PTX Series Packet Transport Router Interface Module Reference

August 2013

This guide provides an overview and description of the PICs supported by the Juniper Networks PTX Series Packet Transport Routers.

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PTX5000 PIC Description

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- PTX5000 PICs Supported on page 3
- PTX5000 PIC Components on page 3

PTX5000 PIC Slots

Each Type 5 FPC has two PIC slots. Blank PICs resemble other PICs but do not provide any physical connection or activity. When a PIC slot is not occupied by a PIC, you must insert a blank PIC to fill the empty slot and ensure proper cooling of the system. PICs are hot-removable and hot-insertable.

PTX5000 PIC Function

PICs provide the physical connection to various network media types, receiving incoming packets from the network and transmitting outgoing packets to the network. During this process, each PIC performs framing and line-speed signaling for its media type. Before transmitting outgoing data packets, the PICs encapsulate the packets received from the FPCs.

PTX5000 PICs Supported

The PTX5000 Packet Transport Router supports 10-Gigabit Ethernet, 40-Gigabit Ethernet, and 100-Gigabit Ethernet PICs. See "PTX Series PICs Supported" on page 5.

PTX5000 PIC Components

Figure 1 on page 4 shows a Type 5 PIC supported for the packet transport router. Type 5 PICs have an upper ejector handle and a lower ejector handle.

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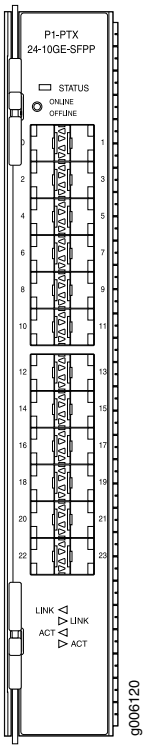
Figure 1: PIC



Related Documentation

- *PTX5000 Hardware Component Overview*
- *Maintaining the PTX5000 PICs*
- *Maintaining the PTX5000 PIC Cables*
- *Troubleshooting PTX5000 PICs and PIC Cables*
- PTX Series PIC/FPC Compatibility on page 7

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PTX Series PICs Supported

Table 1 on page 5 lists the PICs supported by the packet transport router by PIC family.

NOTE: PTX5000 does not support Junos OS Releases 12.1, 12.2, or 13.1.

Table 1: PICs Supported in the Packet Transport Router

PIC Family and Type	Ports	Model Number	Connectors	PTX5000First Junos OS Release Support
10-Gigabit Ethernet				
"10-Gigabit Ethernet PIC with SFP+ (PTX Series)" on page 8	24	P1-PTX-24-10GE-SFPP	Optical: LC	12.1x48 12.3 13.2
"10-Gigabit Ethernet LAN/WAN OTN PIC with SFP+ (PTX Series)" on page 12	24	P1-PTX-24-10G-W-SFPP	Optical: LC	12.3 R2 13.2
40-Gigabit Ethernet				
"40-Gigabit Ethernet PIC with CFP (PTX Series)" on page 16	2	P1-PTX-2-40GE-CFP	Optical: SC	12.1x48 12.3 13.2
100-Gigabit Ethernet				
"100-Gigabit Ethernet PIC with CFP (PTX Series)" on page 20	2	P1-PTX-2-100GE-CFP	Optical: SC. LC, or 24-fiber MPO depending on the transceiver. See the PIC description for more information.	12.1x48 12.3 13.2
100-Gigabit DWDM OTN				
"100-Gigabit DWDM OTN PIC (PTX Series)" on page 24	2	P1-PTX-2-100G-WDM	Optical: LC	13.2

Related Documentation

- PTX5000 PIC Description on page 3
- PTX Series PIC/FPC Compatibility on page 7

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PTX5000 FPCs Supported

Table 2 on page 6 lists the FPCs for the PTX5000 Packet Transport Router. First Junos OS Release Supported indicates the first release that the FPC is supported in the packet transport router.

NOTE: **PTX5000 does not support Junos OS Releases 12.1, 12.2, or 13.1.**

Table 2: FPCs Supported by the PTX5000 Packet Transport Router

FPC Type	FPC Name	FPC Model Number	Maximum Number of PICs	Maximum Throughput per FPC	First Junos OS Release Supported
5	FPC5	FPC-PTX-P1-A	2	480 Gbps	12.1x48 12.3

Related Documentation

- *PTX5000 FPC Description*
- *PTX5000 Hardware Component Overview*
- PTX Series PIC/FPC Compatibility on page 7

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PTX Series PIC/FPC Compatibility

The PIC/FPC compatibility matrixes list the current PICs for the PTX Series Packet Transport Routers. For example, Junos OS Releases 12.1x48 and 12.3 are the first releases in which the FPC-PTX-P1-A supports the P1-PTX-24-10GE-SFPP, 24-port PIC in the PTX Series Packet Transport Routers.

NOTE: **PTX5000 does not support Junos OS Releases 12.1, 12.2, or 13.1.**

- PIC/FPC Compatibility (Type 5 FPCs and Type 5 PICs) on page 7

PIC/FPC Compatibility (Type 5 FPCs and Type 5 PICs)

Table 3 on page 7 provides a PIC/FPC compatibility matrix for the current Type 5 PICs for the packet transport routers and Type 5 FPCs.

