Tellabs® Titan® 5500 Digital Cross-Connect System — Consolidated Core Switch

Expanded capacity with a smaller footprint saves space and conserves power compared with standard configurations.

Overview

The Tellabs® Titan® 5500 Digital Cross-Connect System (DCS) Consolidated Core Switch (CCS) expands the maximum capacity to 4608 STS-1 equivalents (STS-1e) from the previous maximum of 3072, with the capability to expand up to 6144. It can be deployed as a standalone system or be used as an expansion switch matrix for existing Tellabs Titan 5500 DCS Standard Core Switch (SCS) systems.

The Tellabs Titan 5500 DCS 4608 CCS switch matrix resides in a single shelf, with 2 shelves required for redundancy. A fully redundant switch matrix, along with Administrative Complex (AC) shelves, fits into just 2 bays — compared to the 9 bays required for a SCS 3072 configuration. In addition, Tellabs continues the commitment to support existing equipment in customers’ networks by providing the capability to expand any existing Tellabs 5500 SCS (256, 1024, 1536 and 3072 core sizes) to over 4K core size with as little as one additional bay of equipment. This capability offers significant savings in both floor space and power consumption compared to current standard density core configurations.

Features and Benefits

- 4608 STS-1 (240G) total capacity in 2 shelves
  - 100% Non-blocking matrix
  - Full STS-1 and VT1.5 grooming capability
    - Native support of DS1 interfaces — no adjuncts
    - Supports STS-1e, DS1, DS3, OC-3, OC-12 and OC-48 interfaces
  - Full transmux capability
  - Centralized management
  - Consolidates 12 bays of equipment into 2 shelves
- Designed for high reliability
  - 1+1 redundant switch shelves
  - Physical separation of switch complexes
- Full suite of Tellabs Titan 5500 DCS features
  - ASIST, bridge & roll, performance monitoring, test access, trace route, etc.
- Designed for easy expansion of port capacity
- Tellabs Titan 5500 DCS reliability stats exceed 99.99975%

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General Specifications

Dimensions
- Height: 22.75 in (57.8 cm)
- Width: 21.5 in (54.6 cm)
- Depth: 15.0 in (38.1 cm)
- Mounts in 23-in rack

Power – fully equipped (per shelf)*
- < 860 Watts at -48V DC
- < 17.8A at -48V DC
- < 20.4A at -42V DC
- Breaker size: 50 amp

Normal operating temperature range
- 41°F to 104°F (5°C to 40°C)
- Meets normal operating temperature range requirements specified in Telcordia GR-63-CORE (NEBS)

Short-term operating temperature range
- 23°F to 122°F (-5°C to 50°C) for no more than 96 consecutive hours, and a total of no more than 15 days per year

Operating relative humidity range
- 5%–85% (non-condensing)

Operating short-term relative humidity
- 5% to 90%, but not to exceed 0.024 pounds of water per pound of dry air for no more than 96 consecutive hours, and a total of no more than 15 days per year

Operating altitude range
- From 196 feet (60 m) below mean sea level up to 13,000 feet (4,000 m) above mean sea level — manufacturer will provide special requirements for installations above 1800 m

* For current 4608 STS-1 configuration. Shelf is designed for up to 6144 STS-1 to allow for future expansion.

Technical References (TR)
- TR-TSY-000191, Alarm Indication Signal Requirements and Objectives, Bellcore, Issue 1, May 1986
- TR-NWT-001244, Clocks for the Synchronized Network: Common Generic Criteria, Issue 1, Bellcore, June 1993
- TR-TSY-000012, MML Requirements, Issue 1, Bell Communications Research, January 1985

Technical Advisories (TA)

Generic Requirements (GR)
- GR-820-CORE, Generic Digital Transmission Surveillance, Issue 1, November 1994
- GR-1400-CORE, SONET Dual-Fed Unidirectional Path Switched Ring (UPSR) Equipment Generic Criteria, Issue 1, March 1994
- GR-2914-CORE, Human Factors Requirements for Equipment to Improve Network Integrity, Issue 1, December 1995
- GR-2924-CORE, Generic Requirements for National MCUP Committee CSCANS, Issue 1, April 1996

See tellabs.com for more information about Tellabs Solutions
- GR-815-CORE: Generic Requirements for Network Element/Network System (NE/NS) Security, Issue 1, Bellcore, November 1997
- GR-472-CORE, Network Element Configuration Management, Issue 2, November 1996
- GR-78-CORE, General Requirements for the Physical Design and Manufacturing of Telecommunications Products and Equipment, Issue 1, Bellcore, September 1997
- GR-2996-CORE, Generic Requirements for SONET Digital Cross-Connect Systems, Issue 1, Bellcore, January 1999

