

Cisco ONS 15310-MA SDH Multiservice Platform

The Cisco® ONS 15310-MA is a Multiservice Provisioning Platform (MSPP) that switches packet and TDM traffic, and interfaces to both circuit-based and Ethernet/MPLS backbone networks. Together with the Cisco ONS 15305, Cisco ONS 15454, and Cisco ONS 15600, the Cisco ONS 15310-MA provides an end-to-end solution for multiservice transport over SDH networks.

Product Overview

The Cisco ONS 15310-MA (Figure 1) is a carrier-class MSPP that efficiently switches Ethernet and TDM traffic for use in metropolitan and regional optical networks. Its flexibility and scalability allow it to support 2-Mbps to 2.5-Gbps TDM, as well as 10/100/1000-Mbps Ethernet interfaces. The Cisco ONS 15310-MA can aggregate traffic at a central office or collect services at the customer premises. At a central office, it can groom traffic from multiple customer-located network elements, such as the Cisco ONS 15305, Cisco Catalyst® 3750 Series Switch, or another Cisco ONS 15310-MA for distribution to other networks or handoff to specialized networking devices, such as a ONS 15454 SDH, ONS 15454 MSPP-on-a-blade, ONS 15600 SDH, Cisco 7600 Series Router, a high-capacity digital cross-connect (DXC), or a Class 5 telephone switch. At the customer premises, the Cisco ONS 15310-MA can collect high-density and high-capacity traffic from medium-sized and large businesses, or from several customers in a multitenant location.

Figure 1. Cisco ONS 15310-MA Multiservice Platform



Carrier-Class Compact MSPP

In a very compact chassis (six rack units [RUs]), the Cisco ONS 15310-MA provides six slots for hot-swappable traffic interfaces. High-density electrical (up to 126 E1), Ethernet (up to 32 10/100BASE-T and up to 24 GE), or optical interfaces can be terminated in this small footprint to optimize use of expensive real estate at the central office or remote terminal cabinet. A centralized two-stage 20-Gbps AU-4 and 5-Gbps TU12-TDM cross-connect can switch SDH encapsulated traffic from any tributary port onto any optical interface.

All Cisco ONS 15310-MA common equipment, including processor, cross-connect, timing, and power supply, can be optionally duplicated for 99.999% reliability. Protection for TDM electrical as well as optical interfaces is also possible. Subnetwork Connection Protection (SNCP) and Multiplex Section Protection 1+1 (MSP) can be configured for greater fault tolerance in the optical network. The Cisco ONS 15310-MA is CE compliant, and supports industrial

temperature ranges, making it fully qualified for deployment in central offices, customer locations, or remote terminals.

Management

Each Cisco ONS 15310-MA is equipped with Cisco Transport Controller, a subnetwork craft interface tool that simplifies node control. The Cisco Transport Controller graphical user interface (GUI) allows easy node turn-up, autorouted A-to-Z circuit provisioning, and rapid service creation. Cisco Transport Controller provides:

- Element-level control
- Quick access to operations, administration, maintenance, and provisioning (OAM&P) functions
- Transaction Language One (TL1) command window
- Graphical representation of network topology, network conditions, and shelf configurations

Cisco Transport Manager is the comprehensive element management system for the entire Cisco ONS product line. Integrating fault, configuration, and performance management, Cisco Transport Manager simplifies and strengthens optical network OAM&P. The client-and-server platform easily scales to manage up to 1000 network elements and 100 simultaneous users. Cisco Transport Manager helps service providers quickly identify and correct network problem areas and more rapidly deploy revenue-generating services.

Both the Cisco Transport Controller and Cisco Transport Manager support the entire Cisco ONS Family. This allows a single craft tool, as well as element manager interface, for fault management, configuration, and provisioning across the network. The end-to-end management capabilities of Cisco Transport Controller and Cisco Transport Manager increase profitability for service providers by reducing operational expenses and minimizing service activation time.

