

 AXOS e7 2[®] NGPON2-4

Looking to future-proof your next-generation GPON network in preparation for launching advanced services?

As North America's most widely deployed access system, the Calix AXOS E7-2 Intelligent Modular System is a breakthrough evolutionary system that provides a transformational path to next generation networks, fiber technologies, and Software Defined Access. The E7-2 is the industry's benchmark for a modular, small form factor, environmentally hardened access solution for service providers. By adding the AXOS platform, the E7-2 is now even more of a disruptive and compelling enabler to next generation networks that connect the world. The AXOS E7-2 leads a rapidly expanding family of AXOS E-Series systems capable of supporting both centralized and decentralized network architectures that range from the data center edge, central office, or headend, to the remote cabinet, or MDU.

Functional Description

10 GIGABIT PON:

The Calix AXOS E7-2 NGPON2-4 line card provides all the benefits of Calix AXOS while bringing both NG-PON2 and XGS- PON technology to the access network. Each card provides 4 XGS-PON or NG-PON2 OLT channel termination ports that subtend up to 128 ONTs each, for a capacity of 512 ONTs per card and 1024 ONTS per E7-2 1RU chassis. Each port can be independently provisioned to support NG-PON2 or XGS-PON.

KEY FEATURES AND CAPABILITIES

The NGPON2-4 card features and capabilities include:

- Based on ITU G.989 NG-PON2 and XGS-PON family of standards
- 9.953 Gbps downstream, 9.953 Gbps upstream
- Supports up to 4 TWDM wavelengths (one per physical port, upgradeable to 8 wavelengths in future) and the XGS-PON wavelength
- Supports NG-PON2 wavelength mobility
- Leveraging OMCI and GEM (Ethernet) based provisioning model as GPON
- Interoperable with Calix Next Generation 10G PON Residential SFUs and MDUs as well as Business ONTs
- Class N1 +29 dB link budget, up to 1:128 splits
- Integrated 10GE aggregation and transport
- Hardened for central office and remote terminals

IP SERVICES DELIVERY

The Calix AXOS E7-2 NGPON2-4 line card delivers a full spectrum of IP access services over PON fiber networks.

- 4K IPTV – broadcast and Video on Demand (VoD)
- MEF CE 2.0 compliant business services
- Ultra-fast High-Speed Internet (HSI) access
- Voice – Native SIP/VoIP and TDM Gateway support

INTEGRATED HIGH-CAPACITY TRANSPORT

Built on a core Layer 2 and Layer 3 switch, the AXOS E7-2 NGPON2-4 line card is capable of full-duplex, line rate forwarding at all frame sizes and traffic types across all interfaces

Each PON port has a dedicated 10 Gbps switch interface. Four 10 GE XFP uplinks provide support for backhaul of all traffic.

NETWORK RESILIENCY

The Calix AXOS E7-2 NGPON2-4 line card supports a flexible set of standards- based network topology protocols for use in point to point or ring based transport.

Each PON port has a dedicated 10 Gbps switch interface. Four 10 GE XFP uplinks provide support for backhaul of all traffic.

- ITU G.8032v2 Ethernet Ring Protection Switching (ERPS)
- IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.3ad/802.1AX Link Aggregation

MOBILE BACKHAUL & FRONTHAUL

With integrated network synchronization, Ethernet OAM and advanced timing capabilities, the AXOS E7-2 NGPON2-4 line card can be used to transport mobile front haul as well as backhaul traffic while also supporting triple play residential and MEF certified business services from a single platform.

UNIFIED ACCESS INFRASTRUCTURE

With advanced QoS and intelligent NG-PON2 card architecture, operators have a cost-effective way to start with XGS-PON for high density MDU residential services such as Gfast. Then, operators can seamlessly migrate to TWDM optics and further monetize their investment by offering SLA-driven business and mobile hauling capabilities.

The AXOS E7-2 NGPON2-4 line card will thus offer ultra-high bandwidth residential IPTV services, mobile and business services over a single unified access infrastructure.

