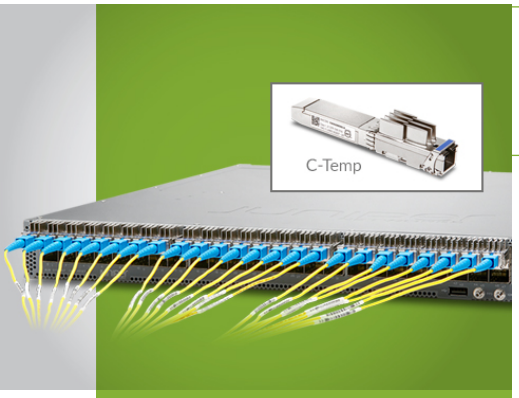

UNIFIED PON DATASHEET

Product Overview

Network traffic is growing significantly faster within the metro, fueled by the advent of cloud, 5G, and the accelerated deployment of Internet of Things (IoT) devices and access points. Adding to this burden, most residential, business, and mobile traffic stays within the metro as service edge functions become increasingly disaggregated, virtualized, and distributed across the metro area network. Juniper's Unified Passive Optical Network (PON) offers a simple, economical, and highly scalable pathway to greenfield and brownfield 10G PON access and aggregation network deployments that seamlessly integrate into your Juniper Cloud Metro architecture.

Product Description

The integration and operation of PON services with other access services has never been easier. Juniper's Unified PON (Figure 1) combines innovative, smart- pluggable optical line terminal (OLT) technology (Figure 2), Juniper Networks® ACX5448, ACX5448-D, ACX5448-M Universal Metro Routers, ACX710 routers, and industry-leading broadband network gateway (BNG) technologies, with Juniper's suite of orchestration and management solutions. The unique combination creates a comprehensive, multiservice fiber to the x (FTTx) access and aggregation solution.

The Next Evolution in PON Technology

The 10 Gbps (10G) PON OLT transceivers are hot-pluggable with built-in Ethernet- to-10G PON media access control (MAC) bridging. Available in both industrial-temperature (I-Temp) and commercial-temperature (C-Temp) options, the transceivers plug directly into the small form-factor pluggable plus transceiver (SFP+) ports on supported ACX Series routers, enabling discrete port by router port assignment to either PON or Ethernet services. PON Manager, a browser-based graphical user interface for PON device provisioning and managing, enables simple web-based management of all PON components.

In brownfield applications, the Unified PON solution eliminates the cost, power, and footprint of bulky and dedicated OLT shelves and enables the migration of 1G or 2.5G PON to 10G PON services (Figure 3). Now, a Junos® operating system-based Unified PON service can seamlessly integrate with upstream Juniper architecture.

The result is an "open" architecture based on 10G XGS-PON (ITU-T), or 10G EPON (IEEE) standards that provides validated compatibility with multiple third-party optical network unit (ONU) or optical network terminal (ONT) devices. Your new Unified PON services deliver exceptional levels of flexibility, convergence, and automation on a single Juniper® Cloud Metro architecture, providing a pay-as-you- grow, and OLT plug-as-you-grow, financial model.

