Alcatel-Lucent 1830 Photonic Service Switch (PSS-64 and PSS-36)

RELEASE 4.0

The Alcatel-Lucent Photonic Service Switch (PSS) 1830, Release 4, adds best-in-class-multi-terabit Optical Transport Network (OTN) switching functionality to the existing best-in-class dense wave division multiplexing (DWDM) capabilities, which include 100G coherent, tunable Reconfigurable Optical Add Drop Multiplexer (ROADM), photonic Operations, Administration & Maintenance (OA&M), design tools and optical long reach. The introduction of the Alcatel-Lucent Photonic Service Switch-64 (PSS-64) and Alcatel-Lucent Photonic Service Switch-36 (PSS-36) electrical switching shelves allows for an OTN/WDM modular approach in the Alcatel-Lucent 1830 PSS product family. Plug-and-play OTN modules can be introduced into new or existing 1830 PSS-based WDM or ROADM networks.

1830 PSS-36

1830 PSS-64

The Alcatel-Lucent 1830 PSS-64 and Alcatel-Lucent PSS-36 are a new class of optical-core switching platforms with terabit capacity and OTN support for the next-generation intelligent optical core. The Alcatel-Lucent 1830 PSS-64 starts with 2 Tb/s in a 64-half-slot single chassis and can scale its universal switch matrix to multiple terabits. The Alcatel-Lucent 1830 PSS-36 starts with 1 Tb/s in a single chassis and is also upgradable to multi-terabit capacity. Both switches offer high-density architecture with the flexibility to split increasing traffic demands among any combination of Carrier Ethernet, OTN and Synchronous Digital Hierarchy/Synchronous Optical Network (SDH/SONET).

WDM photonic switching and ODU electronic switching convergence

The Alcatel-Lucent 1830 PSS family presents a combination of WDM photonic switching and ODU electronic switching layers, scalable product size variants from access (PSS-1) to core (PSS-64), interchangeable line cards among shelves, cross-layer capabilities, and a common network management system for photonic DWDM functions and OTN functions. The solution addresses key customers' backbone challenges by providing Layer 0, Layer 1 and Layer 2 networking capability and synergies between the layers to assure transport at the most economical level, maximum resource optimization, optimized wavelength filling, SLA guarantee, flexible client service assignment, ultra-fast restoration and coordinated network operations.

Along with the Alcatel-Lucent 7750 Service Router, the Alcatel-Lucent 1830 PSS is part of the Alcatel-Lucent Converged Backbone Transformation Solution, which employs a Leverage Network™ architecture.

Low-cost traffic transport

Designed to ensure efficient bandwidth management and traffic forwarding at the most economical transport layer, the Alcatel-Lucent 1830 PSS WDM/OTN approach meets the exaflood challenge of explosive service growth by facilitating traffic transport at the lowest cost per bit. Synergies between the optical and electrical layers ensure the highest availability and resiliency in order to warranty service quality assurance. Moreover, the power consumption in the new electrical shelves is significantly reduced, to less than 2 W/Gb/s.

Flexible bandwidth management

Sub-wavelength ODU switching and any-client, any-line assignment maximizes the wavelength filling factor and provides flexible bandwidth management. Port-level and sub-port-level grooming enables efficient core-router traffic offload onto the optical network and supports scaling of the IP backbone.

Multi-terabit OTN switching

The OTN universal fabric can handle ODU, SONET/SDH and packets agnostically. Leveraging the non-blocking matrix design, the system provides any-rate switching at full capacity usage regardless of the ingress and egress traffic mix. The new PSS-64 and PSS-36 high density shelves present an ODU non-blocking matrix in two size variants, with 2 Tb/s capacity (Alcatel-Lucent PSS-36) and 1Tb/s capacity (Alcatel-Lucent PSS-36), upgradable to 8 Tb/s and 4 Tb/s, respectively. The PSS-36 and PSS-64 modules can be integrated into new or existing 1830 PSS-based WDM or ROADM networks.

GMPLS control plane

The Alcatel-Lucent 1830 PSS-64 and Alcatel-Lucent PSS-36 enable automated operations and resilience with an integrated Generalized Multi-Protocol Label Switching (GMPLS) control plane. The control plane enables a range of benefits, including automated network and service provisioning for bandwidth-on-demand services and highly available networks that are resilient to multiple failures and have flexible restoration options for service differentiation and Service Level Agreement (SLA) support. The Alcatel-Lucent 1830 PSS with OTN and wavelength switching capabilities is ready to support multilayer GMPLS restoration for network monetization by reducing the resources required for protection and freeing bandwidth for revenue-producing traffic.