Special Report (SR)
- SR-332, Reliability Prediction Procedure, Issue 1, Bellcore, May 2001
- SR-3528, NEBS Criteria Levels, Issue 1, Bellcore, November 1995

ANSI Documentation
- ANSI T1.102-1993, American National Standard for Telecommunications, Digital Hierarchy — Electrical Interfaces
- ANSI T1.231-1993, American National Standard for Telecommunications, Digital Hierarchy — Layer 1 In-Service Digital Transmission Performance Monitoring
- ANSI T1.105.03-1994, American National Standard for Telecommunications — Synchronous Optical Network (SONET) — Jitter at Network Interfaces
- ANSI T1.105.03a-1995, American National Standard for Telecommunications — Synchronous Optical Network (SONET) — Jitter at Network Interfaces — DS1 Supplement
- ANSI T1.403-1989, American National Standard for Telecommunications, Carrier-to-Customer Installation — DS1 Metallic Interface
- ANSI T1.107a-1990, American National Standard for Telecommunications, Digital Hierarchy — Supplement to Formats Specifications — (DS3 format applications)
- ANSI T1.403.02-1999, American National Standard for Telecommunications, Network and Customer Installation Interfaces — DS1 Robbed-Bit Signaling State Definitions
- ANSI/IEEE 802.3i-1990 (Supplement to ISO/IEC 8802-3 — 1990/ANSI/IEEE Std. 802.3-1990) System Configurations for Multiple-segment 10 MB/s Baseband Networks (Section 13) and Baseband Medium Attachment Unit (MAU) and Baseband Medium Type 10BASE-T (Section 14)
- ANSI T1.245-1995, American National Standard for Telecommunications — Directory Service for Telecommunications Management Network (TMN) and Synchronous Optical Network (SONET) Interfaces between Operations Systems and Network Elements

ITU Documentation

See tellabs.com for more information about Tellabs Solutions
- ITU-T Recommendation G.783 (02/2004), Characteristics of Synchronous Digital Hierarchy (SDH) Equipment Functional Blocks
- ITU-T Recommendation G.783 Corrigendum 1 (06/2004)
- Recommendation G.823, The Control of Jitter and Wander Within Digital Networks which are Based on the 2048 Kbps Hierarchy, CCITT, 1988
- Recommendation X.25, Interfaces Between Data Terminal Equipment (DTE) and Data Circuit-Termination Equipment (DCE) for Terminals Operating in the Packet Mode and Connected to Public Data Networks by Dedicated Circuit, CCITT, 1988
- Recommendation Q.920, ISDN User-network interface — Data link layer — General Aspects, CCITT, 1988
- Recommendation K.41 Resistibility of Internal Interfaces of Telecommunication Centers to Surge Overvoltages, 05/98
- Recommendation G.704 Synchronous Frame Structures Used at 1544, 6312, 2048, 8488 and 44,736 kbps Hierarchical Levels, 07/95
- Recommendation G.747 Second Order Digital Multiplex Equipment Operating at 6312 kbps and Multiplexing Three Tributaries at 2048 kbps, 1993
- Recommendation G.775 Loss of Signal (LOS) and Alarm Indication Signal (AIS) Defect Detection and Clearance Criteria, 11/94
- Recommendation G.826 Error Performance Parameters and Objectives for International, Constant Bit Rate Digital Paths at or above the Primary Rate, 8/96
- ITU-T Recommendation G.707 Corrigendum 1 (06/2004)
- ITU-T Recommendation G.7041 (08/2005), Generic Framing Procedure (GFP)
- ITU-T Recommendation G.7042 (02/2004), Link Capacity Adjustment Scheme (LCAS) for Virtual Concatenated Signals
- ITU-T Recommendation G.7042 Amendment 1 (02/2005 prepublished)
- ITU-T Recommendation G.7042 Amendment 2 (08/2005 prepublished)
- ITU-T Recommendation G.806 (02/2004), Characteristics of Transport Equipment — Description Methodology and Generic Functionality
- ITU-T Recommendation G.806 Amendment 1 (06/2004)
- ITU-T Recommendation G.806 Corrigendum 1 (06/2004)
- ITU-T Recommendation G.806 Corrigendum 2 (01/2005)
- ITU-T Recommendation X.86 (02/2001), Ethernet over LAPS
- ITU-T Recommendation G.8010/Y.1306 (02/2004), Architecture of Ethernet Layer Networks
- ITU-T Recommendation X.85/Y.1321 (03/2001), IP over SDH Using LAPS

**ETSI Standards**

**AT&T Documentation**
- AT&T TR 54016, Requirements For Interfacing Digital Terminal Equipment To Services Employing the Extended Superframe Format, AT&T, September 1989

See tellabs.com for more information about Tellabs Solutions
EIA Documentation

UL Documentation

U.S. Government Publications

Canadian Standards Association Documentation
- CSA — C22.2, No. 950-95, Safety of Information Technology Equipment, Including Electrical Business Equipment

