

# DENSE PORT CONCENTRATORS

## Product Overview

The Juniper Networks Dense Port Concentrator (DPC) cards are optimized for Ethernet density and can support up to 40 Gigabit Ethernet or four 10-Gigabit Ethernet ports. The DPC cards combine both Layer 2 Ethernet switching and Layer 3 routing capabilities in a single form factor. Combining Layer 2 and Layer 3 features with industry-leading port density, a distributed architecture with on-board processing helps ensure performance and scalability as Ethernet requirements and services grow.

## Product Description

DPCs provide multiple physical interfaces and Packet Forwarding Engines (PFE) on a single board that installs in a slot in the Juniper Networks® MX Series 3D Universal Edge Routers. A DPC receives incoming packets from the network and sends outgoing packets to the network. The PFEs on a DPC are equipped with purpose-built application-specific integrated circuits (ASICs) that perform packet processing and forwarding. Each PFE consists of one I-chip for Layer 3 processing and one Layer 2 network processor.

To ensure that the MX Series delivers the lowest cost per port without sacrificing performance, reliability, scalability, or functionality, each Ethernet services router has been purpose-built for optimization to provide both switching and carrier-class Ethernet routing functions.

The MX Series 3D Universal Edge Routers have three models of Dense Port Concentrators: DPCE-X, DPCE-R, and DPCE-Q.

## Service-Rich Juniper Networks Junos Operating System Support

Juniper Networks has extended its award-winning Junos® operating system to include support for the DPCs and MX Series 3D Universal Edge Routers. Using a single, common OS release across Juniper Networks M Series Multiservice Edge Routers, T Series Core Routers, and MX Series routers provide consistent support for both legacy and Ethernet-based services across a broad range of chassis types and sizes, providing ease of use and operation. The proven stability of Junos OS coupled with proven routing protocols, flexible policy language, and industry-leading MPLS implementation can be a tremendous asset when building an Ethernet-centric infrastructure.

## Features and Benefits

Via Junos OS, the DPCs support a wide range of Layer 2 and Layer 3 Ethernet functionality, including 802.1Q virtual LAN (VLAN), link aggregation, circuit cross-connect, Virtual Router Redundancy Protocol (VRRP), Layer 2 to Layer 3 mapping, and port monitoring. Additionally, the DPCs support filtering, sampling, load balancing, rate limiting, class of service, and other key features necessary for deployment of dependable, Ethernet services.

## Product Options

Three types of Dense Port Concentrators are available for the MX Series 3D Universal Edge Routers: DPCE-X, DPCE-R, and DPCE-Q.

### DPCE-X

The DPCE-X builds upon the Juniper Networks leadership position in providing high-performance networking hardware and software by extending Junos OS to include traditional Layer 2 switching features such as Spanning Tree as well as more recent Ethernet standards developments including Operation, Administration, and Maintenance (OAM). The MX Series combined with the DPCE-X Layer 2 switching cards provide a wide range of MPLS and Ethernet functionality for cost-effective Layer 2 and MPLS aggregation.

The DPCE-X cards are designed specifically for applications that include:

- Distributed and centralized Central Office (CO) Ethernet aggregation: DPCE-X cards can be used for pure Layer 2 Ethernet aggregation, for VLAN-based services with the ability to enable higher-value Layer 2 and VPLS and inter-autonomous system (AS) VPLS at no incremental cost.
- Metro Ethernet aggregation: DPCE-X cards can be used as a combined Layer 2 and Layer 2.5 aggregation switch with MPLS control plane functionality to push such advanced capabilities further into the metro networks.

PROTOCOL OR APPLICATION
Accepts traffic destined for generic routing encapsulation (GRE) tunnels or Distance Vector Multicast Routing Protocol (DVMRP) (IP-in-IP) tunnels
Bidirectional Forwarding Detection (BFD) protocol
BGP
BGP and MPLS virtual private networks (VPNs)
DVMRP and GRE support access side and server side
Firewall filters
Flexible Ethernet encapsulation
IEEE 802.3ad link aggregation
IPv4
IP multicast
IPv6
IPv6 multicast
IPv6 neighbor discovery
IS-IS
Local loopback

### DPCE-R

In addition to the Layer 2 switching and MPLS features offered on the DPCE-X cards, the DPCE-R cards provide a full suite of layer routing protocols and packet processing capabilities.

FEATURE DIFFERENTIAL	DPCE-X	DPCE-R
IP Multicast	Yes	Yes
Layer 2 switching and STP	Yes	Yes
VPLS (L2 VPNs)	Yes	Yes
2547 VPNs (Layer 3)	No	Yes
BGP	No	Yes
	Limited Scaling	
uRFP	No	Yes
SCU/DCU	No	Yes
Scalability (filters)	Limited	Very Large

### DPCE-Q

The DPCE-Q cards provide enhanced queuing capabilities with support of up to 64,000 individual queues.