Table 3: PTX Series PIC/FPC Compatibility Type 5

Type 5 PIC	PIC Model Number	FPC-PTX-P1-A
Ethernet PICs		
"10-Gigabit Ethernet PIC with SFP+ (PTX Series)" on page 8	P1-PTX-24-10GE-SFPP	12.1x48 12.3
"10-Gigabit Ethernet LAN/WAN OTN PIC with SFP+ (PTX Series)" on page 12	P1-PTX-24-10G-W-SFPP	12.3R2 12.3
"40-Gigabit Ethernet PIC with CFP (PTX Series)" on page 16	P1-PTX-2-40GE-CFP	12.1x48 12.3
"100-Gigabit Ethernet PIC with CFP (PTX Series)" on page 20	P1-PTX-2-100GE-CFP	12.1x48 12.3
"100-Gigabit DWDM OTN PIC (PTX Series)" on page 24	P1-PTX-2-100G-WDM	13.2

Related Documentation

- PTX5000 PIC Description on page 3
- PTX Series PICs Supported on page 5
- PTX5000 FPCs Supported on page 6

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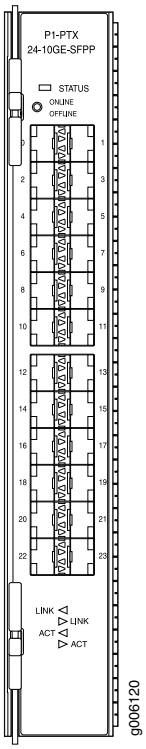
10-Gigabit Ethernet PIC with SFP+ (PTX Series)



- Software Release on page 8
- Hardware Features on page 8
- Software Features on page 9
- Cables and Connectors on page 10
- LEDs on page 10

Software Release

- Junos OS Release 12.1x48 and later 12.1x48 releases
- Junos OS Release 12.3 and later 12.3 releases

NOTE: **This PIC is not supported on Junos OS Releases 12.1, 12.2, or 13.1.**

For information on which FPCs support these PICs, see "PTX Series PIC/FPC Compatibility" on page 7.

Hardware Features

- 24 10-Gigabit Ethernet SFP+ ports
- Model number P1-PTX-24-10GE-SFPP

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- Power requirements: 1.45 A @ –48 V (70 W)
- High-performance throughput: LAN-PHY mode at 10.3 Gbps
- Full-duplex mode
- Large maximum transmission units (MTUs):
  - Junos OS Release 12.1x48: up to 9192 bytes
  - Junos OS Release 12.1x48R2 and later 12.1x48 releases: up to 9500 bytes
  - Junos OS Release 12.3 and later 12.3 releases: up to 9500 bytes

Software Features

The interface name media type for all PTX Series PICs is **et**. Table 4 on page 9 shows the first supported release for each software feature.

Table 4: Software Features Supported

Software Feature	PTX5000 First Supported Junos OS Release
Flexible-ethernet-services encapsulation	12.1x48 12.3
Flexible VLAN tagging	12.1x48 12.3
IFINFO / IFMON	12.1x48 12.3
IEEE 802.1 ag OAM	12.1x48 12.3
IEEE 802.3 ah OAM	12.1x48 12.3
IEEE 802.3ad link aggregation	12.1x48 12.3
Interrupt-driven link-down detection for MPLS FRR	12.1x48 12.3
MAC accounting per logical interface for source addresses	12.1x48 12.3
MAC filter per port for destination addresses and source addresses	12.1x48 12.3

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Table 4: Software Features Supported *(continued)*

Software Feature	PTX5000 First Supported Junos OS Release
MAC filter per logical interface for source addresses	12.1x48 12.3
SNMP	12.1x48 12.3
Up to 8000 logical interfaces share across all ports on a single PFE	12.1x48 12.3

Cables and Connectors

- Duplex LC connector (Rx and Tx)
- 10-Gigabit SFP+ transceivers:
  - 10GBASE-ER (model number SFPP-10GE-ER)
  - 10GBASE-LR (model number SFPP-10GE-LR)
  - 10GBASE-SR (model number SFPP-10GE-SR)
  - 10GBASE-ZR (model number: SFPP-10GE-ZR) supported Junos OS Release 12.3 and later 12.3 releases.
  - Optical interface specifications—see 10-Gigabit Ethernet 10GBASE Optical Interface Specifications

LEDs

The **STATUS** LED is located above the **ONLINE OFFLINE** button. The **LINK** and **ACT** LEDs are located next to each port. Table 5 on page 10 describes the functions of these LEDs.

Table 5: 10-Gigabit Ethernet PIC with SFP+ LEDs

Label	Color	State	Description
STATUS	Green	On steadily	PIC is operating normally.
	Yellow	On steadily	PIC is initializing.
	Red	On steadily	PIC has an error or failure.
	–	Off	PIC is offline and safe to remove from the router.

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Table 5: 10-Gigabit Ethernet PIC with SFP+ LEDs *(continued)*

Label	Color	State	Description
LINK for each port:	Green	On steadily	Port is on with no alarms or errors.
	Red	On steadily	Port has detected an alarm or error.
	–	Off	Port is off.
ACT for each port	Green	Flashing	Link has activity.
	–	Off	No activity.

Related Documentation

- PTX Series PICs Supported on page 5
- PTX5000 PIC Description on page 3

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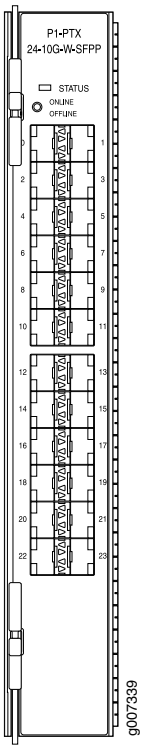
10-Gigabit Ethernet LAN/WAN OTN PIC with SFP+ (PTX Series)



- Software Release on page 12
- Hardware Features on page 12
- Software Features on page 13
- Cables and Connectors on page 14
- LEDs on page 14

Software Release

- Junos OS Release 12.3R2 and later 12.3 releases

NOTE: This PIC is not supported on Junos OS Release 13.1.

