



Q & A

SAN EXTENSION OVER SONET/SDH NETWORKS

The Cisco® ONS 15454 with the SL-Series card provides Cisco customers with carrier-class, private-line Fibre Channel/Fiber Connection (FICON) transport service integrated into a SONET/SDH optical transport platform. This document provides answers to frequently asked questions regarding this solution.

SL-SERIES OVERVIEW: FUNCTIONS, FEATURES, AND BENEFITS

Q. What is the SL-Series card?

A. The SL-Series card (part number ONS 15454 FC-MR-4) is a single-slot card for the Cisco ONS 15454 Multiservice Provisioning Platform (MSPP) and Multiservice Transport Platform (MSTP). The SL-Series card offers four client ports, each supporting 1.0625- or 2.125-Gbps Fibre Channel or FICON to a maximum of 2.4 Gb (OC48/VC-4).

Q. What platform supports the SL-Series card?

A. The card plugs into any new or existing Cisco ONS 15454 SONET/SDH or DWDM chassis supporting Rel 5.0 Software.. The SL-Series card can be deployed in any of the 4 high-speed (STS-48) slots in the 2.5-Gbps Cisco ONS 15454 systems and any of the 12 interface slots within the newer 10-Gbps Cisco ONS 15454 SONET SDH shelves.

Q. How many client-side interfaces does the SL-Series support?

A. Each SL-Series card offers 4 client ports, each supporting 1.0625- or 2.125-Gbps Fibre Channel or FICON. This yields the industry's highest Fibre Channel density: 16 protected, full line-rate 1-Gbps Fibre Channels (requires 2 OC-192 rings) or 40 subrate Fibre Channels per network element to a maximum of OC 48 (2.4 Gbps).

Q. What are the ONS 15454 system requirements necessary to deploy the SL-Series card?

A. SL-Series card deployments require a Cisco ONS 15454 platform equipped with timing, communications, and control (TCC-2) common cards and R5.0 or later software.

Q. Is the SL-Series appropriate for North American and global applications?

A. Yes. The same SL-Series line card plugs into any new or existing Cisco ONS 15454 SONET or SDH chassis, thus supporting North American and global applications today.

Q. What key features and functions does the SL-Series card provide?

- A.** Some of the key features and functions of the SL-Series include:
- Line-rate and sub-rate support for 1- and 2-Gbps Fibre Channel or FICON to a maximum of 2.4 Gb (OC48/VC-4)
 - Storage area network (SAN) extension over both SONET and SDH infrastructures
 - Use of generic framing procedure-transparent (GFP-T) to deliver low-latency SAN transport
 - Ability to take advantage of SONET/SDH resiliency schemes
 - Support for extended distances with innovative Buffer to Buffer credit management (Distance Extension)
 - Transport efficiency through subrating and virtual concatenation (Sub Rates based on STS-1Nv and STS-3c-Nv VCAT)

Q. Does the SL-Series offer any flexibility in client-side interface selection?

A. Yes, the SL-Series uses pluggable gigabit interface converter (GBIC) optical modules for the client interfaces, enabling greater user flexibility and the ability to invest in equipment as providers gain the customers to support those investments. Available GBICS include ONS-GX-2FC-MMI (850 nm Multi mode) and ONS-GX-2FC-SML (1310 nm Single Mode) which both support 1 Gb FC and 2 Gb FC.

Q. Does the SL-Series offer bandwidth efficiency? How?

A. The SL-Series offers subrate capability and VCAT. These features not only optimize the use of the SONET/SDH bandwidth, but also allow the service provider to offer Fibre Channel services at increments of 50 Mbps.

Q. Distance often becomes a barrier in SAN extension service delivery. How does the SL-Series card handle distance extension?

A. The SL-Series uses the buffer to buffer credits supported by the connected Fibre Channel switching devices to overcome distance limitations in 1- and 2-Gbps line-rate SAN extension applications. Furthermore, distance extension functions via R_RDY spoofing will enable the SL-Series to serve as an integrated Fibre Channel extension device, obviating the need for external SAN extension devices. The SL-Series solution support distances up to 2300 km at line rate 1 Gbps and 1150 km at 2 Gbps. The SL will support distances beyond 1150/2300 km with reduced throughput.

SL-SERIES TARGET MARKETS AND CUSTOMERS

Q. What are the target market segments and who are the target customers for the SL-Series card?

A. Although customers across several market segments may benefit from the SL-Series features, Cisco anticipates that the primary interest will be from Fortune 1000-type enterprises, many of whom will require a managed service solution. Managed service providers can gain additional revenue streams through new service opportunities over their existing infrastructures.

Q. What benefits does the SL-Series card deliver for enterprise customers?

A. The SL-Series offers the following key benefits to the enterprise customer:

- Operational ease—Storage IT experts do not have to become optical transport experts; they can simply purchase Fibre Channel services from a managed service provider.
- Disaster recovery/business continuance (DR/BC) planning—IT personnel are not restricted by the unavailability of dark-fiber availability between data centers. If dark fiber is unavailable, it is likely that MSP based SONET/SDH interconnect can be quickly obtained.
- Multiservice/platform convergence—The Cisco ONS 15454 provides enterprise customers with the ability to deliver multiple voice, data, video, and storage services from a single, high-availability platform.
- Single point of contact—When deployed as customer premises equipment (CPE), the customer has a single point of contact—the Cisco ONS 15454 MSPP/MSTP—for transport of Ethernet, storage, DWDM, and time-division multiplexing (TDM) services.