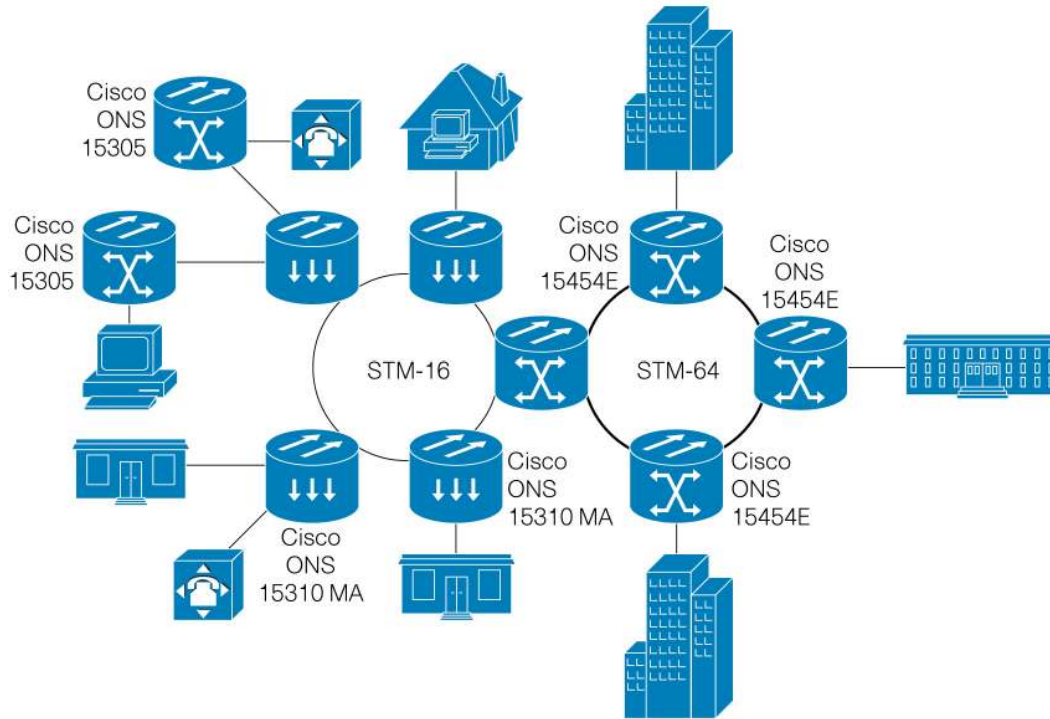
Applications

The flexibility of the Cisco ONS 15310-MA gives it superior versatility. Its true multilayer Ethernet-over-SDH transport capabilities allow service providers to more efficiently add support for next-generation, packet-based services to their existing infrastructure while limiting capital and operational expenditures and increasing speed of service delivery. Interoperability with the Cisco ONS 15305, Cisco ONS 15454, and Cisco ONS 15600 provides a robust network solution that can deliver economical, scaleable, and cost-effective services on demand. The versatility and reliability of the Cisco ONS 15310-MA make it the optimal choice for a wide variety of applications, some of which are listed in the following sections.

Metro Access Aggregation

The Cisco ONS 15310-MA can serve as the first point of aggregation for customer access equipment that delivers services directly to the customer site. Flexible Small Form-Factor Pluggable (SFP)-based optical interface modules can terminate STM1, STM4 and STM16 collector rings. For example, multiple Cisco ONS 15305 platforms can be aggregated on a Cisco ONS 15310-MA at an end-office or small central office (Figure 2). Customer traffic can then be groomed for transport over an optical uplink, or terminated onto colocated networking devices – such as a Cisco 7600 Series Router or a Class-5 switch – using tributary interface ports.

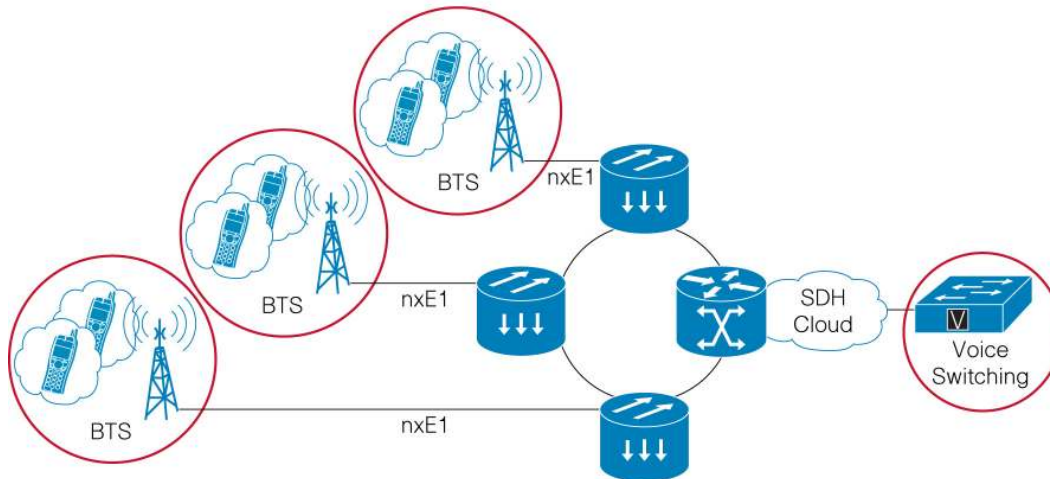
Figure 2. The Cisco ONS 15310-MA as a Multiservice Aggregation Device



