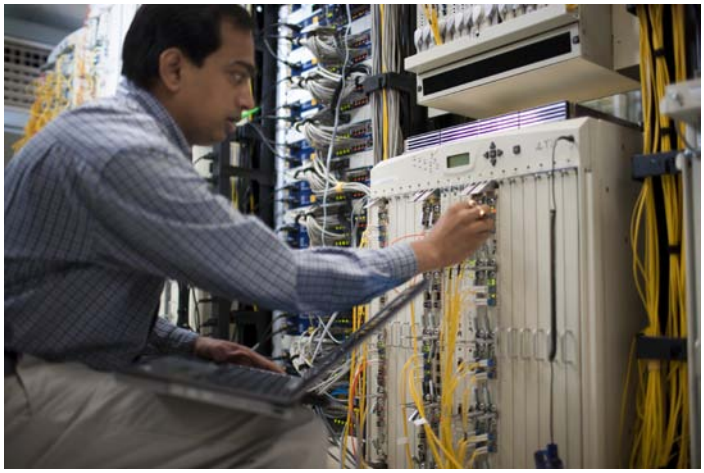
Tellabs® 8800 Multiservice Router Series

High-performance, carrier-class multiservice edge routers that enable new services and network convergence.

Overview

The Tellabs 8800 Multiservice Routers provide an industry leading platform for convergence of diverse routing and switching functions. Broad support for network protocols and standards based data solutions enable the Tellabs 8800 MSR to serve as a core and provider edge router for carriers around the globe in mobile backhaul, converged fixed-mobile environments, legacy network migration, and carrier Ethernet services.

The Tellabs 8800 MSR series concurrently supports any-to-any Layer 2 and Layer 3 network and service interworking. It provides service providers integration of legacy networks with Multi-Protocol Label Switching (MPLS)-enabled IP networks. The Tellabs 8800 MSR series enables connection-oriented network characteristics, flexible Quality of Service (QoS) and security with powerful MPLS traffic engineering capabilities, while maintaining the superior scalability and flexibility of pure IP networks.



Add new services to your existing network, while using any combination of technologies your customers request

Feature Highlights

Comprehensive Standards-based Signaling and Routing Support

The Tellabs 8800 MSR series supports simultaneous IP, ATM, FR and MPLS control planes and pseudowire service interfaces. It has one of the industry's first ATM/MPLS control plane interworking implementations. Tellabs was the driver and active contributor behind the ATM and MPLS control plane interworking technical specification at the MFA Forum and remains unique in the industry in support of control plane interworking of MPLS and ATM signaling over end to end circuits.

In addition to UNI and NNI support for ATM, FR and UNI for carrier Ethernet, the Tellabs 8800 series uses LDP and RSVP-TE for MPLS signaling and traffic engineering. Moreover, it supports hierarchical and distributed PNNI for ATM routing and highly scalable MPLS and IP routing protocols such as BGP, MP-BGP, OSPF, IS-IS and PIM-SM.

Any-to-Any True Service Interworking at Line Rate

Based on pseudowire architecture, a unified MPLS core for Layer 2 services and TDM transport enables any customer with any Layer 1 or Layer 2 access technologies such as ATM, FR, Ethernet/VLAN, metro Ethernet, TDM, PPP and HDLC to communicate with each other, regardless of access media. All I/O slots can support complex any-to-any service interworking at 10 Gbps packet forwarding and switching speed while performing lookup and filtering tasks. Interworking of routing and switching domains is available through flexible IRB interfaces.

Any Service, Any Channel, Any Port

The Tellabs 8800 series supports the industry's most comprehensive and flexible multiservice interfaces. Single interface modules can be configured on a port by port basis to support: IP, MPLS, PPP/POS, HDLC, ATM, FR, EoS, TDM, pseudowire circuits and link aggregation.

The multiservice Universal Line Card (ULC) card can simultaneously support packets, cells, frames, TDM circuits, and mixing and matching of any Ethernet and SONET/SDH Physical Line Modules (PLM). A single unified version of the Tellabs multiservice operating system supports the complete set of interface types and services.

Per-Flow Guaranteed QoS

State-of-the-art, custom Application-Specific Integrated Circuit (ASIC) technology optimizes performance and traffic management. Per-Flow Queuing (PFQ) with Connection Admission Control (CAC) at both the port and LSP level to consistently ensure end-to-end, deterministic, hardware-based QoS across different service types, including traditionally best-effort IP and Ethernet services. Each line card supports tens of thousands of Per-Flow Queues (PFQs). As an example, the Tellabs® 8860 support s up to 512,000 PFQs per chassis.

Carrier-Class Reliability

The Tellabs 8800 series is a fully redundant platform providing carrier-class reliability. It offers immediate forwarding and hitless service preservation for all Layer 2 and Layer 3 services. The Tellabs 8800 series supports Service Assured Upgrade: a carefully designed non-service affecting TMOS upgrade procedure. Based on a real-time, modular software architecture, the Tellabs® Multiservice Operating System (TMOS) software is field-proven and time tested in more than 50 carrier networks worldwide.

Next Generation Ethernet Support

The Tellabs 8800 series provides Metro Ethernet Forum (MEF) certified Ethernet E-Line and E-LAN services, Ethernet over MPLS, Ethernet over ATM, Ethernet over FR and Ethernet over SONET (EoS) for both VPLS and Q-in-Q implementations. Interworking is proven in multiple networks around the world in a multivendor environments as well as networks built in conjunction with other Tellabs platforms such as the 8600 Multiservice Edge Switch (MES) and 7300 Ethernet Edge Switch.

In addition, the Tellabs 8800 series supports per-flow guaranteed QoS with CAC for all types of Ethernet services and was field-proven in one of the world's largest metro-Ethernet deployments since 2003. The Ethernet Optimized ELC (Ethernet Line Card) provides Ethernet port scalability within a single Tellabs 8800 node.

Redundancy and OAM Protocol Support

Network uptime is a primary concern as carriers merge a variety of network elements and services into single unifed designs. A broad set of redundancy and resiliency options are required to all network operators to design robust networks.

The Tellabs 8800 MSR supports a wide variety of features at multiple networking layers which can lead to sophisticated multi-protocol resilience solutions. OAM protocols support resiliancy by notifing administrators of network failure, automatically responding to failures and trouble shooting network problems as they occur or during post-mortem root cause analyses.

As a multiservice platform, the Tellabs 8800 MSR supports redundancy options for a wide variety of protocols, From APS/MPS for SONET/SDH, LAG for Ethernet ports, ECMP, VRRP, VCCV, and PW redundancy for IP.MPLS networks. Troubleshooting mechanism include Ping and/or trace for a variety of services, as well as integration of recently ratified Ethenret OAM standards: 802.3ah, 812.1ag and Y.1731/

Customer Benefits

Enhanced Service Level Agreements (SLA)

The Tellabs 8800 series opens up new revenue streams by offering meaningful SLAs. These SLAs extend hardware-based QoS contracts previously available only for ATM circuits to new broadband data services based on Ethernet, MPLS, and IP. Mission-critical services can now exist on technologies previously limited to traditional best-effort performance.