For information on which FPCs support these PICs, see "PTX Series PIC/FPC Compatibility" on page 7.

Hardware Features

- 24 10-Gigabit Ethernet SFP+ ports
- Model number P1-PTX-24-10G-W-SFPP
- Power requirements: 2.67 A @ –48 V (128 W)

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- High-performance throughput: LAN-PHY mode at 10.3125 Gbps and WAN-PHY mode at 9.95 Gbps

  Configurable modes:

  - LAN-PHY
  - WAN-PHY
- Full-duplex mode
- Large maximum transmission units (MTUs): up to 9500 bytes

Software Features

The interface name media type for all PTX Series PICs is **et**. Table 6 on page 13 shows the first supported release for each software feature.

Table 6: Software Features Supported

Software Feature	PTX5000 First Supported Junos OS Release
Flexible-ethernet-services encapsulation	12.1x48 12.3
Flexible VLAN tagging	12.1x48 12.3
IFINFO / IFMON	12.1x48 12.3
IEEE 802.1 ag OAM	12.1x48 12.3
IEEE 802.3 ah OAM	12.1x48 12.3
IEEE 802.3ad link aggregation	12.1x48 12.3
Interrupt-driven link-down detection for MPLS FRR	12.1x48 12.3
MAC accounting per logical interface for source addresses	12.1x48 12.3

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Table 6: Software Features Supported *(continued)*

Software Feature	PTX5000 First Supported Junos OS Release
MAC filter per port for destination addresses and source addresses	12.1x48 12.3
MAC filter per logical interface for source addresses	12.1x48 12.3
SNMP	12.1x48 12.3
Up to 8000 logical interfaces share across all ports on a single PFE	12.1x48 12.3

NOTE: **OTN is not currently supported.**

Cables and Connectors

- Duplex LC connector (Rx and Tx)
- 10-Gigabit SFP+ transceivers:
  - 10GBASE-SR (model number SFPP-10GE-SR)
  - 10GBASE-LR (model number SFPP-10GE-LR)
  - 10GBASE-ER (model number SFPP-10GE-ER)
  - 10GBASE-ZR (model number: SFPP-10GE-ZR)
  - Optical interface specifications—see 10-Gigabit Ethernet 10GBASE Optical Interface Specifications

LEDs

The **STATUS** LED is located above the **ONLINE OFFLINE** button. The **LINK** and **ACT** LEDs are located next to each port. Table 7 on page 15 describes the functions of these LEDs.

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Table 7: 10-Gigabit Ethernet LAN/WAN OTN PIC with SFP+ LEDs

Label	Color	State	Description
STATUS	Green	On steadily	PIC is operating normally.
	Yellow	On steadily	PIC is initializing.
	Red	On steadily	PIC has an error or failure.
	–	Off	PIC is offline and safe to remove from the router.
LINK for each port:	Green	On steadily	Port is on with no alarms or errors.
	Red	On steadily	Port has detected an alarm or error.
	–	Off	Port is off.
ACT for each port	Green	Flashing	Link has activity.
	–	Off	No activity.

Related Documentation

- PTX Series PICs Supported on page 5
- PTX5000 PIC Description on page 3

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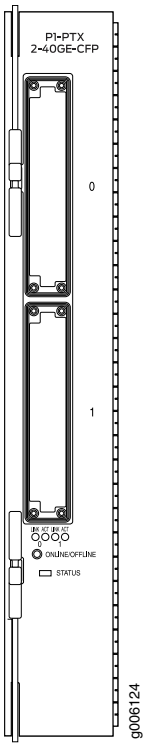
40-Gigabit Ethernet PIC with CFP (PTX Series)



- Software Release on page 16
- Hardware Features on page 17
- Software Features on page 17
- Cables and Connectors on page 18
- LEDs on page 18
- Alarms, Errors, and Events on page 19

Software Release

- Junos OS Release 12.1x48
- Junos OS Release 12.3 and later 12.3 releases

NOTE: **This PIC is not supported on Junos OS Releases 12.1, 12.2, or 13.1.**

For information on which FPCs support this PIC, see "PTX Series PIC/FPC Compatibility" on page 7.

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Hardware Features

- Two 40-Gigabit Ethernet CFP ports
- Model number P1-PTX-2-40GE-CFP
- Power requirements: 0.7 A @ –48 V (35 W)
- Large maximum transmission units (MTUs):
  - Junos OS Release 12.1x48: up to 9192 bytes
  - Junos OS Release 12.1x48R2 and later 12.1x48 releases: up to 9500 bytes
  - Junos OS Release 12.3 and later 12.3 releases: up to 9500 bytes

Software Features

The interface name media type for all PTX Series PICs is **et**. Table 8 on page 17 shows the first supported release for each software feature.

