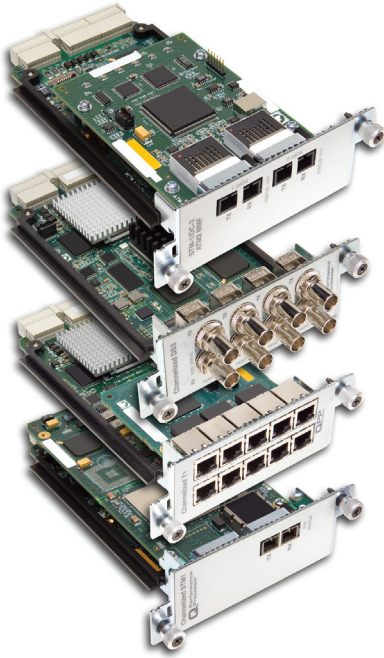


# Juniper Networks IQ PICs



*Juniper Networks IQ PICs deliver a variety of service interconnect technologies such as Frame Relay, PPP, and HDLC. The IQ PICs offer high-density clear channel and fractional connectivity. These PICs enable service providers to deploy stable, highly reliable, dedicated leased line circuits to carry business-critical data in a variety of businesses, both large and small. In addition to providing affordable access, the Channelized IQ PICs enable maximum flexibility through rate limiting and multilink services, allowing service providers to deliver IP services as customer needs dictate.*

## Product Overview

The IQ PICs are mounted on Flexible PIC Concentrators (FPCs), which are inserted into a slot in Juniper Networks M-series and T-series routers. Each PIC occupies a single slot on an FPC. The PICs receive incoming packets from the network and transmit outgoing packets to the network. During this process, each PIC performs framing and high-speed signaling for its media type. Before transmitting outgoing data packets, the PICs encapsulate the packets received from the FPCs.

Juniper Networks PICs enhance network scalability and flexibility in both edge and core networks by supporting predictable performance, standards-based features, granular class-of-service (CoS), and a wide range of port densities and speeds.

### Juniper Networks IQ PICs:

- 4-port Channelized DS3 IQ
- 1-port Channelized OC12 IQ
- 1-port Channelized OC3 IQ
- 1-port Channelized STM1 IQ
- 10-port Channelized T1 IQ
- 10-port Channelized E1 IQ
- 4-port Clear Channel E3 IQ

## Features and Benefits

### Intelligent Queuing

The IQ PICs provide comprehensive CoS services with up to eight queues per physical/logical interface, which helps to facilitate service creation on a per-customer basis. This includes per-DLCI queuing, fine granularity of rate control and scheduling, Weighted Round-Robin (WRR) scheduler and strict priority queuing, Weighted Random Early Detection (WRED), ingress and egress policing, and egress shaping. The IQ PICs support a flexible set of encapsulations including PPP, HDLC, Frame Relay, CCC, and TCC.

### Key CoS Features

- Granular CoS on a per-interface basis
- CoS is implemented at line rate
  - No performance impact regardless of the number of interfaces or number of queues configured per PIC
- Implements Priority Queue Deficit WRR on all the interfaces
- Supports Weighted RED (WRED) on all queues
  - Up to 4 drop profile curves supported per queue
  - Allows multiple classes of traffic to share the queue, but have different CoS treatments based on class
- Supports hierarchical CoS
  - Allows shaping and scheduling at the physical level
  - Allows shaping and scheduling at the interface level
- Supports up to 4 levels of priority scheduling per interface
- Supports strict high-priority level to provide low-latency and low-jitter traffic path for a high-priority traffic class

### CoS Scaling

- Supports 768 schedulers per PIC and 3072 schedulers per FPC slot
- Supports 4096 queues per PIC and 16K queues per FPC slot
- Supports 64 WRED user-configurable drop profiles per PIC
- Up to 8 queues configurable per interface
- Up to 8 queues configurable per DLCI

