E1 traffic is mapped into VC-12 containers and multiplexed.

The physical interface use a RJ-45 connector and only supports 120-ohm differential interface.

The module does not contain any IP functionality.

The interface supports both transparent data (G.703) and the NT functionality of ISDN PRA according to ETSI 300 233.

12.2 Power Consumption

The power consumption of the E1-8 is 3,5 W.

12.3 External Interface

The interface is a 2 Mbps E1 interface according to ITU-T G.703, 120 ohm differential pair.

The cable type must be CAT5E-STP.

12.4 Connectors

The connector is a RJ-45 connector, [Table 12-1](#) lists the E1 interface pinouts.

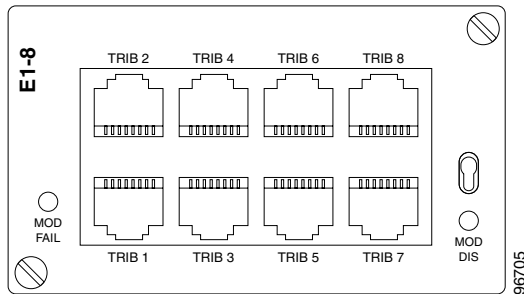
Table 12-1 E1 Interface Pinouts

Pin	Signal
1	P120 OUT
2	N120 OUT
3	GND
4	P120 IN
5	N120 IN

Table 12-1 E1 Interface Pinouts (continued)

Pin	Signal
6	SHIELD
7	NC
8	NC

Figure 12-1 Octal E1 Tributary Module, E1-8

**Note**

Pin 6 is always AC connected to ground. The outer screen is always direct connected to ground.

12.5 Pinout

Table 12-2 Pinout-8xRJ45 2Mb

Signal name	Pin	I/O	Signal Description
PORT 1			
RJ_TX1+	A1	O	Transmit+ Port1
RJ_TX1-	A2	O	Transmit- Port1
RJ_RX1+	A4	I	Receive+ Port1
RJ_RX1-	A5	I	Receive- Port1
PORT 2			
RJ_TX2+	B1	O	Transmit+ Port 2
RJ_TX2-	B2	O	Transmit- Port 2
RJ_RX2+	B4	I	Receive+ Port 2
RJ_RX2-	B5	I	Receive- Port 2
PORT 3			
RJ_TX3+	C1	O	Transmit+ Port 3
RJ_TX3-	C2	O	Transmit- Port3
RJ_RX3+	C4	I	Receive+ Port3
RJ_RX3-	C5	I	Receive- Port 3
PORT 4			

Table 12-2 Pinout-8xRJ45 2Mb

Signal name	Pin	I/O	Signal Description
RJ_TX4+	D1	O	Transmit+ Port 4
RJ_TX4-	D2	O	Transmit- Port 4
RJ_RX4+	D4	I	Receive+ Port4
RJ_RX4-	D5	I	Receive- Port 4
PORT5			
RJ_TX5+	E1	O	Transmit+ Port 5
RJ_TX5-	E2	O	Transmit- Port5
RJ_RX5+	E4	I	Receive+ Port 5
RJ_RX5-	E5	I	Receive- Port 5
PORT 6			
RJ_TX6+	F1	O	Transmit+ Port 6
RJ_TX6-	F2	O	Transmit- Port 6
RJ_RX6+	F4	I	Receive+ Port6
RJ_RX6-	F5	I	Receive- Port 6
PORT 7			
RJ_TX7+	G1	O	Transmit+ Port 7
RJ_TX7-	G2	O	Transmit- Port7
RJ_RX7+	G4	I	Receive+ Port7
RJ_RX7-	G5	I	Receive- Port 7
PORT 8			
RJ_TX8+	H1	O	Transmit+ Port 8
RJ_TX8-	H2	O	Transmit- Port8
RJ_RX8+	H4	I	Receive+ Port8
RJ_RX8-	H5	I	Receive- Port 8

12.6 Compliance

Table 12-3 E1 Interface Compliance

STANDARD	Comment
ETS 300 246	Connector
ETS 300 247	Connector
ETS 300 011	Impedance towards ground Tolerable longitudinal voltage
ETS 300 126	Output signal balance

Table 12-3 E1 Interface Compliance

STANDARD	Comment
ITU-T G.703	Cable attenuation Input reflection loss Input port immunity against reflection Output pulse mask
ITU-T G.783	Output jitter in the absence of input jitter Output combined jitter
ITU-T G823	Max. tolerable input jitter