Superior Traffic Management

Per-port policies defining service contracts for each customer flow are honored and can be used to support end-user SLAs. The state-of-the-art custom ASIC technology provides deterministic and granular per-flow and per-service bandwidth management. Service-aware queuing techniques and traffic shaping help ensure predictability through varying levels of network utilization. Queues, policers, and shapers are defined for each customer'straffic for granular service definition.

Evolutionary Migration of Legacy Networks

The Tellabs 8800 series supports open, standards-based software and hardware to interface with legacy equipment and protocols. Deployed legacy multiservice networks can be integrated with the Tellabs 8800 series-based network as part of a nondisruptive migration.

Enabling New Revenue Streams

With the enhanced SLA and superior MPLS traffic engineering, the Tellabs 8800 MSR series enables service providers to offer high-growth Ethernet services using VPLS, Q-in-Q interfaces, multi-class pseudowires, and L3 MPLS VPN services (RFC 2547bis/4364), while supporting legacy ATM and FR services from the same platform.

Guaranteed Service Availability

Tellabs® ServiceAssured™ Upgrade (SAU) assures no, non-service affecting product upgrades, Layer 2 and Layer 3 redundancy, in-service network expansion and distributed processing to maximize fault tolerance and performance. Carrier-class design provides full redundancy in common equipment and software resiliency features enable maximum service and network uptime.

Investment Protection

While increasing the breadth of the service portfolio, the Tellabs 8800 series extends service providers' investment in legacy network equipment by scaling its capacity as customer demands grow, without forklift upgrades. With significant high-density and high-speed capabilities, the Tellabs 8800 series accommodates growth in both end-user traffic and services. The switch fabric is highly scalable, providing up to 720 Gbps of nonblocking performance in a single chassis.

CapEx Reduction

Service providers frequently maintain multiple core service networks based on the individual end-customer services and infrastructure elements that are not easily migrated to new IP/MPLS VPN service.

The Tellabs 8800 series provides a consolidated network infrastructure, collapsing multiple overlay networks to reduce the total number of network elements. Capital expenditures are further reduced with industry-leading technology, density and performance improvement.

OpEx Reduction

The Tellabs 8800 series enhances service flexibility and adds network based OAM functions to help service providers reduce truck rolls, lower spares inventory, and minimize operational costs:

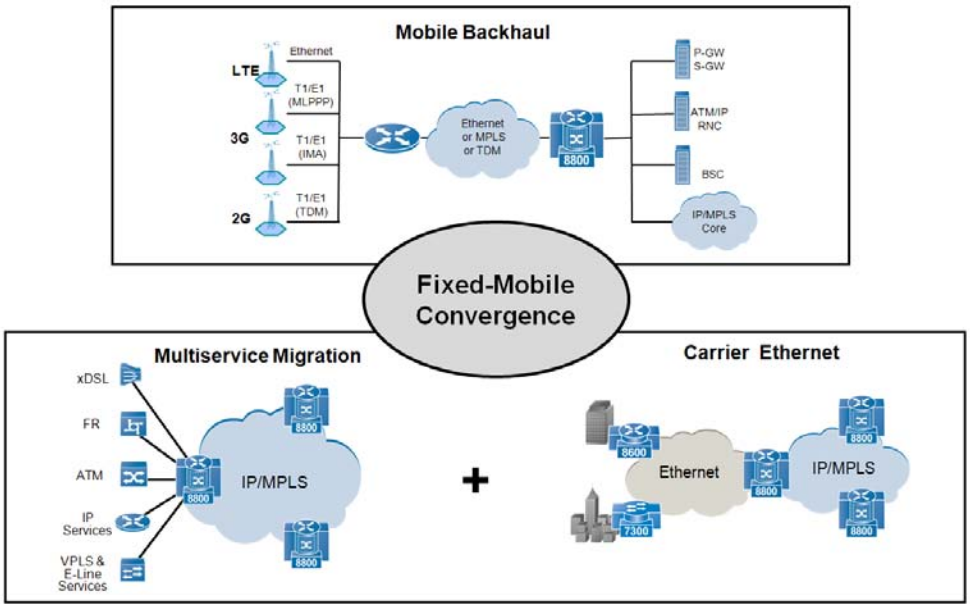
- A single ULC that accepts a flexible set of mix and matched PLMs spanning T1/E1 to OC-192/ STM-64 or 10/100 Ethernet to 10 GigE.
- Software-defined service edge enables any physical or logical port, channel or flow to be software configured to provide IP, FR, ATM, MLPPP, PPP, HDLC, MPLS or TDM.

In addition, the effective use of rack space further reduces operational complexity of managing multiple networks or network layers in the service provider network. Reduced operations costs are facilitated to bring greater profits and revenues.

Applications and Services

The Tellabs 8800 series enables service providers to offer a variety of services on converged network architecture, enabling new revenue opportunities while maintaining their legacy investments:

- Layer 1/Layer 2 Legacy Services
  - Private line service via TDM circuit emulation
  - ATM service (Layer 2 VPN)
  - FR service (Layer 2 VPN)
- Ethernet Transparent LAN Services (L2 VPN)
  - 802.1Q
  - 802.1ad Provider Bridge/VLAN Stacking
  - VPLS and H-VPLS for large-scale multipoint-to-multipoint connectivity
- Layer 2 Service Interworking
  - Bridged and route
  - FR to ATM
  - ATM to Ethernet
  - FR to Ethernet
- Layer 2 VPNs
  - Virtual Private Wire Services (VPWS)
  - Virtual Private LAN Services (VPLS)
- IP Routing and Layer 3 VPNs
  - Layer 3 BGP/MPLS VPNs
  - IP VPN using GRE
- Broadband Aggregation
  - DSLAM aggregation and backhaul using Ethernet or ATM
  - Metro Ethernet aggregation
  - ATM VPI/VCI mapping to Q-in-Q
- High-Speed Access
  - EoS (X.86) and GFP
  - Broadband Internet access
  - IP-enabled FR service
  - IP-enabled ATM service
- Wireless Transport
  - TDM circuit optimization for 2G transport
  - 3G migration
  - 4G/LTE migration
  - Wireless backhaul
  - RAN aggregation
  - Wireless core
- Triple Play Services
  - IP telephony
  - IPTV
  - Broadcast TV
  - VoIP



Tellabs® 8800 Multiservice Router Series sample services

Tellabs 8800 Series Architecture

- 6 slots (Tellabs® 8830 Multiservice Router),
- 15 slots (Tellabs® 8840 Multiservice Router)
- 19 slots (Tellabs® 8860 Multiservice Router).