### Statistics

- L2 per packet and per byte transmit counter per interface
- L2 per packet and per byte queued and transmit counters per queue
- L2 per packet and per byte RED drop counters per queue and per drop precedence
- BERT transmit and error counters for all interfaces

### Channelization Matrix

| PIC Type     | OC12 Interfaces | OC3 Interfaces | DS3 Interfaces | DS1 Interfaces | E1 Interfaces | DS0 Interfaces |
|--------------|-----------------|----------------|----------------|----------------|---------------|----------------|
| 4-port ChDS3 | N/A             | N/A            | 4 per PIC      | 28 per DS3     | N/A           | 24 per DS1     |
| 1-port ChOC3 | N/A             | 1 per PIC      | 3 per PIC      | 28 per DS3     | N/A           | 24 per DS1     |
| 1-port STM1  | N/A             | 1 per PIC      | N/A            | N/A            | 63 per PIC    | 32 per E1      |
| 1-port OC12  | 1 per PIC       | 4 per PIC      | 3 per OC3      | 28 per DS3     | N/A           | 24 per DS1     |
| 10-port T1   | N/A             | N/A            | N/A            | 10 per PIC     | N/A           | 24 per DS1     |
| 10-port E1   | N/A             | N/A            | N/A            | N/A            | 10 per PIC    | 32 per E1      |
| 4-port E3    | N/A             | N/A            | N/A            | N/A            | N/A           | N/A            |

### Diagnostic Support

- Per-interface BERT with full range of algorithms and error insertion support
- Local and remote diagnostic loopback
- Interface-specific alarms

### LEDs

One tricolor per port:

- Off – Not enabled
- Green – Online with no alarms or failures
- Amber – Online with alarms for remote failures
- Red – Active with a local alarm; router has detected a failure

## Specifications

### Features

|                                    |  |
|------------------------------------|--|
| Extensive Diagnostics              | CSU/DSU T1 subrate and scrambling<br>BERT patterns for T1, DS3, NxDS0<br>Alarm and error reporting<br>FDL and inband loopback        |
| Granular Accounting and Statistics | 4096 sets of L2 counters<br>Per packet/byte Tx/Rx counters<br>Per queue drop counters  |
| Dense Multilevel Connectivity      | 768 customer channels per PIC<br>Channelization to NxDS0<br>Dynamic channel reprovisioning<br>Multiink support for NxT1, NxE1, NxDS0 |

### IQ PIC Product Specifications

|                         |   |
|-------------------------|---|
| 4-port Channelized DS3  | Data Service Unit (DSU) functionality<br>BNC coaxial cable connectors   |
| 1-port Channelized OC3  | DSU functionality<br>SMIR optical interface (Bellcore GR-253-CORE compliant)<br>Connector: SC duplex connector<br>Length: 9.3 miles/15 km<br>Wavelength: 1260 to 1360 nm<br>Average launch power: -15 to -8 dBm<br>Receiver saturation: -8 dBm<br>Receiver sensitivity: -28 dBm                     |
| 1-port Channelized STM1 | DSU functionality<br>SMIR optical interface (Bellcore GR-253-CORE compliant)<br>Connector: SC duplex connector<br>Length: 9.3 miles/15 km<br>Wavelength: 1260 to 1360 nm<br>Average launch power: -15 to -8 dBm<br>Receiver saturation: -8 dBm<br>Receiver sensitivity: -28 dBm                     |
| 1-port Channelized OC12 | Data Service Unit (DSU) functionality<br>SMIR optical interface (Bellcore GR-253-CORE compliant)<br>Connector: SC duplex connector<br>Length: 9.3 miles/15 km<br>Wavelength: 1260 to 1360 nm<br>Average launch power: -15 to -8 dBm<br>Receiver saturation: -8 dBm<br>Receiver sensitivity: -28 dBm |
| 10-port T1              | DSU functionality<br>120-ohm RJ-48C connectors  |

