Cisco ONS 15305 Multiservice Provisioning Platform for SDH Access Networks

The Cisco® ONS 15305 Multiservice Provisioning Platform (MSPP) is a small (one rack unit) solution that allows service providers to collect high-capacity Ethernet and TDM traffic for transport over SDH networks. The product is typically used for high-bandwidth service delivery to medium-sized and large businesses, and for traffic aggregation at small central offices.

Product Overview

The Cisco ONS 15305 transports Ethernet and TDM traffic inside an SDH frame for metropolitan-area network (MAN or metro) applications. The Cisco ONS 15305 can be used as customer premises equipment (CPE) for medium- and large-sized businesses – collecting voice and data traffic from each site for switched voiced and data services, Layer 1 and Layer 2 VPNs, and Internet access – for transport over an STM-1, STM-4, or STM-16 SDH uplink to the central office. The Cisco ONS 15305 can also be deployed as a central office aggregator; consolidating STM-1 access links from Cisco ONS 15310E MA Multiservice Provisioning Platforms or other Cisco ONS 15305 CPE, as well as directly connected customer TDM or data traffic from electrical interfaces.

The Cisco ONS 15305 can be deployed in many configurations: as an add/drop multiplexer, as a terminal multiplexer, as an STM-4/STM-16 cross-connect (non-blocking 64x64 STM-1 matrix at the VC-4/3/12 levels), and as a customer-access device. The system supports subnetwork connection protection (SNCP) (VC-4/3/12) as well as 1+1 MSP protection schemes. Ethernet connections over the SDH infrastructure can be point-to-point or multipoint. The Cisco ONS 15305 can be configured with up to four plug-in service modules which may vary depending on which application will be implemented.

Figure 1. Cisco ONS 15305 MSPP

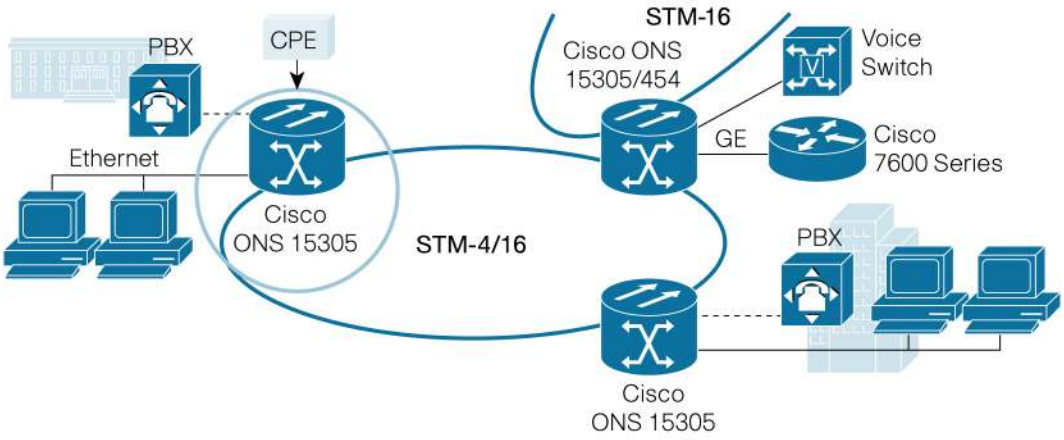
The Cisco ONS 15305 management solution is based on an embedded Simple Network Management Protocol (SNMP) agent. A local craft interface called Cisco Edge Craft, the Cisco optical network craft application Cisco Transport Controller and the element management system – Cisco Transport Manager – allow remote supervision and operation of Cisco ONS 15305 devices. For scalability purposes, and to manage larger networks as a whole, Cisco Transport Manager offers a single-seat management solution to operate networks with the Cisco ONS 15305 and all other Cisco optical products. The Cisco ONS 15305 also provides a simple VT100 command-line interface (CLI) for initial configuration of the unit. Remote access is possible via IP Point-to-Point Protocol (PPP)-based data communications network (DCN) or in band via one of the LAN or WAN ports.

