

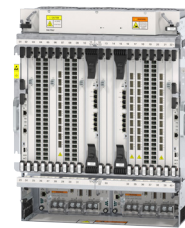
## Nokia 1830 Photonic Service Switch (PSS-64 and PSS-36)

### Release 8.0

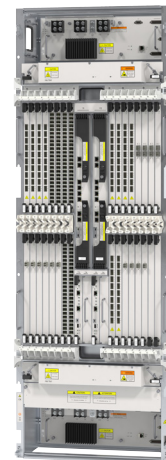
The Nokia 1830 Photonic Service Switch (PSS) supports next-generation WDM multiservice transport from access to core. The scalable 1830 PSS, with high-performance 100G transport, drives lower TCO and extends network life cycles.

The 1830 PSS transforms traditional WDM into a flexible transport layer with managed agile photonics, multilayer switching and services, and network intelligence. The platform supports a wide range of applications and services such as Carrier Ethernet transport, mobile and broadband backhaul, multicast video, Data Center Interconnect (DCI) and Cloud. With 1830 PSS platforms ranging from compact access to converged Optical Transport Network (OTN)/WDM core, operators can optimize multiservice networks to meet unpredictable traffic demands in the cloud services era.

The 1830 PSS portfolio provides terabit OTN switching and photonics capacities. The Photonic Service Engine (PSE) enables high-performance 100G and an evolutionary path to 400G transport. Leveraging an intelligent control plane and integrated data, control and management planes, the 1830 PSS simplifies network management for maximum multilayer performance and efficiency.



1830 PSS-36



1830 PSS-64

The 1830 PSS-64 and PSS-36 electrical switching shelves allow for an OTN/WDM modular approach in the 1830 PSS product family. They also support control plane, Carrier Ethernet and data center applications, as well as SDH/SONET gateway functionality.

The Nokia 1830 PSS-64 and Nokia 1830 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 Nokia 1830 PSS-64 supports 4 Tb/s in a 64-half-slot single chassis and can scale its universal switch matrix to multiple terabits. The Nokia 1830 PSS-36 supports 2 Tb/s in a single chassis. Both switches offer a high-density architecture with the flexibility to split increasing traffic demands among any combination of Carrier Ethernet, OTN and Synchronous Digital Hierarchy (SDH)/Synchronous Optical Network (SONET).

## WDM Photonic Switching and OCU Electronic Switching Convergence

The Nokia 1830 PSS family presents a combination of WDM photonic switching and ODU electronic switching layers, scalable product size variants from access (PSS-4) 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 network 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.

## Low-cost traffic transport

Designed to ensure efficient bandwidth management and traffic forwarding at the most economical transport layer, the Nokia 1830 PSS OTN/WDM 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. Plus, integrated 100G DPM-QPSK with Soft Decision FEC, integrated 40G PDM-BPSK coherent muxponders and 10G muxponders are now offered.

## Flexible bandwidth management

Sub-wavelength VC-4/STS-1/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 enable efficient core-router traffic offload onto the optical network and support scaling of the IP backbone.

## Multi-terabit OTN switching

The OTN universal fabric can handle ODU, SDH/SONET 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 1830 PSS-64 and 1830 PSS-36 high-density shelves present an ODU non-blocking matrix in two size variants, with 4 Tb/s capacity (1830 PSS-64) and 2Tb/s capacity (1830 PSS-36), with an upgrade path toward multi-terabit. The 1830 PSS-64 and 1830 PSS-36 modules can be integrated into new or existing 1830 PSS-based WDM or ROADM networks.