Table 8: Software Features Supported

Software Feature	PTX5000 First Supported Junos OS Release
Flexible-ethernet-services encapsulation	12.1x48 12.3
Flexible VLAN tagging	12.1x48 12.3
IFINFO / IFMON	12.1x48 12.3
IEEE 802.1 ag OAM	12.1x48 12.3
IEEE 802.3 ah OAM	12.1x48 12.3
IEEE 802.3ad link aggregation	12.1x48 12.3
Interrupt-driven link-down detection for MPLS FRR	12.1x48 12.3
MAC accounting per logical interface for source addresses	12.1x48 12.3

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Table 8: Software Features Supported *(continued)*

Software Feature	PTX5000 First Supported Junos OS Release
MAC filter per port for destination addresses and source addresses	12.1x48 12.3
MAC filter per logical interface for source addresses	12.1x48 12.3
SNMP	12.1x48 12.3
Up to 8000 logical interfaces share across all ports on a single PFE	12.1x48 12.3

Cables and Connectors

- Duplex SC connector (RX and TX)
- 40-Gigabit Ethernet CFP transceiver: 40GBASE-LR4 (model number: CFP-40GBASE-LR4)
- Optical interface specifications—see 40-Gigabit Ethernet 40GBASE-R Optical Interface Specifications

LEDs

The **STATUS** LED is located above the **ONLINE OFFLINE** button. The **LINK** and **ACT** LEDs are located next to each port. Table 9 on page 18 describes the functions of these LEDs.

Table 9: 40-Gigabit Ethernet PIC with CFP LEDs

Label	Color	State	Description
STATUS	Green	On steadily	PIC is online with no alarms or failures.
	Yellow	On steadily	PIC is initializing.
	Red	On steadily	PIC has an error or failure.
	–	Off	PIC is offline or not enabled.
LINK for each port:	Green	On steadily	Port is online with no alarms or failures, and the link is up.
	Red	On steadily	Port is on but the link is down, and the port has detected a failure with alarms.
	–	Off	Port is off or not enabled.

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Table 9: 40-Gigabit Ethernet PIC with CFP LEDs *(continued)*

Label	Color	State	Description
ACT for each port	Green	Flashing	Activity detected. Port is sending or receiving packets.
	–	Off	No packet activity detected on the port.

Alarms, Errors, and Events

- Alarm indication signal (AIS)
- Laser bias current high/low alarms and warnings
- Laser Rx power high/low alarms and warnings
- Module not ready alarm
- Module power down alarm
- Module temperature high/low alarms and warnings
- Rx CDR loss of lock alarm
- Rx loss of signal alarm
- Rx not ready alarm
- Tx CDR loss of lock alarm
- Tx data not ready alarm
- Tx laser fault alarm
- Tx not ready alarm

Related Documentation

- PTX Series PICs Supported on page 5
- PTX5000 PIC Description on page 3

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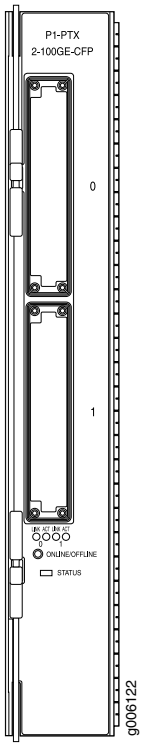
100-Gigabit Ethernet PIC with CFP (PTX Series)



- Software Release on page 20
- Hardware Features on page 21
- Software Features on page 21
- Cables and Connectors on page 22
- LEDs on page 22
- Alarms, Errors, and Events on page 23

Software Release

- Junos OS Release 12.1x48 and later 12.1x48 releases
- Junos OS Release 12.3 and later 12.3 releases

NOTE: **This PIC is not supported on Junos OS Releases 12.1, 12.2, or 13.1.**

For information on which FPCs support this PIC, see "PTX Series PIC/FPC Compatibility" on page 7.

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Hardware Features

- Two 100-Gigabit Ethernet CFP ports
- Model number P1-PTX-2-100GE-CFP
- Power requirements: 1.6 A @ –48 V (75 W)
- Large maximum transmission units (MTUs):
  - Junos OS Release 12.1x48: up to 9192 bytes
  - Junos OS Release 12.1x48R2 and later 12.1x48 releases: up to 9500 bytes
  - Junos OS Release 12.3 and later 12.3 releases: up to 9500 bytes

Software Features

The interface name media type for all PTX Series PICs is **et**. Table 10 on page 21 shows the first supported release for each software feature.

Table 10: Software Features Supported

Software Feature	PTX5000 First Supported Junos OS Release
Flexible-ethernet-services encapsulation	12.1x48 12.3
Flexible VLAN tagging	12.1x48 12.3
IFINFO / IFMON	12.1x48 12.3
IEEE 802.1 ag OAM	12.1x48 12.3
IEEE 802.3 ah OAM	12.1x48 12.3
IEEE 802.3ad link aggregation	12.1x48 12.3
Interrupt-driven link-down detection for MPLS FRR	12.1x48 12.3
MAC accounting per logical interface for source addresses	12.1x48 12.3

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Table 10: Software Features Supported *(continued)*

Software Feature	PTX5000 First Supported Junos OS Release
MAC filter per port for destination addresses and source addresses	12.1x48 12.3
MAC filter per logical interface for source addresses	12.1x48 12.3
SNMP	12.1x48 12.3
Up to 8000 logical interfaces share across all ports on a single PFE	12.1x48 12.3

Cables and Connectors

- You can install any 100-Gigabit Ethernet CFP transceivers supported by the PIC.
  - 100GBASE-ER4 (model number: CFP-100GBASE-ER4)
    - Duplex LC connector (RX and TX)
    - Junos OS Release 12.1x48R4 and later 12.1x48 releases
    - Junos OS Release 12.3 and later 12.3 releases
  - 100GBASE-LR4 (model number: CFP-100GBASE-LR4)
    - Duplex SC connector (RX and TX)
    - Junos OS Release 12.1x48 and later 12.1x48 releases
    - Junos OS Release 12.3 and later 12.3 releases
  - 100GBASE-SR10 (model number: CFP-100GBASE-SR10)
    - 24-fiber MPO connectors
    - Junos OS Release 12.1x48R3 and later 12.1x48 releases
    - Junos OS Release 12.3 and later 12.3 releases
  - Optical interface specifications—see 100-Gigabit Ethernet 100GBASE-R Optical Interface Specifications

LEDs

The **STATUS** LED is located above the **ONLINE OFFLINE** button. The **LINK** and **ACT** LEDs are located next to each port. Table 11 on page 23 describes the functions of these LEDs.