Applications

Multiservice Delivery

The Cisco ONS 15305 offers a small form factor (one rack unit [RU]) and is capable of terminating TDM and native Ethernet traffic, making it an ideal service-delivery device (Figure 2). The Cisco ONS 15305 provides a solution for sites that require a large number of services, typical of medium-sized or large businesses, as well as multitenant customer locations. The Cisco ONS 15305 can also deliver higher-bandwidth services through interface types such as E3/T3 and Gigabit Ethernet.

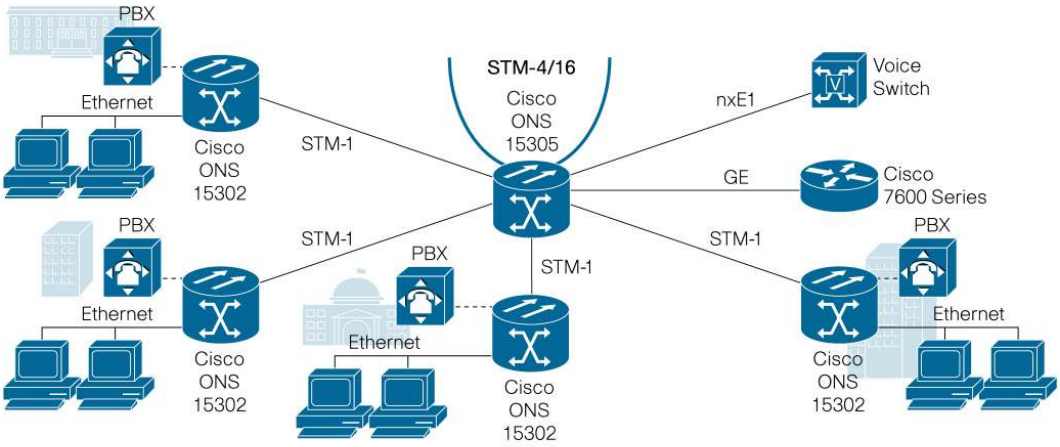
Figure 2. Cisco ONS 15305 as a Multiservice Delivery Platform
The Cisco ONS 15305 can be used in collector rings to provide broadband services (for example, TDM/Voice, Internet access, voice over IP [VoIP]) to large customers and in multitenant buildings.



Multiservice Aggregation

The Cisco ONS 15305 can aggregate multiservice traffic when configured with high-density service interfaces (Figure 3). With 8-port STM-1 modules, up to eight protected (16 unprotected) 155-Mbps connections carrying Ethernet and TDM traffic can be aggregated from remote Cisco ONS 15305 or ONS 15310E MA devices that are used to collect traffic at the customer premises. The multiservice traffic can then be transported over higher-capacity (STM-4, STM-16) uplinks to a Cisco ONS 15310E MA, ONS 15454 MSPP at the central office or point of presence (POP). Aggregated 10/100 Ethernet traffic can also be terminated on a Gigabit Ethernet port on the Cisco ONS 15305, and delivered to a central router or switch. The 63-port E1 module and 6-port E3/T3 module can also be used to aggregate local E1 and E3/T3 traffic respectively. Up to 189 E1 and 18 E3 or T3 services can be aggregated on a single Cisco ONS 15305 network element.