Wireless Aggregation

With the advent of third-generation (3G) mobile services, wireless networks require high-capacity infrastructure to transport bandwidth-intensive services such as Web browsing or videoconferencing from a cellular phone. The multiservice capabilities of the Cisco ONS 15310-MA, together with its carrier-class reliability, compact size, and reduced power consumption, make it ideal for backhaul of TDM and packet traffic from the cell site to the nearest point of presence (POP) (Figure 3).

Figure 3. The Cisco ONS 15310-MA in a Cellular Network Transport Infrastructure



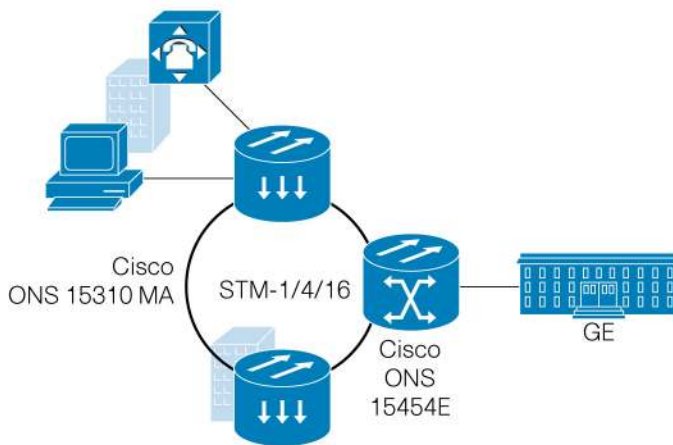
Customer Access Platform

Service providers can collect voice and data services using the Cisco ONS 15310-MA at the customer location. Its carrier-class features, such as redundant common equipment and facility protection, allow it to support 99.999% availability requirements, making it specifically valuable for supporting the most demanding service-level agreements (SLA). Its compact form factor makes it easy to deploy in enterprise customer communication closets, which are typically space-constrained.

Enterprise Networks and Managed Services

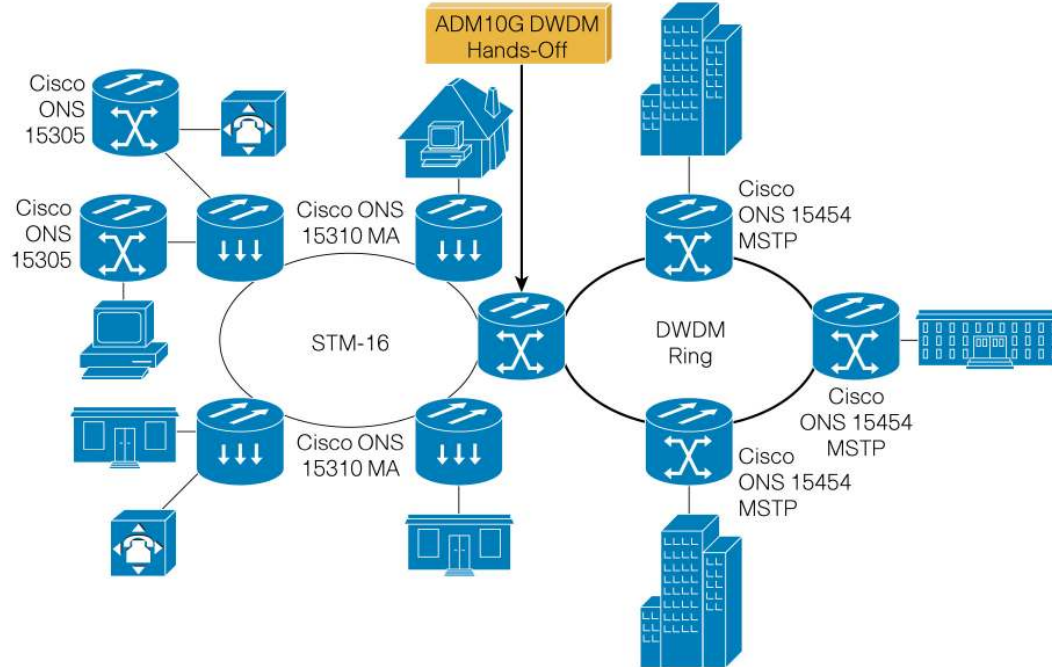
The Cisco ONS Family of products can also serve as an optical transport platform for an enterprise-owned network or a managed service. A Cisco ONS 15310-MA located at the headquarters or main building of an office, university, or government campus, for example, can aggregate Ethernet and TDM traffic from multiple remote sites. Other Cisco ONS 15310-MA or Cisco ONS 15305 units can be used in these remote locations to connect to private branch exchange (PBX) systems and LANs. The hub unit would simultaneously interface with the service provider to receive bandwidth for switched voice or data services, Internet access, or a wide-area extension of the VPN (Figure 4).