|  |  |
|--|--|
| 10-port E1   | DSU functionality<br>120-ohm RJ-48C connectors                       |
| 4-port E3  | DSU functionality<br>120-ohm RJ-48C connectors                       |
| Physical   | Height: 1"<br>Width: 4"<br>Depth: 7"                                 |
| MIB Support  | Interface-MIB (RFC1573)<br>SNMP<br>DS1 MIB<br>DS3 MIB                |
| MTBF   | 200,000 hours  |
| Subrate and Scrambling:<br>IQ PICs with DS3 support<br>provide interoperability with<br>the following vendors: | Digital Link/Quick Eagle<br>Kentrox<br>Larscom<br>Adtran<br>Verilink |

### Agency Approvals

|  |  |
|--|--|
| <b>Safety</b>                                      | CAN/CSA-C22.2 No. 60950-00/UL 60950 – Third Edition,<br>Safety of Information Technology Equipment<br>EN 60950, Safety of Information Technology Equipment<br>Certification<br>– FIPS 140-2 Level 1 certification<br>– Stateful Firewall - ICSA certified                                    |
| <b>EMC</b>   | AS / NZS 3548 Class A (Australia/New Zealand)<br>BSMI Class A (Taiwan)<br>EN 55022 Class A Emissions (Europe)<br>FCC Part 15 Class A (USA)<br>VCCI Class A (Japan)   |
| <b>Immunity</b>                                    | EN-61000-3-2 Power Line Harmonics<br>EN-61000-4-2 ESD<br>EN-61000-4-3 Radiated Immunity<br>EN-61000-4-4 EFT<br>EN-61000-4-5 Surge<br>EN-61000-4-6 Low Frequency Common Immunity<br>EN-61000-4-11 Voltage Dips and Sags   |
| <b>NEBS – Designed to meet<br/>these standards</b> | GR-63-CORE; NEBS, Physical Protection<br>GR-1089-CORE; EMC and Electrical Safety for Network<br>Telecommunications Equipment<br>SR-3580 NEBS Criteria Levels (Level 3 Compliance)<br>ETSI<br>ETS-300386-2 Telecommunications Network Equipment<br>Electromagnetic Compatibility Requirements |

## Ordering Information

| PIC Type                | M7i, M10i           | M120, M320, T320, T640, TX | M20, M40          |
|-------------------------|---------------------|----------------------------|-------------------|
| 4-port Channelized DS3  | PE-4CHDS3-QPP       | PB-4CHDS3-QPP              | P-4CHDS3-QPP      |
| 1-port Channelized OC3  | PE-1CHOC3-SMIR-QPP  | PB-1CHOC3-SMIR-QPP         | P-1CHOC3-SMIR-QPP |
| 1-port Channelized STM1 | PE-1CHSTM1-SMIR-QPP | PB-1CHSTM1-SMIR-QPP        | P-1CHOC3-SMIR-QPP |
| 1-port Channelized OC12 | PE-1CHOC12SMIR-QPP  | PB-1CHOC12SMIR-QPP         | P-1CHOC12SMIR-QPP |
| 10-port T1              | PE-10CHT1-RJ48-QPP  | PB-10CHT1-RJ48-QPP         | P-10CHT1-RJ48-QPP |
| 10-port E1              | PE-10CHE1-RJ48-QPP  | PB-10CHE1-RJ48-QPP         | P-10CHE1-RJ48-QPP |
| 4-port E3               | PE-4E3-QPP          | PB-4E3-QPP                 | P-4E3-QPP         |

## About Juniper Networks

Juniper Networks develops purpose-built, high-performance IP platforms that enable customers to support a wide variety of services and applications at scale. Service providers, enterprises, governments and research and education institutions rely on

Juniper to deliver a portfolio of proven networking, security and application acceleration solutions that solve highly complex, fast-changing problems in the world's most demanding networks. Additional information can be found at [www.juniper.net](http://www.juniper.net).



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