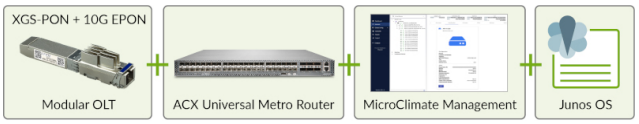

Figure 1: Comprehensive, Junos OS-based 10G PON solution

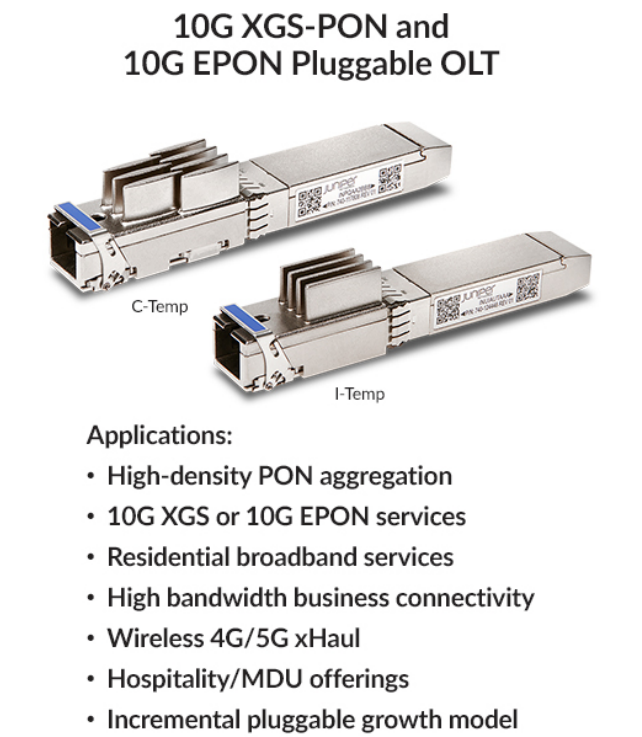

Figure 2: Integrated 10G PON OLT transceivers

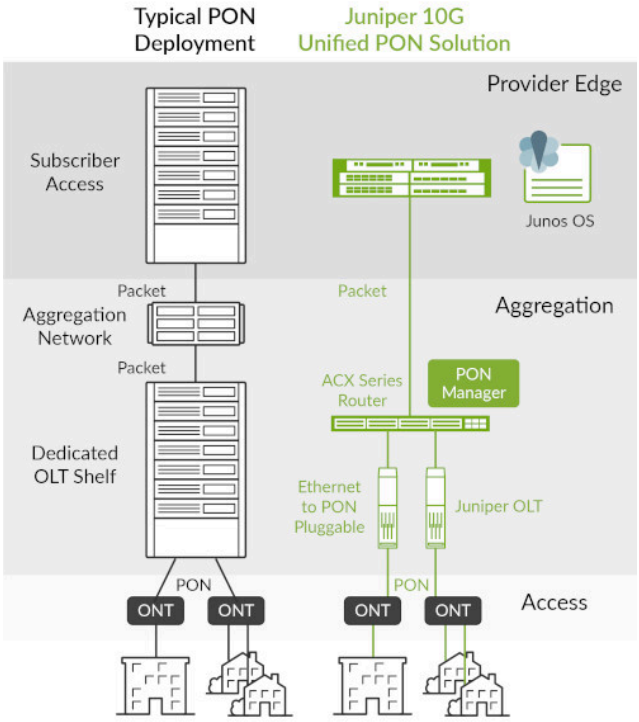

Figure 3: Legacy versus Juniper Unified PON solution

Simple Web-Based Management for Converged 10G PON Access

The PON Manager Web interface provides direct access to all PON components, which allows templated provisioning and management. The simple-to-use platform supports full customization of all services and visualization of device MIBs.