All three models share a wide range of interfaces with unmatched service flexibility, enabling service providers to deliver business-class MPLS, IP and carrier Ethernet services, legacy packet based Frame Relay (FR) and Asynchronous Transfer Mode (ATM), and traditional Time Division Multiplexing (TDM) private leased line services. Transport speeds range from N x DS-0 to OC-192c/STM-64 with Ethernet services provided from 10 Mbps to 10 Gbps. The Tellabs 8800 MSR series scales from 80 to 720 Gbps in a fully redundant, non-blocking shelf.

Each router chassis combines a centralized switch fabric, built from redundant switching elements. The chassis is outfitted with fully redundant power supplies, cooling fans, and backplane paths to support a variety of multiservice and Ethernet-optimized line cards. The hardware architecture is designed to meet the 99.999% uptime requirements of carrier-class Central Office equipment.

Switch and Control Cards (SCC)

SCCs are the central resource of the Tellabs 8800 MSR series for both data-plane switching and the control and management functionality. The highly scalable, efficient and redundant switch fabric is distributed across multiple SCCs to enhance redundancy. The SCCs provide N:1 automatic, hot-standby redundancy for the entire Tellabs 8800 series and data plane load sharing.

The switch fabric has the following switching and fault tolerant features:

- Fully nonblocking switching architecture
- Highly efficient and deterministic performance
- Instantaneous routing/switching around internal failures
- Scalable single-stage, low-latency design to achieve up to 720 Gbps in a single chassis

Universal Line Card (ULC)

All ULCs are hot-swappable multiservice line cards. In contrast to legacy systems with cell or packet-specific processing cards, the ULC provides both native cell and packet switching at the same time. Therefore, the ULC significantly reduces service provider card types, sparing inventory and operations complexity.

Tellabs custom ASICs, supporting low-latency and line-rate performance at all packet sizes provide the packet processing and traffic management functionality of the ULC. Each standard ULC accommodates a number of Physical Line Modules (PLM) to support interface types, ranging from T1/E1 to OC192/STM64 and from 10/100 Ethernet to 10 GE.

Physical Line Modules (PLM)

PLMs provide interchangeable interface module support for the ULC. The combination of ULC-based packet processing with PLM interface options enables the industry leading flexibility of the Tellabs 8800 'Any-Service Any-Port' line card design. All PLM types can be interchanged and interworked with each other in the Tellabs 8800 MSR series.

The Tellabs 8800 series delivers one of the industry's best SONET/SDH channelization. SONET/SDH PLMs are available in rates ranging from OC-3/STM-1 through OC-192/STM-64. The OC-192/STM64 and the 10 GigE PLMs require one ULC and hence displace four standard PLMs. All channelized SONET/SDH interfaces are completely flexible in terms of channel (STS-1 through STS-48c) assignment or concatenated operations.

With the software-defined service edge feature, service providers can define any protocol (FR, ATM, EoS, PPP, MPLS and TDM) on a per-channel basis via software configuration. Specialty modules support L2 circuit types such as MLPPP, IMA, and circuit emulation.

Ethernet Line Card (ELC)

ELCs are optimized for Ethernet interface density. ELC combine the functions of both the ULC (packet processing) and PLM (interface modules) for Ethernet services in a single compact line card that consumes half of a standard ULC slot. This results in a doubling of the GE and 10GE interface throughput on the Tellabs 8840 and 8860 MSR chassis. ELC provide complete backwards compatibility with the multiservice ULC.

Innovative SLAs can be provisioned and managed on the ELC and ULC with:

- Per-flow policing, queuing and shaping
- Per-flow congestion detection and avoidance
- Support of all QoS classes regardless of service types
- Support of IP QoS based on Differentiated Services (DiffServ) classes of service
- Support of Ethernet CoS based on IEEE 802.1p
- Wire-speed IP forwarding and processing with complex lookup and filtering mechanisms
- Support of 32,000 flows per line card and 512,000 flows per chassis

Combined with the switch fabric, the Tellabs 8800 MSR line cards provide the ability to offer integrated and highly efficient data forwarding across multiple services.

	Tellabs® 8830 MSR	Tellabs® 8840 MSR	Tellabs® 8860 MSR
Undirectional Switching Capacity	80 Gbps	576 Gbps	720 Gbps
Bandwidth per Slot	20 Gbps	48 Gbps	48 Gbps
Chassis Design	Midplane	Backplane	Backplane
No. of SCC per Chassis	2	3	3
No. of ULC per chassis	4	12	16
No. of ELC per chassis	N/A	24	30
ULC per chassis Redundancy	1:1 Redundancy on all common system elements: power supplies, cooling, BITS inputs, Stratum 3 internal clocks, etc.	N:1 Redundancy on all common system elements: power supplies, cooling, BITS inputs, Stratum 3 internal clocks, etc.	N:1 Redundancy on all common system elements: power supplies, cooling, BITS inputs, Stratum 3 internal clocks, etc.

	Tellabs® 8830 MSR	Tellabs® 8840 MSR	Tellabs® 8860 MSR
Redundancy	1+1 Control Plane Redundancy: rovides non-stop reliability, mirror state from primary to secondary SCC	1+1 Control Plane Redundancy: provides non-stop reliability, mirror state from primary to secondary SCC	1+1 Control Plane provides non-stop reliability, mirror state from primary to secondary SCC
	1:1 Forwarding Plane Redundancy: 100% available internal bandwidth in case of unlikely switch fabric failure	N:1 Forwarding Plane Redundancy: switch fabric will load share across all three SCCs	N:1 Forwarding Plane Redundancy: switch fabric will load share across all three SCCs
	1:8 switch fabric component redundancy for graceful degradation	1:12 switch fabric component redundancy for graceful degradation	1:12 switch fabric component redundancy for graceful degradation
	In-service insertion and removal of system components and physical interfaces	In-service insertion and removal of system components and physical interfaces	In-service insertion and removal of system components and physical interfaces
Mechanical Dimensions	Height: 14 in / 35.6 cm Width: 17.5 in / 44.4 cm Depth: 23.5 in / 59.7 cm	Height: 35 in / 88.9 cm Width: 17.3 in / 43.9 cm Depth: 29 in / 73.7 cm	Height: 35 in / 88.9 cm Width: 21.6 in / 54.9 cm Depth: 29.5 in / 74.9 cm
No. of chassis per 7 ft rack	5	2	2
Weight (fully configured)	160 lbs (72 kg)	390 lbs (176 kg)	470 lbs (213 kg)
Cooling	– Dual fan trays with 7 fans each – Side to side air flow	– 3 small fan trays with 4 fans each – Top to bottom air flow	– 1 large fan tray with 16 dual-speed fan – Top to bottom air flow
Electrical Power	Powered AC or DC. 1:1 redundancy from separate, independent power sources	Four power input filters — each has A&B power inputs	Three redundant power inputs — each has A&B power inputs
Maximum Power	1300 W	5700 W	6000 W
DC	Maximum current 32.5 Amps at -40V DC	Maximum current per power input: 50 Amps at -40V DC	Maximum current per power input: 70 Amps at -40V DC
	Input voltage range: -40V DC to -56.7V DC	Input voltage range: -40V DC to -56.7V DC	Input voltage range: -40V DC to 56.7V DC