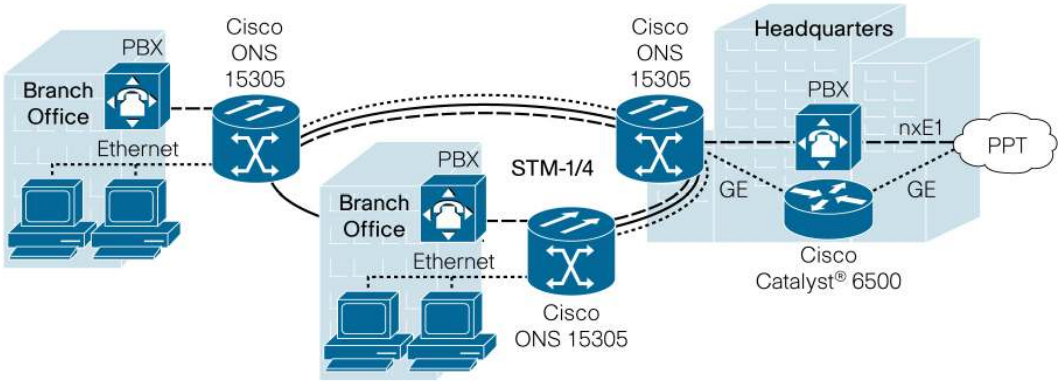
Figure 3. Cisco ONS 15305 in a Multiservice Aggregation Application
The Cisco ONS 15305 can aggregate up to 189 E1, 18 E3/T3, 24 10/100 Ethernet, 6 Gigabit Ethernet, or 16 STM-1 (8 protected) connections, and transport them over an STM-4 or STM-16 uplink.



Enterprise Private Networks

The Cisco ONS 15305 can serve as an optical transport platform for enterprise private networks (Figure 4). A Cisco ONS 15305 device located at the headquarters or main building of an office, university, or government campus can aggregate Ethernet and TDM traffic from multiple remote sites. Other Cisco ONS 15305 units can be used in these remote locations. The hub unit would simultaneously interface with the service provider network to receive bandwidth for switched voice or data services, Internet access, or a wide-area extension of the VPN. A similar application takes place in high-rise buildings where the Cisco ONS 15305 can serve as a hub to distribute traffic via an optical backbone to other Cisco ONS 15305 devices in different floors.

Figure 4. Cisco ONS 15305 in an Enterprise-Metropolitan or Campus-Network Application
The compact design and simplicity of the Cisco ONS 15302 and Cisco ONS 15305 make these systems an easy choice for enterprise network environments.



Key Features and Benefits

Ethernet over SDH Standards Compliance

The Cisco ONS 15305 offers ITU-T G.7041-compliant Generic Framing Procedure (GFP) encapsulation of Ethernet traffic for easy integration with existing SDH networks. The product also uses ITU-T G.707-compliant low-order and high-order virtual concatenation (VCAT) and ITU-T G.7042-compliant link capacity adjustment scheme (LCAS), making it more effective for scalable, next-generation optical infrastructures.

Integrated Layer 2 Switching

The Cisco ONS 15305 10/100 Ethernet and Gigabit Ethernet modules have integrated Layer 2 switches that permit advanced management of packets for various applications and network configurations, such as data-traffic aggregation, multipoint connections, and shared packet rings.

