

Alcatel-Lucent 7210 SAS-M SERVICE ACCESS SWITCH | RELEASE 1.0

Purpose-built to enable cost-effective and highly scalable Carrier Ethernet/MPLS services delivery, the Alcatel-Lucent 7210 SAS-M is a customer edge device designed to address the metro Ethernet services, managed wide area network (WAN) services and service aggregation markets. Leveraging the powerful Alcatel-Lucent Service Router Operating System (SR OS) and the Alcatel-Lucent 5620 Service Aware Manager (SAM), the 7210 SAS-M extends MPLS capabilities and manageability into the customer edge for a new breed of highly available and fully managed Carrier Ethernet VPN services and extends the reach of the Carrier Ethernet/ MPLS aggregation network.



The Alcatel-Lucent 7210 Service Access Switch (SAS) is a family of next generation, small footprint, Carrier Ethernet customer edge devices. As a member of the industry leading Carrier Ethernet product portfolio, the Alcatel-Lucent 7210 SAS-M optimizes the business case for providing innovative Ethernet services to multiple locations, enables cost-effective addition of new sites to a Carrier Ethernet/MPLS Virtual Private Network (VPN), and delivers multiple services per port.

Powered by the industry-leading SR OS, MPLS and 5620 Service Aware Manager (SAM), the Alcatel-Lucent 7210 SAS-M empowers service providers such as incumbent telephone companies, competitive carriers and multi-service operators (MSOs) with the ability to innovate and differentiate their retail and wholesale Carrier Ethernet VPN service portfolio by extending service level agreements (SLAs) into the customer edge. Stringent SLAs require end-to-end service delivery with differentiation based on reliability, quality of service (QoS), operation, administration and maintenance (OAM) tools and streamlined management. To meet the reliability requirements of enhanced MPLS/VPLS-based services for mission critical applications, the Alcatel-Lucent 7210 SAS-M supports fast reroute (FRR) and pseudowire redundancy over dual-homed connections into the customer edge for end-to-end highly available service delivery. The 7210 SAS-M also supports MPLS traffic engineering with resource reservation protocol — traffic engineering (RSVP-TE). When combined with the per-service attributes of the Alcatel-Lucent SR OS, service providers can enable services end-to-end across an IP/MPLS network with guaranteed QoS per application within a single SLA. Per-service OAM

ensures end-to-end operational consistency, rapid troubleshooting and detailed performance measurement for further service differentiation. The Alcatel-Lucent 5620 SAM simplifies the end-to-end service management of the Ethernet services by expediting initial time to market for service provisioning, as well as on-going moves, adds and changes as the service requirements evolve for the subscribers.

The Alcatel-Lucent 7210 SAS-M supports MPLS-based Carrier Ethernet VPN services. These services include spoke access to hierarchical Virtual Private LAN Service (VPLS - also referred to as E-LAN by the MEF) multi-point services, Virtual Leased Line (VLL – also referred to as E-Line by the MEF) point-to-point services, along with Ethernet access to enhanced Internet services (IES) and IP VPN services. The 7210 SAS-M can also be deployed as a cost-effective aggregation device to extend the reach of the Carrier Ethernet/MPLS aggregation network to smaller sites.

The Alcatel-Lucent 7210 SAS-M is Metro Ethernet Forum (MEF) 9 and MEF 14 certified and supports Multiprotocol Label Switching (MPLS), Ethernet, and high availability along with per-service QoS and OAM tools. The 7210 SAS-M is a wire speed non-blocking platform, delivering 24 x 100/1000 GigE (SFP) ports. It can support 10/100/1000BASE-T copper and coarse wave division mulitiplexing (CWDM) SFPs for added configuration flexibility. With support for dual-homed point-to-point and ring topologies, the 7210 SAS-M has the flexibility for use in single tenant and multi-tenant offices as well as campus environments.

For operational efficiency with streamlined management and effective service assurance, the Alcatel-Lucent 7210 SAS-M is fully managed by the 5620 SAM, giving the operator a comprehensive, easy-to-use fault management system, a full suite of OAM tests for SLA compliance, simplified service provisioning with GUI-based templates, and threshold crossing alerts to identify issues before they affect customers. Full integration with the Alcatel-Lucent 5650 Control Plane Assurance Manager (CPAM) enables users to proactively detect abnormal control plane behavior and to rapidly resolve problems by visualizing control plane topology and routing configuration. The OSS Connected Partner program offers certified integration with industry-leading OSS applications including service assurance, provisioning and traffic engineering.