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Table 11: 100-Gigabit Ethernet PIC with CFP LEDs

Label	Color	State	Description
STATUS	Green	On steadily	PIC is online with no alarms or failures.
	Yellow	On steadily	PIC is initializing.
	Red	On steadily	PIC is online but has errors or alarms.
	–	Off	PIC is offline or not enabled.
LINK for each port:	Green	On steadily	Port is online with no alarms or failures, and the link is up.
	Red	On steadily	Port is on but the link is down, and the port has detected a failure with alarms.
	–	Off	Port is off or not enabled.
ACT for each port	Green	Flashing	Activity detected. Port is sending or receiving packets.
	–	Off	No packet activity detected on the port.

Alarms, Errors, and Events

- Alarm indication signal (AIS)
- Laser bias current high/low alarms and warnings
- Laser Rx power high/low alarms and warnings
- Module not ready alarm
- Module power down alarm
- Module temperature high/low alarms and warnings
- Rx CDR loss of lock alarm
- Rx loss of signal alarm
- Rx not ready alarm
- Tx CDR loss of lock alarm
- Tx data not ready alarm
- Tx laser fault alarm
- Tx not ready alarm

Related Documentation

- PTX Series PICs Supported on page 5
- PTX5000 PIC Description on page 3

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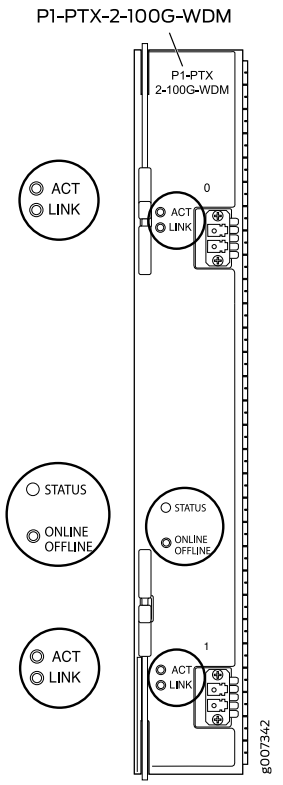
100-Gigabit DWDM OTN PIC (PTX Series)



- Software Release on page 24
- Hardware Features on page 24
- Software Features on page 25
- Cables and Connectors on page 26
- LEDs on page 26
- Alarms, Errors, and Events on page 27

Software Release

- Junos OS Release 13.2 and later (Type 5)

  For information on which FPCs support this PIC, see "PTX Series PIC/FPC Compatibility" on page 7.

Hardware Features

- Two 100-Gigabit DWDM (Dense Wavelength Division Multiplexing) OTN (Optical Transport Network) ports
- Power requirements: 6.48 A @ –48 V (311 W)
- Model number: P1-PTX-2-100G-WDM

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- Transparent transport of two 100-Gigabit Ethernet signals with OTU4V framing
- ITU-standard OTN performance monitoring and alarm management
- Dual polarization-quadrature phase-shift keying (DP-QPSK) modulation and soft-decision forward error correction (SD-FEC) for long haul and metro applications
- 96 channels on C-band ITU grid with 50-GHz spacing
- Full-duplex mode
- Maximum transmission units (MTUs) up to 9500 bytes

NOTE: The 100-Gigabit DWDM OTN PIC is designed to comply with NEBS regulations when used in typical configurations. The 100-Gigabit DWDM OTN PIC complies with NEBS regulations when used in typical configurations. The typical configuration for a PTX5000 router is up to eight FPCs, with one 100-Gigabit DWDM OTN PIC and one 100-Gigabit Ethernet PIC with CFP, 40-Gigabit Ethernet PIC with CFP, or 10-Gigabit Ethernet PIC with SFP+ installed in the same FPC.

To comply with EMC regulations you must also install the front door on the PTX5000 chassis, see *Installing the Front Door on a PTX5000 Packet Transport Router in a Four-Post Rack* or *Installing the Front Door on a PTX5000 Packet Transport Router in an Open-Frame Rack*.

Software Features

The interface name media type for all PTX Series PICs is **et**. Table 12 on page 25 shows the first supported release for each software feature.

Table 12: Software Features Supported

Software Feature	PTX5000 First Supported Junos OS Release
Compliant with ITU G.709 and G.798	13.2
Provides a transport interface and state model (GR-1093)	13.2
Performance monitoring such as alarms, threshold crossing alerts, OTU/ODU error seconds and pre-FEC statistics	13.2
SNMP management of the PIC based on RFC 3591, Managed Objects for the Optical Interface Type • Set functionality • Juniper Networks Black-Link MIB • IFOTN MIB • Optics MIB • FRU MIB	13.2

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Table 12: Software Features Supported *(continued)*

Software Feature	PTX5000 First Supported Junos OS Release
802.1ag OAM	13.2
802.3ah OAM	13.2
IFINFO/IFMON	13.2
IEEE 802.3ad link aggregation	13.2
Pre-FEC fast reroute (FRR) provides interrupt-driven link-signal-degrade BER-based detection for MPLS FRR	13.2
Flexible-ethernet-services encapsulation	13.2
Flexible VLAN tagging	13.2
Source address MAC accounting per logical interface	13.2
Source address MAC filter per port	13.2
Source address MAC filter per logical interface	13.2
Destination address MAC filter per port	13.2
Up to 8000 logical interfaces shared across all ports on a single PFE	13.2

Cables and Connectors

- Duplex LC connector (Rx and Tx)
- Single-mode optical fiber (ITU-T G.652)
- Optical interface specifications—see "100-Gigabit DWDM OTN Optical Interface Specifications" on page 32

LEDs

The **STATUS** LED is located above the **ONLINE OFFLINE** button. The **LINK** and **ACT** LEDs are located next to each port. Table 13 on page 27 describes the functions of these LEDs.