	Tellabs® 8830 MSR	Tellabs® 8840 MSR	Tellabs® 8860 MSR
AC	Maximum current per power input: 8 Amps at 180 V	N/A	N/A
	Input voltage range: 180–240 V	N/A	N/A
Maximum Thermal Output	4,437 BTU/hr	15,500 BTU/hr	18,700 BTU/hr
Temperature	41°F – 104°F / 5°C – 40°C	41°F – 104°F / 5°C – 40°C	41°F – 104°F / 5°C – 40°C
Maximum Altitude	Up to 4,000 m (13,123 ft)	Up to 4,000 m (13,123 ft)	Up to 4,000 m (13,123 ft)
Operational Relative Humidity	5–90% no condensing	5–90% no condensing	5–90% no condensing

Tellabs 8800 Series Port Densities

The Tellabs 8800 series supports industry-leading port densities while efficiently using central office/point-of-presence rack space. The following table provides the system and rack densities offered by a selection of line card options:

The Tellabs 8860 MSR supports the following interface modules:

		Tellabs® 8860 MSR	**Tellabs® 8840 MSR**	**Tellabs® 8830 MSR**
Module	**Ports Per PLM/ULC**	**Ports Per Shelf / 7 ft Rack**	**Ports Per Shelf / 7 ft Rack**	**Ports Per Shelf / 7 ft Rack**
OC-192c/STM-64	1 / 1	16 / 32	12 / 24	4 / 20
Channelized OC-48/STM-16 (down to DS-3/E-3)	1 / 4	64 / 128	48 / 96	16 / 80
OC-48c/STM-16c	1 / 4	64 / 128	48 / 96	16 / 80
Channelized OC-12/STM-4 (down to DS-3/E-3)	4 / 16	256 / 512	192 / 384	64 / 320
Channelized OC-48/STM-16 GFP (down to STS-1/VC-3)	4 / 16	256 / 512	192 / 384	64 / 320
OC-12c/STM-4c	4 / 16	256 / 512	192 / 384	64 / 320
OC-3c/STM-1c	4 / 16	256 / 512	192 / 384	64 / 320
Channelized OC-3/STM-1 (down to DS-0)	2 / 8	128 / 256	96 / 192	32 / 160
Channelized OC-3 STM-1 IMA (down to T-1/E-1)	2 / 8	128 / 256	96 / 192	32 / 160
Channelized OC-3 STM-1 SAToP (down to T-1/E-1)	2 / 8	128 / 256	96 / 192	32 / 160
Channelized OC-3 STM-1 MS ML-PPP (down to DS-0)	2 / 8	128 / 256	96 / 192	32 / 160
DS-3/E-3	6 / 24	384 / 768	288 / 576	96 / 480
Channelized DS-3/E-3 (3/1/0) (down to DS-0)	6 / 24	384 / 768	288 / 576	96 / 480
10 GigE	1 / 1	16 / 32	12 / 24	4 / 20
GigE	4 / 16	256 / 512	192 / 384	64 / 320
10/100BaseT	24 / 96	1536 / 3072	1152	384 / 1920
T1/E1/J1	24 / 96	1536 / 3072	1152	384 / 1920
Module	**Ports Per ELC**	**Tellabs 8860 MSR Ports per Shelf / 7 ft rack**	**Tellabs 8840 MSR Ports per Shelf / 7 ft rack**	**Tellabs 8830 MSR Ports per Shelf / 7 ft rack**
10 GigE	1	30 / 60	24 / 48	n/a
GigE	12	360 / 720	288 / 576	n/a

Tellabs® 8000 Intelligent Network Manager (INM)

The Tellabs 8800 series can be managed locally via Command Line Interface (CLI) or remotely by the Tellabs® 8000 INM. The Tellabs 8000 INM is a full FCAPS network and element that provides:

- Integration with existing OSS systems via CORBA and SNMP-based northbound interfaces
- Graphical network maps with element drill-down views
- Per-network, per-circuit management view
- Point-and-click configuration and provisioning
- Integrated fault management
- Accounting, performance and security management
- Statistics collection for SLA reporting and network planning

NMS support for the Tellabs 8800 series is also available on Metrowatch and 8890 NMS products.

Technical Specifications

Tellabs Multiservice Operating System Software

The Tellabs Multiservice Operating System (TMOS) software provides a standards-based set of open protocols and control planes for the Tellabs 8800 series network. It facilitates new SLAs for existing services that require no change of the end-user customer or customer premise equipment.

- **System Management and Alarm Interfaces**
  - RS-232 (DB-9) serial ports for remote and console connections
  - 10/100 Mbps Ethernet (RJ-45) ports for out-of-band management
  - Premise alarm connector (DB-25)
  - Alarm Cut-Off (ACO) switch
  - LEDs for power, temp, fan, status and alarm (critical, major and minor)

Tellabs 8800 MSR Switch and Control Card (SCC) Specifications

	SCC1 (8830)	SCC1 (8840/8860)	SCC2 (8840/8860)
Forwarding Capacity	80 Gbps	320 Gbps	720 Gbps
PC100 SDRAM	1 GB	1 GB	2 GB
Flash Boot ROM	4 MB	4 MB	4 MB
Mass Storage Capacity	20 GB hard drive	20 GB hard drive	25 GB solid state drive
Flash Memory	256 MB	256 MB	1 GB
Route/Management Processors	One integrated RP/MP	Separate RP and MP	Separate RP and MP
RP/MP SDRAM	2 GB	1 GB per processor	2 GB per processor

Tellabs 8800 MSR Line Card Specifications

	ULC1	ULC2	ULC3	ELC
No. per 8830	4	4	n/a	n/a
No. per 8840 / 8860	12 / 16	12 / 16	12 / 16	24 /30
PC100 SDRAM	1 GB	1 GB	2 GB DDR	4 GB DDR2
Flash Boot ROM	4 MB	4 MB	1 MB	16 MB
Flash	256 MB	256 MB	1 GB	1 GB
CAM	9MB ingress, 9MB egress	9MB ingress, 9MB egress	36MB ingress, 9MB egress	41MB shared ingress/egress
Interface support	T1/E1, DS3/E3, OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64, 10/100 Ethernet, 1 Gbps Ethernet, 10 Gbps Ethernet	T1/E1, DS3/E3, OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64, 10/100 Ethernet, 1 Gbps Ethernet, 10 Gbps Ethernet	T1/E1, DS3/E3, OC3/STM1, OC12/STM4, OC48/STM16, OC192/STM64, 10/100 Ethernet, 1 Gbps Ethernet, 10 Gbps Ethernet	10/100/1000 Base TX, Gigabit Ethernet, 10 Gigabil Ethernet

- **Regulatory Compliance**
  - Safety
    - UL 60950-1
    - EN 60950-1:2001
    - CSA C22.2 No. 60950-1
    - AS/NZS 60950.1:2003
    - EN 60825-1:1994, A11, A2
  - EMC/Immunity
    - FCC Part 15 Class A
    - ICES-003 Class A (Canada)
    - EN 55022 (1998) Class A (Europe)
    - VCCI (April 2000) Class A (Japan)