Figure 4. Cisco ONS 15310-MA in a Campus or Metropolitan Corporate Network



Another application is the use of the 15310MA as Low Order aggregation device for the MSPP on a blade card. When the DWDM ring has to bring E1, E3, DS3 and FE there is no economic way to transport low bit rate signals. Aggregating them over standard SDH transport may cost a in terms of common part. Leveraging on ONS 15454 MSTP MSPP on a Blade, that aggregate TDM over wavelength and the 15310 MA which provide very cost effective low order aggregation (Figure 5).

Figure 5. Cisco ONS 15310-MA as LO Aggregation for ONS 15454 MSTP with MSPP-on-a-blade Application



Key Features and Benefits

The Cisco ONS 15310-MA provides a wide array of important features and benefits that make it the preferred choice for service providers and enterprise customers looking to:

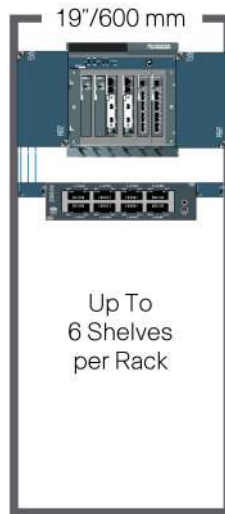
- Reduce capital and operational expenditures
- Deploy a network infrastructure that supports revenue-enhancing services
- Offer the highest service availability to a demanding customer base

The following sections describe some of the unique features and benefits of the Cisco ONS 15310-MA.

Small Footprint

At only 6-RU high, the Cisco ONS 15310-MA provides unprecedented service density in its compact form factor (Figure 6). The small footprint increases network design flexibility, allowing service providers to deploy a powerful MSPP in small cabinets where space is limited, and deliver higher-bandwidth services in remote locations. It also helps service providers conserve space in central offices. Finally, as a customer access platform, the Cisco ONS 15310-MA can be more easily deployed in telecommunications closets of enterprise customers, resulting in more cost-effective and faster service activation.

Figure 6. The Small Form Factor Allows for Flexible Rack-Mounting Options



Carrier Ethernet-over-SDH Transport

The Cisco ONS 15310-MA can be equipped with Ethernet cards to facilitate the delivery of carrier-class, private-line Ethernet and Fast Ethernet services. Virtual Concatenation (VCAT), Link Capacity Adjustment Scheme (LCAS), standard encapsulation, and SDH sub-50-millisecond (ms) resiliency schemes are used to deliver these point-to-point data services efficiently and in conjunction with the traditional TDM service-delivery requirements.

The Cisco ONS 15310 CE-Series 8-Port 10/100 Carrier Ethernet Card can be installed in a Cisco ONS 15310-MA for Layer 1 Ethernet-over-SDH applications. The Cisco ONS 15310 CE-Series provides port-mapped services and interoperability with the Carrier Ethernet cards supported on the Cisco ONS 15454 and E100-8-W cards of the 15305, delivering Ethernet and Fast Ethernet solutions that span access and metropolitan-area networks.

The Cisco ONS15310 CE-MR-6 port, 10/100/1000 Carrier Ethernet card enable up to 24 GE ports on the 15310 MA per chassis. Fully interoperable with Carrier Ethernet cards of the ONS 15454 and GE-2-W cards of the 15305, as well as GE services on the ASAP card of the 15600, the CE-MR-6 card delivers Gigabit Ethernet services over Metropolitan area networks, DWDM Aggregation, EPL.