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Table 13: 100-Gigabit DWDM OTN PIC LEDs

Label	Color	State	Description
STATUS	Green	On steadily	PIC is online with no alarms or failures.
	Yellow	On steadily	PIC is initializing.
	Red	On steadily	PIC is online but has errors or alarms.
	–	Off	PIC is offline or not enabled.
LINK for each port:	Green	On steadily	Port is online with no alarms or failures, and the link is up.
	Yellow		Port has detected an alarm or failure.
	Red	On steadily	Port has detected a media alarm or failure.
	–	Off	Port is off or not enabled.
ACT for each port	Green	Flashing	Activity detected. Port is sending or receiving packets.
	–	Off	No packet activity detected on the port.

Alarms, Errors, and Events

Chassis and PIC:

- PIC (FRU) inserted or removed
- PIC (FRU) Admin InService/OutOfService, Oper Unequipped/Init/Normal/Mismatch/Fault/Upgrade
- Mismatch equipment
- Temperature alarm
- Fan alarm

Port (interface):

- Interface Admin InService/OutOfService/ServiceMA/OutOfServiceMA, Oper Init/Normal/Fault/Degraded

OTN (optical transport network):

- LOS (loss of signal)
- LOF (loss of frame)
- LOM (loss of multiframe)
- SSF (server signal failure)
- TSF (trail signal fail)

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OTU (optical channel transport unit):

- OTU-FEC-DEG (forward error correction degraded)
- OTU-FEC-EXE (excessive errors, FEC_FAIL from the transponder)
- OTU-AIS (alarm indication signal or all ones signal)
- OTU-BDI (backward defect identification)
- OTU-IAE (incoming alignment error)
- OTU-BIAE (backward incoming alignment error)
- OTU-TTIM (destination access point identifier [DAPI], source access point identifier [SAPI], or both mismatch from expected to received)
- OTU-DEG (OTU degraded)

ODU (optical channel data unit):

- CSF (client signal failure)
- ODU-DM-TIMEOUT (DM timeout)
- ODU-LCK (ODU lock triggers for PM [path monitoring] and TCM levels 1 through 6)
- ODU-AIS (alarm indication signal or all ones signal)
- ODU-OCI (open connection error)
- ODU-BDI (backward defect indication)
- ODU-DEG (ODU degraded)
- ODU-IAE (incoming alignment error)
- ODU-DAPI-TTIM (DAPI or DAPI/SAPI mismatch from expected to receive)
- ODU-SAPI-TTIM (SAPI or DAPI/SAPI mismatch from expected to receive)
- ODU-BEI (backward error indication)
- ODU-BEI-ERR (backward error indication error)
- ODU-BIP8-ERR (bit interleaved parity 8 error)
- ODU-SSF (server signal fail)
- ODU-TSF (trail signal fail)
- ODU-SD (signal degrade)

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OPU (optical channel payload):

- OPU-PTM (payload type mismatch)

Optics:

- TX output power

Card-related status:

- Transceiver temperature high alarm
- Transceiver temperature high warning
- Transceiver temperature low alarm
- Transceiver temperature low warning
- Transceiver voltage high alarm
- Transceiver voltage high warning
- Transceiver voltage low alarm
- Transceiver voltage low warning
- Transceiver temperature monitor A/D value
- Transceiver power supply monitor A/D value (voltage)

Network lane transmit–related status:

- TX laser current bias high alarm
- TX laser current bias high warning
- TX laser current bias low alarm
- TX laser current bias low warning
- TX laser temperature high alarm
- TX laser temperature high warning
- TX laser temperature low alarm
- TX laser temperature low warning
- TX output optical power high alarm
- TX output optical power high warning
- TX output optical power low alarm
- TX output optical power low warning
- TX laser TEC fault
- TX laser wavelength unlocked fault
- TX modulator bias high alarm
- TX modulator bias high warning

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- TX modulator bias low alarm
- TX modulator bias low warning
- TX loss of signal fault
- TX current laser output power
- TX minimum laser output power over PM interval
- TX average laser output power over PM interval
- TX maximum laser output power over PM interval

Network lane receive–related status:

- RX laser bias current high alarm
- RX laser bias current high warning
- RX laser bias current low alarm
- RX laser bias current low warning
- RX input optical power high alarm
- RX input optical power high warning
- RX input optical power low alarm
- RX input optical power low warning
- RX laser output high alarm
- RX laser output high warning
- RX laser output low alarm
- RX laser output low warning
- RX laser temperature high alarm
- RX laser temperature high warning
- RX laser temperature low alarm
- RX laser temperature low warning
- RX LOS
- RX Laser wavelength unlocked fault
- RX laser TEC fault
- RX current chromatic dispersion
- RX average chromatic dispersion over PM interval
- RX minimum chromatic dispersion over PM interval
- RX maximum chromatic dispersion over PM interval
- RX current Q
- RX average Q over PM interval

