

AXOS **e7 2** [®] **XG801**

Looking to future-proof your next-generation XGS-PON / GPON network in preparation for launching advanced broadband 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 communications service providers (CSPs). Powered by the AXOS platform, the E7-2 is now even more of a disruptive and compelling enabler to next generation networks that connects everyone and everything. The AXOS E7-2 leads a rapidly expanding family of Intelligent Access EDGE 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

XGS-PON / GPON AND POINT-TO-POINT ETHERNET:

The Calix E7-2 AXOS XG801 card provides multi-service capability over IP/Ethernet-based networks. Each XG801 provides eight selectable XGS-PON / GPON OLT ports that subtend up to 128 ONTs each, for a card capacity of 1,024 PON ONTs, or 2048 per E7-2 1RU chassis. An additional four 10GE SFP+ sockets per card can provide high-bandwidth, point-to-point Ethernet services to individual subscribers or be used to aggregate other Ethernet devices.

Each port can be independently provisioned to support XGS-PON, GPON, or Ethernet connections. The Calix E7-2 XG801 card can co-exist with other Calix E7-2 AXOS line cards in a shelf.

KEY ATTRIBUTES

XG801 card features and capabilities include:

- Based on ITU G.989 XGS-PON family of standards
- XGS-PON: 9.953 Gbps downstream, 9.953 Gbps upstream
- GPON: 2.488 Gbps downstream, 1.244 Gbps upstream
- GEM (Ethernet) based GPON
- Interoperable with Calix ONTs, including GigaFamily and Calix Next Generation 10GPON Residential SFUs, MDUs, and Business ONTs
- Class N1 +29 dB link budget, up to 1:128splits

- Class N2 +31 dB link budget, up to 1:128splits
- Class B+ ODN, +28 dB link budget, up to 20 km at 32-way splits
- Class C+ ODN, +32 dB link budget with Forward Error Correction (FEC), up to 35km at 32-way split, up to 60 km at 2-way split
- Integrated 100GE and 10GE aggregation and transport
- Hardened for central office and remote terminals

INTEGRATED HIGH-CAPACITY AGGREGATION

The E7-2 AXOS XG801 card is built on a core Layer 2 and Layer 3 switch capable of full-duplex, line rate forwarding at all frame sizes and traffic types across all interfaces. Each XGS-PON OLT port has a dedicated 10Gbps switch interface. Industry standard pluggable modules are used for all interfaces, including ITU G.9807.1 XGS-PON and G.984 compliant GPON, GE, 10GE SFP+, and QSFP-DD 100GE. The XG801 supports (2) QSFPDD sockets supporting QSFP28 100GE optical modules and QSFP-DD Point-to-Point and Point-to-Multipoint Direct Attach cables. The XG801 also provides (4) SFP+ modules that are mechanically compatible with the industry-ubiquitous SFP module. Each SFP+ interface supports 10GE/1GE modules as well as Direct Attach copper cables..

IP SERVICES DELIVERY

The Calix E7-2 AXOS XG801 card delivers a full spectrum of IP access services over XGSPON, GPON and Point-to-Point Ethernet networks.

- Secure AES encryption on the PON
- IPTV – broadcast and Video on Demand (VoD)

- MEF compliant business services
- High-Speed Internet (HSI) access
- Voice – Native SIP/VoIP and TDM Gateway support
- T1 services
- CATV: 1550nm RF video overlay; 1610nmRF return

NETWORK RESILIENCY

All Calix E7-2 AXOS XG801 cards support a flexible set of standards-based network topology protocols for use in aggregation, ring-based transport, and uplink.

- ITU G.8032 Ethernet Ring Protection Switching (ERPS)
- ITU G.8032v2 Ethernet Ring Protection Switching
- IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
- IEEE 802.3ad/802.1AX Link Aggregation
- ITU G.983.5 - Type B Protection and enhanced survivability for XGS-PON OLTs

TRAFFIC MANAGEMENT

With intergradation, hierarchical QoS, and support for T1 services, the E7-2 AXOS XG801 card enables the transport of uncompromised broadband traffic while also supporting triple play residential services and MEF-certified business services from a single platform. A powerful collection of classification, policing, and scheduling algorithms let CSPs manage per subscriber and per-service traffic flows to maintain priority/delay/loss service differentiation within the E7 network.

SCALABLE IPTV SUPPORT

The E7 supports industry standard IGMP snooping to identify and replicate multicast video sent between the set-top box and the video distribution network, thus providing efficient, scalable, high-quality IPTV distribution on both GPON and Ethernet interfaces.

