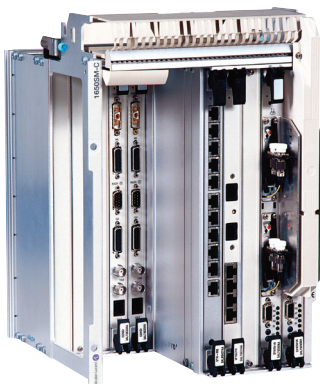# Alcatel·Lucent

Alcatel-Lucent 1650 Synchronous Multiplexer Compact
RELEASE 4.7

The Alcatel-Lucent 1650 Synchronous Multiplexer Compact (SMC) is an ideal space-saving, next-generation Synchronous Transfer Mode 4 (STM-4) multiservice provisioning platform (MSPP). It serves as a building block for metropolitan networks, providing unmatched performance and multitechnology integration for its size. A compact, cost-effective platform, the Alcatel-Lucent 1650 SMC addresses metro-access applications, offering a transport vehicle with integrated packet functions to support revenues from multiple broadband services such as private-line and Ethernet business services, mobile aggregation, transport services and always-on mission-critical communication.

The Alcatel-Lucent 1650 SMC is a metro-edge component of the Alcatel-Lucent Optical Multi-Service Node (OMSN) product family, a family that also includes the Alcatel-Lucent 1660 SM, an STM-64 MSPP, and the Alcatel-Lucent 1662 SMC, an STM-16 MSPP. For offering capital and operational efficiencies, the Alcatel-Lucent OMSN products share many common features and modules.

Features

- Fully non-blocking, redundant Synchronous Digital Hierarchy (SDH) matrix with 32 x 32 high-order/low-order (HO/LO) STM-1 equivalent switching
- Two STM-4 interfaces
- Richly featured 10/100 Ethernet and Gigabit Ethernet (GE)
- E1 and E3/DS3
- Multi-Protocol Label Switching (MPLS)-enabled Ethernet, packet ring, ATM and digital video switching

- Service over symmetric high-speed DSL (SHDSL) for E1 and 10/100 Ethernet
- ITU-T G.8032 v2 Ethernet Ring Protection (ERP)
- Synchronous Ethernet (SyncE) for Alcatel-Lucent Integrated Service Adapter Ethernet Switch (ISA-ES) blades linked to SDH Synchronization Status Message (SSM)

Benefits

- Supports high-capacity Plesiochronous Digital Hierarchy (PDH)/SDH metro-edge service
- Aggregates broadband services
  - ¬ Business Ethernet: MEF (former Metro Ethernet Forum)-compliant virtual LAN (VLAN) and Virtual Private LAN Service (VPLS)
  - ¬ Extending service reach over copper loops

- Provides Third Generation (3G) mobile backhaul with ITU-T G.8032 v2 ERP
- Functions as a terminal multiplexer, add-drop multiplexer (ADM) or mini cross-connect in spur, multiple-ring or mesh topologies
- Offers highly reliable and manageable TDM and data services
- Delivers feature transparency and operational savings through components common to the Alcatel-Lucent OMSN product family

- Supports ITU-T G.8032 v2 ERP for 100 percent increase in Ethernet over SDH (EoS) bandwidth for protected services
- Supports SyncE derived from SDH synchronization supply unit (SSU) quality

Technical specifications

Interfaces per board

- Network interfaces: compact ADM function with either of:
  - ¬ 2 x STM-1
  - ¬ 2 x STM-4
  - Both support EPS 1+1
- Customer interfaces: three slots available for each
  - ¬ 63 x 2 Mb/s: ISDN-PRA and retiming function
  - ¬ 3 x 34/45 Mb/s switchable
  - ¬ 4 x 140 Mb/s STM-1 switchable
  - ¬ 4 x STM-1: electrical, S-1.1, L-1.1 and L-1.2
  - ¬ 1 x STM-4: S-4.1, L-4.1 and L-4.2
  - ¬ Digital Video Broadcasting (DVB) ASI blade
  - ¬ Up to 14 x Ethernet 10/100Base-T per ISA blade
  - ¬ Up to 8 x Ethernet 100Base-FX per ISA blade
  - ¬ Up to 4 x GE Base-SX/LX/ZX per ISA blade