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- RX minimum Q over PM interval
- RX maximum Q over PM interval
- RX current carrier frequency offset
- RX average carrier frequency offset over PM interval
- RX minimum carrier frequency offset over PM interval
- RX maximum carrier frequency offset over PM interval
- RX current SNR (signal to noise ratio)
- RX average SNR
- RX minimum SNR
- RX maximum SNR
- RX modem sync detect fault occurred over PM interval
- RX modem lock fault occurred over PM interval
- RX loss of alignment occurred over PM interval
- RX out of alignment occurred over PM interval
- RX deskew lock fault occurred over PM interval
- RX LOS occurred over PM interval
- RX current laser output power
- RX minimum laser output power over PM interval
- RX average laser output power over PM interval
- RX maximum laser output power over PM interval

Related Documentation

- PTX5000 PIC Description on page 3
- PTX Series PICs Supported on page 5
- PTX Series PIC/FPC Compatibility on page 7

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100-Gigabit DWDM OTN Optical Interface Specifications

PTX Series routers support the following 100-Gigabit DWDM (Dense Wavelength Division Multiplexing) OTN (Optical Transport Network) PIC transceiver.

Table 14 on page 32 and Table 15 on page 33 show the optical interface specifications for the 100-Gigabit DWDM OTN PIC transceiver.

Table 14: 100-Gigabit DWDM OTN Optical Interface Specifications

Model number	• PIC model number: P1-PTX-2-100G-WDM
Transceiver type	• Dense wavelength division multiplexing (DWDM) integrated transceiver
Standards	• ITU-T G.709—Interfaces for the optical transport network. • ITU-T G.798—Characteristics of optical transport network hierarchy equipment functional blocks • ITU-T G.694.1—Spectral grids for WDM applications: DWDM frequency grid • RFC 3591—Definitions of Managed Objects for the Optical Interface Type
Optical interface	• Single-mode optical fiber (ITU-T G.652)
Line interface	• Line rate: 127.156441 Gbps • Modulation format: Dual polarization-quadrature phase-shift keying (DP-QPSK), non-return-to-zero (NRZ) • FEC type: Soft decision • Channel-plan wavelength range: 1529.55 through 1567.54 nm • Channel-plan frequency range: 191.25 through 196.00 THz • Channel spacing: 50 GHz • Channel tunability: 96 channels—see Table 15 on page 33
Optical transmitter	• Output power (on): –2 dBm • Output power (off): ≤ –45 dBm • Wavelength accuracy: +/–2.5 GHz • Channel tuning time: ≤30 seconds
Optical receiver	• Average receive power (input power range): –18 to –5 dBm • Input sensitivity (unamplified/dark-fiber applications): –28 dBm • LO wavelength accuracy: +/–2.5 GHz • Channel tuning time: ≤30 seconds • Damage input power threshold: +10 dBm • Minimum OSNR: 14.5 dB (EOL) • Chromatic dispersion tolerance: +/–50,000 ps/nm • PMD tolerance: 25 ps (mean DGD) • Polarization tracking: 150 krad/s

Table 15 on page 33 provides the supported wavelengths in both terahertz (THz) and nanometers (nm).

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Table 15: 100-Gigabit DWDM OTN Supported Wavelengths

100–GHz Grid		50–GHz Offset	
THz	nm	THz	nm
–	–	191.25	1567.54
191.30	1567.13	191.35	1566.72
191.40	1566.31	191.45	1565.90
191.50	1565.50	191.55	1565.09
191.60	1564.68	191.65	1564.27
191.70	1563.86	191.75	1563.45
191.80	1563.05	191.85	1562.64
191.90	1562.23	191.95	1561.83
192.00	1561.42	192.05	1561.01
192.10	1560.61	192.15	1560.20
192.20	1559.79	192.25	1559.39
192.30	1558.98	192.35	1558.58
192.40	1558.17	192.45	1557.77
192.50	1557.36	192.55	1556.96
192.60	1556.55	192.65	1556.15
192.70	1555.75	192.75	1555.34
192.80	1554.94	192.85	1554.54
192.90	1554.13	192.95	1553.73
193.00	1553.33	193.05	1552.93
193.10	1552.52	193.15	1552.12
193.20	1551.72	193.25	1551.32
193.30	1550.92	193.35	1550.52
193.40	1550.12	193.45	1549.72

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Table 15: 100-Gigabit DWDM OTN Supported Wavelengths *(continued)*

100–GHz Grid		50–GHz Offset	
THz	nm	THz	nm
193.50	1549.32	193.55	1548.91
193.60	1548.51	193.65	1548.11
193.70	1547.72	193.75	1547.32
193.80	1546.92	193.85	1546.52
193.90	1546.12	193.95	1545.72
194.00	1545.32	194.05	1544.92
194.10	1544.53	194.15	1544.13
194.20	1543.73	194.25	1543.33
194.30	1542.94	194.35	1542.54
194.40	1542.14	194.45	1541.75
194.50	1541.35	194.55	1540.95
194.60	1540.56	194.65	1540.16
194.70	1539.77	194.75	1539.37
194.80	1538.98	194.85	1538.58
194.90	1538.19	194.95	1537.79
195.00	1537.40	195.05	1537.00
195.10	1536.61	195.15	1536.22
195.20	1535.82	195.25	1535.43
195.30	1535.04	195.35	1534.64
195.40	1534.25	195.45	1533.86
195.50	1533.47	195.55	1533.07
195.60	1532.68	195.65	1532.29
195.70	1531.90	195.75	1531.51

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Table 15: 100-Gigabit DWDM OTN Supported Wavelengths *(continued)*

100–GHz Grid		50–GHz Offset	
THz	nm	THz	nm
195.80	1531.12	195.85	1530.72
195.90	1530.33	195.95	1529.94
196.00	1529.55	–	–

Related Documentation

- 100-Gigabit DWDM OTN PIC (PTX Series) on page 24

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Network Cable and Transceiver Overview for PTX Series Packet Transport Routers

PTX Series Packet Transport Routers support a variety of pluggable transceivers and network cable, including single-mode fiber-optic cable. To determine which transceivers are supported on a particular PIC, see "Cables and Connectors" in the PIC description. For a list of the network interface standards supported by a transceiver, see "Supported Network Interface Standards by Transceiver for PTX Series Packet Transport Routers" on page 37.

