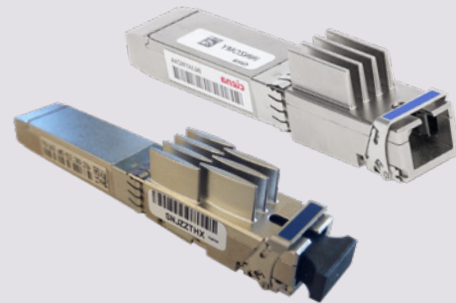![Ciena logo](ciena.)

DATA SHEET

Universal Aggregation and Access over 10G PON Transceiver

10G PON OLT

Ciena's Universal Aggregation and Access over 10G Passive Optical Network (PON) transceivers bring more value to the aggregation network edge—driving next-generation business services, cable MSO access, 4G/5G RAN, and low-cost metro access.

The Small Form-factor Pluggable (SFP+) symmetrical 10 Gb/s OLT module works with Ciena's extensive Routing and Switching platforms to address key 10G XGS-PON (X=10, G-Gigabit, and S=Symmetrical) market opportunities related to fiber deep, 4G/5G xHaul, and business services to maximize ROI. The simple pluggable solution reduces edge transport, routing and switching costs, footprint, and power consumption by right sizing the high-density OLT platforms.

Driving the industry toward 10G PON service delivery

Most network operators' environments are very challenging, as they experience surging IP traffic growth in both their wireless and wireline networks. Complicating this enormous growth is that most of the traffic is IP-based—a trend that has been made even more problematic in recent years by flat to declining revenues and associated margins and it is expected to continue well into the future.

For the past 15 years, PONs have become extremely popular due to surges in IP television (IPTV) and high-speed internet access. However, bandwidth demands and competition are driving network operators to 10G PON, as 15-year-old asymmetrical Ethernet PON (EPON) and Gigabit PON (GPON) technologies are running out of steam and cannot keep up with network growth at least by a factor of 10 in the next decade.

The network edge is where content lives and, to operators, where successful business outcomes are determined. For network operators, improving the ability to offer new service revenue opportunities and improve margins is essential to maintaining existing customers as well as attracting new ones.

Features and benefits

- Concurrent 10G PON and Active Ethernet services
- Multi-vendor interop
- Compliant with ITU-T G.9807.1 specifications
- Rich OAM for all access/service types
- Multiple over-subscription rates for multiple downstream devices
- Operates at extended temperature range (check host/density specifications)
- Advanced synchronization including 1588v2 over PON support
- Ciena's Manage, Control and Plan (MCP) multi-layer support for end-to-end network management, control, and planning
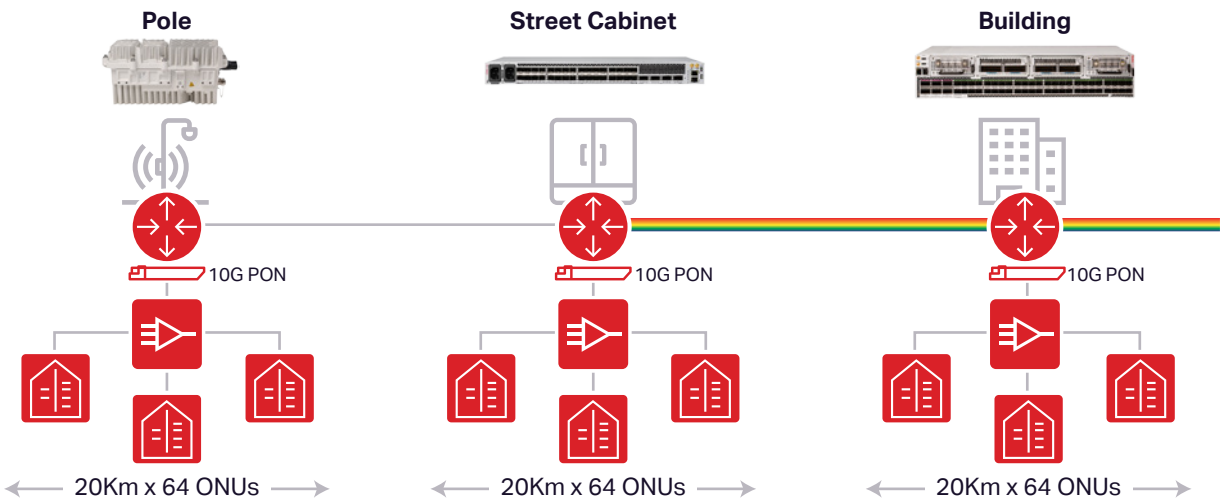- E-Temp and I-Temp