For industry and public sector customers who install and manage their own private networks, the Alcatel-Lucent 7210 SAS-M increases the services they can provide to their internal customers while reducing operating costs. Information and Communication Technology directors who manage such networks can cost-effectively deliver advanced voice, video and data services, reduce network complexity and leased line costs through a single metro/WAN uplink, and provide easy service delivery with quick moves and changes to services along with seamless integration with Carrier Ethernet/ MPLS aggregation and core IP/MPLS networks from Alcatel-Lucent. With its lower power consumption, the 7210 SAS-M is designed to be environmentally friendly by helping operators meet their energy efficiency and environmental goals.

Features

- Wire speed, non-blocking, serviceaware MPLS switch with full Ethernet functionality
- 24 x 100/1000 optical SFP ports
- Support for a wide range of pluggable SFP optics including 10/100/1000BASE-T copper and CWDM SFPs for greater flexibility
- Powered by SR OS for feature-rich Carrier Ethernet VPN services
 - Per-service quality of service (QoS) with up to eight levels of class-based queuing per port
 - Per-service OAM supports extensive MPLS OAM toolkit along with IEEE 802.1ag, IEEE 802.3ah and local service mirroring
 - Service assurance agent (SAA) provides two-way measurements of jitter, latency and packet loss
- MPLS features include Fast Reroute (FRR), Resource Reservation Protocol with Traffic Engineering (RSVP-TE) and targeted label distribution protocol (T-LDP), primary and secondary LSPs and pseudowire redundancy
- Dual-homed connections to separate aggregation devices
- Flexible deployment options with support for ring topologies
- Ethernet features include IEEE 802.1Q, xSTP, LAG and mVPLS/RSTP
- Integrates MPLS and Ethernet technologies onto a single MEF 9 and MEF 14 certified platform
- Network Equipment Building System (NEBS) 3 compliant platform
- Managed by the 5620 SAM and 5650 CPAM
- Provides four opto-isolated inputs and two dry relay contact alarm outputs through a DB-15 interface on the front panel
- Hot-swappable, redundant, load-sharing AC or DC power and hot-swappable fan modules

Benefits

- Increase revenue with a full suite of enhanced MPLS-based Carrier Ethernet VPN services with differentiated, highly available services
- Reduce the cost of customer acquisition with common OS and seamless service extension capabilities with the 7450 ESS, 7750 SR and 7710 SR
- Simplify enterprise networking complexity with stringent SLAs supporting a full suite of demanding enterprise applications over a single Ethernet connection
- Extend MPLS and SR OS to the customer edge to support enhanced VPLS (E-LAN), VLL (E-Line), and Ethernet access to IES and IP VPN services

Technical specifications

Physical interfaces

- 24 100/1000 SFP ports
- Support for a wide range of pluggable SFP optics including 10/100/1000BASE-T copper SFPs and CWDM SFPs
- Four opto-isolated inputs and 2 dry relay contact outputs through a DB-15 interface on the front panel
- One expansion slot (for future use)
- One Ethernet out of band management port
- One management console port

Performance

- Full wire-speed switching
- Throughput (half-duplex): 48 Gb/s
- MAC address table size: 16 K
- Jumbo frame size: 9 k bytes

MPLS

- Static LSP
- RSVP-TE
- T-LDP
- FRR detour LSPs (one-to-one)
- PW redundancy on VLLs
- Primary and secondary LSPs

Routing

- Static
- OSPF with TE extensions
- IS-IS with TE extensions

- Cost-effectively extend the reach of the Carrier Ethernet/MPLS aggregation network into smaller sites or closer to the end user
- Deliver operational efficiency with streamlined management and service assurance that tightly integrates the 5620 SAM, 5650 CPAM and the extensive OAM tool kit for rapid troubleshooting and expediting initial time to market for service activation with quick moves, adds and changes for end-to-end managed service delivery
- Effectively monitor and measure SLA performance into the customer edge

- Provide a cost-effective MPLS/Ethernet demarcation device for retail or wholesale services to single or multiple customers using flexible networking topologies
- Provide scaling and service differentiation advantages with seamless service extension capabilities with 7450 ESS, 7750 SR and 7710 SR solutions
- Increase revenue opportunities and service reliability with enhanced SLAs to proactively monitor the status of co-located customer premise equipment, such as door actions or battery alarms, and generate alarms in real time using four opto-isolated inputs and two dry relay contact outputs