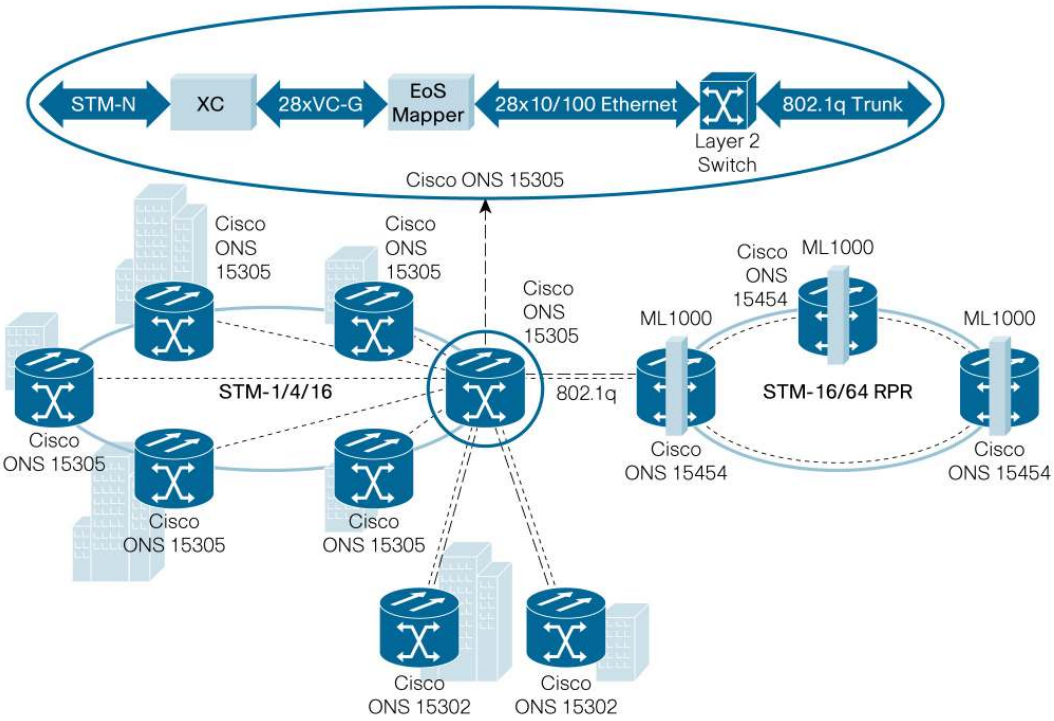
Flexible Network Topologies

The Cisco ONS 15305 can be deployed in point-to-point or ring configurations. It can also be used as a hub, aggregating traffic from Cisco ONS 15305 spokes. Optical spans can be unprotected or 1+1 linear MSP protected. Subnetwork connection protection (SNCP) is also supported at the VC-12, VC-3, and VC-4 levels. Ethernet traffic over the SDH network can be configured for point-to-point or multipoint connections. The versatility of the Cisco ONS 15305 gives customers the flexibility to deploy next-generation services in a variety of network architectures, adjusting to the existing infrastructure and optimizing capital and operational expenditures.

Unprecedented 1-RU Aggregation Capabilities

The Cisco ONS 15305 is the first 1-RU device that has high-density aggregation capabilities. Up to 189 E1, 18 E3/T3, or 16 STM-1 connections can be aggregated in a single chassis, with 1 slot left available for an optical uplink. Twenty-four RJ-45 ports for 10/100 Ethernet traffic can be configured in a single chassis and aggregated onto an STM-n optical or a Gigabit Ethernet link. The Cisco ONS 15305 also permits aggregation of up to 42 virtual container groups (VCGs) carrying Ethernet traffic from a multiservice-over-SDH access network. Aggregated Ethernet traffic can be handed off an 802.1q trunk. This allows unprecedented efficiency in high-density concentration of Metro Ethernet services for handoff to an IP backbone, or to a Cisco ONS 15454 ML-Series Resilient Packet Ring (RPR), as shown in Figure 5.

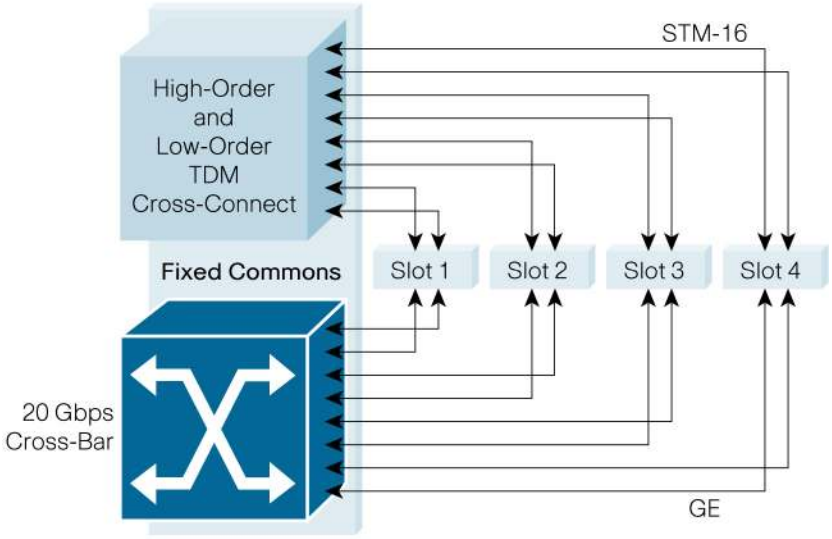
Figure 5. The Cisco ONS 15305 Ethernet-over-SDH Aggregation
The Cisco ONS 15305 can aggregate up to 28 VCGs containing Ethernet traffic for 802.1q handoff to an IP backbone or to a Cisco ONS 15454 RPR.