Q. What benefits does the SL-Series card deliver for service provider customers?

A. The SL-Series offers the following key benefits to the service provider customer:

- Maximize service creation from existing networks—The Cisco ONS 15454 protects investments because it enables service providers to use their existing infrastructures to generate incremental service revenues and reduce customer churn by adding new services or bandwidth without network disruption.
- Maximum flexibility and service coverage—The Cisco ONS 15454 offers the industry's broadest array of service and transport options from a single platform. The platform also supports all network topologies (for example, unidirectional path-switched ring [UPSR], bidirectional line-switched ring [BLSR], mesh, linear, automatic protection switching [APS], etc.) and allows service providers to choose protection schemes based on their network requirements.

- Converged network infrastructure—The Cisco ONS 15454 combines the functions of legacy add-drop multiplexers (ADM)s, cross-connect systems, and next-generation optical transport in a single solution. The result is a platform that delivers more features from a smaller footprint, requires less power, and is significantly more flexible than traditional ADMs. This solution enables service providers to reduce capital and operating expenses.

SL-SERIES STANDARDS COMPLIANCE AND INTEROPERABILITY

- Q.** Does the SL-Series card support standards-based encapsulation?
- A.** Yes, the SL-Series supports ITU-T G.7041 GFP-T for SONET and SDH encapsulation.
- Q.** What storage switching devices does the SL-Series interoperate with?
- A.** Its standards-based client interfaces allow the SL-Series to interoperate with storage switching devices from all leading vendors, including the Cisco MDS 9000 Family, EMC, IBM, HDS, and McData.
- Q.** Will the SL-Series card be certified with original storage manufacturers (OSMs)?
- A.** Yes. OSM certification is a critical component of any SAN extension product. The SL-Series is currently certified by EMS and HDS, and is in the certification process with IBM and Hewlett-Packard.
- Q.** Does the SL-Series card provide customers with any investment protection or future-proof design characteristics?
- A.** Yes, as demonstrated on the ML-Series line card, new features will be added to the SL-Series line card in software releases, without requiring new hardware and with no impact to the existing infrastructure.

SL-SERIES PROVISIONING

- Q.** Distance Extension or Buffer to Buffer Credits...how is it enabled? Is it software provisionable?
- A.** Yes. Distance Extension (B2B Credit Management and R-RDY spoofing) can be enabled for the SL cards either via CTC or through TL1 commands. Each port can be separately enabled for DE (Distance Extension).
- Q.** Is the SL card transparent to customer FC control packets for buffer to buffer credits?
- A.** The SL card is essentially transparent; however, in the 5.0 S/W Rel we do implement Distance Extension (B2B credit management (255 BC Per Port) and R_RDY Spoofing. When enabled the FC Flow Control is terminated and the B2B Credit algorithm manages the flow of FC packets across the SONET Link.
- Q.** How does the SL card implement the Distance Extension and determine if it's working?
- A.** When Distance Extension mode is enabled on a specific port via TL1 or CTC, it starts a negotiation process with the remote SL card. If the other end is also enabled for DE then the ports continue to operate. If the SL partner card is not enabled with DE, then there will be an alarm raised indicating the failure (Distance Extension Mismatch Alarm).
- Q.** Are there Performance Monitoring Features on the SL cards?
- A.** Yes, there are PM statistics for GFP, SONET, and FC along with a variety of Alarms available through CTC, CTM, or TL1.
- Q.** With respect to UPSR, what happens after a switch from the working to the protect path when there are differing latencies on the two paths have?
- A.** Latency will be dependent on the path delay of the different spans before and after switch. Since we support B2B Credit Management and R-RDY spoofing in S/W 5.0, we detect the change in the path latency after a switchover and then adjust our buffers to reduce the latency.

Q. How many STS are required for line-rate FC (18, 19, 21, or 24)? Do we encap the entire 8B10B coded signal (1.062 Gb) or strip off the coding and pass only the user data where 800 Mbps would be sufficient?

A. STS-3c-6v would be required. With STS-1-Nv supported, STS-1-18v would support a line rate of 850 Mbps after converting 10b to 8b and STS-1-19v when Distance Extension is used.

Q. What is the application layer impact of “spoofing”? Isn’t this undermining the intent of the protocol to synchronize I/O between local and remote file systems?

A. No. When executing synchronous backups and a read/write command to is sent to the remote system, that action will only be considered complete when the local source has received a complete status from the remote end. So while we spoof the source and it ends up transmitting a higher number of frames than it would without B2B Credit management, the application layer will not consider the action successful until the proper acknowledgments have been received. As would be the case without B2B Credits enabled.

SL-SERIES POSITIONING

Q. The Cisco ONS 15530 and ONS 15540 also have Fibre Channel and FICON interfaces. When and why should a customer choose a Cisco ONS 15454 with an SL-Series card versus a Cisco ONS 15500 platform?

A. Although the Cisco ONS 15500 Series also offer Fibre Channel and FICON interfaces (as well as ESCON), these products address different applications:

- The Cisco ONS 15530 and ONS 15540 Metro DWDM solutions are designed for large enterprises that have access to dark-fiber, geographically dispersed-parallel-sysplex (GDPS) environments for large-scale ESCON implementations, and non-incumbent local exchange carrier (ILEC) and non-interexchange carrier (IXC) service providers offering managed optical services.
- The Cisco ONS 15454 with an SL-Series card is designed for the service providers seeking to enhance their managed services portfolio with a SAN extension offering. This solution will be particularly attractive to these customers when there is a need for a limited number of Fibre Channel/FICON service requirements and deployments.

**Corporate Headquarters**

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters

Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters

Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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