ISO Documentation
- ISO 8208, Data Communications — X.25 Packet Level Protocol for Data Terminal Equipment, September 1987
- ISO/IEC 8473:1988, Information processing systems — Protocol for providing the connectionless-mode network service
- ISO/IEC 8473:1988/Add.3:1989, Information processing systems — Data communications — Protocol for providing the connectionless-mode network service, ADDENDUM 3: Provision of the underlying service assumed by ISO 8473 over subnetworks which provide the OSI data link service
- ISO/IEC 9542/First Edition 1988, Information processing systems — Telecommunications and Information exchange between systems — End system to Intermediate system routing exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode Network Service (ISO 8473)
- ISO/IEC 10589:1992, Information technology — Telecommunications and Information exchange between systems — Intermediate system to Intermediate system Intra-domain routing information exchange protocol for use in conjunction with the Protocol for providing the connectionless-mode Network Service (ISO 8473)
- ISO/IEC DIS 10733 (1991), Information technology — Telecommunications and Information exchange between systems — Elements of management information relating to OSI Network Layer standards
- ISO/IEC 8073 (1988), Information processing systems — Open Systems Interconnection — Connection-oriented transport protocol specifications — Addendum 2: Class four operations over connectionless network service

SONET Interoperability Forum (SIF/NSIF) Documents
- SIF-AR-9903-034R2, Proposed requirements for TL1 over TCP, (Draft Company Contribution)
- SIF-AR-9903-035-R2, Proposed Requirements for TL1/TCP — TL1/OSI Gateway (T-TD), (Draft Company Contribution)
- SIF-110-0495R1 (1995) TARP Cleanup, SONET Interoperability Forum
- SIF-019-1998, Interoperability Requirements for TARP(SIF-AR-9803-059R1), (Approved)

Internet Engineering Task Force RFCs
- RFC 768, User Datagram Protocol
- RFC 792, Internet Control Message Protocol, DARPA Internet Program Protocol Specification
- RFC 793, Transmission Control Protocol, DARPA Internet Program Protocol Specification
- RFC 814, Names, Addresses, Ports and Routes
- RFC 826, An Ethernet Address Resolution Protocol (ARP)
- RFC 854, TELNET Protocol Specification
- RFC 903, A Reverse Address Resolution Protocol
- RFC 950, Internet Standard Subnetting Procedure
- RFC 959, File Transfer Protocol (FTP)
- RFC 1010, Assigned Numbers
- RFC 1011, Official Internet Protocols
- RFC 1034, Domain Names — Concepts and Facilities
- RFC 1035, Domain Names — Implementation and Specification
- RFC 1058, Routing Information Protocol
- RFC 1062, Internet Numbers

See tellabs.com for more information about Tellabs Solutions
RFC 783, The TFTP Protocol — Revision 2
RFC 1662, PPP in HDLC-like Framing
RFC 1663, PPP Reliable Transmission
RFC 1661, The Point-to-Point Protocol (PPP)
RFC 3518, The Bridging Control Protocol (BCP), April 2003
RFC 1570, PPP LCP Extensions, January 1994
RFC 1989, PPP Link Quality Monitoring, August 1996
RFC 2131, Dynamic Host Configuration Protocol, March 1997
RFC 2132, DHCP Options and Vendor Extensions, March 1997
RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers
RFC 4251 The Secure Shell (SSH) Protocol Architecture
RFC 4252 The Secure Shell (SSH) Authentication Protocol
RFC 4253 The Secure Shell (SSH) Transport Layer Protocol
RFC 4254 The Secure Shell (SSH) Connection Protocol
RFC 4255 Using DNS to Securely Publish Secure Shell (SSH) Key
RFC 4256 Generic Message Exchange Authentication for the Secure Shell Protocol (SSH)

RFC 4419 Diffie-Hellman Group Exchange for the Secure Shell (SSH) Transport Layer Protocol
RFC 4432 RSA Key Exchange for the Secure Shell (SSH) Transport Layer Protocol
RFC 3927 Dynamic Configuration of IPv4 Link-Local Addresses

IEEE Documentation
IEEE 802-2001, Local and Metropolitan Area Networks: Overview and Architecture
IEEE 802.1D-2004 Media Access Control (MAC) Bridges (includes 802.1t, 802.1w)
IEEE 802.1Q-2003, Virtual Bridged Local Area Networks (includes 802.1u, 802.1v, 802.1s)
IEEE 802.3-2002, CSMA/CD access method and physical layer specification (includes 802.3ad)

Metro Ethernet Forum Documentation
Technical Specification MEF 6 Ethernet Services Definitions — Phase 1, June 2004
Ethernet Service Attributes Phase 1, MEF 10 November 2004

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