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Datasheet

DS-3, E1, E3, and T1 PICs

DS-3/E3 and T1/E1 circuits for Internet access represent a key component of service provider business. The highly dynamic nature of aggregation deployments requires that edge router interfaces be highly dependable, flexible, and operationally efficient.

Juniper Networks DS-3, E1, E3, and T1 Physical Interface Cards (PICs) offer highly available, highly flexible solutions for edge applications. These links deliver not only business-critical Internet connectivity, but also an ever increasing portfolio of rich IP services, such as VPNs and flexible bandwidth. Leveraging cross-platform predictable performance, uniform JUNOS Software, and seamless, hardware-based features, these PICs enable service providers to rapidly deploy and provision new IP services with no performance trade-off.

Advantages

Features	Benefits
■ Predictable performance and consistent service-enabling features across all M-series and T-series PICs.	■ Supports rich IP service deployment across all interfaces. ■ Increases service reliability. ■ Simplifies configuration. ■ Accelerates deployment time. ■ Reduces operational complexity. ■ Decreases operational costs. ■ Minimizes training time for operational staff.
■ High-density interfaces with the ability to mix and match up to four PICs within a single Flexible PIC Concentrator (FPC) slot.	■ Improves edge concentration and scalability of the core. ■ Increases configuration flexibility by enabling service providers to mix different speeds, technologies, and IP services. ■ Enables service providers to add uplink interfaces without wholly consuming an FPC slot. ■ Reduces operational costs by maximizing POP space.
■ Broad range of connectivity speeds.	■ Enables service providers to offer a wide range of IP services in diverse environments. ■ Enhances service definition richness by increasing configuration flexibility. ■ Ensures scalability for both subscriber and uplink interfaces.

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Features	Benefits
■ DS-3 and E3 integrated DSU.	■ Interoperable with leading vendors. ■ Provides subrate functionality.
■ Rate limiting and multilink services.	■ Minimizes costs by maximizing bandwidth efficiency. ■ Enables service providers to deliver IP services according to dynamic customer requirements. ■ Decreases congestion. ■ Promotes customer loyalty by enabling rapid fine tuning of IP services.
■ Input policing and output shaping.	■ Reduces congestion. ■ Enables service providers to deliver and bill for a finer granularity of IP services.

Descriptions

2-port, 4-port DS-3 and E3

Greater demand for Internet applications is driving a need for high-speed backbone access connections. DS-3 and E3 PICs are cost-effective solutions for connecting corporations and other high-bandwidth Internet subscribers to Internet backbones for greater throughput and faster response times. These PICS are also suitable in backbones where higher levels of DS-3 and E3 density are needed to meet high-bandwidth demands while conserving valuable POP rack space.

The DS-3 PIC delivers up to 44.736-Mbps connectivity, and the E3 PIC delivers 34.368 Mbps.

- 2-port available on M5 and M10 Routers.
- 4-port available on all M-series routers.

4-port E1 and T1

The E1 and T1 PICs offer high-density, clear-channel and fractional E1/T1 connectivity. These PICs enable service providers to deploy stable, highly reliable, dedicated, lease-line E1/T1 circuits to carry business-critical data in a variety of businesses, both large and small. In addition to providing affordable access, E1 and T1 PICs enable maximum flexibility through rate limiting and multilink services, allowing service providers to deliver IP services as customer needs dictate.

The E1 PIC delivers up to 2.048-Mbps connectivity, and the T1 PIC delivers 1.544 Mbps.

Available on all M-series routers.

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Port Density and Flexibility

Platform	DS-3 and E3		E1 and T1
	2-port	4-port	4-port
M5			
Per Chassis	8	16	16
Per Rack	120	240	240
M10			
Per Chassis	16	32	32
Per Rack	240	480	480
M20			
Per Chassis	—	64	64
Per Rack	—	320	320
M40			
Per Chassis	—	128	128
Per Rack	—	256	256
M40e			
Per Chassis	—	128	128
Per Rack	—	256	256
M160			
Per Chassis	—	128	128
Per Rack	—	256	256

— = Not applicable

Key Features

A few of the key features supported by these PICs include integrated DSU, input policing, output shaping, and rate limiting. Additionally, they support filtering, sampling, load balancing, class of service, and other key features necessary for deploying secure, dependable, high-performance IP services.

DS-3 and E3 Integrated DSU

The DS-3 PIC is interoperable with Digital Link, Kentrox, and Larscom scrambling mechanisms and Digital Link and Larscom subrate mechanisms. E3 PICs are interoperable with Digital Link subrate mechanisms and Kentrox and Digital Link scrambling mechanisms.

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The integrated DSU functionality provides subrate DS-3 and subrate E3 connectivity, enables more efficient use of POP rack space, and simplifies circuit management. Moreover, it reduces the number of devices that need to be managed and enables service providers to configure all devices through a single user interface.

Input Policing and Output Shaping

These PICs support an input token bucket police mechanism per port. Service providers can configure a threshold rate and tag incoming packets that exceed this threshold. Service providers can then configure the router's random early detection (RED) mechanisms on outbound interfaces to drop out-of-profile packets more aggressively.