High-Density 63xE1 Module

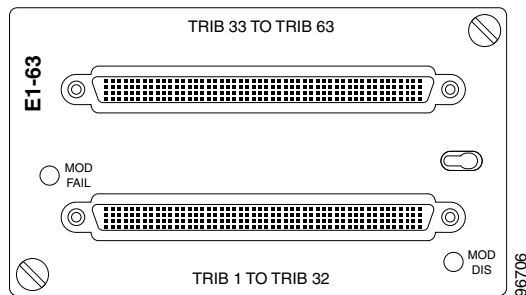
13.1 Functional Description of Module

The E1-63 module contains 63 E1 interfaces. The E1 traffic is mapped into VC-12 containers and multiplexed together according to the [“5.1.1 Multiplexing Structure and Mapping Modes”](#) section on page 5-1.

Two high-density LFH type connectors are used to interface the 63 E1s; 32 interfaces in the bottom connector and 31 interfaces in the top connector (one pair left unconnected)

This module supports transparent data (G.703) and ISDN PRA.

Figure 13-1 High Density 63xE1 Module, E1-63



13.2 Power Consumption

The power consumption of the E1-63 module is 8 W.

13.3 Connectors

The connector is a high-density LFH connector.

13.4 Compliance

Table 13-1 Multi-Interface E1 Compliance

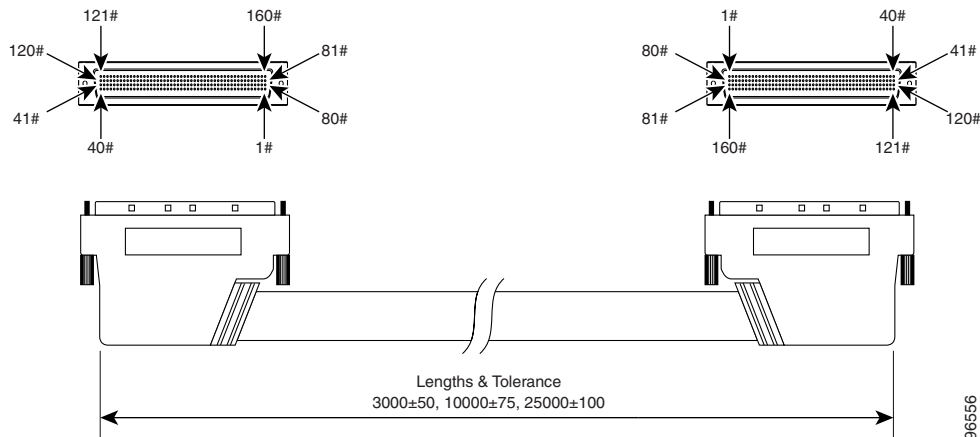
Standard	Comment
ETS 300 011	Impedance towards ground Tolerable longitudinal voltage
ETS 300 126	Output signal balance
ITU-T G.703	Cable attenuation Input reflection loss Input port immunity against reflection Output pulse mask
ITU-T G.783	Output jitter in the absence of input jitter Output combined jitter
ITU-T G.823	Max. tolerable input jitter

13.5 Patch Panels

Patch panels and an LFH cable are available for patching the 63 E1s interface on the High Density 63xE1 module.

13.5.1 32XE1 LFH - LFH Cable

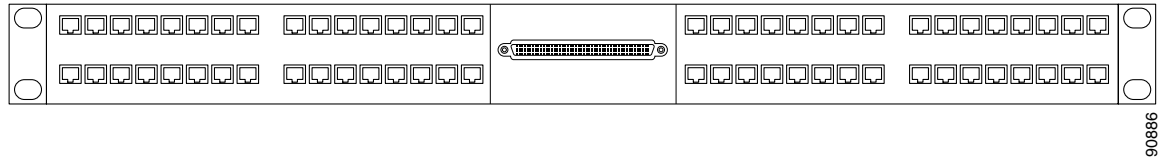
Figure 13-2 32XE1 LFH - LFH Cable



The available patch cable length is 3 M.

13.5.2 32xE1-LFH-RJ45 panel

Figure 13-3 32xE1-LFH-RJ45 panel





Dual Optical S-1.1 Module

14.1 Functional Description of Module

The S1.1-2-LC module contains two optical STM-1 interfaces that meet the S-1.1 specification in ITU-T G.957. The physical connector is an LC connector.

14.2 Power Consumption

The power consumption of the S1.1-2-LC module is 9 W.