- 4 level hierarchical WRR
- 4 levels of per-VLAN queue priority
- Priority propagation
- Drop Statistics Per <VLAN, Color, Queue>
- Changeable allocation of schedulers per port (8,000 scheduler nodes with 8 queues each or 16,000 nodes with 4 queues each)

PROTOCOL OR APPLICATION
MAC learning, policing, accounting, and filtering
Maintenance data link (MDL)
Multiple Tag Protocol Identifiers (TPIDs)
MPLS
OSPF
Packet mirroring
Quality of service (QoS) per channel: Weighted Round Robin (WRR), Random Early Drop (RED), and Weighted Random Early Drop (WRED)
Remote loopback
RIP
Spanning Tree Protocol (STP)
Transparent bridging
IEEE 802.1Q VLANs
• VLAN stacking and rewriting
• Channels defined by two stacked VLAN tags
• IP service for nonstandard TPID and stacked VLAN tags
Virtual private LAN service (VPLS)
VPN
VRRP

## MX-FPC

MX-FPCs occupy two slots and are designed to accept up to two physical interface cards (PIC) commonly used with the M Series and T Series routers. These modules allow the MX Series to support non-ethernet interfaces and the PIC portability between M Series, T Series and MX Series routers provide common sparing and investment protection.

MXFPC-2	MXFPC-3
PB-10C48-SON-B-SFP	PC-10C192-SON-VSR
PB-40C3-10C12-SON2-SFP	PC-10C192-SON-XFP
PB-40C3-40C12-SON-SFP	PC-40C48-SON-SFP
PB-4CH012-STM4-IQE-SFP	
PB-1CHOC48-STM16-IQE-SFP	

## MS-DPC

The Multiservices DPC enables high performance services such as IPsec, NAT, firewall, J-Flow, DPI and link services on the MX Series. These services can help providers manage their own network or offer revenue generating services to their customers.

## Agency Approvals

### Safety

- CAN/CSA-22.2 No.60950-1-03-UL60950-1, 2nd Ed. Safety of Information Technology Equipment
- EN 60950-1 Safety of Information Technology Equipment

## EMC

- AS/NZS CISPR22 Class A (Australia/New Zealand)
- EN 55022 Class A Emissions (Europe)
- FCC Part 15 Class A (USA)
- VCCI Class A (Japan)

## Immunity

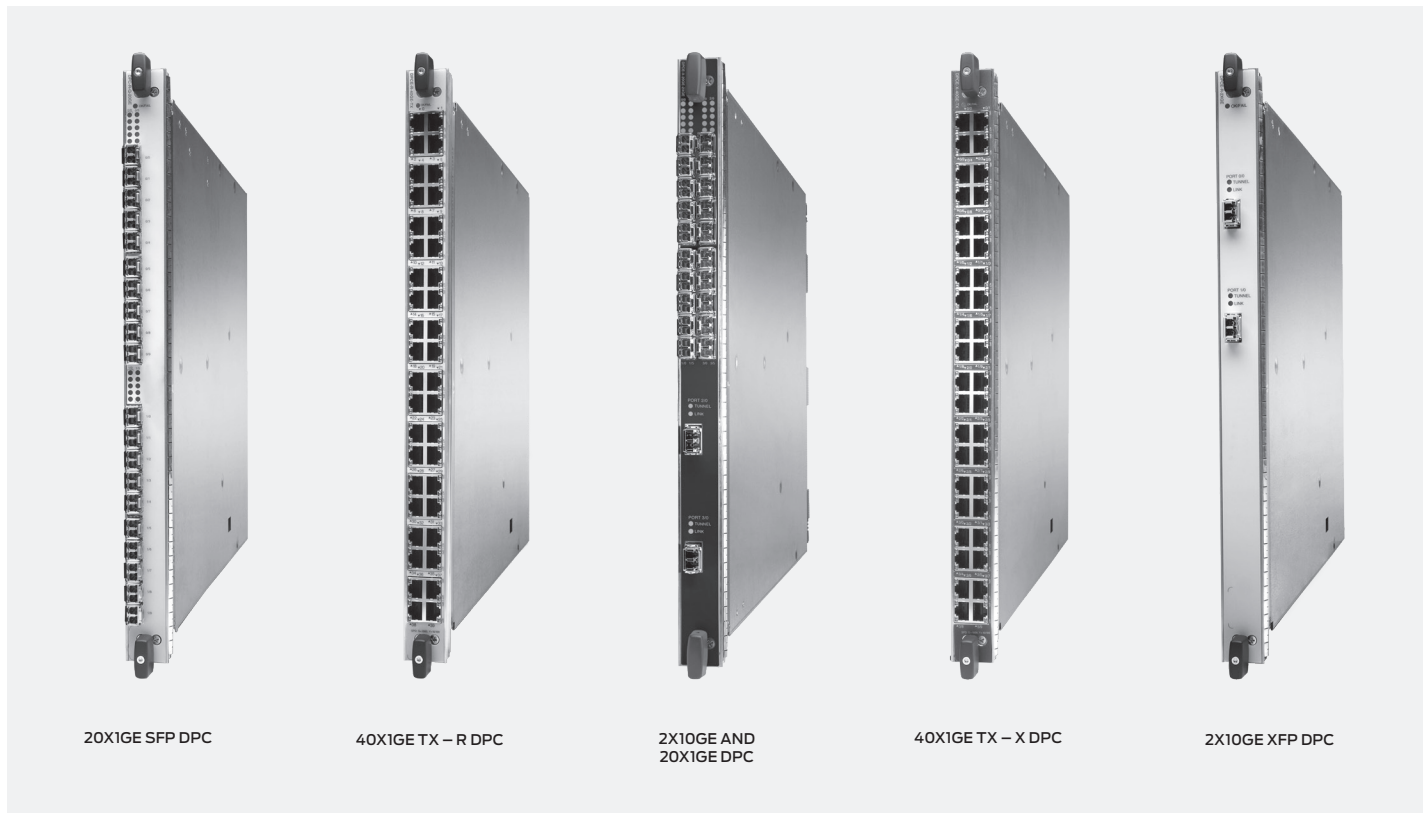
- EN 61000-3-2 Power Line Harmonics
- EN 61000-3-3 Voltage Fluctuations and Flicker
- EN 61000-4-2 ESD
- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 Low Frequency Common Immunity
- EN 1000-4-11 Voltage Dips and Sags

