

## Nokia 1830 PSS-24x

The 1830 Photonic Services Switch (PSS) portfolio consists of platforms optimized for varying optical network deployment environments ranging from interconnecting data centers to efficiently scaling large metro, regional and long-haul multi-layer, multiservice optical networks. Each platform leverages common software, hardware, management and control to offer seamless operations across the portfolio.

The 1830 PSS-24x platform is optimized for core and large metro packet/optical transport network (OTN) switching applications, placing industry-leading electrical switching scale at international/national, regional and metro core network locations. It provides the scale and efficiency required to support an evolution to 100G/400G services, enabling continued revenue streams as customers demand more bandwidth and enterprises move toward higher capacity connectivity between their routers and data centers.

With support for 24 Tb/s of electrical switching capacity in a single shelf, 48 Tb/s per rack, the Nokia 1830 PSS-24x offers industry-leading OTN and packet switch scale, port densities, and wavelength distances, while also using less power per bit.



Nokia 1830 PSS-24x

This new level of switching scale is enabled by intelligent electrical fabric design coupled with terabit-capable card slots for transport wavelength cards powered by the Photonic Service Engine (PSE), and services cards with high client port density.

## Benefits

- Significantly and simultaneously scales network capacity, distance and density, making feasible the mass delivery of sub-10G, 10G, 100G and 400G services
- Supports extremely efficient dense wavelength division multiplexing (DWDM) transport wavelengths:
  - Flexible, rate-adaptive 100G to 400G coherent DWDM lines
  - Ultra-efficient multicarrier superchannels
  - Optimizes transport wavelength spectral efficiency for both capacity and distance, maximizing achievable fiber bandwidth without compromising wavelength availability
  - 200G wavelength distances of 2400 km, supporting an evolution from 100G to 200G DWDM long haul
  - 100G wavelength distances of 3,000 km to 5,000+ km, supporting ultra-long haul without costly regeneration
  - Pay-as-you-grow 100G/200G/400G DWDM pluggable line options.
- Provides the flexibility to optimize networks along the dimensions of power, space, cost and spectral density
- Isolates line cards from client cards for investment and operational decoupling
- Delivers reliable, efficient, scalable multiservice transport:
  - Redundant control, power and timing
  - Efficient 2+1 electrical fabric protection
  - reducing startup costs and power
- Fast resilience using software-defined networking (SDN) centralized or distributed Generalized Multiprotocol Label Switching (GMPLS) control plane
- Power consumption of less than 0.4 W/Gb
- The ability to scale to 24 Tb per shelf and 48 Tb per rack
- Multiservice packet/OTN switching
- Large-scale transport of 1G to 100G services with traffic segregation, bandwidth, loss, latency and availability guarantees
- Direct multiplexing of low-speed clients to 100G, 200G and 400G line interfaces
- Simplified protection and spares inventory.
- Efficient and reliable multi-layer networking:
  - Efficient bandwidth management capabilities at the 100G and sub-100G levels
  - ODUk switching and protection from ODU0 to ODU4, including ODUFlex
  - Carrier Ethernet and Multiprotocol Label Switching – Transport Profile (MPLS-TP) services and networking
  - IP router offload via integrated packet/OTN cards
  - 10GE and 100GE mapping into ODUFlex
  - (prepared for) 400GE mapping into ODUFlex
  - IP/optical integration via GMPLS user-network interface (UNI)
  - Efficient enhanced reconfigurable add-drop multiplexer (eROADM) in multivendor environment
  - Compatible with fixed grid and flex spectrum photonic infrastructures
  - Advanced wavelength frequency and high-speed phase recovery capabilities enable 50-ms protection.

- Ultra-fast wavelength multi-layer protection and restoration
- ODUk and ODUFlex 1:N (N=10) broadcast
- Path latency measurements: DMp, DMt path and trail delay measurement
- Embedded multi-layer capability with multiplexing, grooming, and switching at Layer 0 (wavelength), Layer 1 (ODUk), and Layer 2 (packet)
- Provides a smooth evolutionary path for the Nokia 1830 PSS product portfolio, allowing network operators to leverage their existing investment and migrate to higher service rates.