Connectivity

- 32 x 32 STM-1 equivalent fully non-blocking SDH fabric (HO/LO) in all configurations
- Unidirectional, bidirectional, drop-and-continue multicast and broadcast SDH connections
- Line and virtual container (VC) loopbacks
- Virtual concatenation (VCAT) and contiguous concatenation

- Embedded ATM star, ring and mesh topologies
- Embedded Ethernet/MPLS star, ring and mesh topologies

Equipment protection

- Matrix, control and synchronization EPS 1+1
- ISA-ATM switch EPS 1+1
- ISA-ES16 EPS 1+1
- 63 x 2 Mb/s EPS n+1, maximum n = 1
- 3 x 34/45 Mb/s EPS n+1, maximum n = 2
- 4 x STM-1e EPS n+1, maximum n = 2

Network protection

- Linear MSP single-ended at STM-1/STM-4
- SNCP/I and SNCP/N
- SNCP drop and continue plus insertion
- Collapsed single-node ring interconnection
- Collapsed dual-node ring interconnection
- ITU-T G.8032 v2 ERP

Monitoring

- Performance monitoring according to ITU-T G.784, G.826 and G.821
- Path overhead monitoring (POM) on all VCs
- Supervisory unequipped trail (SUT)
- Tandem connection monitoring (TCM)
- Ethernet performance monitoring counters
  - ¬ Per port/aggregate/flow
  - ¬ Incoming/outgoing

Synchronization

- Internal oscillator ±4.6 ppm
- Holdover drift ±0.37 ppm per day
- External sources
  - ¬ STM-n/2 Mb/s ports
  - ¬ One external 2 MHz/2 Mb/s output
- Priority and quality SSM synchronization algorithms
- SyncE for Alcatel-Lucent ISA-ES blades linked to SDH SSM

Data blades: ISA

ISA-ATM

- 600 Mb/s cell switch with optional STM-1 access on board
- Equipment protection 1+1
- VPC/VCC switch/cross-connect
- Hard/soft PVC connections for PNNI
- Point-to-point/multipoint from E1 up to VC-4-4c payloads
- Up to 252 ATM logical ports
- IMA support: maximum 126 groups/ 32 links
- Policing, shaping and congestion management
- CBR, UBR, UBR+, rt-VBR/nrt-VBR, GFR ATM traffic contracts
- ATM operations, administration and maintenance (OA&M)

ISA-ES1

- 1 Gb/s throughput
- 155 Mb/s back-panel capacity
- 8 x Ethernet 100Base-FX
- GFP-F/LAPS, VCAT, LCAS
- LACP
- VC-12/VC-3/VC-4 terminations
- VC groups: maximum eight at 50/2/1

- Classification and forwarding
  - ¬ Per port
  - ¬ MAC DA: IEEE 802.3
  - ¬ C-VLAN/S-VLAN
  - ¬ IEEE 802.1p
  - ¬ DSCP/ToS
  - ¬ Ethertype
- Ethernet multicast: IGMP
- Ethernet OA&M CFM
- Q-in-Q: IEEE 802.1Q/ad
- QoS: IEEE 802.1p
- CoS
  - ¬ Guaranteed
  - ¬ Regulated
  - ¬ Best-effort
- Congestion avoidance
- STP/RSTP/MSTP/PVSTP: IEEE 802 1d/w/s
- ITU-T G.8032 v2 ERP
- Ethernet performance counters
  - ¬ Per port/aggregate/flow
  - ¬ Incoming/outgoing
  - ¬ Unicast
  - ¬ Multicast
  - ¬ Broadcast
- E-Line, E-LAN and Ethernet aggregation services in accordance with MEF

ISA-ES4

- 2.5 Gb/s throughput
- 622 Mb/s back-panel capacity
- 1 x GE using SFP, 8 x Ethernet 10/100Base-T
- GFP-F/LAPS, VCAT, LCAS
- LACP
- VC-12/VC-3/VC-4 terminations
- VC groups: maximum 16 at 63/12/4

- Classification/forwarding
  - ¬ Per port
  - ¬ MAC DA: IEEE 802.3
  - ¬ C-VLAN/S-VLAN
  - ¬ IEEE 802.1p
  - ¬ DSCP/ToS
  - ¬ Ethertype
- Ethernet multicast: IGMP
- Ethernet OA&M CFM
- Q-in-Q: IEEE 802.1Q/ad
- QoS: IEEE 802.1p
- CoS
  - ¬ Guaranteed
  - ¬ Regulated
  - ¬ Best-effort
- STP/RSTP/MSTP/PVSTP: IEEE 802.1d/w/s
- Congestion avoidance
- ITU-T G.8032 v2 ERP
- Ethernet performance counters
  - ¬ Per port/aggregate/flow
  - ¬ Incoming/outgoing
  - ¬ Unicast
  - ¬ Multicast
  - ¬ Broadcast
- E-Line, E-LAN and Ethernet aggregation services in accordance with MEF