Integrated TDM and Data Planes

Each slot in the Cisco ONS 15305 has 2.5-Gbps bidirectional connections to a fully nonblocking VC-4/VC-3/VC-12, 10-Gbps cross-connect. This allows any-to-any connectivity of SDH virtual containers between slots, typically used to aggregate Plesiochronous Digital Hierarchy (PDH) traffic onto the optical SDH interfaces. Additionally, each slot in the Cisco ONS 15305 has two bidirectional, 1-Gbps connections to an Ethernet cross-bar in the main chassis that allows data packets to flow between Ethernet modules in all slots. The TDM and data planes of the Cisco ONS 15305 allow flexible architectures for multiservice networks that result in reduced service provider capital expenditures.

Figure 6. Cisco ONS 15305 Integrated TDM and Data Planes: Each slot in the Cisco ONS 15305 has access to the TDM cross-connect and to an Ethernet cross-bar.



Simplified Management for All Cisco Optical Platforms

The Cisco ONS 15305 is managed by the Cisco Transport Manager element management system (EMS), which integrates all Cisco optical products under a single screen for network management. Cisco Transport Manager can indicate alarms and events of Cisco ONS 15305 devices in customer networks. Cisco Transport Manager can also display G.826 performance-monitoring parameters recorded by the Cisco ONS 15305 counters. In addition, the Optical network craft application, Cisco Transport Controller, is available off the shelf with common management and A-Z provisioning among ONS 15305, ONS 15454 MSPP, ONS 15310E MA and the ADM10G, the MSPP on A Blade card of the ONS 15454 MSTP platform.

Summary/Conclusion

The Cisco ONS 15305 MSPP enables transport of Ethernet and time-division multiplexing (TDM) traffic over optical networks. The Cisco ONS 15305 is unique in that in a small form factor it can aggregate unprecedented multiservice bandwidth capacity and service density, significantly reducing capital expenditures for next-generation infrastructures. The simple approach to integrate Layer 2 Ethernet intelligence with embedded optical transport technology allows cost-effective delivery of advanced Ethernet and traditional TDM services using an existing SDH infrastructure. This consolidation eliminates duplicate operations, administration, maintenance, and provisioning costs in the service provider infrastructure. Together with the Cisco ONS 15454 and the Cisco ONS 15310E MA, the Cisco ONS 15305 is part of an end-to-end solution for multiservice transport over SDH networks that can be monitored and provisioned on a single Cisco Transport Manager EMS or Cisco Transport Controller network craft application screen.

Product Specifications

The tables below show the technical specifications of the Cisco ONS 15305.