SPECIFICATIONS

Minimum System Requirements

- Calix AXOS Software Release 21.2

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: 2.7 lbs (1.21 kg)

Ports

- 8 SFP ports supporting selectable XGS-PON / GPON optical modules
- 4 SFP+ ports supporting 10GE, 2.5GE, and GE optical modules
- 2 QSFP-DD ports supporting 40GE/100GE optical modules

Packet Switching Capacity

- Wire speed forwarding across all Ethernet and XGS-PON / GPON OLT ports
- 64,000 MAC addresses per system
- 9,000 byte jumbo frames
- 2,000 byte frames over GPON
- 4,096 VLANs
- 4,000 IGMP Multicast channels

Quality of Service

- Service classification based on port, SVLAN-ID, CVLAN-ID, P-Bit
- Port and flow-based policing to 1Mbps increments
- 8 CoS queues per port
- Strict priority scheduling with minimum bandwidth guarantee
- Congestion avoidance: Tail Drop

Standards and RFC Support

- TR101 VLAN Service models
- IEEE802.1ag Connectivity Fault Management (G.8032 support)
- IEEE 802.1D Rapid Spanning Tree
- IEEE 802.1p CoS Prioritization
- IEEE 802.1 MAC Bridges
- IEEE 802.1Q VLAN tagging
- IEEE 802.1ad VLAN stacking (Q-in-Q) support
- IEEE 802.1w RSTP IEEE 802.3ad/802.1AX
- Link Aggregation
- RFC 2236 IGMP v2
- RFC 3376 IGMP v3
- RFC 3046 DHCP Relay Agent Information Option ("Option 82")
- RFC 4541 IGMP snooping
- RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP)
- ITU-T G.8032 Ethernet Ring Protection Switching (ERPS)/ Enhanced EAPS
- ITU-T G.8032v2 Ethernet Ring Protection Switching
- ITU-T G.9807.1 XGS-PON
- ITU-T G.984 GPON
- ITU G.984.1 Type B Protection
- Dynamic Bandwidth Assignment (DBA)
- NIST Advanced Encryption Standard (AES)

Synchronization

- Synchronization enabled by E7 line cards
- Built-in Stratum-3 clock

Compliance

- NEBS Level 3 compliance (GR-63-CORE, GR-1089- CORE, GR-3028)
- UL 62368 FCC Part 15 Class A
- CE Mark

Power Specifications

- XG801 power/heat dissipation: 130 Watts (Maximum) 90 Watts (Typical)

Operating Environment

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

Storage Environment

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

Notes: QSFP-DD ports support the use of optical modules and direct attach cables. For uncontrolled environment cabinet installations, only one optical module and one direct attach cable may be used. Controlled environment Central Office/Data Center installations may use optical modules in both QSFP-DD ports. 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.

Calix ONTs

The E7-2 AXOS XG801 card supports the Calix family of ONTs, including 700GE, 836GE, as well as the 800G GigaFamily. 10G PON ONTs are also supported, including the GP1000X, GP1100X, GP1101X, GH3200X, GPR3000X, GP4200XH, and GigaSpire u6x / u6xw ONTs.

Calix ONTs support auto-sensing GPON and GE network interfaces, allowing service providers to manage service changes without subscriber onsite technical support.

Calix E7-2 AXOS Line Cards

100-05529..... E7-2 AXOS XG801 (8x XGS-PON/GPON OIM, 4x 10GE SFP+, 2x 100GE QSFP-DD)

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.

SFP..... 1GE and 2.5GE optical and copper Small Form-factor Pluggable (SFP) modules

SFP+..... 10GE optical Enhanced Small Form-factor Pluggable (SFP+) modules

Direct Attach..... Multi-rate copper Small Form-factor Pluggable (SFP/SFP+) cables

AXOS XGS-PON / GPON

B+ OIM..... 2.5Gbps GPON (Class B+, 20km, C-Temp, AXOS) 2.5Gbps GPON (Class B+, 20km, I-Temp, AXOS)AXOS GPON

C+ OIM..... 2.5Gbps GPON (Class C+, 60Km, I-Temp, AXOS)

N1 OIM.....10Gbps XGS-PON (Class N1, 20km, I-Temp, AXOS)

N2 OIM.....10Gbps XGS-PON (Class N2, 20km, I-Temp, AXOS)

E1 OIM.....10Gbps XGS-PON (Class E1, 20km, I-Temp, AXOS)

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.

Note: Calix believes the information in this publication to be accurate as of publication date, and is not responsible for error. Product Specifications are subject to change without notice.