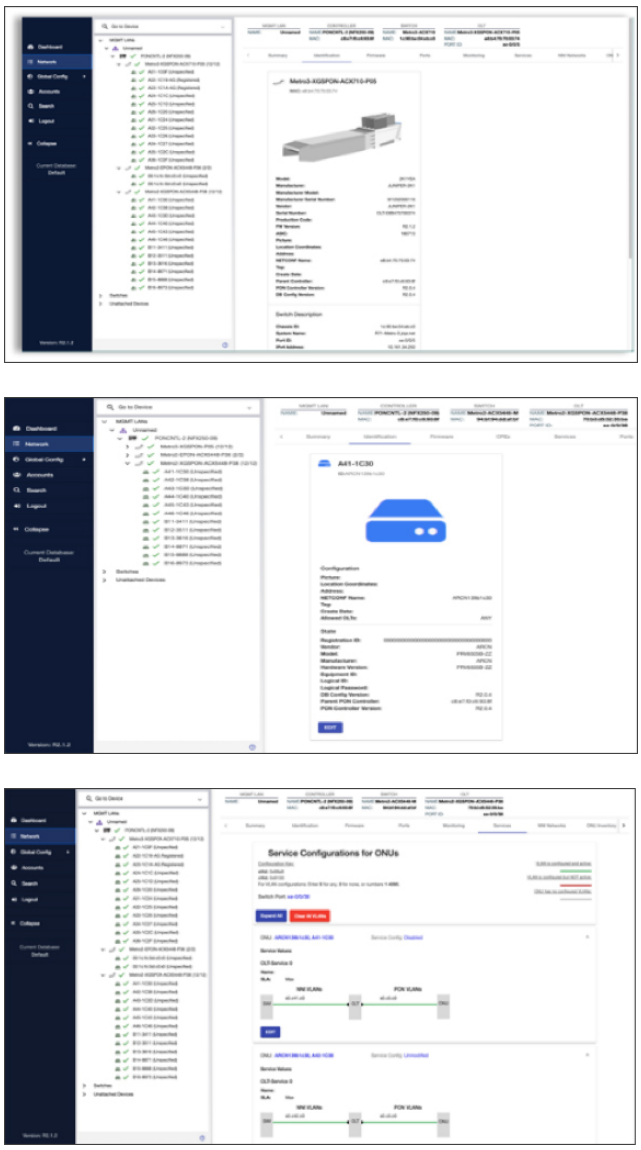

Figure 4: GUI windows from PON Manager: OLT data, ONU/ONT administration, and service provisioning

The provisioning and control of Juniper's Unified PON solution is provided through the MicroClimate Management System (MCMS). MCMS consists of three elements:

- **PON Manager** provisions and manages the active PON devices in a network through a browser-based GUI

- **Northbound Interface** leverages standards-based NETCONF protocol and published YANG data models
- **Distributed PON Control Agent** bridges OMCI/OAM communications from the OLT to PON Manager and supports scalable deployments with external servers, or it can be integrated into the ACX5448, ACX5448-D, and ACX5448-M Universal Metro Routers starting in Junos OS release 21.3R1.

MCMS is an easy to use, simple to deploy, management system for PON service requirements.

Architecture and Key Components

Juniper Cloud Metro is Juniper's overarching vision of how metro networks will transform to support emerging, disruptive, and pioneering technologies in the cloud, 5G, and IoT era. The underlying infrastructure of Juniper Cloud Metro, the IP services fabric, facilitates manual and automated interaction between physical network functions (PNFs), virtualized network functions (VNFs), and cloud operations across a single cloud metro environment. This provides a holistic view and wide-ranging control over operations.

Unified PON services are seamlessly integrated into the Juniper Cloud Metro solution, providing multiple deployment models and hardware choices. Options include scaling up of existing PON connections to 10G, or offering new 10G PON services while lowering OpEx through power and space savings, providing an efficient and economical deployment model.

- **Simplified architecture for all services**: Deploy 10G PON alongside existing Ethernet services, including mobile backhaul, Remote PHY, direct Internet, and metro Ethernet on the same device.
- **Consolidated and simplified PON deployments**: Easily migrate your 1G or 2.5G FTTx services to 10G PON over existing fiber plants and leverage a variety of third-party ONU/ONT devices. For greenfield deployments, move immediately to 10G PON on every fiber to provide highly competitive access and aggregation services. In either case, the new Unified 10G PON access and aggregation architecture benefits from industry-leading virtual or physical BNG solutions and Junos OS orchestration.
- **Open, standards-based orchestration**: Avoid vendor lock-in to legacy PON systems due to the Unified PON solution's compatibility with most third-party ONU/ONT devices. Juniper offers a comprehensive suite of automation tools to create customized, end-to-end workflows from ONU/ ONT, through OLT, to BNG, a variety of APIs to integrate operations, NETCONF configuration protocol, and YANG data modeling. Juniper's portfolio of physical and virtual network functions converts disparate network elements into a highly integrated and orchestrated cloud of fungible and highly scalable service resources.
- **Seamless integration with advanced BNG operations**: Gain the performance and advanced features operators need to improve service velocity, market coverage, and profitability. Juniper's physical and virtual BNG solutions help broadband providers deliver service agility, subscriber density, and automation. Combining Juniper's integrated 10G PON OLT transceivers with supported ACX Series routers on a Juniper BNG-enabled service architecture creates a highly distributed PON access and aggregation solution. Operators gain the ability to load-balance and scale out across broadband service delivery networks, while eliminating the need for application-specific OLT shelves and legacy Broadband Remote Access Server (B-RAS) platforms. The Juniper Unified PON Solution transforms rigid residential service access and aggregation elements into agile, cloud-fungible resources that are integral to the converged cloud metro architecture.

Features and Benefits

Juniper's Unified PON solution goes beyond solving persistent bandwidth consumption challenges. It delivers a new FTTx paradigm that supports residential, business, and mobile transport services over a single architecture for operators. It provides better integration with other network resources, improved opportunity for automation, and a highly compelling and easy migration path for 10G PON upgrades.