Table 1. Optical Interfaces

Description	Specification
Compliance	ITU-T G.707 – Optical line signal ITU-T G.783 – Rx pull in and hold range ITU-T G.813 – Output jitter ITU-T G.825 & G.958 – Input jitter ITU-T G.957 – Transmission
S1.1 optical interface	Source type: Laser diode Wavelength: 1261–1360 nm Modulation: 155,520 kbps Transmit power: –8 dBm maximum, –15 dBm minimum Receiver: –28 dBm sensitivity (BER < 1 in 10^{10})/–8 dBm overload Connectors: LC
S4.1 optical interface	Source type: Laser diode Wavelength: 1293–1334 nm/1274–1356 nm Modulation: 622,080 kbps Transmit power: –8 dBm maximum –15 dBm minimum Receiver: –28 dBm sensitivity (BER < 1 in 10^{10})/–8 dBm overload Connectors: LC
L4.2 optical interface	Source type: Laser diode Wavelength: 1480–1580 nm Modulation: 622,080 kbps Transmit power: +2 dBm maximum, –3 dBm minimum Receiver: –28 dBm sensitivity (BER < 1 in 10^{10})/–8 dBm overload Connectors: LC
L16.2 optical interface	Source type: Laser diode Wavelength: 1500–1580 nm Modulation: 2488,380 kbps Transmit power: +2 dBm maximum, –3 dBm minimum Receiver: –28 dBm sensitivity (BER < 1 in 10^{10})/–9 dBm overload Connectors: LC

Table 2. Electrical Interfaces

Description	Specification
E1 – 8 x 2 Mbps G.703 and ISDN Primary Rate Access (PRA)	Bit rate: 2048 kbps ± 50 ppm Line code: HDB3 Input jitter: According to ITU-T G.823 Output jitter: According to ITU-T G.783 Termination: 120 ohms on RJ-45 connectors (75 ohms with external balun)
E1 – 63 x 2 Mbps and 21 x 2 Mbps G.703 and ISDN PRA	Bit rate: 2048 kbps ± 50 ppm Line code: HDB3 Input jitter: According to ITU-T G.823 Output jitter: According to ITU-T G.783 Termination: 120 ohms or 75 ohms on high-density patch panel
E3/DS3 G.703	Bit rate: 34 Mbps to 45 Mbps Input jitter: According to ITU-T G.823 Output jitter: According to ITU-T G.783 Termination: 75 ohm coaxial connector type 1.0/2.3

Table 3. Data Interfaces

Description	Specification
Ethernet/LAN 10/100BASE-T	Compliance: According to IEEE 802.3 Connector: RJ-45 type
Gigabit Ethernet	Connector compliant with Cisco qualified IEEE 802.3z Small Form-Factor Pluggable (SFP) optics

Table 4. Ethernet Features

Description	Specification
Ethernet Layer 2 switching	MAC switching Self-learning MAC addresses Static MAC entries Support of up to 24,000 MAC addresses Automatic aging for MAC addresses MAC multicast Supports up to 6144-byte frames Support for up to 9216-byte frames in Layer 1 mode Transparent bridging IEEE 802.1Q VLAN tagging 802.1q in 802.1q Layer 2 Control Protocol tunneling Head-of-line blocking prevention Back pressure and flow-control handling IGMP support Spanning Tree Protocol according to IEEE 802.1D I RSTP according to IEEE 802.1w Mirroring port EEE 802.1p priorities IEEE 802.3ad Link Aggregation
Ethernet over SDH transport	ITU-T G.7041 Generic Framing Procedure (GFP) ITU-T G.707 VCAT 10/100 Ethernet module: VC-12-Xv, X=1-50; VC-3-Xv, X=1-3, VC-4 Gigabit Ethernet module: VC-3-Xv, X=1-21; VC-4-Xv, X=1-7 ITU-T G.7042 Link Capacity Adjustment Scheme (LCAS)

Table 5. Performance Monitoring

Description	Specification
Compliance	ITU-T G.826
MS/RS PM-STM-n	B1 near end, B2 near and far end
VC-3 and VC-4	B3 near and far end
VC-12	BIP-2 near and far end

Table 6. Timing

Description	Specification
Sources	STM-n, 2048 kHz synchronization input, E1 tributary (PRA)
Output	2048-kHz synchronization output (output signal balance according to ETS 300 126)
Connector	One 8-pin RJ-45 for both input and output