Figure 1. Universal aggregation and PON on a pole, cabinet, and building

Universal aggregation

Efficient use of real estate assets is a growing concern for network operators, who either host their own network equipment or lease power and space in collocation facilities. As services multiply, operators have been forced to stack 10G-capable equipment, incurring additional collocation rental and power costs.

Network operators now can bring more value to their networks by supporting concurrent PON, IP, and Ethernet services on the same Ciena aggregation platform, taking advantage of tightly integrated Class of Service (CoS) per-service and per-Optical Network Unit (ONU) traffic management and statistics.

Imagine 5G and XGS-PON from a pole—simply add an XCVR-SGPL04 as shown in Figure 1. Then draw a 20 km circle around the pole to add up to 64 x XGS-PON ONUs. It is a simple, open infrastructure for poles, cabinets, and environmentally-controlled buildings, regardless of temperature range.

XGS-PON wavelengths

Ciena's 10G PON transceiver supports 10 Gb/s XGS-PON downstream and upstream. Downstream wavelengths operate at 1577nm wavelengths; upstream operate at 1270nm. While increasing PON data rates to 10 Gb/s symmetrical, G-PON, XGS-PON, and NG-PON2 can operate in the overall PON transmission window of 1260nm to 1650nm window—enabling coexistence of multiple PON services due to each technology using different wavelengths. Operators can seamlessly migrate services to XGS-PON or offer differentiated levels of services, for example business, residential, etc.

Parameters	Minimum	Typical	Maximum	Unit
Tx Operating Wavelength	1575	1577	1580	nm
Tx Spectral Wavelength			1	nm
Average (Tx) launch power	4.0/3.0		7.0/6.0	dBm
Rx Operating Wavelength	1260	1270	1280	dBm
Rx Sensitivity	-7		-28	dBm

Figure 2. uOLT optical transceiver characteristics

Ciena's 10G PON transceiver meets the N2 class maximum optical link budget in the ITU-T G.9807.1 standard, supporting symmetrical 10 Gb/s data rate up to 1:64 split ratio on 20km links.

XGS-PON applications

As a last-mile technology, used between the subscriber and network operator, Ciena's 10G PON transceiver increases operator competitiveness by doing more with less, and network operators are able to quickly turn up services, such as those related to Multi-Dwelling Units (MDUs), Fiber-To-The-Cabinet (FTTC), Fiber To The Home (FTTH), and Fiber-To-The-x (FTTx), by simply adding Ciena's 10G PON transceiver in one of Ciena's 10+ feature-rich switching and routing platforms.

