

Nokia 1830 Global Express (GX) G25

600G Generation Coherent in a Sub-300-mm ETSI Form Factor

Multiple coherent technology evolutions have driven down cost per bit, power consumption, and footprint while increasing spectral efficiency and fiber capacity. The first evolution was from 40 Gb/s to 100 Gb/s, followed by the transition from hard-decision forward error correction (FEC) to soft-decision FEC. Then came a “200G generation” with flexible-rate interfaces enabled by higher-order modulation, followed by a 400G generation with higher baud rates and additional modulations that enabled 400 Gb/s wavelengths. More recently, a 600G generation has emerged with even higher baud rates, enabling both 600 Gb/s wavelengths and significant improvements in terms of cost per bit, fiber capacity, transport for 400 GbE services, power consumption, and footprint. The Nokia 1830 GX G25, part of the 1830 Global Express (GX) G20 Series, removes the constraint of requiring 600-mm-deep racks by providing this technology in an ETSI-compliant form factor that is optimized for deployment in 300-mm-deep racks. The 1830 GX G25 can be deployed alongside 300-mm-compliant optical line system equipment, including the OMD64C, a 2RU 64-channel 75 GHz mux/demux; the OMD48E, a 2RU 48-channel 100 GHz mux/demux; the Nokia 7100 packet-optical transport platform; the Nokia 1830 Express Transport Metro (XTM) Series; the Nokia 1830 Flexible Intelligent Line System (FlexILS) MTC-9 photonic chassis; and the Nokia 7300 multi-haul transport platform.

1830 GX 600G Technology in a 300-mm Form Factor

While the widely deployed Nokia 1830 GX G30 Series is designed for 600-mm-deep racks, the 1830 GX G25 is an ETSI-compliant form factor with a height of 100 mm (4SU) that is optimized for deployment in 300-mm racks. It provides the same functionality as a single 1830 GX G30 CHM2T sled with two 100G-600G line interfaces and 12 x 100 GbE/OTU4 clients, three of which can be used for 400 GbE, in a fixed configuration form factor with front-only access, redundant D/C power feeds, and dual redundant fans, leveraging the same feature-rich and proven set of software features as the 1830 GX G30 Series.

Industry-leading 600G Technology with 72 Gbaud and Advanced Modulation

The 1830 GX G25 leverages a 16-nm DSP and high-performance indium phosphide modulators to deliver two wavelengths from 100 Gb/s to 600 Gb/s in 50 Gb/s increments. It supports a tuneable baud rate from 28 to 72 Gbaud, with the higher baud rates enabling maximum capacity-reach while the lower baud rates enable more optimal use of the available spectrum and provide support for scenarios like 50 GHz fixed-grid point-to-point and 50 GHz ROADMs networks where the baud rate/spectrum of the signal is constrained. It can be deployed over Nokia line systems (1830 Global Express [GX] Open Line System, 1830 FlexILS, 7300 multi-haul transport platform, 7100 packet-optical transport platform, 1830 XTM Series), third-party open line systems (OLS), and third-party legacy DWDM line systems.

Benefits of the 1830 GX G25

- Leverage high-baud-rate 600G generation technology in 300-mm-deep racks
- Reduce the cost per bit by up to 40% while also minimizing power consumption and footprint
- Maximize fiber capacity with advanced modulation enabling up to 38.4 Tb/s per fiber pair
- Deploy the 1830 GX G25 over fixed-grid and flexible-grid line systems from Nokia or third parties
- Transport 400 GbE client services cost-effectively over a wide range of distances
- Minimize operational cost and speed service delivery with automation enabled by the full set of 1830 GX G30 software features, including RESTCONF/NETCONF open APIs and gNMI/gRPC streaming telemetry



1830 GX G25 600G technology in 300 mm

The images shown are for illustration purposes only and may not be an exact representation of the product.



Figure 1: 1830 GX G25 600G technology

In addition to the PM-QPSK/8QAM/16QAM of earlier coherent generations, it supports higher-order PM-32QAM and PM-64QAM modulation. Advanced modulation features include hybrid modulation, which provides the ability to mix different QAM symbols in the time domain; geometric shaping, which optimizes the location of the constellation points; and set-partitioned PM-QPSK and PM-16QAM, which provide high-performance alternatives to PM-BPSK and PM-8QAM respectively. Soft-decision FEC options include 27% with a 12.3 dB net coding gain for maximum reach and a 15% overhead option for reduced spectrum. Additional features include wire-speed ODU4 AES-256 encryption for 100G and 400G clients, more robust non-differential encoding, high state-of-polarization rotation (i.e., lightning) tolerance, spectral shaping including WSS filtering mitigation, non-linear compensation, sub-50-millisecond line protection including coherent colorless add/drop, and comprehensive performance monitoring.

Maximize Capacity-Reach and Fiber Capacity While Reducing Power Consumption

These features enable 600G distances of up to 150+ km, 400G distances of up to 2,000+ km, and 200G distances of up to 7,500+ km with the margin required for real network deployments, resulting in average cost savings of around 33% relative to 400G generation coherent. They also enable the 1830 GX G25 to maximize fiber capacity and spectral efficiency, delivering up to 38.4 Tb/s per fiber pair and 8 bits/s/Hz with PM-64QAM, while PM-32QAM and hybrid modulation enable increased fiber capacity over a wide range of longer distances. With both wavelengths at 600 Gb/s, typical power consumption is around 0.23 W per Gb/s.