- **NEBS**
  - GR-63-CORE: Issue 2 (APR 2002) NEBS Physical Protection
  - GR-1089-CORE Issue 3 (2002): EMC and Electrical Safety
  - ETS 300 019-2-1
  - ETS 300 019-2-2
  - ETS 300 019-2-3
  - ETS 300 019-2-4
  - ETS 300 753
  - AT&T NEDS (MLID#4069, V4.01, 1/16/2004)
  - SBC-TP-96200 Issue 5A, Feb 2004
  - ANSI T1.315-2001 (Tellabs 8830 MSR only)

Software Specifications

- **Layer 3 Protocol Supported**
  - Routing: BGP4, IS-IS, OSPF, PIM-SM
  - Advanced Routing features: BGP Confederation and BGP graceful restart
  - IS-IS: Graceful Restart, Jumbo Frames, Domain-wide Prefix Distribution, Mesh Groups, IGP Shortcuts
  - OSPF: Stateful Redundancy, NSSA, IGP Shortcuts, Multiple Instances, graceful restart
  - MPLS: LDP, RSVP-TE
  - Advanced MPLS Features: MPLS traffic engineering, RSVP-TE, IS-IS-TE, OSPF-TE, Constraint-based Shortest Path First (CSPF)
  - RSVP-TE: stateful redundancy, fast reroute (FRR) with sub 10ms failover, Diffserv encoding, backup LSPs, open-bandwidth LSPs and auto-bandwidth LSPs
  - LDP: LDP QoS, graceful restart, fault tolerant, LDP over RSVP tunnels
  - IP VPN: RFC2547bis/4364 MP-BGP, OSPF multi-instance, overlapping VPNs, Full mesh and hub/spoke VPN topologies
  - IP Multicast: IGMPv2, PIM-SMv2, IGMP Snooping, IGMP Proxy
  - Policies: Access lists, prefix lists, route maps, AS-path lists, extended community lists
  - DHCP relay

- **Layer 1 and 2 Protocol Supported**
  - ATM : UNI 3.0 and 3.1, PNNI 1.0 and 1.1, ILMI 4.0, IISP 1.0, AINI 1.2, ITU TI.617, IMA 1.0 and 1.1
  - Frame Relay: FRF 1.1 UNI, FRF 2.1 NNI, FRF.5 Network Interworking, and FRF.8 Service Interworking, ITU Q.933 FR LMI
  - Ethernet/VLAN, link aggregation, E-line and E-LAN, VPLS, H-VPLS, Q-in-Q STP, RSTP, MSTP
  - EoS (X.86) and GFP
  - TDM: SAToP
  - HDLC
  - PPP (POS)
  - ML-PPP
  - Pseudowires based on Martini Draft for ATM, Frame Relay, Ethernet/VLAN, PPP, HDLC and TDM traffic encapsulation
  - MFA: The Use of Virtual Trunks for ATM/MPLS Control Plane Interworking

- **Traffic Management**
  - MPLS traffic engineering using OSPF-TE, ISIS-TE, RSVP-TE, LDP over RSVP tunnel
  - CSPF routing
  - E-LSP (EXP inferred)
  - L-LSP (Label inferred)
  - 2-Stage CAC at Layer 2, Layer 3 and LSP level
  - Strict Priority Queuing: CBR, VBR-rt, VBR-nrt, UBR, UBR+ and UBR+max
  - Weighted Fair Queuing (WFQ) based on Deficit Round Robin (DRR) scheme
  - Policing at the ingress (Dual leaking bucket algorithm with 3 color marking + explicit drop)
  - Shaping at the egress and ingress
  - Weighted Random Early Detection (WRED) and/or Weighted Tail Drop (WTD)
  - Hierarchical queuing
  - Hierarchical QoS
  - 32,000 Per-Flow Queues (unidirectional) per ULC or 512,000 per 8860 Chassis
  - 4,000 Per-Group Queues per ULC or 64,000 per 8860 Chassis
  - Virtual output queues
  - SLAs are applied (both policing and shaping) on Per-Flow Queues via state-of-the-art ASICs
  - Multi-class pseudowires
  - Weighted QoS

- **Carrier Class Resiliency**
  - Tellabs® ServiceAssured™ Upgrade without affecting services and minimal customer traffic loss
  - Fully redundant platforms to provide carrier-class reliability
  - Hot-swappable switch fabric and line cards
  - N:1 redundancy on all common systems elements: Switch fabric, management processor, routing processor, power supplies, dual DC feeds, cooling, external BITS inputs, Stratum 3 internal clocks, disks, OAM ports, etc.
  - 1:N switch fabric component redundancy for graceful degradation
  - N:1 forwarding plane redundancy when using 3 SCCs
  - Nonstop forwarding for all traffic during control plane switchover
  - 1+1 control plane redundancy: Provides nonstop reliability, mirrored states from primary to secondary SCC
  - Routing resiliency: OSPF and RSVP-TE stateful redundancy, OSPF, ISIS, BGP and LDP graceful restart
  - Database redundancy: RIB and FIB routing and forwarding table, OSPF-TE and ISIS-TE traffic engineering database, CAC, statistics,VPLS MAC address, circuit states
  - PPP states, ARP Cache, SVC states are maintained during control plane switchover
  - Data path protection: Supports redundant LSPs and LSP fast reroute in sub-10 ms, ECMP, link aggregation and SONET/SDH APS/MSP protection, ATM IMA, MLPPP, VRRP, STP, RSTP, MSTP, H-VPLS, backup pseudowires and VRRP, loop detection blocking
  - Pseudowire redundancy: dual-homing for H-VPLS
  - BFD support for OSPF, IS-IS, BGP, LDP and RSVP LSP
  - Distributed PNNI signaling

- **OAM**

  Extensive network diagnostics capabilities to detect and diagnose abnormalities in the network. The feature set includes, but not limited to:
  - ATM services disruption detection and diagnostic capabilities: fault notification, fault detection, fault isolation and fault recovery, as per recommended standards: F4/F5 ATM AIS, RDI, and loopback
  - Frame Relay Link Management Interface (LMI): ITU-T Q.933 Annex A, ANSI T1.617 Annex D and Cisco ILMI
  - Ethernet services disruption detection and diagnostics: port mirroring, IEEE 802.1ag continuity check (includes VPLS) link trace and loopback, Y.1731 AIS/802.1ag RDI, 802.2ah
  - MPLS services disruption detection and diagnostics: LSP ping and trace, pseudowire Virtual Circuit Connectivity Verification (VCCV) and Bidirectional Forwarding Detection (BFD)
  - Performance monitoring and management role provided via integrated OSS support

