e9-2 NG-PON2 16 Port Line Card (NG1601)

DESCRIPTION

Service providers looking to ensure their networks are ready for the continued increase of bandwidth and services demands are looking to deploy 10G PON and beyond. The Calix E9-2 NG1601 line card makes this possible by supporting both XGS-PON and NG-PON2. Service providers looking to increase bandwidth can deploy the line card utilizing XGS-PON optics. Service providers looking to further future proof their network to 40G PON today and 80G in the future while taking advantage of the opportunity to collapse multiple services networks onto a common ODN, can take advantage of NG-PON2 by utilizing NG-PON2 optics in the line card.

The E9-2 NG1601 line card is part of the AXOS systems portfolio and supports the ability to simplify and automate the network, by enabling the consolidation of multiple network functions, including subscriber management, aggregation and OLT onto a single network element, reducing the number of network elements to provision and manage.

AXOS PLATFORM

The E9-2 Intelligent Edge System is built on the Calix AXOS platform ensuring faster time to revenue, standards based APIs and northbound interfaces for simplified OSS/BSS/SDN Controller integration and an always-on network.

CONVERGED SERVICES NETWORKS

The E9-2 enables convergence of residential, business and mobile services into a unified access network. The E9-2 delivers scalable residential IPTV, high-speed internet (HSI), voice and business services. In addition, the E9-2 supports high value business class services allowing operators to use a common access network to deliver higher revenue generating opportunities.
Utilizing NG-PON2 as the backhaul, service providers can now also scale to deliver high bandwidth Gfast services to high-density MDU's.

NG-PON2

The Calix E9-2 NG1601 line card provides multiservice capability over IP/Ethernet-based networks. Each card provides 16 OLT channel termination ports that subtend up to 128 ONTs each, for a card capacity of 2048 ONTs per card.

The NG1601 line card features and capabilities include:
- Non-blocking 9.953 Gbps downstream and 9.953 Gbps upstream bandwidth per port
- Supports up to 4 TWDM wavelengths (one per physical port, upgradeable to 8 wavelengths in the future) and the XGS-PON wavelength
- Leveraging OMCI and GEM (Ethernet) based provisioning model
- Interoperable with NG-PON2 and XGS-PON ONTs
- Class N1 +29 dB link budget, up to 1:128 splits

NETWORK RESILIENCY

All Calix E9-2 cards are part of the E9-2 system that supports a flexible set of standards-based network topology protocols for use in aggregation, ring-based transport, and uplink.
- IEEE 802.3ad/802.1AX Link Aggregation

SERVICES DELIVERY

The Calix E9-2 NG1601 line card delivers a full spectrum of IP access services over fiber networks.
- IPTV – broadcast and Video on Demand (VOD)
- MEF CE 2.0 compliant business services
- High-Speed Internet (HSI) access
- Voice – Native SIP/VoIP and TDM Gateway support

MOBILE BACKHAUL & FRONTHAUL

With integrated network synchronization, Ethernet OAM, advanced timing capabilities, the NG1601 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.

MINIMUM SOFTWARE RELEASE

Calix AXOS E9-2 Release 3.1.0

PORTS

16 XFP interfaces for 10G/10G, 10G/2.5G Access Links (16 TWDM channels per card)

4 QSFP28 ports (to inter-connect with CLX3001 cards)

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 AND OPTICS*

XGS-PON: 1:128
NG-PON2: 1:128
- Class N1 +29 dB link budget (*Refer to Calix PPG for engineering design guidelines)

QUALITY AND SERVICE

Service classification based on port, SVLAN-ID, CVLAN-ID, p-bit

Strict priority and Weighted Round Robin (WRR) based scheduling

Hierarchical QoS

Congestion avoidance: Tail Drop

STANDARDS AND RFC SUPPORTS

ITU-T G.989 NG-PON2
ITU-T G.9807.1 XGS-PON
TR-101 VLAN Service models
IEEE 802.1p CoS Prioritiza-tion
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 Mul- tiplexing (TDM) over Packet (SAToP)
Dynamic Bandwidth Allocation (DBA)
Advanced Encryption Standard (AES)
Forward Error Correction (FEC)