## ETSI

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

## Juniper Networks Services and Support

Juniper Networks is the leader in performance-enabling services and support, which are designed to accelerate, extend, and optimize your high-performance network. Our services allow you to bring revenue-generating capabilities online faster so you can realize bigger productivity gains and faster rollouts of new business models and ventures. At the same time, Juniper Networks ensures operational excellence by optimizing your network to maintain required levels of performance, reliability, and availability. For more details, please visit [www.juniper.net/us/en/products-services/](http://www.juniper.net/us/en/products-services/).



## Ordering Information

MODEL NUMBER	DESCRIPTION
DPCE-R-40GE-SFP	40x1 Gigabit Ethernet Layer 2 and 3 capable
DPCE-R-4XGE-XFP	4x10 Gigabit Ethernet Layer 2 and 3 capable
DPCE-X-40GE-SFP	40x1 Gigabit Ethernet Layer 2+ capable
DPCE-X-4XGE-XFP	4x10 Gigabit Ethernet Layer 2+ capable
DPCE-R-Q-40GE-SFP	40x1 Gigabit Ethernet Layer 2 and 3 capable board with enhanced queuing
DPCE-R-Q-4XGE-XFP	4x10 Gigabit Ethernet Layer 2 and 3 capable board with enhanced queuing
DPCE-X-Q-40GE-SFP	40x1 Gigabit Ethernet Layer 2+ capable board with enhanced queuing
DPCE-X-Q-4XGE-XFP	4x10 Gigabit Ethernet Layer 2+ capable board with enhanced queuing
DPCE-R-Q-20GE-SFP	20x1 Gigabit Ethernet Layer 2 and 3 capable with enhanced queuing
DPCE-R-2XGE-XFP	2x10 Gigabit Ethernet Layer 2 and 3 capable
DPCE-R-40GE-TX	40x10/100/1000 Ethernet Layer 2 and 3 capable with RJ45
DPCE-X-40GE-TX	40x10/100/1000 Ethernet Layer 2+ capable with RJ45
DPCE-X-20GE-2XGE	20x1 Gigabit Ethernet SFP and 2x10 Gigabit Ethernet XFP Layer 2+ capable
DPCE-R-20GE-2XGE	20x1 Gigabit Ethernet SFP and 2x10 Gigabit Ethernet XFP Layer 2 and 3 capable
DPCE-R-Q-20GE-2XGE	20x1 Gigabit Ethernet SFP and 2x10 Gigabit Ethernet XFP with enhanced queuing
MX-FPC2	DPC with two slots for type 2 PICs (occupies two slots)
MX-FPC3	DPC with two slots for type 3 PICs (occupies two slots)
MS-DPC	IP services line card for MX Series

## About Juniper Networks

Juniper Networks, Inc. is the leader in high-performance networking. Juniper offers a high-performance network infrastructure that creates a responsive and trusted environment for accelerating the deployment of services and applications over a single network. This fuels high-performance businesses. Additional information can be found at [www.juniper.net](http://www.juniper.net).

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