Each 10G XGS-PON micro-OLT SFP+ can support up to 128 ONUs

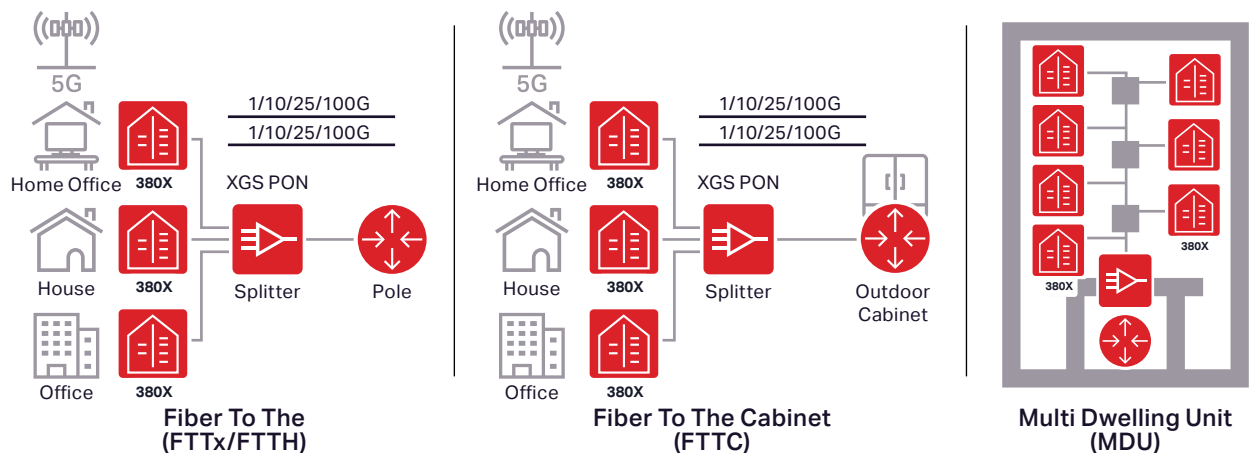Ciena's Routing and Switching products

Learn more

Figure 3. 10G XGS-PON applications

10G PON transceiver functions

Ciena's 10G PON transceiver contains the following functions:

- 10G Ethernet-to-XGS-PON OLT MAC bridge
- 10G optical transceiver
- Supports XGS OMCI (ITU) or Ethernet OAM (IEEE) management channel
- Digital diagnostics and monitoring (SFF-8472)
- PHY-layer OAM (PLOAM) layer discovery and registration for new ONUs
- Grant and track upstream PON bandwidth
- Service Level Agreement (SLA) via Dynamic Bandwidth Allocation (DBA) for upstream traffic
- Layer 2 (L2) switching, broadcasting of all multicast and broadcast traffic flooding on the PON
- VLAN-based switching, add, pop, or translate SVLAN or CVLAN tag
- Up to 500 Allocation IDs (AllocIDs) and up to 128 ONUs
- Upstream bandwidth traffic shaping

Synchronization

The PON physical layer includes WDM optics and line encoding. By accomplishing line encoding in the OLT hardware, the OLT can maintain strict 125 microsecond spacing for the Physical Synchronization Block downstream (PSBd) frames and provide timing alignment of the resulting bitstream and ONUs. These PSBd frames and embedded time stamps can be aligned to synchronization inputs from the host device.

Ciena's 10G PON transceiver enables frequency and phase alignment to IEEE 1588v2 from the host device. This is accomplished when phase accuracy to device reference time is aligned to native PON time stamps to the 1588v2 reference. This capability allows Ciena's 10G PON networks to support mobile backhaul and other synchronization-dependent applications, such as TDM circuit emulation.

Technical Information

Interface
- XGS-PON

Management and support
- Management via Ciena's Service-Aware Operating System (SAOS)

Host device compatibility
- 3924, 3926, 3928, 3984, 3985, 5130, 5131, 5144, 5160, 5164, 5166, 5171, and 8114

*not all platforms are hardware qualified with each uOLT transceiver.

Mechanical
- Conforms to SFP 20-pin Multi Source Agreement (MSA) LC connector supports XGS-PON

Physical dimensions (millimeters)
- Length 80.65 mm
  Width 13.95mm
  Height 18.95 mm
- Protrusion from faceplate:
  SGPL02 33.1mm
  SGPL04 29mm

Operating temperature
- Dependent on host platform (39xx, 51xx, 8114) and transceiver density.
- Typical Range: Minimum:
- E-Temp -40°C (Min.) - +50° (Max.)
- I-Temp -40°C (Min.) - +65° (Max.)

Ordering information

Part Number	Description
XCVR-SGPL02	10G PON UOLT SFP+, N2 CLASS, EXTENDED TEMP CHECK HOST SPECS FOR RANGE
XCVR-SGPL04	10G PON UOLT SFP+, -28DBM SENSITIVITY, 20KM DISPERSION LIMITED, INDUSTRIAL TEMPERATURE

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