For transceiver and cable specifications, see:

- 10-Gigabit Ethernet 10GBASE Optical Interface Specifications
- 40-Gigabit Ethernet 40GBASE-R Optical Interface Specifications
- 100-Gigabit Ethernet 100GBASE-R Optical Interface Specifications
- 100-Gigabit DWDM OTN Optical Interface Specifications on page 32

Related Documentation

- *Calculating Power Budget and Power Margin for Fiber-Optic Cables*
- *Understanding Fiber-Optic Cable Signal Loss, Attenuation, and Dispersion*

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Supported Network Interface Standards by Transceiver for PTX Series Packet Transport Routers

The following transceivers are supported on PTX Series Packet Transport Routers. To determine which transceivers are supported on a particular PIC, see "Cables and Connectors" section of the PIC description..

Table 16 on page 37 through Table 18 on page 38 are organized by transmission speed and then alphabetically by model number.

- 10-Gigabit Ethernet Transceivers (10GBASE Standards) on page 37
- 40-Gigabit Ethernet Transceivers (40GBASE-R Standards) on page 37
- 100-Gigabit Ethernet Transceivers (100GBASE-R Standards) on page 37

10-Gigabit Ethernet Transceivers (10GBASE Standards)

For each 10-Gigabit Ethernet transceiver supported on packet transport routers, Table 17 on page 37 lists the transceiver type, connector, and the supported network interface standard. For the optical specifications for each standard, see 10-Gigabit Ethernet 10GBASE Optical Interface Specifications.

Table 16: Supported 10-Gigabit Ethernet 10GBASE Standards

Transceiver Model Number	Transceiver Type	Connector	Standard
SFPP-10GE-ER	SFP+	LC	10GBASE-ER
SFPP-10GE-LR	SFP+	LC	10GBASE-LR
SFPP-10GE-SR	SFP+	LC	10GBASE-SR
SFPP-10GE-ZR	SFP+	LC	10GBASE-Z

40-Gigabit Ethernet Transceivers (40GBASE-R Standards)

For each 40-Gigabit Ethernet transceiver supported on packet transport routers, Table 17 on page 37 lists the transceiver type, connector, and the supported network interface standard. For the optical specifications for each standard, see 40-Gigabit Ethernet 40GBASE-R Optical Interface Specifications.

Table 17: Supported 40-Gigabit Ethernet 40GBASE-R Standards

Transceiver Model Number	Transceiver Type	Connector	Standard
CFP-40GBASE-LR4	CFP	SC	40GBASE-LR4

100-Gigabit Ethernet Transceivers (100GBASE-R Standards)

For each 100-Gigabit Ethernet transceiver supported on packet transport routers, Table 18 on page 38 lists the transceiver type, connector, and the supported network

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interface standard. For the optical specifications for each standard, see 100-Gigabit Ethernet 100GBASE-R Optical Interface Specifications.

Table 18: 100-Gigabit Ethernet 100GBASE-R Standards

Transceiver Model Number	Transceiver Type	Connector	Standard
CFP-100GBASE-LR4	CFP	SC	100GBASE-LR4
CFP-100GBASE-ER4	CFP	LC	100GBASE-ER4
CFP-100GBASE-SR10	CFP	24-fiber MPO	100GBASE-SR10

Related Documentation

- Network Cable and Transceiver Overview for PTX Series Packet Transport Routers on page 36

Junos OS Documentation and Release Notes

For a list of related Junos OS documentation, see http://www.juniper.net/techpubs/software/junos/.

If the information in the latest release notes differs from the information in the documentation, follow the *Junos OS Release Notes.*

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at http://www.juniper.net/techpubs/.

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf .
- Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/ .
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

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- Find CSC offerings: http://www.juniper.net/customers/support/
- Search for known bugs: http://www2.juniper.net/kb/
- Find product documentation: http://www.juniper.net/techpubs/
- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/
- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/
- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/
- Open a case online in the CSC Case Management tool: http://www.juniper.net/cm/

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: https://tools.juniper.net/SerialNumberEntitlementSearch/

Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see http://www.juniper.net/support/requesting-support.html.

Revision History

August 2013—Added support for 100-Gigabit DWDM OTN PIC.

June 2013—Corrected the connectors for the 100-Gigabit Ethernet PIC. Added the media type for all PICs.

May 2013—Changed the name from PIC Guide to Interface Module Reference.

April 2013—Added support for the 24-port 10-Gigabit Ethernet LAN/WAN OTN PIC. Updated the name to packet transport router.

January 2013 —Added support for Junos OS Release 12.3. Added the network cable and transceiver overview and supported network interface standards. Minor edits.

May 2012—For Junos OS Release 12.1x48R2, updated the maximum number of MTUs.

March 2012—For Junos OS Release 12.1x48, initial PIC guide for the PTX Series.

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