- **Security**

  Well-defined secure network element access, extensive monitoring and disaster recovery methods based on layered, reliable and scalable security architecture:
  - Operating system security using protected memory and modular processes
  - Management plane security using multi-level security matrix for secure EMS/NMS access, SNMPv3 security support, SFTP, RADIUS, TACACS+, forensics capability for security audit or threat diagnostics, network database backup for disaster recovery
  - Control plane security against DDoS and TCP SYN attacks and MD5 authentication for IP, ATM/FR and MPLS
  - Data plane security for flexible class based traffic protection, E911 regulation for public safety, deep packet inspection, flexible access control list, lawful interception, resource protection, spoofing

Standards Compliance

- **TCP/IP**
  - RFC 768 User Datagram Protocol (UDP)
  - RFC 791 Internetwork Protocol (IP)
  - RFC 792 Internet Control Message Protocol (ICMP)
  - RFC 793 Transmission Control Protocol (TCP)
  - RFC 813 Window and Acknowledgement Strategy in TCP/IP
  - RFC 815 IP Datagram Reassembly Algorithms
  - RFC 826 Address Resolution Protocol (ARP)
  - RFC 854 Telnet Protocol Specification
  - RFC 879 The TCP Maximum Segment Size and Related Topics
  - RFC 894 Standard for Transmission of IP Datagrams over Ethernet
  - RFC 919 Broadcasting Internet Datagrams
  - RFC 950 Internet Standard Subletting Procedure
  - RFC 1042 Standard for the Transmission of IP Datagrams over IEEE 802 Network
  - RFC 1122 Requirements for Internet Hosts — Communication Layers
  - RFC 1141 Incremental Updating of the Internet Checksum
  - RFC 1191 Path MTU Discovery
  - RFC 1256 ICMP Router Discovery Messages
  - RFC 1305 Network Time Protocol (NTP) Version 3
  - RFC 1323 TCP Extensions for High Performance
  - RFC 1349 Type of Service in the Internet Protocol Suite
  - RFC 1350 TFTP Version 2 (revision of RFC 783)
  - RFC 1812 Requirements for IP Version 4 Routers
  - RFC 1918 Address Allocation for Private Internets
  - RFC 2018 TCP Selective Acknowledgment
  - RFC 2390 Inverse Address Resolution Protocol
  - RFC 2581 TCP Congestion Control
  - RFC 3768 Virtual Router Redundancy Protocol (VRRP)

IP Multicast

- RFC 1112 Host Extensions for IP Multicasting
- RFC 2236 Internet Group Mangement Protocol, Version 2
- RFC 3046 DHCP Relay Agent Information Option
- RFC 4601 Protocol Independent Multicast-Sparse Mode (PIM-SM) (Revision of RFC 2362)
- Draft-IETF-PIM-SM-BSR: Boot Strap Router (BSR) Mechanism for PIM Sparse Mode
- Draft-IETF- magma-snoop: Considerations for IGMP and MLD Snooping Switches

RSVP

- RFC 2205 Resource ReSerVation Protocol (RSVP)
- RFC 2209 Resource ReSerVation Protocol (RSVP) — Version 1 Message Processing Rules
- RFC 2210 The USE of RSVP with IETF Integrated Service
- RFC 2961 RSVP Refresh Overhead Reduction Extension
- RFC 3097 RSVP Cryptographic Authentication (revision of RFC 2747)
- RFC 3209 RSVP-TE: Extensions to RSVP for LSP Tunnels
- RFC 3210 Applicability Statements for Extensions to RSVP for LSP Tunnels
- RFC 4090 Fast Reroute Extensions to RSVP-TE for LSP Tunnels

CIDR

- RFC 1519 Classless Inter-Domain Routing (CIDR) an Address Assignment and Aggregation

EoS

- ITU-T X.86 Ethernet over LAPs

GFP

- ITU-T G.7041/Y.1303 Generic Framing Procedure (GFP)

OSPF

- RFC 1370 Applicability Statement for OSPF
- RFC 1403 BGP OSPF Interaction
- RFC 1745 BGP4/IDRP for IP/OSPF Interaction
- RFC 1850 OSPF Version2 Management Information Base
- RFC 2307 The OSPF Opaque LSA Option
- RFC 2328 OSPF Version 2
- RFC 2740 OSPF for IPv6 (upgradable)
- RFC 3101 The OSPF Not So Stubby Area Option
- RFC 3137 OSPF Stub Router Advertisement
- RFC 3623 Graceful OSPF Restart
- RFC 3630 Traffic Engineering Extensions to OSPF v2
- Draft-IETF-L3VPN-OSPF-2547: OSPF Multi-instance in BGP/MPLS VPNs
- Draft-IETF-OSPF-2547-dnbit: DN bit to prevent looping

IS-IS

- ISO/IEC 10589: IS-IS Routing Protocol
- RFC 1142 OSI IS-IS Intra-Domain Routing Protocol
- RFC 1195 Use of OSI IS-IS for Routing in TCP/IP in Dual Environment
- RFC 2763 Dynamic Hostname Exchange Mechanism for IS-IS
- RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
- RFC 2973 IS-IS Mesh Groups
- RFC 3277 IS-IS Transient Black Hole Avoidance
- RFC 3373 Three-Way Handshake for IS-IS Point-to-Point Adjacencies
- RFC 3567 Intermediate System to Intermediate System Cryptographic Authentication
- RFC 3784 ISIS-TE
- RFC 3847 Restart signaling for IS-IS
- Draft-IETF-ISIS-WG-MIB: Management Information Base for IS-IS
- Draft-IETF-ISIS-IGP-P2P-Over -LAN: Point-to-point Operation Over LAN in Link-state Routing Protocols
- Draft-IETF-ISIS-ext-ETH: Extended Ethernet Frame Size Support
- Draft-IETF-ISIS-IPv6: Routing IPv6 with IS-IS (upgradable)

BGP

- RFC 1172 Application of the BGP in the Internet
- RFC 1268 Application of BGP in the Internet
- RFC 1403 BGP OSPF Interaction
- RFC 1657 Definitions of Managed Objects for Version 4 of the Border Gateway Protocol (BGP-4)
- RFC 1745 BGP4/IDRP for IP — OSPF Interaction
- RFC 1772 Application of the Border Gateway Protocol in the Internet
- RFC 1997 BGP Communities Attribute
- RFC 1998 BGP Communities Attribute in Multi-home Routing
- RFC 2385 Protection of BGP Sessions via the TCP MD5 Signature Option
- RFC 2439 BGP Route Flap Damping
- RFC 2519 A Framework for Inter-domain Route Aggregation
- RFC 2547bis/4364 BGP/MPLS VPNs — Inter-AS and CsC
- RFC 2796 BGP Route Reflection (Revision of RFC 1966)
- RFC 2858 Multi-Protocol Extensions for BGP-4 (Revision of RFC 2283)
- RFC 2918 Route Refresh Capability for BGP-4
- RFC 3065 Autonomous System Confederation for BGP (Revision of RFC 1965)
- RFC 3107 Carrying label information in BGP
- RFC 3392 Capability Advertisement with BGP-4 (Revision of RFC 2842)
- RFC 4271 A Border Gateway Protocol (BGP-4) (Revision of RFC 1771)
- RFC 4364 (Revision of RFC 2547bis) BGP/MPLS VPNs
- RFC 4724 Graceful Restart Mechanism for BGP
- RFC 4781 Graceful Restart Mechanism for BGP with MPLS
- Draft-IETF-IDR-BDP-ext-communities: BGP Extended Communities Attribute
- Draft-IETF-L2VPN-OSPF-2547: OSPF Multi-instance in BGP/MPLS VPNs