FRAME SIZE

9216 byte frames over NG- PON2/XGS-PON

SYNCHRONIZATION

Built-in Stratum-3 clock 1588v2, SyncE (derived via BITS from Aggregation card)

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 DISSA-PATION

NG1601 power consumption: 300 Watts (with Optics)
Heat dissipation: 1023 BTU/ Hour

OPERATING ENVIRONMENT

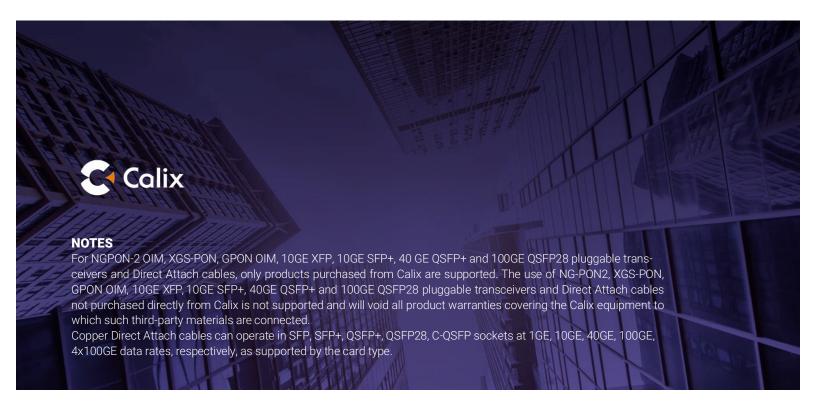Temperature: 23º to +131º F (−5° to +55° C)
Humidity: 10 to 95% (non-condensing)

STORAGE ENVIRONMENT

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

DIMENSIONS Width: 17"
(43cm) Height: 1.7" (4.3cm) Depth: 13" (33cm) Card height is 1 RU

WEIGHT

6.25 lbs. (2.83 Kg) − (without optical modules)

CALIX E9-2 NG-PON2 LINE CARD

100-04494   E9-2 NGPON2 16 port line card (16x10GPON OIM)

CALIX NG-PON2 OPTICS MODULES

100-04478 ....NG-PON2 XFP OIM, 10/10 Gbps, Class N1, 1596.34nm, C-Temp (CO) OLT

100-04479 ....NG-PON2 XFP OIM, 10/10 Gbps, Class N1, 1597.19nm, C-Temp (CO) OLT

100-04480 ....NG-PON2 XFP OIM, 10/10 Gbps, Class N1, 1598.04nm, C-Temp (CO) OLT

100-04481 ....NG-PON2 XFP OIM, 10/10 Gbps, Class N1, 1598.89nm, C-Temp (CO) OLT

100-04482 ....XGS-PON XFP OIM, 10G/10 Gbps, 1577/1270nm, C-Temp (CO), OLT

CALIX PLUGGABLE TRANSCEIVER MODULES

The E9-2 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

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

XFP · 10GE optical Small Form-factor Pluggable (XFP) modules

QSFP+ · 40GE optical Quad Small Form-factor Pluggable (QSFP+) modules

QSFP28 Direct Attach · 40GE-100GE Quad Small Form-factor Pluggable (QSFP-28) Direct Attach Cables

QSFP28 DAC Break Out · 40GE to 4x10GE, QSFP to 4 SFP+ Direct Attach Breakout Cable

C-QSFP-4xQSFP28 DAC Break Out · 4x100GE C-QSFP to 4 x QSFP28 Direct Attach Breakout Cable

GPON OIM · 2.5Gbps GPON (Class B+ ODN with minimum 28dB link budget

ER-GPON OIM · 2.5Gbps Extended Reach GPON (up to 40 km with 1:8 split

NG-PON2 OIM · NG-PON2 XFP 10/10Gbps, Class N1 (1596.34nm, 1597.19nm, 1598.04nm,1598.89nm)

XGS-PON OIM · XGS-PON XFP OIM 10/10Gbps, 1577/1270nm