14.3 External STM-1 S-1.1 Interface

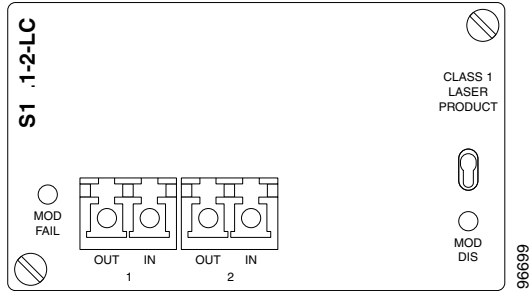
The two optical STM-1 interfaces use dual fiber interface, LC style connector, one fiber in each direction, 1310nm wavelength and use single mode fiber of type 10/125 um. The optical interfaces is compatible with ITU-T 957 for S-1.1.

The interface is an optical STM-1 short haul interface, according to clause 5 ITU-T G.957 The definitions of optical parameters and reference points S and R refer to ITU-T G.957. Reference point S refers to the transmit direction and R refers to the receive direction of the fiber.

14.4 Connector Type

The physical connector is a LC connector.

Figure 14-1 S1.1-2-LC Module



14.5 Optical Budget

Table 14-1 S-1.1 Interface Optical Budget

Parameter	Value
Modulation rate on optical line	155 520 kbps
Wavelength range	1261 - 1360 nm
Transmitter at reference point S	
Source type	MLM
Spectral characteristics (max. RMS width)	7.7 nm
Mean launched power (max.)	-8 dBm
Mean launched power (min.)	-15 dBm
Min. extinction ratio	8.2 dB
Optical path between S and R	
Attenuation range	0 - 12 dB
Max. tolerable dispersion	96 ps/nm
Min. optical return loss	NA
Max. discrete reflectance between S and R	NA
Receiver at reference point R	
Min. sensitivity (BER < 1 in 10 ¹⁰)	-28 dBm
Min. overload	-8 dBm
Max. optical path penalty	1 db
Max. reflectance at R	NA

14.6 Compliance

Table 14-2 Optical S-1.1 Interface Compliance

Standard	Comment
ITU-T G.652	Type of optical fiber
ITU-T G.707	Optical line signal
ITU-T G.783	RX pull-in and hold range
ITU-T G.813	Optical output jitter
ITU-T G.825	Optical input jitter
ITU-T G.957	Optical spectrum Optical output power Optical eye diagram Optical extinction ratio
ITU-T G.958	Input jitter measurement



Octal Optical S-1.1 Module

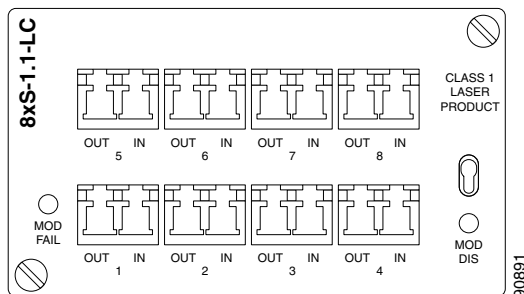
15.1 Functional Description of Module

The S1.1-8-LC module contains eight optical STM-1 interfaces that meet the S-1.1 specification in ITU-T G.957. The physical connector is an LC connector.

The module also contains 8 mapper circuits and an IP switch, allowing concentration of IP traffic mapped into a VC-12 container. Because the mapper circuits are connected to the matrix, the mapper circuits are global resources which means that the traffic to be terminated can come from other modules in the system.

As shown in [Figure 15-1](#), the module is especially made for termination of traffic from a large number of ONS 15302 and ONS 15305 devices.

Figure 15-1 Octal Optical S-1.1 Module, 8xS-1.-LC Front View



15.2 Power Consumption

The power consumption of the S1.1-8-LC is 25 W.

15.3 External STM-1 Interface

15.3.1 Description

The eight optical STM-1 interfaces use dual fiber interface, LC style connector, one fiber in each direction, 1310nm wavelength and use single mode fiber of type 10/125 um. The optical interfaces is compatible with ITU-T 957 for S-1.1.

The interface is an optical STM-1 short haul interface, according to clause 5 ITU-T G.957 The definitions of optical parameters and reference points S and R refer to ITU-T G.957. Reference point S means transmit direction while R is the receive direction of the fibre.

15.3.2 Connector Type

The physical connector is an LC connector.

15.3.3 Optical Budget

Table 15-1 describes the optical parameters.