MPLS

- RFC 2597 Assured Forwarding PHB Group
- RFC 2598 An Expedited Forwarding PHB
- RFC 2702 Requirements for Traffic Engineering Over MPLS
- RFC 3031 MPLS Architecture
- RFC 3032 MPLS Label Stack Encoding
- RFC 3036 LDP Specification
- RFC 3037 LDP Applicability
- RFC 3063 MPLS Loop Prevention Mechanism
- RFC 3107 Carrying Label Information in BGP-4
- RFC 3215 LDP State Machines
- RFC 3270 MPLS Support for Differentiated Services
- RFC 3346 Applicability Statement for Traffic Engineering with MPLS
- RFC 3443 Time to Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks
- RFC 3468 The Multiprotocol Label Switching (MPLS) Working Group Decision on MPLS Signaling Protocols
- RFC 3469 Framework for Multi-Protocol Label Switching (MPLS) based Recovery
- RFC 3478 Graceful Restart Mechanism for Label Distribution Protocol
- RFC 3479 Fault Tolerance for LDP
- RFC 3564 Requirements for Support of Differentiated Services-aware MPLS Traffic Engineering
- RFC 3612 Applicability Statement for Restart Mechanisms for the Label Distribution Protocol (LDP)
- RFC 4221 Overview of MPLS Management
- RFC 4364 (Revison of RFC 2547bis)
- RFC 4379 Detecting MPLS Data Plane Failures

VPLS and H-VPLS

- RFC 4762 Virtual Private LAN Services over MPLS
- Draft-IETF-L2VPN-ARP-Mediation: ARP Mediation for IP Interworking of Layer 2 VPN

Ethernet

- IEEE 802.1d Bridging
- IEEE 802.1p Priority
- IEEE 802.1q VLAN
- IEEE 802.1ad Q-in-Q/VLAN stacking
- IEEE 802.1ag (Draft) service OAM
- IEEE 802.3 10Base-T
- IEEE 802.3u 100Base-TX
- IEEE 802.3x Flow Control
- IEEE 802.3z 1000Base-SX/LX
- IEEE 802.3ad Link Aggregation
- IEEE 802.3ae 10 Gbps Ethernet
- IEEE 802.3x Ethernet Flow Control
- IEEE 802.3 with 802.2 SAP
- IEEE 802.3 with 802.2 SNAP
- RFC 2427 Multiprotocol Interconnect over Frame Relay (revision of RFC 1490)
- RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5 (revision of RFC 1483)

BFD

- Draft-IETF-BFD-base: Bidirectional Forwarding Detection
- Draft-IETF-generic: Generic Application of BFD
- Draft-IETF-BFD-v4v6: BFD for IPv4 and IPv6
- Draft-IETF-BFD-MPLS: Bidirectional Forwarding Detection for MPLS LSPs

Pseudowires

- MFA: The Use of Virtual Trucks for ATM/MPLS Control Plane Interworking
- RFC 3916 Requirements for Pseudo-wire Emulation Edge-to-Edge (PWE3)
- RFC 3985 PWE3 Architecture
- RFC 4379: Detecting MPLS Data Plane Failures
- RFC 4446: IANA Allocations for Pseudo Wire Edge to Edge Emulation
- RFC 4447: Pseudowire Setup and Maintenance using LDP
- RFC 4448: Encapsulation Methods for Transport of Ethernet Frames Over MPLS
- RFC 4553: Structure-Agnostic TDM over Packet (SAToP)
- RFC 4618: Encapsulation Methods for Transport of PPP/HDLC over MPLS
- RFC 4619: Encapsulation Methods for Transport of Frame Relay Over MPLS
- RFC 4717: Encapsulation Methods for Transport of ATM over MPLS Networks
- RFC 4905: Encapsulation Methods for Transport of Layer 2 Frames over MPLS Networks
- RFC 4906: Transport of Layer 2 Frames Over MPLS
- Draft-IETF-PWE3-VCCV: Pseudo Wire Virtual Circuit Connectivity Verification (VCCV)
- Draft-IETF-PWE3-CW: PWE3 Control Word for Use Over an MPLS PSN
- Draft-IETF-BFD-MPLS: Bidirectional Forwarding Detection (BFD) for MPLS LSPs
- Draft-IETF-pwe3-ms-pw-requirement: Requirements for Multi-segment Pseudowire Emulation Edge to Edge
- Draft-IETF-pwe3-segmented-pw: Segmented Pseudowires

PPP

- RFC 1332 PPP Internet Protocol Control Protocol (IPCP)
- RFC 1334 PPP Authentication Protocols
- RFC 1661 PPP (Point-to-Point Protocol)
- RFC 1662 PPP in HDLC-like Framing
- RFC 1990 PPP Multilink Protocol
- RFC 1994 PPP Challenge Handshake Authentication Protocol
- RFC 2433 Microsoft PPP CHAP Extensions
- RFC 3518 Point-to-point Protocol (PPP) Bridging Control Protocol (BCP)

GRE

- RFC 1701 Generic Route Encapsulation (GRE)
- RFC 1702 Generic Route Encapsulation over IPv4 networks
- RFC 2473 Generic Packet Tunneling in IPv6
- RFC 2784 Generic Routing Encapsulation (GRE) (revision of RFC 1701)

Frame Relay

- FRF.1.1 Frame Relay UNI
- FRF.2.1 Frame Relay NNI
- FRF.5 Frame Relay / ATM PVC Network Interworking
- FRF.8.1 Frame Relay / ATM PVC Service Interworking
- ITU-T Q.933 Annex A DSS1 — Signaling Specification for Frame Mode Switched and Permanent Virtual Connection Control and Status Monitoring
- RFC 2427 Multiprotocol Interconnect over Frame Relay (revision of RFC 1490)
- RFC 2590 Transmission of IPv6 Packets over Frame Relay Networks Specification
- ANSI T1.617 Annex D DSS1 — Signaling Specification for Frame Relay Bearer Service

OAM

- ITU-T I.610 B-ISDN Operation and Maintenance Principles and Functions
- ITU-T Q.933 Annex A DSS1 — Signaling Specification for Frame Mode Switched and Permanent Virtual Connection Control and Status Monitoring
- RFC 4379 Detecting MPLS Data Plane Failures
- Draft-IETF-PWE3-VCCV: Pseudo Wire Virtual Circuit Connectivity Verification (VCCV)
- Draft-IETF-BFD-MPLS: Bidirectional Forwarding Detection for MPLS LSPs
- ITU Y.1731
- IEEE 802.1ag Service OAM
- IEEE 802.3ah Link OAM