## Technologies

- Nokia-designed PSE compact and super coherent electro-optics:
  - Multiple modulation formats to support maximum wavelength scale over various geographic distances and qualities of fiber
  - Flexible-rate DWDM coherent interfaces with aggregate payload capacity ranging from 100G to 400G
  - Next-generation, latency-adjustable, soft decision forward error correction (SD-FEC)
  - Adaptable to a wide range of fiber impairments for operation over extreme distances and challenging fiber environments
- Integrated Wavelength Tracker™ encoding, supporting unique and powerful wavelength operations, administration and maintenance (OAM)
- Multi-layer control plane capabilities
  - Multi-layer, multi-region networking support, including coordinated multi-layer protection and restoration
  - GMPLS UNI support for IP/optical integration
- Management
  - Nokia Network Services Platform (NSP) Network Functions Manager - Transport (NFM-T)

- Transport SDN
  - Centralized, multi-layer control via Network Services Platform (NSP)
- Network design and planning
  - Integrated network planning tools for optimized multi-layer network planning/deployment

## Applications

- Large-scale grooming of sub-100G and 100G services on to efficient DWDM transport:
  - Business services
  - Wholesale services
  - Multiservice transport
- Optimized metro and regional/national core packet/OTN switching
- More 100G and 200G distance for the long haul
- More capacity on difficult fiber routes
- Sub-sea networks

## Product description

### 1830 PSS-24x

The 1830 PSS-24x is designed to address multi-layer, multiservice optical network scale and efficiency by delivering an industry-leading level of OTN and packet switching. By leveraging class-leading, in-house-designed silicon for both electrical switching and DWDM interface port density and capacity, the 1830 PSS-24x provides efficient, non-blocking, high-capacity, any-rate switching regardless of traffic mix.

Capable of supporting up to 48 Tb/s of packet/OTN switching capacity in a single rack, terabit-capable card slots and low system power utilization, the 1830 PSS-24x takes packet/OTN grooming and protection capabilities to the next level of scale required at international/national, regional, and metro core network locations to support an evolution to 100G/400G services.

## DWDM line card options

### 1T configurable 200G to 400G LH/Regional/Metro transport wavelength card

This PSE-Vc Coherent DSP-based card can be configured from Metro to Longhaul networks.

Features:

- 1-slot card, 24 per PSS-24x shelf
- 4 flexible 200G to 400G PSE-Vc line ports
- Lines fully tunable across C-Band; Flexgrid-capable
- 200G supporting 2,400 km using 62 Gbaud QPSK
- 400G using 62 Gbaud 16QAM modulation
- NxOTU4, OTUCn line structure

### 8 x 100G Regional/Long-haul, 5 x 200G Metro/regional transport wavelength card

This PSE-3 Compact DSP-based card is ideal for addressing routes with abundant fiber capacity. Typical deployments include a 100/200G evolution for metro/regional networks.

Features:

- 1-slot card, 24 per PSS-24x shelf
- 8 flexible PSE-3c 100G/200G line ports
- OPSflex protection
- Pay-as-you-grow CFP4-ACO pluggables
- Lines fully tunable across C-Band, Flexgrid-capable
- PSE-3c 100G QPSK transport wavelengths
- PSE-3c 200G 16QAM transport wavelengths
- Wavelength Tracker technology for operationally efficient end-to-end wavelength OAM

### 400G Long-haul/Ultra-long-haul transport wavelength card

This PSE-2 Super Coherent DSP-based card is ideal for addressing routes with very high traffic growth and/or routes with limited fiber capacity. Typical deployments include long-haul core networks and challenging regional/metro routes.