Deliver Cost-effective Transport for 400 GbE Services

Compact pluggable form factors such as QSFP-DD are making 400 GbE an attractive option for routers, with network operators seeing increasing demand for 400 GbE transport both as an internal service interconnecting their own routers and as a service for wholesale and enterprise customers. The 1830 GX G25 can transport 400 GbE over a single wavelength at distances of over 2,000 km. Its tuneable baud rate also enables the 1830 GX G25 to deliver a 400 GbE service over a single 400G wavelength in 50 GHz fixed-grid point-to-point scenarios leveraging PM-64QAM and 42 Gbaud. For longer reach requirements, the 1830 GX G25 can also leverage its dual-wavelength DSP to deliver 400 GbE over two 200G wavelengths at distances up to 7,500+ km. For shorter distances, the dual-wavelength DSP enables the 1830 GX G25 to transport three 400 GbE services over two 600G wavelengths, providing a 33% cost savings compared to using a 400G wavelength for each 400 GbE service.

Automation Enabled by Open APIs and Streaming Telemetry

The 1830 GX G25 supports management, automation, and streaming telemetry via open interfaces. It supports WebGUI, CLI, SNMP, TACACS+, syslog, YANG-modeled NETCONF and RESTCONF APIs, and gNMI/gRPC streaming telemetry. It is OpenConfig and Open ROADM compliant. In-band management is supported via GCCO on the line interfaces, out-of-band management via Ethernet interfaces, and commissioning via the console interface. An OSPF-based DCN is supported. Additional manageability features include zero-touch commissioning (ZTC), RMON, LLDP, and PRBS test generation and loopbacks. The 1830 GX G25 is also supported under Nokia's Transcend Network Management System and Transcend Controller.



Technical Specifications

Physical

- Width: 19" according to IEC 297 (493 mm incl. air baffle)
- Height/rack spacing: ETSI 100 mm/4SU
- Depth: 213 mm/230 mm approx.; mounted in rack with cabling approx. 292 mm
- Fixed configuration
- Front-only access

Electrical Power

- DC power
- 38 to 75 V
- Dual feeds
- Power consumption: 280 W typical, 430 W max

Cooling and Fans

- 1:1 FRU fans
- Airflow: front-to-front or front-to-side

Management and Console Ports

- 3 x RJ-45 Ethernet
- 1 x RJ-45 console
- Pluggable memory card (SDHC)

Regulatory and Compliance

- RoHS-6 compliant and lead-free per Directive 2002/95/EC
- GR-3160-Core Generic Requirements for Telecommunications Data Center Equipment and Spaces
- Telcordia GR-326-Core Generic Requirements for Single-Mode Optical Connectors and Jumper Assemblies
- Telcordia GR-1435-Core Generic Requirements for Multi-Fiber Optical Connectors
- Emissions: FCC Part 15 Class A, EN55022/CISPR Class A Compliant, CE Laser Safety: ANSI Class 1M, IEC Class

1M, EN 60825-1/2, 21 CFR 1040 US FDA CDR, Class 1

- Electrical safety: UL 60950, CSA22.2 60950 and IEC 60950

Environmental

- Operating temperature: 0° C to 45° C/32° F to 113° F
- Transport and storage: -40° C to 70° C/-40°F to 158° F/40° C + 93% RH
- Humidity: 5% to 90% non-condensing

Management Options

- Management and control platforms:
 - Nokia Transcend Controller
 - Nokia Transcend Network Management System
- Command line interface (CLI)
- Zero-touch commissioning (ZTC)
- Syslog
- TACACS+/RADIUS
- WebGUI
- NETCONF
- RESTCONF
- Native YANG models
- OpenConfig
- Open ROADM
- gNMI/gRPC
- SNMP fault and performance management
- OSPF-based DCN

Line Interfaces

- Two integrated interfaces
- 600G generation coherent technology with 16-nm dual-wavelength DSP and high-performance indium phosphide modulators
- 100 Gb/s-600 Gb/s in 50G increments
- Tuneable 28-72 Gbaud

- PM-QPSK/8QAM/16QAM/32QAM/64QAM
- Time domain hybrid modulation
- Geometric shaping
- Set partitioning:
 - PM-SP-QPSK (2 bits/symbol), high-performance alternative to PM-BPSK
 - PM-SP-16QAM (6 bits/symbol), high-performance alternative to PM-8QAM
- Non-differential encoding
- FEC: 27% (12 dB NCG) or 15%
- Spectral shaping including WSS filtering mitigation
- Non-linear compensation
- 50 ms line protection including coherent colorless add/drop
- Performance monitoring: CD, PMD, PDL, Q-factor, pre-FEC BER, OTU-Level PM, delay measurement
- Chromatic dispersion tolerance of >300 ns/nm (100 Gb/s PM-QPSK)
- PMD: Up to 50 ps mean DGD (100 Gb/s PM-QPSK)
- SOP rotation tolerance: >3 Mrad/s (100 Gb/s PM-QPSK)
- Wire-speed ODU4 AES-256 encryption for 100G and 400G clients
- GCCO in-band management on the line port OTUk
- PRBS test and loopback

Client Interfaces

- 12 x QSFP client interfaces
- 12 x 100 GbE/OTU4 QSFP28 (SR4, LR4, ER4, PSM4, CWDM4, active optical cable)
- 3 x 400 GbE QSFP-DD (SR8/AOC, FR4, DR4, LR8)
- LLDP and RMON support (100 GbE)

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

With truly open architectures that seamlessly integrate into any ecosystem, our high-performance networks create new opportunities for monetization and scale. Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

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