

Infinera GX Series – Compact Modular Optical Transport Solutions

Over the past few years, the optical networking industry has witnessed the rise of a new breed of platforms called “compact modular.” Pioneered by Infinera through the introduction of the Cloud Xpress and Groove G30 (now the GX G30), compact modular platforms have repeatedly raised the bar of optical performance, operational flexibility, space and power efficiency, and automation. Compact modular platforms were originally built for internet content providers (ICPs) for point-to-point Ethernet transport in metro data center interconnect applications. Now, their compelling technical and economic value has resulted in fast and consistent market adoption by all types of network operators, including communication service providers (CSPs), cable and multiple systems operators (MSOs), research and education network operators, and many others in a wide variety of applications. With over 300 customers and over 10,000 network elements deployed in just a few years, the GX Series has demonstrated outstanding market adoption. Leveraging a sled-based architecture and an add-as-you-grow operational model, Infinera has introduced many key capabilities to further accelerate the deployment of compact modular platforms and unleash their full potential in a wide scope of applications. Infinera’s GX Series compact modular portfolio consists of:

- **The G25:** A 100-mm-high and 300-mm-deep ETSI-compliant compact modular platform built for 100 GbE and 400 GbE service delivery over a 1.2T optical line (2 x 600G/wavelength), with feature parity with the CHM2-T sled on the G30 platform.
- **The G30 Series:** Equipped with four service slots in 1RU, and with eight service slots in 2RU, the G30 Series offers true multi-service support (SONET/SDH, OTN, Ethernet, Fibre Channel, video, etc.) with advanced transponder and muxponder capabilities, sub-wavelength aggregation, and fully featured add-drop multiplexer functionality in a sled form factor. The G30 Series also supports open line system (OLS) and Open ROADM configurations and a mix of photonic and muxponder sleds in the same chassis.

The G30c Series is a 300-mm-deep ETSI-compliant carrier-grade compact modular solution with OLS and Xponder applications. The line system supports the latest optical transport technologies ranging from simple fixed-grid to flexible-grid CDC ROADM configurations addressing metro, core, and long-haul applications. The Xponders utilize the same technology as the G30 Series, offering true multi-service support (SONET/SDH, OTN, Ethernet, Fibre Channel, video) and are fully interoperable within the GX Series.

- **The G42:** Equipped with four service slots in a 3RU, 600-mm-deep ETSI-compliant form factor, this carrier-grade platform offers full NEBS Level 3 compliance, redundant controllers, multi-chassis management, and many other features. It offers high capacity and low power consumption in a compact footprint, leveraging Infinera’s 1.6T (2 x 800G per wavelength) sixth-generation Infinite Capacity Engine (ICE6). The G42 supports 100G to 800G line transponders and 10G to 400G client interfaces, and is perfectly suited for CSPs, ICPs, and many other network operators that require high-capacity networking.

BENEFITS OF THE INFINERA GX SERIES

- **Decrease capital and operating costs** with more capacity at longer reaches, a compact footprint, and low power consumption
- **Add as you grow** by smoothly adding capacity when and how you want and eliminating the up-front cost of buying all the hardware on day one and the associated CapEx
- **Maximize ROI** with one sled-based architecture for a multi-generational optical engine
- **Seamlessly integrate** compact modular in your CSP network with numerous carrier-grade features
- **Avoid vendor lock-in** by building on third-party open line systems
- **Simplify turn-up and lifecycle management** with easy installation, quick service turn-up, and intuitive management
- **Automate the network** to streamline operations and reduce sources of human error

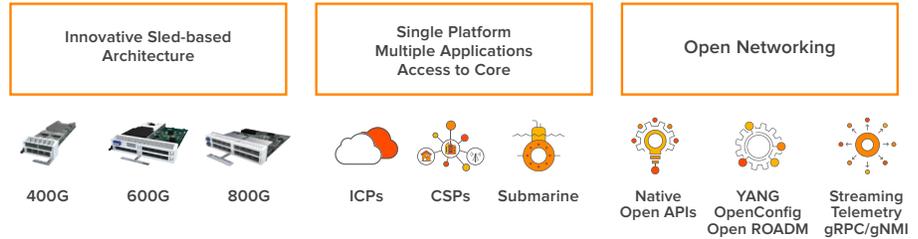


The Infinera GX Series



GX G40/G30 Series

GX Portfolio



Optical Layer

- Fixed OADM
- Amplification
- ROADM – flexible-grid C, CD, CDC
- C+L Band



Service Layer

- 1 GbE to 400 GbE
- Multi-service (SONET/SDH, OTN, FC)
- Transponders/muxponders
- ADM and switching sleds
- Synchronization