Table 15-1 Optical Budget S-1.1 Interface

Parameter	Value
Modulation rate on optical line	155 520 kbps
Wavelength range	1261 - 1360 nm
Transmitter at reference point S	
Source type	MLM
Spectral characteristics (max. RMS width)	7.7 nm
Mean launched power (max.)	-8 dBm
Mean launched power (min.)	-15 dBm
Min. extinction ratio	8.2 dB
Optical path between S and R	
Attenuation range	0 - 12 dB
Max. tolerable dispersion	96 ps/nm
Min. optical return loss	NA
Max. discrete reflectance between S and R	NA
Receiver at reference point R	
Min. sensitivity (BER < 1 in 10 ¹⁰)	-28 dBm
Min. overload	-8 dBm
Max. optical path penalty	1 db
Max. reflectance at R	NA



Shelf Assembly Specifications

This appendix provides specifications for the Cisco ONS 15305.

A.1 Mechanical Parameters

A.1.1 Chassis

The equipment is provided as a sub-rack suitable for mounting within a 19-inch equipment cabinet. The height of the unit is 43.6 mm (1U =44.45mm).

[Table A-1](#) lists the minimum dimensions required to mount a single unit, including power supply, cable termination, and fiber handling facilities.

Table A-1 Chassis Dimensions

Width	445mm
Height	43.6mm
Length	280mm

The depth of the sub-rack is 240 mm. The total weight of the ONS 15305 fully equipped does not exceed 5 Kg.

Different mounting brackets are available for both 19-inch and ETSI cabinets/racks (as specified in ETS 300 119, IEC 60917, and IEC 60297).

The thermal design of the unit meets the requirements of EN/IEC 60950.

A.1.2 Service Modules

[Table A-2](#) lists the physical dimensions of the ONS 15305 service modules.

Table A-2 Service Module Dimensions

Length	175mm
--------	-------

Table A-2 Service Module Dimensions (continued)

Height	41mm
Width	75mm

A.1.3 Power Module, DC Power

Table A-3 list the physical dimensions of the power module.

Table A-3 Power Module Dimensions

Length	230mm
Height	19mm
Width	44mm

A.1.4 System Controller Module, SYSCONT-SD128-RJ45

Table A-4 lists the physical dimensions of the system controller module.

Table A-4 System Controller Module Dimensions

Length	175mm
Height	19mm
Width	95mm

A.1.5 Alarm and Fan Module, FAN-ALARM

Table A-5 lists the physical dimensions of the Alarm and Fan module.

Table A-5 Alarm and Fan Module Dimensions

Length	236mm
Height	41mm
Width	28mm

A.2 Reliability, MTBF

MTBF values comply with Telcordia Technologies Special Report, SR-332, Issue 1, May 2001, but with the following corrections:

- A Correction Factor, CF=2, has been used to improve the reliability figures.
- For components where the manufacturer's reliability figures have been used, no further correction has been applied.

Table A-6 MTBF Values

Item	MTBF [Years] 40°C ambient temperature Ground Benign]
64x64/20G Base module without FAN-ALARM	47
FAN-ALARM	74,8
DC Power	168,1
SYSCONT-SD128-RJ45	97
MAIN CARD	97,5
BACKPLANE	82,8
S1.1-8-LC	72,6
S16.1-1-LC	160,6
GigE-2-LC	102,5
E100-8	159,9
E1-8	212
E1-63	88,9
S4.1-2-LC	162,7
6XE3/T3-1.0/2.3	126,9
S1.1-2-LC	270,9

A.3 Environmental Conditions

The equipment conforms to the requirement of EN 300 386 for EMC related specifications. The equipment is also compliant with the following standards:

- ETSI EN 300 386
- EN 55022
- EN 55024
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-6
- EN60950, The Low Voltage Directive.

The equipment operates under all environmental conditions detailed in ETS 300 019-2-3 Class 3.2.

A.3.1 Health and Safety

The equipment meets the requirements in EN/IEC 60950 (CLASS III) and EN60825.

The equipment meets the requirements in ETS 300 753 for acoustic noise.

A.3.2 Storage and Transport

The equipment meets the requirements in ETS 300 019, Class 1.2 and class 2.2.

The supported storage temperature range is -40°C to +70°C.

A.4 Referenced Specifications

A.4.1 ITU-T Recommendations

G.652

Single Mode Optical Fiber

G.701

Vocabulary of Transmission and Multiplexing, and Pulse Code Modulation (PCM) Terms.