These PICs also support per-port traffic shaping for outbound traffic.

Provider-side Rate Limiting

These PICs support a full suite of rate limiting features to enable service providers to control the bandwidth on access circuits without having to rely on DSU reconfiguration on the CPE. By simply adjusting the bandwidth rate-limiting configuration on the provider side, service providers can easily move subscribers from one bandwidth tier to another. A fine granularity of rate limiting (for example, by traffic type) is also supported.

N x E1/T1 Service with MLPPP and MLFR

Using the E1 or T1 PIC with the Multilink Services PIC, service providers can provide n x E1 and n x T1 access service using MLPPP (RFC 1990) or MLFR (FRF.15). The Multilink Services PIC bundles up to eight E1 or T1 links per interface, enabling service providers to leverage the existing E1 or T1 infrastructure for multimegabit tiered services, rather than migrating to a faster speeds, such as DS-3 or E3. By using these PICs together, service providers can aggregate hundreds of multilink bundles in a single chassis without compromising forwarding performance. This multilink solution enables service providers to offer a dynamic solution for growing bandwidth requirements from 1.5 Mbps to 12 Mbps.

Specifications

General

DS-3

- B3ZS line encoding
- C-bit framing
- DSU Functionality
- DSU Scrambling: Larscom, Digital Link, and ADC Kentrox
- DSU Subrate: Larscom and Digital Link
- Encapsulations
  - Frame Relay
  - HDLC
  - MPLS Circuit Cross-connect
  - PPP

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E1

- Balanced (120-Ω) and unbalanced (75-Ω) modes
- Encapsulations
  - Frame Relay
  - HDLC
  - MPLS Circuit Cross-connect
  - PPP
- HDB3 line encoding
- Large MTUs, up to 4,500 bytes

E3

- Encapsulations
  - Frame Relay
  - HDLC
  - MPLS Circuit Cross-connect
  - PPP
- HDB3 line encoding

T1

- B8ZS or AMI line coding
- Encapsulations
  - Frame Relay
  - HDLC
  - MPLS Circuit Cross-connect
  - PPP

Interfaces

DS-3, E3

- 10 ft / 3.05 m posilock SMB to BNC
- TX and RX coaxial cables ship with the PIC

E1

- Connectors
  - 75-Ω mini-BNC connectors
  - 120-Ω RJ-48 connectors
- 10-ft / 3.05-cm cable ships with the 75-Ω version of the PIC

T1

- 100-Ω RJ-48 connectors

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LEDs

One tricolor LED per port

- Green: Port is online with no alarms or failures
- Amber: Port is online with alarms or remote failures
- Red: Port is active with a local alarm; failure detected
- Off: Port is not enabled

Agency Approvals

Safety

- CAN/CSA-C22.2 No. 60950-00/UL 60950 - Third Edition, Safety of Information Technology Equipment
- EN 60825-1 Safety of Laser Products - Part 1: Equipment Classification, Requirements and User's Guide
- EN 60825-2 Safety of Laser Products - Part 2: Safety of Optical Fibre Communication Systems
- EN 60950, Safety of Information Technology Equipment

EMC

- AS/NZS 3548 Class A (Australia / New Zealand)
- BSMI Class A (Taiwan)
- EN 55022 Class A Emissions (Europe)
- FCC Part 15 Class A (USA)
- VCCI Class A (Japan)

Immunity

- EN 61000-3-2 Power Line Harmonics
- EN 61000-4-2 ESD
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency Common Immunity
- EN 61000-4-11 Voltage Dips and Sags

NEBS

Designed to meet these standards

- GR-63-CORE: NEBS, Physical Protection
- GR-1089-CORE: EMC and Electrical Safety for Network Telecommunications Equipment
- SR-3580 NEBS Criteria Levels (Level 3 Compliance)

ETSI

- ETS-300386-2 Telecommunication Network Equipment Electromagnetic Compatibility Requirements

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Ordering Information

PIC	Platform	Model Number
DS-3		
2-port (ships with cables)	M5, M10	PE-2DS3
4-port (ships with cables)	M5, M10	PE-4DS3
	M20, M40, M40e	P-4DS3
	M40e, M160	PB-4DS3
E1		
4-port, 75-Ω BNC connectors (ships with cables)	M5, M10	PE-4E1-COAX
	M20, M40, M40e	P-4E1-COAX
	M40e, M160	PB-4E1-COAX
4-port, 120-Ω RJ-48 connectors	M5, M10	PE-4E1-RJ48
	M20, M40, M40e	P-4E1-RJ48
	M40e, M160	PB-4E1-RJ48
E3		
2-port (ships with cables)	M5, M10	PE-2E3
4-port (ships with cables)	M5, M10	PE-4E3
	M20, M40	P-4E3
	M40e, M160	PB-4E3
T1		
4-port, 100-Ω RJ-48 connectors	M5, M10	PE-4T1-RJ48
	M20, M40	P-4T1-RJ48
	M40e, M160	PB-4T1-RJ48

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Part Number: 100049-003 07/02

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