ISA-ES16

- 4.5 Gb/s throughput
- 2.5 Gb/s back-panel capacity
- 4 x GE using SFP, 14 x Ethernet 10/100Base-T, 7 x 100Base-FX
- GFP-F/LAPS, VCAT, LCAS
- LACP
- VC-12/VC-3/VC-4 terminations
- VC groups maximum 64 at 63/12/8
- Classification/forwarding
  - ¬ Per port
  - ¬ MAC DA: IEEE 802.3
  - ¬ C-VLAN/S-VLAN
  - ¬ IEEE 802.1p
  - ¬ DSCP/ToS
  - ¬ Ethertype
  - ¬ MPLS label switching (pseudowire/tunnel)
  - ¬ MPLS EXP bits

- Ethernet and MPLS multicast, IGMP
- Martini encapsulation
- Q-in-Q: IEEE 802.1Q/ad
- QoS: IEEE 802.1p
- CoS
  - ¬ Guaranteed
  - ¬ Regulated
  - ¬ Best-effort up to eight CoS
- Policing dual-rate token bucket, metering, marking, CIR/CBS, EIR/EBS, dropping OOP
- Scheduling HOL, weighted-deficit round robin
- Congestion-avoidance WRED per queue
- STP/RSTP/MSTP/PVSTP: IEEE 802.1d/w/s
- ITU-T G.8032 v2 ERP
- Ethernet and MPLS performance counters
  - ¬ Per port/aggregate/flow
  - ¬ Incoming/outgoing
  - ¬ Unicast
  - ¬ Multicast
  - ¬ Broadcast
- Ethernet OA&M CFM
- E-Line/VLL, E-LAN/VPLS, Ethernet aggregation services in accordance with MEF

DVB-ASI

Unidirectional transparent transport

- CBR MPEG-*n* transport stream (TS)
  - ¬ Single program TS (SPTS)
  - ¬ Multiple program TS (MPTS)
- TS rate: 1.5 Mb/s to maximum 100 Mb/s with C-12 or C-3 granularity

For more detailed information, see Alcatel-Lucent DVB-ASI Network Adapter data sheet.

ISA Broadband Copper Extender (BCE)-E1/ISA BCE-Ethernet

- Eight interfaces: up to eight remote NT devices can be connected
- Full NT management
- PM on VC-12 and SHDSL line
- Maintenance operation on NT: loopback and restart

Physical specifications

Power

- Station battery: -48 V DC to -60 V DC
- Power consumption: 100 W (typical)

Dimensions

Subrack main shelf

- Height: 325 mm
- Width: 241 mm
- Depth: 250 mm

Rack

- Height: 2.2 m
- Width: 600 mm
- Depth: 300 mm

Regulatory compliance

Environmental

- Operating conditions: ETS 300 019, Class 3.2
- Storage conditions: ETS 300 019, Class 1.2
- Transportation conditions: ETS 300 019, Class 2.2
- ESD/EMC: ETS 300 386 "Telecommunications Center"

Operational

- Alcatel-Lucent 1350 Optical Management System (OMS)
- CMISE craft terminal through TIA/EIA-232 at 38.4 kb/s
- Network management access through QB3 interface or Qecc G.784
- Local and remote software download
- Remote inventory
- Housekeeping: four inputs plus two outputs
- Auxiliary channels
  - ¬ EOW
  - ¬ 2 x 64 kb/s G.703
  - ¬ 2 x TIA/EIA-232
  - ¬ 2 x V.11
  - ¬ 1 x 2 Mb/s G.703

Standards

- In compliance with all the latest relevant ITU-T standards
  - ¬ G.7041
  - ¬ G.7042
  - ¬ G.707
- ETSI
- ATM Forum
- IETF
- IEEE
- MEF 9, MEF 14, MEF 21 certified
- ITU-T G.8032 v2

CARRIER ETHERNET
MEF
Certified Compliant

Alcatel·Lucent