Coherent Interfaces

- 100G to 800G
- XR optics including ZR+
- CFP2, QSFP-DD, embedded



Ease of Operations

- Protection/restoration
- Encryption
- Security
- Automation and zero-touch

Figure 1: The next generation of compact modular platforms

THE BENEFITS OF INFINERA'S GX SERIES

The significant business and operational benefits of Infinera's GX Series can be summarized as follows:

- **Multi-generational pay-as-you-grow mode of operation:** The sled-based design allows network operators to eliminate the up-front cost of buying all the hardware on day one and the associated CapEx. Network operators can add capacity and change configuration through sleds when and how they want to, while scaling horizontally by adding new sleds and vertically through the addition of new chassis in a pay-as-you-grow operational model. Moreover, Infinera's game-changing Instant Bandwidth capacity activation model enables the quick, easy, and remote addition or modification of capacity without truck rolls. Instant Bandwidth enables a perfect match between the timing of CapEx and service revenue, thus accelerating time to revenue from months to minutes, and reduces OpEx by streamlining operations and eliminating truck rolls. Moreover, the GX Series platforms are designed to support multiple generations of optical engines, thus maximizing network operators' return on investment.
- **Carrier-grade features:** Many platforms in Infinera's compact modular portfolio are designed to be carrier-grade. Key features such as NEBS Level 3 compliance, hot-swappable redundant controllers, multi-chassis control, AC/DC power supplies, and the ability to fit into 300-mm or 600-mm ETSI racks allow seamless deployment and integration into CSP networks, thus widening the application scope in various parts of the network.
- **Significantly reduced transport costs:** The Groove G30 (now GX G30) disrupted the optical industry with its sled-based architecture, offering high port density in a compact footprint with low power consumption. Infinera builds upon this success by offering a complete portfolio of compact modular platforms and leverages ICE6 to further decrease capital and operating costs with more capacity at longer reach, C+L-band support, compact footprint, low power consumption, and better spectral efficiency. The ICE6 sled design also reduces sparing costs, as the same module can be utilized in a wide variety of applications in metro, regional, long-haul, and submarine networks.
- **Open and disaggregated principles:** The GX Series is built around the principles of hardware disaggregation, open standards (e.g., OpenDaylight, Open ROADM, OpenConfig, etc.), and open APIs with standard YANG models, which further facilitates multi-vendor interoperability and prevents vendor lock-in. Moreover, a next-generation microservices-based software framework allows network operators to selectively deploy the microservices (e.g., path computation engine, etc.) they need, thus accelerating feature development, speeding up software upgrades, improving software scalability, and significantly improving user experience.
- **Simplified turn-up and lifecycle management:** With the goal of having traffic up and running within minutes, Infinera's compact modular platforms have been designed from the ground up to allow easy installation, quick service turn-up, and intuitive management, as well as proven, easy integration into third-party line systems.
- **Built for automation:** The GX Series supports numerous features and capabilities to automate tasks, streamline operations, and eliminate sources of human error. Such features include declarative configuration management, streaming telemetry (gRPC, gNMI), open APIs, and standards-based YANG models. Support for extensible NOS application agents enhances analytics while enabling better network-wide performance monitoring.

WIDE APPLICATION SCOPE

With its sled-based architecture, carrier-grade features, and variety of chassis types, Infinera's compact modular portfolio can be deployed by all types of network operators in a wide variety of applications. These include:

- Providing a wide variety of client services such as OTN, Ethernet, Fibre Channel
- Introducing cost-effective high-speed 100 GbE/400 GbE services over third-party line systems
- Upgrading metro/regional networks for 5G and DAA
- Reducing the cost of optical transport in metro, regional, and long-haul networks
- Double the capacity of existing fiber by leveraging both the C- and L-bands
- Maximizing spectral efficiency in long-haul and submarine networks for more capacity at longer distances
- Addressing data center interconnect applications regardless of distance (anyhaul)
- Expanding network coverage and capacity of existing optical line systems (e.g., GX OLS, FlexILS, and 7300 Series, etc.)
- Introducing new services and reducing transport costs of DTN-X installed base
- Delivering advanced photonic capabilities over open line systems across the entire network and overcoming any site complexity

CONCLUSION

Compact modular platforms continue to elevate the optical networking industry to a whole new level of optical performance, operational flexibility, and automation. The GX Series' support for carrier-grade features, fully featured optical line systems, multi-service sleds, and much more will further accelerate their deployment by all types of network operators in a wide variety of applications, from metro to submarine networks.