- **Leverage SFP+ ports on supported ACX Series routers**: Customizable configuration of each access router on a port-by-port basis as FTTx or Ethernet services provides a pay-as-you-grow, and OLT plug-as-you-grow, deployment model.
- **Interoperability with third-party ONU/ONT devices**: The Juniper integrated 10G PON OLT transceiver interoperates with multiple popular third-party ONU/ONT devices, leveraging standards-compliant OMCI (XGS) and OAM (EPON) protocols. This eliminates vendor lock-in and provides the flexibility to create a best-in-class FTTx deployment.
- **OLT functionality**: Multiservice support includes built-in traffic shaping and scheduling per service (Internet, over- the-top video, voice, and so on), and comprehensive port and service statistics. Services are delivered with flexible VLAN options including single or stacked tags.
- **Software selectable ITU-T and IEEE standard formats**: Standardization ensures reliable, predictable performance, and interoperability with third-party, standards-based ONU/ONT devices.

- **Comprehensive PON-OLT Manager**: Single-page Web application provides a browser-based graphical user interface for provisioning and managing the PON network.
- **Seamless integration with existing Juniper network**: Integrating FTTx services with Junos OS and the broader Juniper architecture provides enhanced levels of performance, orchestration, and security.

Specifications

Specifications	SFPP-10GE-OLT	SFPP-10GE-OLT-IT
Form factor	SFP+	SFP+
Optical Distribution Network (ODN) class	Class N2 (XGS)/PR30+ (10G EPON) 20 km	ODN Class PR10+ 10km
Connector type	Single SC/UPC Receptacle	Single SC/UPC Receptacle
Capacity per OLT	128 ONU/ONTs	128 ONU/ONTs
Average optical transmitter output power	+4 to +7 dBm	+3 to +6 dBm
Optical receiver damage input power threshold	-6 dBm	-4 dBm
Optical receiver input sensitivity	-7 to -28 dBm	-5 to -26 dBm
Maximum power consumption	3.1 W	2.8 W
Storage temperature	-40° to +85° C	-40° to +85° C
Operating temperature	0° to +70° C (C-Temp)	-40° to +85° C (I-Temp)
Dimensions (W x H x D)	13.95 x 18.95 x 80.86 mm	13.95 x 18.95 x 76.44 mm
Supported platforms*	ACX5448, ACX5448-D, ACX5448-M	ACX710

* For platform specifications, view this datasheet.

Compliance

- Compliant with ITU-T G.9807.1 and G.988 specifications (XGS PON)
- Compliant with IEEE 802.3av and IEEE1904.1 specifications (10G EPON)
- SFF-8472
- RoHS 6 complaint

Ordering Information

The following ordering information applies to 10G PON OLT transceiver and related software. Ordering information for other components in the Unified PON solution can be found in the respective datasheets.

Product	Description
Hardware	
SFPP-10GE-OLT	SFP+ 10GE PON OLT (bi-directional), Tx 1577 nm, Rx 1270 nm, SMF 20 km, Standard Temperature (0 through 70°C); SC/UPC connector
SFPP-10GE-OLT-IT	SFP+ 10GE PON OLT (bi-directional), Tx 1577 nm, Rx 1270 nm, SMF 10 km, industrial Temperature (-40 through 85°C), SC/UPC connector
Software	
S-PON-S-1	SW, Passive Optical Network, Standard, with SW Support, 1 YEAR
S-PON-S-3	SW, Passive Optical Network, Standard, with SW Support, 3 YEAR
S-PON-S-5	SW, Passive Optical Network, Standard, with SW Support, 5 YEAR
Management Software Subscription	
S-MCLIMATE-1K-S-1	SW, Microclimate, 1K subscribers, Standard, with SW Support, 1 YEAR
S-MCLIMATE-1K-S-3	SW, Microclimate, 1K subscribers, Standard, with SW Support, 3 YEAR
S-MCLIMATE-1K-S-5	SW, Microclimate, 1K subscribers, Standard, with SW Support, 5 YEAR

About Juniper Networks

At Juniper Networks, we are dedicated to dramatically simplifying network operations and driving superior experiences for end users. Our solutions deliver industry-leading insight, automation, security and AI to drive real business results. We believe that powering connections will bring us closer together while empowering us all to solve the world's greatest challenges of well-being, sustainability and equality.

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