Multilayer Ethernet-over-SDH Transport

Traditional Ethernet-over-SDH services consist of simple Layer 1 mapping of Ethernet frames into SDH for transport between two endpoints where SDH protection mechanisms are used to deliver sub-50-ms resiliencies.

Consequently, bandwidth must be reserved for both working and protected traffic, resulting in underutilization of available bandwidth. Furthermore, services such as voice over IP (VoIP), digital videoconferencing, surveillance, and VPNs all require interconnectivity between multiple end locations. Using the traditional Ethernet-over-SDH point-to-point model, these solutions become very complicated and highly inefficient.

Switched Ethernet uses statistical multiplexing, which supports oversubscription and better usage of Ethernet networks. Resilient Packet Ring (RPR) enables efficient multipoint services, with spatial reuse of bandwidth and sub-50-ms, Layer 2 ring-based protection. Using switched Ethernet and RPR results in a more robust, efficient solution that economically addresses the needs of today's advanced services requirements.

The Cisco ONS 15310 ML-Series 8-Port 10/100 Ethernet Card is a Layer 2-switched services card that can be installed Cisco ONS 15310-MA. The card interoperates with the Cisco ONS 15454 ML-Series data cards on the Cisco ONS 15454, delivering Ethernet and Fast Ethernet solutions that span access and metropolitan-area networks.

Integrated Network Management

The Cisco Transport Controller and Cisco Transport Manager support the end-to-end Cisco ONS family of products. With the Cisco optical integrated network management solution, network professionals only need to learn how to operate a single, easy-to-use graphical interface, and they are capable of provisioning, configuring, and troubleshooting their entire network. This helps service providers significantly reduce operational expenditures associated with training, installation and configuration of network equipment, and response to network failures. Furthermore, revenue-generating services can be provisioned more quickly with this simplified and highly integrated network management solution, making an immediate impact to the service provider's top line.

SFP Optics

All optical interfaces on the Cisco ONS 15310-MA support SFP optics for greater transmission reach, line rate, and wavelength flexibility. This simplifies system design, as well as reduces sparring costs for service providers.

Summary/Conclusion

The Cisco ONS 15310-MA SDH Multiservice Platform integrates TDM and packet switching in a single, carrier-grade network element. As a part of the Cisco ONS product family, the Cisco ONS 15310-MA is tightly integrated with the Cisco ONS 15305, Cisco ONS 15454, and Cisco ONS 15600, including common network management interfaces with Cisco Transport Controller and Cisco Transport Manager. The Cisco ONS 15310-MA can be used in a variety of applications, such as multiservice aggregation, traffic backhaul in 3G cellular networks, and enterprise private networks. With unprecedented scalability in a compact 6-RU-high platform, the Cisco ONS 15310-MA brings a variety of unique features that make it the ideal choice for service providers' multiservice transport networks.

Product Specifications

Tables 1 through 4 list the technical specifications of the Cisco ONS 15310-MA.

Table 1. System Specifications

Parameter	Specification
Physical dimensions	<ul style="list-style-type: none"> • 19-IEC or 600x600mm ETSI rack-mounting • 10.67 W x 10.5 H (6 RU) x 12 D (inches)
Power	Dual power input terminal blocks, voltage monitored with threshold crossing alarms (TCAs) Voltage: <ul style="list-style-type: none"> • -48 VDC nominal • -40.5 to -56.7 normal operating range Current (configuration-dependant): <ul style="list-style-type: none"> • 2.5 amps minimum • 10 amps maximum at nominal voltage
Weight	<ul style="list-style-type: none"> • 21 to 34 lbs
Operating conditions	<ul style="list-style-type: none"> • Indoor operations • Qualification for Outdoor operations according to EN 300 019

Table 2. Mechanical Systems

Card Type	Description
Chassis	6 front access common and interface card slots, integrated fan-tray slot
Fan-tray assembly	4-fan module assembly
Electrical interface options	Rear access, A-side + B-side
<ul style="list-style-type: none"> • BNC 	DS-3 and E3; 6 Tx/Rx (maximum)
<ul style="list-style-type: none"> • AMP CHAMP 	E1; 126 Tx/Rx (maximum)