Table 7. External Alarm Ports

Description	Specification
Connector	One 9-pin D-type connector
Input	4 ports
Output	2 ports

Table 8. Power

Description	Specification
DC power	–36 VDC to –72 VDC (–48 VDC nominal) Input: 120W Output: <105W

Table 9. Safety and Environmental

Description	Specification
EMC	EN 55022 Class B and EN 50082-1
Safety	EN 60950 and EN 60825
Temperature	Thermal requirement: EN 60950 Operating temperature: (–5 to 45℃) according to ETS 300 019-1-3, Class 3.2 Storage: ETS 300 019-2-1, Class 1.1 Transport: ETS 300 019-2-2, Class 2.2

Table 10. Network Management

Description	Specification
Craft tool	Cisco Transport Controller and Cisco Edge Craft
EMS	Cisco Transport Manager

Table 11. Physical Dimensions

Description	Specification
H x W x D	43.6 x 445 x 280 mm (1 RU)
Weight	< 5 kg

Ordering Information

To place an order, visit the Cisco Ordering Home Page.

Table 12. Cisco ONS 15305 Ordering Information

Product Name	Part Number
Cisco ONS 15305 Shelf Assembly – R3.0.x -No RTU License	15305-SA-R3.0.5=
Cisco ONS 15305 DC Power Module	15305-DC=
Cisco ONS 15305 Alarm and Fan Module	15305-FAN-ALM
Cisco ONS 15305 Ship Kit	15305-SHIPKIT-A=
Cisco ONS 15305 8xSTM-1, SH, 1310 nm, Optical Service Module	15305-S1.1-8-LC=
Cisco ONS 15305 2xSTM-1, SH, 1310 nm, Optical Service Module	15305-S1.1-2-LC=
Cisco ONS 15305 2xSTM-4, SH, 1310 nm, Optical Service Module	15305-S4.1-2-LC=
Cisco ONS 15305 2xSTM-4, LH, 1550 nm, Optical Service Module	15305-L4.2-2-LC=
Cisco ONS 15305 1xSTM-16, SH, 1310 nm, Optical Service Module	15305-S16.1-1-LC=
Cisco ONS 15305 1xSTM-16, LH, 1550 nm, Optical Service Module	15305-L16.2-1-LC=
Cisco ONS 15305 2xSTM-1 SH, 21xE1 Service Module	15305-S1.1-2-21E1=

Product Name	Part Number
Cisco ONS 15305 8xE1 120 ohm (RJ-45 Connectors) Service Module	15305-E1-8=
Cisco ONS 15305 63xE1 120 ohm (LFH Connectors) Service Module	15305-E1-63=
Cisco ONS 15305 6xE3/T3 75 ohm (1.0/2.3 Connectors) Service Module	15305-E3T3-6=
Cisco ONS 15305 8xFE 10/100Base-TX Service Module with WAN Mapper	15305-E100-8-W=
Cisco ONS 15305 2xGE Service Module with WAN Mapper, SFP connectors	15305-GE-2-W=
32 E1 Patch Panel 75 ohm, Coax 1.0/2.3	15305-PP-32E1-75=
32 E1 Patch Panel 120 ohm, RJ-45	15305-PP-32E1-120=
32 E1 LFH Connect, Patch Cable, 3M	15305-CBL-LFH-3=
Cisco ONS 15305 Installation and Operation Guide Rel 2.0.0, English, CD	15305-DOC2.0.0CD=
Cisco ONS 15305 System Software CD, R3.0.6 RTU	15305-R3.0.6SWCD=
Cisco ONS 15305 Edge Craft Management Tool, R2.0.0	15305-R2.0.0-CEC=

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For More Information

For more information about the Cisco ONS 15305, visit http://www.cisco.com/en/US/products/hw/optical/ps2001/ps5381/index.html or contact your local account representative.

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