Ethernet service delivery

- Layer 2 VLL and VPLS service delivery
 - ¬ MEF defined E-Line (Ethernet private line [EPL] and Ethernet Virtual Private Line [EVPL]) and E-LAN service delivery
 - MAC limiting (per service and per SAP)
 - ¬ Ability to disable MAC learning
 - ¬ Ability to add MAC statically
 - ¬ Ability to discard unknown MAC
 - ¬ MAC pinning
- Encapsulations:
- ¬ null/dot1q on access ports
 Spanning Tree Protocol on access
- and uplinks ¬ IEEE 802.1d Spanning Tree Protocol (STP)
- ¬ IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- Management VPLS with RSTP
- Tunneling Layer 2 control protocols (L2PT)
- Bridged Protocol Data Unit (BPDU) translation
- Port-based split horizon group (SHG)
- Internet Group Management-Protocol (IGMP) snooping
- IPv6 bridging

Advanced Quality of Service

- MEF 9 and MEF 14 certified
- Packet classification based on Layer 2 criteria (MAC, Ethertype, IEEE 802.1p)
- Packet classification based on IP criteria DSCP
- Egress port rate limiting
- Egress remarking
 - ¬ IEEE 802.1p on access and network ports
 - ¬ MPLS EXP on network ports
 - ¬ IP DSCP on network ports
- Traffic rate limiting/policing on service ingress and network ingress
- ¬ SrTCM (single rate three color marker)
- ¬ TrTCM (two rate three color marker)
- Unknown unicast, broadcast and multicast packets can be rate-limited independently
- WRED (weighted random early detection)
- Eight traffic classes (forwarding classes)
- Eight queues per port
- Scheduling (RR, WDRR, WRR, Strict Priority, Hybrid)
- Access control lists
 - Layer 2 criteria (Ethertype, SRC/DST MAC, Layer 2 protocols, dot1p)
 - ¬ Layer 3 criteria (IP SRC/DST, DSCP)

- Layer 4 Layer 7 criteria (TCP/UDP port, for applications like FTP, Telnet)
- Statistics
 - Ingress, per meter (per SAP per FC) statistics bytes and packets
 - ¬ Egress per queue statistics per port
- ¬ Ingress per meter (per IP interface per FC) statistics bytes and packets
- ¬ Per SDP and Pseudowire (VC) statistics
- ¬ Collect and store billing statistics to accounting file

High availability

- Dual-homing using STP or management VPLS (mVPLS)
- FRR detour LSPs (one-to-one)
- Primary and Secondary LSPs
- PW Redundancy for VLL
- IEEE 802.3ad LAG on network ports
- IEEE 802.3ad LAG on access ports
- Modular SR OS
- Hot-swappable, redundant, load-sharing AC or DC power
- Hot-swappable fan module containing three fans. Device continues operation if one fails (raising simultaneous alarm)

OAM

- MPLS OAM toolkit
- IEEE 802.3ah EFM OAM including dying gasp on network ports
- IEEE 802.1ag CFM OAM (support down maintenance entry points [MEPs]/maintenance intermediate points [MIPs])
- Hardware-ready to support ITU-T Y.1731
- Service assurance agent (SAA):
 ¬ Two-way measurements (RFC 2544 based)
 - ¬ Software-based time stamps
 - Threshold monitors send alerts based on SAA measurements to operator if SLA performance statistics deviate from set parameters
- Service mirroring:
 - ¬ Local mirroring
 - ¬ Port mirroring (ingress and egress)
 - Support the following ingress mirror sources:
 - SAP
 - Filter
 - Mirror destination
 - Null SAP
- ICMPv4 (ping and traceroute)
- Accounting policy support
- Event and logging support as in SR OS
- Time-of-day support for implementing policies
- Cron jobs as in SR OS
- Remote upgrade of SR OS software

Network management

- Alcatel-Lucent 5620 Service Aware Manager (SAM)
 - ¬ Fault management
 - ¬ Configuration management
 - Service creation and subscriber management
 - ¬ Performance management
 - \neg Security management
 - \neg Mediation for OSS applications
 - ¬ OSS Certified Partner program
 - Custom Service Portal

- Alcatel-Lucent 5650 Control Plane Assurance Manager (CPAM)
 - ¬ IP control plane visualization
 - ¬ Path computation
 - 5620 SAM service and MPLS overlay visualization
 - Control plane surveillance
 Troubleshooting and assuring
 - multicast-based services ¬ Root cause & impact analysis
- In-band Management
- Telnet
- SNMP v1/v2c/v3
- NTP
- SSHv2/v1
- RMON
- FTP
- TFTP
- SCP (Secure Copy using SSHv2
- protocol)
- Syslog

Security

- IEEE 802.1x on access ports
- Control plane security

 ¬ CPU DOS Protection
 - ¬ Management access filters
- Radius Client
- TACACS+
- User profile management
 as in SR OS