Features:

- 1-slot card, 24 per PSS-24x shelf
- 2 flexible 100G to 200G PSE-2s line ports
- OPSflex protection
- Lines fully tunable across C-Band; Flexgrid-capable
- 200G supporting 2,000 km using unique 8-QAM
- 100G supporting 3,000 km to 5,000+ km using unique DP-SPQPSK modulation
- Wavelength Tracker OAM

### 4 x 100G Regional/Long-haul transport wavelength card

This PSE-2 Compact DSP-based card is ideal for addressing routes with lower traffic growth and/or routes with abundant fiber capacity. Typical deployments include a 10G evolution for metro/regional networks.

Features:

- 1-slot card, 24 per PSS-24x shelf
- 4 flexible PSE-2c 100G line ports
- OPSflex protection
- Pay-as-you-grow CFP2-ACO pluggables
- Lines fully tunable across C-Band, Flexgrid-capable
- PSE-2c 100G QPSK transport wavelengths
- Wavelength Tracker technology for operationally efficient end-to-end wavelength OAM

### 20 x 10G any uplink card

This card provides scalable, pay-as-you-grow 10G any service point-to-point uplink connectivity for large metro applications.

Features:

- 20-port 10G uplink card
- 1-slot card, 24 per PSS-24x shelf
- SFP+ pluggables
- All ports independently configurable as
  - OTU2e, OTU2 including sub-structuring to ODUk/ODUflex

## Client card options

### 100G/400G client card

This card supports cost-efficient 100G pluggables and multirate 100G/400G Ethernet clients.

Features:

- 10-port 100GE/OTU4 client card, 2 ports configurable as 100G or 400GE
- 1-slot card, 24 per PSS-24x shelf
- QSFP28 pluggables SR4, SR4 dual rate, CWDM4, eCWDM4, LR4, LR4 dual rate
- 100GE mapping into ODU4/ODUflex
- 2 x 400GE prepared
- FlexO prepared
- OPSB protection
- Y-cable protection

### 4 x 100G any client card

This card provides scalable, pay-as-you-grow 100G any service point-to-point client connectivity.

Features:

- 4-port 100G any client card
- 1-slot card, 24 per PSS-24x shelf
  - CFP4 pluggables
- OPSB and Y-cable client protection
- All ports independently configurable as
  - 100GE mapping into ODU4/ODUflex
  - OTU4 including sub-structuring to ODUk/ODUflex

### 30 x 10G any client card

This card provides scalable, pay-as-you-grow 10G any service point-to-point client connectivity.

Features:

- 30-port 10G any client card
- 1-slot card, 24 per PSS-24x shelf
- SFP+ pluggables

- OPSB and Y-cable client protection
- All ports independently configurable as
  - 10GE mapped into ODU2 and ODU2e
  - OTU2e, OTU2 including sub-structuring to ODUk/ODUflex
  - STM-64/OC-192 mapped into ODU2

### 10G/40G/100G client card

This card supports cost-efficient 100GE pluggables and multirate 10G/40G Ethernet clients.

Features:

- 10-port 100GE client card
- 1-slot card, 24 per PSS-24x shelf
- QSFP28 pluggables SR4, SR4 dual rate, CWDM4, eCWDM4, LR4, LR4 dual rate
- 100GE mapping into ODU4/ODUflex
- 40 x 10GE with breakout-cable
- OPSB protection
- Y-cable protection

### 20 x sub-10G/10G multiservice client card

This card supports direct connection of sub-10G clients in addition to 10G clients.

Features:

- 16 x sub-10G clients for 1GE, STM-1/-4/-16, OC-3/-12/-48
- 4 x 10G clients for 10GE, STM-64, OTU2, OTU2e

## Ethernet services and switching cards

### 100GE optimized Ethernet services and switching card

This card supports high-capacity Carrier Ethernet services and Ethernet switching over 10GE/40GE/100GE ports and packet/OTN backplane.