ATM

- ATM Forum UNI 3.0, 3.1 and 4.0
- ATM Forum PNNI 1.0 and 1.1
- ATM Forum Integrated Local Management Interface (ILMI) 4.0
- ATM Forum Interim Inter-switch Signaling Protocol (IISP) 1.0
- ATM Forum IMA 1.0 and 1.1
- ATM Forum ATM Inter-Network Interface (AINI) 1.2
- ITU-T 1.610 Annex D B-ISDN Operation and Maintenance Principles and Functions
- ITU-T Q.2110 B-ISDN ATM Adaptation Layer — Service Specific Connection Oriented Protocol (SSCOP)
- MFA: The Use of Virtual Trunks for ATM/MPLS Control Plane Interworking
- ITU-T Q.2130 B-ISDN Signaling ATM Adaptation Layer — Service Specific Coordination Function for Support of Signaling at the User to Network Interface (SSCF at the UNI)
- ITU-T Q.2931 B-ISDN DSS2 User-Network Interface (UNI) Layer 3 Specification for Basic Call/Connection Control
- ITU-T Q.2961 B-ISDN DSS2 Additional Traffic Parameters
- Telecordia GR-1248 Generic Requirements for Operations of ATM Network Elements (NES)
- RFC 1695 Definition of Management Objects for ATM Management Version 8.0 Using SMIv2
- RFC 2225 Classical IP and ARP over ATM (Obsoletes RFC 1577)
- RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5 (Obsoletes RFC 1483)
- RFC 3496 Protocol Extension for Support of Asynchronous Transfer Mode (ATM) Service Class-aware

SNMP

- RFC 1157 Simple Network Management Protocol (SNMP)
- RFC 1215 Convention for Defining Traps for Use with SNMP
- RFC 1904 Conformance Statements for Version 2 of the Simple Network Management Protocol (SNMPv2)
- RFC 1905 Protocol Operations for Version 2 of the Simple Network Management Protocol (SNMPv2)
- RFC 1906 Transport Mappings for Version 2 of the Simple Network Management Protocol (SNMPv2)
- RFC 2012 SNMPv2 Management Information Basefor the Transmission Control Protocol using SMIv2
- RFC 2570 SNMP Version 3 Framework
- RFC 2578 Structure of Management Information Version (SIMv2)
- RFC 2579 Textual conventions for SMIv2
- RFC 3411 An Architecture for Describing Simple Network Management protocol (SNMP) Management Frameworks
- RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
- RFC 3413 User-based Security Model (USM) for Version 3 of the Simple Network Management Protocol (SNMP) Applications
- RFC 3414 User-based Security Model (USM) for Version 3 of the Simple Network Management Protocol (SNMPv3)
- RFC 3415 View-based Security Model (USM) for Version 3 of the Simple Network Management Protocol (SNMP)
- RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP)
- RFC 3584 Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework

MIB

- RFC 1212 Concise MIB Definitions
- RFC 1213 Management Information Base for Network Management of TCP/IP-based Internets: MIB-II
- RFC 1398 Definitions of Managed Objects for Ethernet-like Interface Types
- RFC 1657 Definitions of Managed Objects for Version 4 of the Border Gateway Protocol (BGP-4) Using SMIv2
- RFC 1850 OSPF Version2 Management Information Base
- RFC 1857 A Model for Common Operational Statistics
- RFC 1902 Structure of Management Information for Version 2 of the Simple Network Management
- RFC 1903 Textual Conventions for SNMP Version 2
- RFC 2011 SNMPv2 Management Information Base for IP using SMIv2
- RFC 2013 SNMPv2 Management Information Base for the User Datagram Protocol using SMIv2
- RFC 2465 MIB for IP Version 6: Textual Conventions and General Groups
- RFC 2493 Textual Conventions for MIB Modules using performance history based on 15 minute intervals
- RFC 2495 Definitions of Managed Objects for the DS-1 and E-1 Interface Types
- RFC 2496 Definitions of Managed Objects for the DS-3/E-3 Interface Types
- RFC 2514 Definitions of Textual Conventions and Object-identities for ATM Mgmt
- RFC 2515 Definitions of Managed Objects for ATM Management
- RFC 2571 An Architecture for Describing SNMP Management Framework
- RFC 2863 The Interfaces Group MIB using SMIv2
- RFC 3606 Definitions of Managed Objects for ATM Interfaces
- Draft -ietf-diffserv-model DiffServ MIB
- ATM Forum 0065 ILMI Related MIBs
- ATM Forum 0055 PNNI related MIBs
- ATM Forum 0066 ATM Soft PVC MIBs
- ATM Forum 0086 ATM Inverse Multiplexing
- An extensive arrary of proprietary MIBs is also supported

Security

- RFC 1321 The MD5 Message-Digest Algorithm
- RFC 1492 Access Control Protocol or TACACS
- RFC 1858 Security Considerations for IP Fragmnet Filtering
- RFC 1948 Defending Against Sequence Number Attacks
- RFC 2385 Protection of BGP Sessions via the TCP MD5 Signature Option
- RFC 2759 Microsoft PPP CHAP Extensions, Version 2
- RFC 2827 Network Ingress Filtering: Defeating Denial of Service Attacks which employ IP Source Address
- RFC 2865 Remote Authentication Dial-In User Service (RADIUS)
- RFC 3097 RSVP Cryptographic Authentication — Updated Message Type Value
- RFC 3101 The OSPF Not So Stubby Area (NSSA) Option
- RFC 3195 Reliable Delivery for Syslog
- RFC 3414 User-based Security Model (USM) for Version 3 of the Simple Network Management Protocol (SNMPv3)
- RFC 3567 IS-IS Cryptographic Authentication
- Draft-ylonen-ssh-protocol The SSH (Secure Shell) Remote Login Protocol
- Cisco Proprietary TACACS+
- ATM Forum af-sec-0100.002 ATM Security 1.1
- ATM Forum af-sec-0172.000 Control Plane Security
- ATM Forum af-pnni-0055.002 Private Network-to-Network Interface (PNNI) Spec 1.1

North America

Tellabs
One Tellabs Center
1415 West Diehl Road
Naperville, IL 60563
U.S.A.
+1 630 798 8800
Fax: +1 630 798 2000

Asia Pacific

Tellabs
3 Anson Road
#14–01 Springleaf Tower
Singapore 079909
Republic of Singapore
+65 6215 6411
Fax: +65 6215 6422

Europe, Middle East & Africa

Tellabs
Abbey Place
24–28 Easton Street
High Wycombe, Bucks
HP11 1NT
United Kingdom
+44 871 574 7000
Fax: +44 871 574 7151

Latin America & Caribbean

Tellabs
Rua James Joule No. 92
EDIFÍCIO PLAZA I
São Paulo – SP
04576-080
Brasil
+55 11 3572 6200
Fax: +55 11 3572 6225