Mechanical specifications

Dimensions

- Height: 67 mm (2.64 in.) 1.5RU
- Width: 436 mm (17.17 in.)
- Depth: 253 mm (9.96 in.)
- Weight

• 5 kg (11 lbs)

- LED indicators
- System
- Power Supply
- Port Status
- Fans
- Alarms

- Power requirements
- Redundant, hot-swappable power supplies

Protocol support

RFC 2328 OSPF Version 2

RFC 1765 OSPF Database Overflow

RFC 2370 Opaque LSA Support

RFC 3137 OSPF Stub Router Adver-

RFC 3623 Graceful OSPF Restart -

RFC 3630 Traffic Engineering (TE)

RFC 1142 OSI IS-IS Intra-domain

RFC 1195 Use of OSI IS-IS for rout-

ing in TCP/IP & dual environments

RFC 2966 Domain-wide Prefix Dis-

Extensions to OSPF Version 2

Routing Protocol (ISO 10589)

RFC 2763 Dynamic Hostname

tribution with Two-Level IS-IS

RFC 2973 IS-IS Mesh Groups

RFC 3373 Three-Way Handshake

for Intermediate System to Inter-

mediate System (IS-IS) Point-to-

RFC 3567 Intermediate System to

Intermediate System (ISIS) Crypto-

RFC 3719 Recommendations for

Interoperable Networks using IS-IS

RFC 3784 Intermediate System to

Intermediate System (IS-IS) Exten-

sions for Traffic Engineering (TE)

RFC 3787 Recommendations for

RFC 3847 Restart Signaling for

RFC 3031 MPLS Architecture

the use of MPLS Explicit NULL

draft-ietf-isis-igp-p2p-over-lan-05.txt

RFC 3032 MPLS Label Stack Encoding

RFC 4182 Removing a Restriction on

RFC 4379 Detecting Multi-Protocol

Label Switched (MPLS) Data Plane

Interoperable IP Networks

IS-IS - GR helper

MPLS

(RFV3443)

Failures

Alcatel-Lucent 7210 SAS-M | Release 1.0 | Data Sheet

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Exchange for IS-IS

Point Adjacencies

graphic Authentication

RFC 3101 OSPF NSSA Option

OSPE

tisement

GR helper

15-15

- ¬ AC Input: 100~240 V, 50~60 Hz, Output: +12 V DC
- ¬ DC Input: -36 V DC to -72 V DC, Output: +12 V DC

Power Consumption: 60 W (typical), 205 BTUs per hour

Environmental specifications

- IEC 68-2-14
- Standard operating temperature: 0°C to 50°C (32°F to 122°F)
- Non-operating temperature: -10°C to +50°C (14°F to 122°F)

Safety

- CSA/NRTL (UL60950, CSA 22.2.No 60950-00)
- TUV/GS (EN60950)
- CB

Electronic magnetic compatibility

- CE Mark
- FCC Class A
- VCCI Class A
- Certifications
- NEBS Level 3 compliant
- Telcordia GR-1089 CORE, Issue 4, June 2006
- Telcordia GR-63 CORE, Issue 3, March 2006
- ATT-TP-76200
- CE

Synchronization

- Hardware-ready to support IEEE 1588v2
- Hardware-ready to support ITU-T Synchronous Ethernet standards

Standards compliance

IEEE 802.1d Bridging IEEE 802.1p/q VLAN Tagging IEEE 802.1w Rapid Spanning Tree Protocol

IEEE 802.1x Port Based Network Access Control

IEEE 802.1ag Service Layer OAM IEEE 802.3ah Ethernet in the First Mile

IEEE 802.3 10BASE-T IEEE 802.3ad Link Aggregation IEEE 802.3ah Ethernet OAM IEEE 802.3u 100BASE-TX

IEEE 802.3z 1000BASE-SX/LX

RSVP-TE

RFC 2430 A Provider Architecture DiffServ & TE

RFC 2702 Requirements for Traffic Engineering over MPLS

RFC 3209 Extensions to RSVP for Tunnels

RFC 4090 Fast reroute Extensions to RSVP-TE for LSP Tunnels

DIFFERENTIATED SERVICES

RFC 2474 Definition of the DS Field IPv4 and IPv6 Headers (Rev)

RFC 2597 Assured Forwarding PHB Group (rev3260)

RFC 2598 An Expedited Forwarding PHB

RFC 2697 A Single Rate Three Color Marker

RFC 2698 A Two Rate Three Color Marker

Multicast

IGMP RFC 2236

TCP/IP

RFC 768 UDP RFC 1350 The TFTP Protocol (Rev.) RFC 791 IP RFC 792 ICMP RFC 793 TCP RFC 826 ARP RFC 854 Telnet RFC 1519 CIDR RFC 1812 Requirements for IPv4 Routers