Features:

- Up to 3 x 100GE, 6 x 40GE, 24 x 10GE ports
- 1-slot card, 24 per PSS-24x
- QSFP28/QSFP+ pluggables

- Based on Nokia Service Router Operating System (SR OS)
- Local switching supported
- Flexible OTN service mapping with ODUflex
- Dual card pairability via backplane
- MPLS-TP and Carrier Ethernet services/control
- Supports flexible multi-terabit packet scale
- SNMP management

## 10GE optimized Ethernet services and switching card

This card supports high-capacity Carrier Ethernet services and Ethernet switching over 1/10GE ports and packet/OTN backplane.

Features:

- Up to 30 x 1/10GE B&W or CWDM client Interfaces
- 1-slot card, 24 per PSS-24x
- SFP+ pluggables
- Based on Nokia SR OS

- Local switching supported
- Flexible OTN service mapping with ODUflex
- Dual card pairability via backplane
- MPLS-TP and Carrier Ethernet services/control
- Supports flexible multi-terabit packet scale
- SNMP management

## Related Nokia products

- 1830 Photonic Service Switch (PSS)-4, PSS-8, PSS-16, PSS-32, PSS-8x and PSS-12x
- 1830 Photonic Service Switch (PSS)-36, PSS-64 packet/OTN switching devices
- Network Services Platform (NSP) Network Functions Manager - Transport (NFM-T)
- 1390 Network Planning Tool (NPT)
- Network Service Platform (NSP) IP/Optical SDN controller
- IP/Optical Integration with 7750 Service Router (SR) and 7950 Extensible Routing System (XRS)

## Technical specifications

### Overview

Specifications	
Capacity and performance	24 Tb per shelf, 48 Tb rack
Interface card slots (full height)	24-terabit-capable slots
Dimensions	Height: 950 mm (37.4 in)
	Width: 500 mm (19.7 in)
	Depth: 600 mm (23.6 in)
Weight	33 kg, 73 lb
Packet/OTN fabric options	2+1 protected, centralized packet/OTN fabric and/or pay-as-you-grow, card-based packet fabric
Controller card slots	2 protected
Power modules	Redundant power, modular, scalable power architecture
Power options	-48 V DC/-60 V DC
Power requirements	0.8 W/Gb (9.6Tbps) and 0.4W/Gb (24Tbps)
Operating temperature	5°C to 40°C (41°F to 104°F)
	-5° C to +50° C (+23° F to +122° F) short term
Humidity	5% to 85% non-condensing
Multi-shelf management	Up to 48 1830 PSS shelves

## Fabric cards

Card ID	Card description	Notes
SC96	9.6 Tb/s switch card	Support for 2+1 protection, supports any card in any slot up to 9.6 Tbps
SC24T	24 Tb/s switch card	Support for 2+1 protection, supports any card in any slot up to 24 Tbps