Table 3. Common Cards

Card Type	Description
Control, Timing, Cross-Connect, and Optics (CTX)	
Data communications channel (DCC)	IP and OSI DCC
Card protection	Unprotected, 1:1 protected
Cross-connect	160 x 160 HO (AU-4), 2128 x 2128 TU12
Optical ports	<ul style="list-style-type: none"> • 2 SFP optics ports per card • Cisco qualified STM1, STM4, STM16 and multirate SFPs supported • CWDM / DWDM SFP supported • MSP1+1 or SNCP networking

Table 4. Multiservice Interface Cards

Interface or Card Type	No. of Ports per Card (Tx/Rx)	Protection	Shelf Port Density (Maximum)
Electrical Interfaces (SDH/ETSI)			
E1/DS-3/E3 High Density	63 E1; 3 DS-3/E3	0:1, 1:1	126 E1; 6 DS-3/E3 (protected)
E1/DS-3/E3 Low Density	21 E1; 3 DS-3/E3	0:1, 1:1	42 E1; 6 DS-3/E3 (protected)
CE-Series 10/100 Ethernet Card	8	0:1	32
ML-Series 10/100 Ethernet Card	8	0:1	32
CE-Series 10/100/1000 Multi-rate Ethernet Card	6 (SFP based)	0:1	24

Features

Protection Options

- SDH
 - Subnetwork Connection Protection – ITU-T G.841
 - MSP 1+1 – ITU-T G.841
- Data
 - Resilient Packet Ring (RPR)
 - Spanning Tree Protocol and Rapid Spanning Tree Protocol (RSTP)
 - PDH
 - 1:1 Tributary protection for E1, E3, DS3

Node Configurations

- Terminal
- Linear add/drop multiplexer (ADM)
- Regenerator
- Ring

User Interfaces

- Cisco Transport Controller craft interface
 - Integrated node and subnetwork GUI
 - PC-based client with familiar Web browser interface
 - Layered graphical views – network, node, and card level
 - Network autodiscovery with provisionable subnetwork domain control

- Integrated software wizards
 - Circuit creation
 - Span upgrades
- A-to-Z circuit provisioning
 - Point-and-click source port to destination port
- Automatic internode cross-connect provisioning
 - Detailed circuit-level map
 - Provisionable routing parameters
- Circuit protection
- Nodal diversity
- Balanced traffic
- Batch circuit creation
- System inventory
- User-customizable options
 - Background map
 - Color schemes
- Data export
- Online help
- Transaction Language One (TL1) command line
- Cisco IOS[®] Software command-line interface (CLI)

Security

- Four user levels – Superuser, provisioning, maintenance, and retrieve
- Provisionable timeout durations
- Multiple usernames and simultaneous logins
- RADIUS
- SSL, SSH, HTTPS

Maintenance

- Loopbacks – facility, payload, and terminal
- Database backup and restore
- Lamp test
- Test access circuit creation
- Path trace
- Bridge and roll

Performance Monitoring

- SDH – Multiplex Section, Regenerator Section, and VCn layer
- Ethernet port and subport (VLAN)
- Fifteen minute (32 entries), 24 hour (1 entry)
- Near- and far-end reporting

- Provisionable threshold crossing alarms (TCAs)
- Intermediate path performance monitoring (IPPM)
- Simple Network Management Protocol (SNMP) Remote Monitoring (RMON)

Alarm Monitoring and Reporting

- Shelf LEDs – critical, major, minor, and remote
- Card LEDs – fail, active/standby, signal fail, link, and activity
- Cisco Transport Controller craft tool
- Cisco Transport Manager EMS
- Environmental alarm contact closures
- Near- and far-end reporting
- User-provisionable alarm profiles

System Upgrades

- Optical span
- Network protection
- Software release – local and remotely
- Electrical cards – low density to high density

Data Features

- Layer 1 Ethernet features
 - MEF9 certified EPL service
 - Sub-50-ms SDH protection and restoration of transport circuits
 - Low-latency transport
 - Transparent to Layer 2 bridging, switching, Ethernet MAC protocols (such as Cisco EtherChannel[®] technology, 802.1x, Cisco Discovery Protocol, VLAN Trunking Protocol [VTP], Spanning Tree Protocol), and VLAN (802.1Q and QinQ)
 - Ethernet link functions: autonegotiation, link-speed autosense, full and half duplex, flow control (802.3x)
 - Packet prioritization based on IP type of service (ToS) or 802.1P
 - Maximum packet size supported: 1548 bytes
 - Link integrity
- Layer 2 Ethernet features
 - MEF9 certified EVPL and ELAN service
 - RPR
 - Ethernet bridging (802.1D)
 - Ethernet Priority (802.1P)
 - Spanning Tree Protocol (802.1D), Rapid Spanning Tree Protocol (802.1w)
 - VLANs (802.1Q and 802.1Q in 802.1Q)
 - Point-to-point, point-to-multipoint, or RPR
 - Dedicated or shared bandwidth
 - Fast Ethernet EtherChannel technology (link aggregation)