## GMPLS control plane

The 1830 PSS-64 and 1830 PSS-36 enable automated operations and resilience with an integrated Generalized Multiprotocol 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 Nokia 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 2 Tb/s and 4 Tb/s full-duplex universal switch matrices
- System supports Optical Channel Data Unit-k (ODUk) switching, SDH/SONET switching (VC-4/STS-1) as well as interfaces to DWDM, Ethernet and SDH
- Support for any mix of client traffic, including Gigabit Ethernet (GE), 10GE, 40GE and 100GE, OTH ODUk from OTU2 to OTU4, and SDH/SONET from STM-1/OC-3 up to STM-64/OC-192
- Efficient bandwidth management capabilities at the sub-wavelength level, for high bit-rate traffic scaling up to 100 Gb/s
- GMPLS control plane intelligence, with dynamic bandwidth provisioning across the OTN layer
- Flexible grid-ready OTS line
- High-density 100G coherent mux transponder
- Photonic domain protection (OMSP)
- Universal encryption module and key management tool for DCI applications

## 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 overbuild 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
- Protects investment with flexible grid-ready OTS line capability

## Technical specifications

### Nokia 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
  - 3.84 Tb/s universal switching matrix
  - Controllers
  - Power supply
  - Fan trays

## Nokia 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
  - 1.92 Tb/s universal switching matrix
  - Controllers
  - Power supply
  - Fan

## I/O cards

- Universal cards
  - 1 x 100G any (CFP2): OTU4, 100GE
  - 10 x 10G any (XFP): STM-64, OC-192, OTU2, OTU2e, 10GE
  - 4 x 10G any (XFP): STM-64, OC-192, OTU2, OTU2e, 10GE
  - 24 x multirate any (SFP): STM-16/4/1, OC-48/12/3, GE; prepared for OTU1
  - 2 x 40G any: OTU3, STM-256/OC-768
  - 2 x 40G any (QSFP): OTU3, 40GE
- Ethernet cards
  - 1 x 100GE (CFP2) mapping to ODU4
  - 2 x 40GE (QSFP+) mapping to ODU3
  - 10 x 10GE (XFP) mapping to ODU2 or ODU2e
  - 24 x GE (SFP) mapping to ODU0
  - 8 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)
- Fixed XFP support

- SDH cards
  - 10 x STM-64/OC-192 mapping to VC-4/STS-1
  - 24 x STM-16/-4/-1/OC-48/-12/-3 mapping to VC-4-nc/STS-1-nc
- Switchponder cards
  - OTU3e2 tunable coherent uplink
  - OTU4 Standard and Flexgrid tunable coherent uplink with soft decision FEC; single slot
  - OTU2/OTU2e tunable uplink
- 88-channel flexible grid-ready OTS line

## ASON/GMPLS control plane

- Automatic network discovery
- Multi-region network (MRN) control plane cross electrical and photonic domain
- 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 functions
- IETF UNI

## OTH

- Non-blocking ODUk cross-connections (k=0, 1, 2, 2e, 3, 3e, 4)
- Drop-and-continue
- 1:N broadcast
- 1+1 ODUk SNC/I/N protection

- 1:N ODUk SNC/S protection
- Tandem Connection Monitoring (TCM)
- Generic Communication Channel (GCC)
- Encapsulation of SDH/SONET, GE, 10GE
- Fault and performance monitoring

## **SDH/SONET**

- SDH Line Timing
- STM-64/16/4/1, OC-192/48/12/3 interfaces
- Non-blocking VC-4-nc/STS-1-nc cross-connections
- SNCP and UPSR protection
- Linear 1+1 MSP protection
- Fault and performance monitoring

## **OTH gateway**

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

## **Ethernet**

- Ethernet protocols (IEEE 802.3)
- Client signal fail (CSF)/server signal fail (SSF) forwarding
- Jumbo-frame support
- Ethernet GFP-F mapping and service access to ODU2

- Ethernet mapping to ODU0 and ODU2e, ODU4
  - Timing and physical code section (PCS) transparency

## **Management**

- Nokia 1350 Optical Management System (OMS)
- Nokia 5620 Service Aware Manager (SAM)
- 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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Nokia Oyj  
Karaportti 3  
FI-02610 Espoo  
Finland  
Tel. +358 (0) 10 44 88 000

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