## Interface cards\*

Card ID	Card description	Notes
4UC1T	200G to 400G Transport	Supports 4-port pay-as-you-grow CFP2-DCO pluggables. For high-density 1Tbps applications with NxOTU4 and OTUC4 line structure <ul style="list-style-type: none"> <li>• 200G QPSK, 62 Gbaud</li> <li>• 200G 8QAM, 45 Gbaud</li> <li>• 400G 16QAM, 62 Gbaud</li> <li>• 300G 8QAM, 62 Gbaud*</li> <li>• 250G 8QAM 56 Gbaud*</li> </ul> * future releases
8UC1T	100G/200G Metro/Regional/LH transport	Supports pay-as-you-grow CFP4-ACO pluggables for high-density 100G/200G applications
10AN1T	100G/400G Multiservice client	High-density, multirate Ethernet client card <ul style="list-style-type: none"> <li>• 10 x 100GE/OTU4 QSFP28</li> <li>• 2 x 400GE QSFP56DD</li> </ul>
2UC400	400G Long-haul/Ultra-long-haul transport	Optimized for highest spectral efficiency in long-haul and regional networks
4UC400	4 x 100G Regional/Long-haul transport	Supports pay-as-you-grow CFP2-ACO pluggables for high-density 100G applications
4AN400	4 x 100G Multiservice client	High-density multiservice 100G, CFP4 pluggables, ports independently configurable as: <ul style="list-style-type: none"> <li>• 100GE mapping into ODU</li> <li>• OTU4 including sub-structuring to ODUk/ODUflex</li> </ul>
30AN300	30 x 10G Multiservice client	High-density multiservice 10G, SFP+ pluggables, ports independently configurable as: <ul style="list-style-type: none"> <li>• 10GE mapped into ODU2 and ODU2e</li> <li>• OTU2e, OTU2 including sub-structuring to ODUk/ODUflex</li> <li>• STM-64/OC-192 mapped into ODU2</li> </ul>
20UC200	20 x 10G any uplink card	High-density multiservice 10G, SFP+uplink/client pluggables, ports independently: <ul style="list-style-type: none"> <li>• 10GE mapped into ODU2 and ODU2e</li> <li>• OTU2e, OTU2 including sub-structuring to ODUk/ODUflex</li> <li>• STM-64/OC-192 mapped into ODU2</li> </ul>
10AN400	10G/40G/100G client	High-density, multirate Ethernet client card <ul style="list-style-type: none"> <li>• 4 x 100GE/OTU4 QSFP28</li> <li>• 8 x 40GE/OTU3</li> <li>• 40 x 10GE</li> </ul>
20AN80	20 x sub-10G/10G multiservice client	Sub 10G and 10G client card <ul style="list-style-type: none"> <li>• 16 x sub-10G clients for 1GE, STM1/4/16, OC-3/12/48</li> <li>• 4 x 10G clients for 10GE, STM-64, OTU2, OTU2e</li> <li>• OTU1 (prepared)</li> </ul>



Card ID	Card description	Notes
6SE300	100GE optimized Ethernet services and switching card	<ul style="list-style-type: none"> <li>• Up to 3 x 100GE, 6 x 40GE, 24 x 10GE ports</li> <li>• QSFP28/QSFP+ pluggables</li> <li>• Nokia SR OS-based</li> <li>• Local switching supported</li> <li>• Flexible OTN service mapping with ODUFlex</li> <li>• Dual card pairability via backplane</li> </ul>
30SE300	10GE optimized Ethernet services and switching card	<ul style="list-style-type: none"> <li>• Up to 30 x 1/10GE B&amp;W or CWDM client Interfaces</li> <li>• SFP+ pluggables</li> <li>• Nokia SR OS-based</li> <li>• Local switching supported</li> <li>• Flexible OTN service mapping with ODUFlex</li> <li>• Dual card pairability via backplane</li> </ul>

\*Note: Support for interface cards and related features depends on the software release. Please refer to release notes and user documentation for additional details

## Interface types

Specifications	
SDH: STM-1/-4/-16/-64	✓
SONET: OC-3/-12/-48/-192	✓
OTN: 2/2e/3/4	✓
Ethernet:	
10GE LAN and WAN	✓
100GE	✓
400GE	✓
Pluggable interfaces:	
CFP4-ACO	✓
CFP2-DCO	✓
QSFP56DD	✓
SFP+	✓
CFP2-ACO	✓
QSFP28	✓



## Packet capabilities

Capabilities	
Packet switching technologies	<ul style="list-style-type: none"> <li>• IEEE 802.1Q Provider Bridging with S-VLAN and/or C-VLANs</li> <li>• MPLS-TP for connection-oriented packet transport</li> </ul>
Scalability	<ul style="list-style-type: none"> <li>• Packet service interfaces from 1G to 100G</li> </ul>
Interworking	<ul style="list-style-type: none"> <li>• Interworking with 7750 SR, 7210 SAS</li> <li>• Standard interfaces and protocols</li> </ul>
QoS	<ul style="list-style-type: none"> <li>• Quality of Service – multiple classes of service using SR OS service model</li> <li>• Flexible classification, rate controls, queuing, congestion management, and scheduling options</li> </ul>
OAM	<ul style="list-style-type: none"> <li>• IEEE 802.1ag, ITU-T Y.1731, MEF17/30.1/35.1, 802.3ah (EFM)</li> <li>• MPLS-TP OAM (IETF)</li> <li>• Performance monitoring for SLAs, proactive/predictive maintenance</li> </ul>
MEF CE2.0	<ul style="list-style-type: none"> <li>• Metro Ethernet Forum Carrier Ethernet 2.0 for all service types: E-line, E-LAN, E-Tree, E-Access</li> </ul>
High availability	<ul style="list-style-type: none"> <li>• Ethernet Ring Protection with multi-ring interworking (ITU-T G.8032 )</li> <li>• Link Aggregation(IEEE 802.1AX ), with Multi-Chassis LAG</li> <li>• MPLS-TP 1:1 LSP Protection (RFC 6378, ITU-T G.8131), PW Redundancy (RFC 6718)</li> </ul>