Features

- Two single chassis with 1 Tb/s and 2 Tb/s full-duplex universal switch matrixes
- High-density architecture based on innovative 65 nm silicon technology
- System supports Optical Channel Data Unit-k (ODUk) switching as well as interfaces to DWDM, Ethernet and SDH
- Support for any mix of client traffic, including 40 Gb/s signals, Gigabit Ethernet (GE) and 10GE, OTH ODUk, and SDH/SONET up to STM-64/OC-192
- Efficient bandwidth management capabilities at the sub-wavelength level, for high bit-rate traffic scaling up to 40 Gb/s and prepared for 100 Gb/s
- GMPLS control plane intelligence, with dynamic bandwidth provisioning across the OTN layer

Benefits

- Provides very high capacity in a scalable and sustainable manner to deliver next-generation IP services at the lowest cost per bit
- Avoids the under-utilization or over-build of optical and routing assets and allows traffic forwarding at the most economical layer
- Leverages SDH/SONET assets and operational models for smooth evolutionary upgrading to higher capacity OTN
- Enables the transparent transport of multiple operators' traffic, all with end-to-end control and quality assurance
- Reduces operating expenditures (OPEX) with a high-density, low-power-per-bit design

Technical specifications

Alcatel-Lucent 1830 PSS-64

- Shelf dimensions
  - ¬ Height: 160 cm (63 in.)
  - ¬ Width: 50 cm (19.7 in.)
  - ¬ Depth: 30 cm (11.8 in.)
- 32 slots (64 half slots)
- 120G full duplex per slot
- Protected
  - ¬ 1.92 Tb/s universal switching matrix
  - ¬ Controllers
  - ¬ Power supply
  - ¬ Fan trays

Alcatel-Lucent 1830 PSS-36

- Shelf dimensions
  - ¬ Height: 65 cm (25.6 in.)
  - ¬ Width: 50 cm (19.7 in.)
  - ¬ Depth: 30 cm (11.8 in.)
- 16 slots (32 half slots)
- 120G full duplex per slot
- Protected
  - ¬ 960 Gb/s universal switching matrix
  - ¬ Controllers
  - ¬ Power supply
  - ¬ Fan

I/O cards

- Universal cards
  - ¬ 10 x 10G any (XFP): STM-64, OC-192, OTU2, OTU2e, 10GE
  - ¬ 24 x multirate any (SFP): STM-16, OC-48, GE; prepared for STM-4/1, OC-12/3, OTU1
  - ¬ 2 x 40G any: OTU3
- Ethernet cards
  - ¬ 10 x 10GE (XFP) mapping to ODU2 or ODU2e
  - ¬ 24 x GE (SFP) mapping to ODU0
- OTH cards
  - ¬ 10 x OTU2, OTU2e, STM-64/OC-192 (XFP) mapping to ODU2
- Tunable XFP support (50-GHz spacing)

ASON/GMPLS control plane

- Automatic network discovery
- ODUk service restoration
- Service types
  - ¬ Unprotected
  - ¬ Source-based restoration (SBR)
  - ¬ Guaranteed restoration (GR)
  - ¬ Protection and restoration combined (PRC)
  - ¬ Sub-Network Connection Protection (SNCP)
- Link bundling
- Nominal route handling
- Traffic engineering
- Service provisioning
- Maintenance functionalities

OTH

- Non-blocking ODUk cross-connections
- 1:N broadcast (N = 2)
- 1+1 ODUk protection
- Tandem Connection Monitoring (TCM)
- Generic Communication Channel (GCC)
- Encapsulation of SDH/SONET, GE, 10GE
- Fault and performance monitoring

SDH/SONET

- Linear 1+1 MSP/APS protection
- Fault and performance monitoring

OTH gateway

- Single node configurations to bridge OTH and SDH/SONET
  - ¬ ODUk grooming and switching
  - ¬ Back-to-back linear SDH/SONET protection with OTH

Ethernet

- Ethernet protocols (IEEE 802.3)
- Client signal fail/server signal fail (CSF/SSF) forwarding
- Jumbo-frame support
- Ethernet GFP-F mapping to ODU2
- Ethernet mapping to ODU0 and ODU2e
  - ¬ Timing and physical code section (PCS) transparency

Management

- Alcatel-Lucent 1350 Optical Management System (OMS)
- TL-1
- CORBA (control plane)
- Zero-installation craft (ZIC) terminal

Power and cooling

- Power supply: -48 V DC/-60 V DC
- Power consumption: typically less than 2 W/Gb/s
- Forced air cooling

Operating environment

- Operating temperature: 5°C to 40°C (41°F to 104°F)
- Humidity: 5% to 85% non-condensing

Regulatory compliance

- CE mark
- UL
- Operating environment: ETS 300 019, Class 3.1e
- Storage: ETS 300 019, Class 1.2
- Transportation: ETS 300 019, Class 2.3
- Telcordia® GR-63 (NEBS Requirements: Physical Protection)

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