G.702

Digital Hierarchy Bit Rates

G.703

Physical/Electrical Characteristics of Hierarchical Digital Interfaces

G.704

Synchronous Frame Structures at Primary and Secondary Hierarchical levels.

G.706

Frame Alignment and Cyclic Redundancy Check (CRC) Procedures Relating to Basic Frame Structures Defined in Recommendation G.704

G.707

Network node interface for the synchronous digital hierarchy (SDH)

G.783

Characteristics of synchronous digital hierarchy (SDH) equipment functional blocks

G.784

Synchronous digital hierarchy (SDH) management

G.810

Definition and terminology for synchronization networks

G.811

Timing characteristic of primary reference clocks

G.812

Timing characteristics of slave clocks suitable for use as a node clocks in synchronization networks

G.813

Timing characteristics of SDH equipment slave clocks (SEC)

G.823

The control of jitter and wander within digital networks which are based on the 2048 kbps hierarchy

G.825

The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)

G.832

Transport of SDH elements on PDH networks - Frame and multiplexing structures

G.841

Types and characteristics of SDH network protection architectures

G.957

Optical interfaces for equipment and systems relating to the synchronous digital hierarchy

G.958

Digital line systems based on the synchronous digital hierarchy for use on optical fiber cables

X.150

Principles of maintenance Testing for Public Data Network using Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE) test Loops

A.4.2 Cenelec Documents

EN 50082-1

Generic immunity standard Industrial environment

EN 55022

Specification for Limits and methods of Measurement of Radio Interference Characteristics of Information Technology Equipment

EN 55024

Electromagnetic Compatibility Requirements for Information Technology Equipment (Previously EN 55101)

EN 60825

Radiation Safety of Laser Products

EN 60950

Safety of Information Technology Equipment Including Electrical Business Equipment

EN 61000-3-2

Electromagnetic compatibility (EMC). Part 3: Limits; Section 2: Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

EN 61000-3-3

Electromagnetic compatibility (EMC). Part 3: Limits; Section 3: Limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment with rated current ≤ 16 A

EN 61000-4-2

Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques; Section 2: Electrostatic discharge immunity test. Basic EMC Publication

EN 61000-4-3

Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques; Section 3: Radiated, radio-frequency, electromagnetic field immunity test

EN 61000-4-4

Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques; Section 4: Electrical fast transient/burst immunity test. Basic EMC Publication

EN 61000-4-5

Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques; Section 5: Surge immunity test

EN 61000-4-6

Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques; Section 6: Conducted disturbances induced by radio-frequency fields

A.4.3 ETSI Documents

ETS 300 011

Integrated Services Digital Network (ISDN); Primary rate user-network interface; Layer 1 specification and test principles

ETS 300 019-2-1

Environmental engineering (EE); Environmental conditions and environmental tests for telecommunication equipment Part 2-1: Specification of environmental test; Storage

ETS 300 019-2-2

Environmental engineering (EE); Environmental conditions and environmental tests for telecommunication equipment Part 2-2: Specification of environmental test; Transportation

ETS 300 019-2-3

Environmental engineering (EE); Environmental conditions and environmental tests for telecommunication equipment Part 2-2: Specification of environmental test; Stationary use at weather protected locations

ETS 300 119-4

Equipment engineering (EE); European telecommunication standard for equipment practice Part 4: Engineering requirements for subracks in miscellaneous racks and cabinets

ETS 300 132-2

Environmental engineering (EE); Power supply interface at the input to the telecommunication equipment: Part 2 Operated by direct current (dc)

ETS 300 147

Transmission and multiplexing (TM); Synchronous digital hierarchy (SDH); Multiplexing structure

ETS 300 233

Integrated Services Digital Network (ISDN); Access digital section for ISDN primary rate

ETS 300 253

Environmental engineering (EE); Earthing and bonding configuration inside telecommunication centres

ETS 300 386

Electromagnetic compatibility and radio spectrum matters (ERM); Telecommunication network equipment; Electromagnetic compatibility (EMC) requirements

ETS 300 752

Equipment engineering (EE): Acoustic noise emitted by telecommunication equipment

A.4.4 IEC Documents

IEC 60917-2

Modular order for the development of Mechanical structures for electronic equipment practice

IEC 60297-3

Dimension of mechanical structures of the 482.6mm (19 in) series Part 3 Subracks and associated plug-in units

A.4.5 Bellcore Documents

SR-332

Reliability prediction procedure for electronic equipment