- Flexible packet classification – dual leaky bucket supporting committed information rate (CIR) and peak information rate (PIR) models
- Per-class queuing with Weighted Deficit Round Robin (WDRR) scheduling
- Priority marking for end-to-end QoS support
- Layer 3 Ethernet features
 - Static routing
 - IP-aware QoS (IP ToS/IP DSCP)
 - IP SLA monitoring
- Other
 - General Framing Procedure (GFP)
 - Virtual Concatenation (high-order [HO] and low-order [LO] VCAT)
 - Link Capacity Adjustment Scheme (LCAS)

Timing and Synchronization

- Building Integrated Timing Supply (BITS)
 - 2 input
 - E1, 120 ohm
 - 2 output recovered from optical line
 - E1, 120 ohm
- Optical Line Timing
- Payload E1 Recovered Timing
- Payload E1 Re-Timing
- Stratum Level 3/G.813 internal holdover oscillator
- Synchronization status messaging (SSM)

Network Management Interface Support

- SNMP Versions 1, 2c, V3
- TL1 (GR-189-CORE and GR-833-CORE)
- CORBA Version T1M1.5 through Cisco Transport Manager EMS northbound interface

System Access

- 10/100BASE-T LAN, RJ-45
- TL1 through RJ-45 connector
- Remote: SDH regenerator section data communications channel (RS-DCC)
- Remote: SDH multiplex section data communications channel (MS-DCC)

Other Features

- Drop and continue
- Hairpinning
- Data communications channel (DCC) tunneling
- ITU G.7712 support

Regulatory and Standards

Industry Requirements

- Network Equipment Building Standards (NEBS) Level 3 (GR-1089-CORE and GR-63-CORE)
- SDH (ITU-T G.707, ITU-T G.783, ITU-T G.841)
- IEEE (802.1)

Safety

CAN/CSA-C22.2 No. 60950-1-03 1st Edition

GR-1089-CORE Level 3

IEC 60950-1/EN 60950-1, 1st Ed. (CB Report/Certificate with all country deviations)

- UL and cUL/CSA 60950-1 1st Ed

EMC Emissions

1. CISPR 22 (2006) Class A. This covers also compliance to FCC 47CFR15 (2007), EN55022 (2006), AS/NZS CISPR 22(2004), ICES 003(2004), VCCI(2007)
2. FCC 47CFR15 (2007) Class A
3. GR 1089 Issue 4 Class A

EMC Immunity

1. CISPR24(1997) +A1:2001) +A2:2002 / EN55024 (1998) +A1 :2001+A2 :2003, EN61000-6-2 (2005), EN300386 (2005),

This will cover compliance to WW requirements.

These standards refer to the following documents for test setup and test procedures:

EN61000-4-2 Electrostatic Discharge Immunity – Enclosure (2001)

EN61000-4-3 Radiated Immunity – Enclosure (2006+A1:2007)

EN61000-4-4 Electrical Fast Transient Immunity – DC, and Signal Ports (2004)

EN61000-4-5 Surge – DC, and Signal Ports (2006)

EN61000-4-6 Immunity to Conducted Disturbances – DC, Signal (2007)

Environmental

- GR-63-CORE
- 5% to 95% relative humidity (ETS 300 019-2-1 storage class 1.1)
- Transportation: ETS 300 019-2-2 class 2.3
- Operation: Industrial Temperature Rated at –40 to +65°C (ETS 300 019-2-3 class 3.1E with extended air temperature of class 3.4)¹
- GR-3108 Class 2 Equipment

¹ Selected cards

Service and Support

Cisco Systems® offers a wide range of services programs to accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. Cisco services help you to protect your network investment, optimize network operations, and prepare the network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, see [Cisco Technical Support Services](#) or [Cisco Advanced Services](#).

For More Information

For more information about the Cisco ONS 15310-MA, visit www.cisco.com or contact your local account representative.



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