RFC 2347 TFTP Option Extension RFC 2328 TFTP Blocksize Option RFC 2349 TFTP Timeout Interval and

Transfer size option

Table 1. Ordering information

VPLS

RFC 4762 Virtual Private LAN Services Using LDP (previously draft-ietf-l2vpn-vpls-ldp-08.txt)

PSEUDOWIRE

RFC 3916 Requirements for Pseudowire Emulation Edge-to-Edge (PWE3) RFC 3985 Pseudowire Emulation Edge-to-Edge (PWE3)

RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN RFC 4446 IANA Allocations for

PWE3 RFC 4447 Pseudowire Setup and Maintenance Using LDP (draft-ietf-

pwe3-control-protocol-17.txt) RFC 4448 Encapsulation Methods

for Transport of Ethernet over MPLS Networks (draft-ietf-pwe3ethernet-encap-11.txt)

RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A

Control Channel for Pseudowires draft-ietf-l2vpn-vpws-iw-oam-02.txt

draft-ietf-pwe3-oam-msg-map-05-txt

draft-ietf-pwe3-ms-pw-arch-02.txt

draft-ietf-pwe3-segmented-pw-05.txt

RADIUS

RFC 2865 Remote Authentication Dial In User Service

RFC 2866 RADIUS Accounting **SSH**

draft-ietf-secsh-architecture.txt SSH Protocol Architecture

draft-ietf-secsh-userauth.txt SSH Authentication Protocol draft-ietf-secsh-transport.txt SSH

Transport Layer Protocol draft-ietf-secsh-connection.txt SSH Connection Protocol draft-ietf-secsh-newmodes.txt SSH Transport Layer Encryption Modes TACACS+

draft-grant-tacacs-02.txt

NETWORK MANAGEMENT

ITU-T X.721: Information technology-OSI-Structure of Management Information

ITU-T X.734: Information technology-OSI-Systems Management: Event Report Management Function

M.3100/3120 Equipment and Connection Models

TMF 509/613 Network Connectivity Model

RFC 1157 SNMPv1

RFC 1215 A Convention for Defining Traps for use with the SNMP

RFC 1907 SNMPv2-MIB RFC 2011 IP-MIB

RFC 2012 TCP-MIB

RFC 2013 UDP-MIB

RFC 2096 IP-FORWARD-MIB

RFC 2138 RADIUS

RFC 2575 SNMP-VIEW-BASEDACM-MIB

RFC 2576 SNMP-COMMUNITY-MIB RFC 2665 EtherLike-MIB

RFC 2819 RMON-MIB

RFC 2863 IF-MIB

RFC 2864 INVERTED-STACK-MIB

RFC 3014 NOTIFICATION-LOG-MIB RFC 3164 Syslog

RFC 3273 HCRMON-MIB

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 Simple Network Management Protocol (SNMP) Applications

RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3)

RFC 3418 SNMP MIB

draft-ietf-disman-alarm-mib-04.txt

IANA-IFType-MIB

IEEE8023-LAG-MIB

Plus support for an extensive array of proprietary MIBs



OKDERING CODE		DESCRIPTION
3HE05029AA	7210 SAS-M24F AC Version	 7210 SAS-M chassis with 24 x 100/1000 optical SFP ports, 4 opto-isolated inputs and 2 dry relay contact outputs through a DB-15 interface on the front panel, 1 empty slot for future use, 1 fan tray, 1 AC power supply, 1 power chord and Release 1.1 operating system software
		• A second power supply must be installed for redundancy
		Optical ports require SFPs and must be ordered separately
3HE05029AB	7210 SAS-M24F DC Version	 7210 SAS-M chassis with 24 x 100/1000 optical SFP ports, 4 opto-isolated inputs and 2 dry relay contact outputs through a DB-15 interface on the front panel, 1 empty slot for future use, 1 fan tray, 1 DC power supply and Release 1.1 operating system software
		• A second power supply must be installed for redundancy
		Optical ports require SFPs and must be ordered separately
3HE04413AA	7210 SAS-M24F OS V1.1	• 7210 SAS-M operating system software for R1.1 software upgrades
3HE04415AA	-48V DC Power Supply	-48 V DC power supply (one is required; a second is required for optional redundancy)
3HE04414AA	110-220V AC Power Supply	• 110 V to 220 V AC power supply (one is required; a second is required for optional redundancy)
3HE04416AA	Fan Tray	• Fan tray for all 7210 SAS chassis variants

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