\*Note: Support for packet features depends on the software release. Please refer to release notes and user documentation for additional details

## SDN

Capabilities	
Controllable via Nokia Network Services Platform (NSP) SDN controller	✓

## Management

Capabilities	
Web GUI and CLI	✓
SNMPv3 (AES-256)	✓
TL1	✓
CFM framework (MD, MEL, MEG, up/down MEP, MIP configuration)	✓
Fault propagation/LPT	✓
Ethernet port for local access	✓
Integrated remote management via GCC/OSC	✓
Selectable rates for OSC: 100 Mb/s, 155 Mb/s	
Network Services Platform (NSP) Network Functions Manager - Transport (NFM-T)	✓

## Regulatory and standards compliance

Specifications	ANSI	ETSI
EMC	EMC level: Class A CES-003, Issue 4, February 2004, Class A (Canada) Telcordia GR-1089-CORE, Issue 6, May 2011 (NEBS Level 3) Telcordia Special Report SR-3580, Issue 3, January 2007 FCC 47 CFR15, Class A Part B (2006)	EMC level: Class A EN 300 386 v1.6.1 (2012-4) (CE) CISPR 32 – (2008) Class A. (1G ~ 6 GHz) CISPR 24 – First edition (1997-09), Amendment 1 (2001-07) and Amendment 2 (2002-10) EN 55032: Ed2006 + A1:2007: Class A EN 55024:1998 – CENELEC Amendment A1:2001 and Amendment A2:2003 EU Directive 2014/30/EU EC Directive 93/465/EEC ES 201468 (1.3.1), ITC (Class A)
Supported countries	Canada United States	Europe Latin America Asia Pacific Middle East and Africa
Safety	UL/CSA 60950 - 1 Telcordia GR-1089-CORE, Issue 6 Telcordia GR-63-CORE (NEBS Requirements: Physical Protection) FDA 21 CFR 1040, Laser Notice No. 50 to CDRH ITU-T G.664 (2006) - G.783 (ALS/APR)	IEC 60950-1:2005 (2nd Edition); Am 1:2009 EN 60950-1-1:2006 + A11:2009 EN 60825-1, Edition 2.0, 2007-03 EN 60825-2, Third Edition, 2010-09
Environmental	Telcordia GR-63-CORE, Issue 4	EN 300 019-1-1 (Storage, Class 1.2) EN 300 019-1-2 (Transportation, Class 2.3) EN 300 019-1-3 (Operational, Class 3.1) EU WEEE directive 2002/96/EC EU RoHS6: RoHS2.0 Directive 2011/65/EC China RoHS regulation
Power and grounding	Telcordia GR-1089-CORE, Issue 6, section 10 (DC) ATIS 0600 315	ETS 300 132-2 (DC) ETS 300 253
Acoustic noise	Telcordia GR-63-CORE (78dB at 27C ambient temperature)	EN 300 753
Miscellaneous	Mechanical Shock and Bumps Telcordia GR-63 Zone-4 (earthquake) Country-specific requirements: AS/NZS 60950.1:2003: Information technology equipment - Safety- General requirements	Mechanical Shock and Bumps Telcordia GR-63 Zone-4 (earthquake)

### About Nokia

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