SPECIFICATIONS

Minimum Software Release

- Calix E7 AXOS Release 3.0

Dimensions (W x H x D)

- Width: 14 in (35.6 cm)
- Height: 0.78 in (2 cm)
- Depth: 10.1 in (25.7 cm)

Weight

- 1.98 lbs. (0.90 kg)

Ports

- 4 XFP interfaces for 10G/10G, 10G/2.5G PON Access Links (4 TWDM channels per card)
- 4 XFP interfaces for 10GE network uplink

Wavelength Support

- XGS-PON: 1577nm Down, 1270 nm Up
- NG-PON2: Up to 4 TWDM wavelengths: 1596-1599 Down, 1532-1535 Up (one wavelength pair per OLT port)

Split Ratio*

- XGS-PON: 1:128 NG-PON2: 1:128
- (*Refer to Calix PPG for engineering design guidelines)

Quality of Service

- Service classification based on port, SVLAN-ID, CVLAN-ID, p-bit
- Strict priority and Weighted Round Robin (WRR) based scheduling with minimum bandwidth guarantees
- Congestion avoidance: Tail Drop

Standards And RFC Support

- ITU-T G.989.2 a1 NG-PON2
- ITU-T XGS-PON
- ITU-T G.8032v2 Ethernet Ring Protection Switching (ERPS)
- TR-101 VLAN Service models
- IEEE 802.1p CoS Prioritization
- IEEE 802.1 MAC Bridges
- IEEE 802.1Q VLAN tagging
- IEEE 802.1ad VLAN stacking (Q-in-Q) support
- RFC 2236
- IGMP v2
- RFC 3376
- IGMP v3
- RFC 3810 MLDv2
- RFC 3046 DHCP Relay Agent Information Option ("Option 82")
- RFC 4541 IGMP Proxy
- RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
- Dynamic Bandwidth Allocation (DBA)
- Advanced Encryption Standard (AES)
- Forward Error Correction (FEC)

Packet Switching Capacity

- 9216 byte frames over NGPON2/XGS-PON
- 4,096 VLANs per system
- 4,096 IGMP Multicast channels

Synchronization

- Integrated Stratum-3 reference
- Timing Options: BITs, Synch, 1588v2 (TC, OC, BC)

Compliance

- NEBS Level 3 compliance (GR-63-CORE, GR-1089-CORE, GR-3028)
- UL 60950
- FCC Part 15 Class A
- CE Mark

Power and Heat Dissipation

- NGPON2-4 power consumption: 125 Watts (typical with optics)

Operating Environment

- Temperature: -40° to +65° C (-40° F to +149° F)
- Humidity: 10 to 95% (non-condensing)

Storage Environment

- Temperature: -40° to +85° C (-40° F to +185° F)
- Humidity: 5 to 95%

Notes: Among other exclusions, the Calix Product Warranty shall not apply to any third party products used with Calix Products, nor shall the Product Warranty apply in the event that the Product's defect or nonconformance is due to its use with hardware which is not purchased directly from Calix, including any optical interfaces, optical transceivers and direct attach cables. For complete Product Warranty terms and exclusions, please refer to the Calix Purchase Agreement.

ORDERING INFORMATION

Calix ONTs

The AXOS E7-2 NGPON2-4 line cards support operation with the Next Generation GigaFamily of ONTs using fixed (XGS- PON) and tunable TWDM wavelengths.

Calix E7 Line Cards

100-04636E7-2 NGPON2-4 (4x XGS-PON/NG-PON2 XFP, 4x 10GE XFP)

Calix Pluggable Transceiver Modules

The E7-2 supports pluggable modules for all service and network interfaces. Refer to the Calix Optical Transceiver Modules Datasheet (#250-00191) for a complete list of modules and specifications.

XFP10GE optical Small Form-factor Pluggable (XFP) modules

XGS-GPON XFP10Gbps XGS-PON optical Small Form-factor Pluggable (XFP) modules

XGS-GPON XFP10Gbps XGS-PON optical Small Form-factor Pluggable (XFP) modules

NG-PON2 XFP10Gbps NG-PON2 optical Small Form-factor Pluggable (XFP) modules (CO use only)

Calix Sourced Modules

High-speed optic module operational tolerances and performance vary significantly and can dramatically affect network operations. To maintain predictable performance and product reliability, Calix E-Series systems are supported with Calix GPON, XGS-PON, and NG-PON2 optical modules only ("Optical Modules"). Ethernet-based SFP, CSFP, CDFP, XFP, SFP+, QSFP+, QSFP-DD, QSFP-28 pluggable transceivers ("Optical Transceivers") and direct attach cables are available directly from Calix. Calix does not guarantee full compliance to product specifications for units using non-Calix modules and does not provide customer service support for optical network issues when non-Calix modules are used. Some third-party optics do not fully comply to the standard power and reach characteristics and in several cases have overheated and damaged the Calix equipment resulting in service outages. Calix Product Warranty shall not apply to any third-party products used with Calix Products, nor shall the Product Warranty apply in the event that the Product's defect or nonconformance is due to its use with hardware which is not purchased directly from Calix, including any optical interfaces, optical transceivers and direct attach cables. For complete Product Warranty terms and exclusions, please refer to the Calix Purchase Agreement.