

# DXC-5

## High Capacity Hybrid Cross-Connect



- High density Ethernet/SDH/SONET
- MPLS-TP and Traffic-Engineered Pseudowires
- Synchronization: BITS, SyncE
- High capacity: STM-64/OC-192, 10 GbE
- Sub-50ms protection: 1:1, BLSR, PW, ERPS
- Carrier Ethernet: CE 2.0 Certified
- Optional TDM circuit emulation

DXC-5 balances TDM and packet transport in a way unique to the industry. Its hybrid architecture allows for three transport modes: TDM-over-packet transport, hybrid TDM and packet transport, and all packet transport, based on identical hardware, software and features. This flexibility creates a unique opportunity for network designs, by optimizing every service based on the service requirements, without the limitations of a particular technology. In addition, DXC-5 reduces operations costs by using a single platform for these service requirements and avoiding the need for multiple devices at any site.

When compared to the life cycle costs of separate TDM and packet networks, DXC-5 reduces power consumption, software costs, training costs and the number of modules. Network utilization is also improved by using the full bandwidth of the packet and TDM transport.

Packet and E1/T1 services can be transported over Ethernet or SDH/SONET. Since each slot can directly access the Packet and TDM switches at the same time, services can be matched to best technology whether that is maximizing efficiency with statistical multiplexing or minimizing latency. This slot flexibility has the benefit that each port on each module can be individually routed via software to the appropriate switch reducing operations costs.

DXC-5's transport flexibility ensures the lowest transport cost per bit. With the ability to perform statistical multiplexing, low cost TDM switching and DWDM in the same device, new services can use the lowest cost infrastructure across the entire network.

By matching the service interface to the best switch and the best transport method (Ethernet or SDH/SONET), each service can be delivered with the lowest latency required.

### ETHERNET

DXC-5 provides best-in-class packet switching to create networks with the highest performance. Ingress rate limiting prevents any service or application from congesting/choking the network. Each packet is classified so that the appropriate network policies (like prioritization and scheduling) can be applied. Eight CoS queues and scheduling algorithms ensure that there are sufficient resources available to manage the data traffic efficiently. Standard G.8032 ERPS (Ethernet Ring Protection Switching) provides sub-50ms protected packet rings for greater resiliency. Multiple ringlets and multiple ring topologies are supported.

Ethernet OAM allows real-time monitoring of end-to-end circuits, connections or trunks, enabling quick detection and isolation of faults to a particular subnet, trunk, link or node. DXC-5 features BFD-based Fault OAM and ping/traceroute at tunnel/pseudowire level. For 802.1q/802.1ad-based MEF services, DXC-5 supports Y.1731/802.1ag-based CFM OAM (Port level down MEP) and Y.1731 PM counters.

### CIRCUIT EMULATION

Even though many services and applications move from TDM to packet, a few TDM circuits will remain in the network. Circuit emulation provides an alternative transport method using an all Packet Transport Network. DXC-5 employs E1/T1 SAToP and STM-1/OC-3 CEP for carrying this traffic with the reliability and protection mechanisms of legacy TDM networks, including card level protection for E1/T1 interfaces.

### OTN

DXC-5 uses OTN technology to increase optical span length with Forward Error Correction (FEC), optimize bandwidth utilization for high bandwidth Ethernet requirements and reduce latency in networks with many nodes. OTN switching reduces the cost of high-speed transport throughout the network and DXC-5 provides the aggregation/on-ramp to the OTN core network.

# DXC-5

## High Capacity Hybrid Cross-Connect

### SDH/SONET

Featuring a complete suite of SDH/SONET capabilities, DXC-5 provides the reliability and performance expected of your transport network: predictable latency, low protection switching times, deterministic routes and manageable bandwidth.

### MPLS-TP

MPLS label-based Connection Oriented Ethernet allows packet traffic to be easily and precisely routed through the network. DXC-5 provides MPLS-TP-based pseudowires for traffic engineered flows on trunks, which optimizes the network by providing the right amount of control.

The cost benefits of statistical multiplexing are combined with traffic engineering and capacity planning to lower CAPEX by right sizing the network. OPEX reductions come through faster provisioning, robust protection and quicker root cause analysis during failures. In addition, with mesh protection capabilities latency and protection switch times are minimized.

### SYNCHRONIZATION

SyncE, DCR, ACR

### ARCHITECTURE

DXC-5 has a flexible architecture that allows it to build the network best suited for all services:

- Linear for rapid deployment
- Hub and spoke for cost effective buildouts at the edge of the network
- Ring and ringlet for high utilization and resiliency
- Meshed for low latency and flexible protection.

This is achieved with a unique combination of functionalities, including the ability for every optical port to be defined as a User to Network Interface (UNI) or a Network to Network Interface (NNI).

The DXC-5 family includes the following members:

- DXC-5000-7 – Up to 5 tributary and 2 aggregation slots
- DXC-5000-7 with Expansion– Up to 10 tributary and 2 aggregation slots

### MANAGEMENT AND SECURITY

Point and click technologies for Ethernet and SDH/SONET traffic allow for more accurate service designs, more efficient routing and better fault correlation. Accurate alarming and “fault to affected service mapping” enable fault resolution prioritization. Enhanced network element backups and simple remote software upgrades reduce operational costs while enhancing reliability. NMS server redundancy and geographical diversity ensure faster disaster recovery.

•

# DXC-5

## High Capacity Hybrid Cross-Connect

### Specifications

#### CAPACITY

60G TDM with 1x10G + 2x155M/622M/2.5G + 2x155M/622M ports

20G TDM with 1x2.5G + 1x622M + 2x155M

15G TDM with 1x2.5G + 2x155M

5G TDM with 2x622M + 2x155M

2.5G TDM with 1x622M + 2x155M + 32 E1

#### TDM

#### SDH/SONET Switch Capabilities

Fully non-blocking

VC11, VC12, VC3, VC4, VC4-4c

VT1.5, STS-1, STS-3c, STS-16c

LO and HO Virtual Concatenation

#### Interfaces to SDH/SONET

10 GbE – up to 4 XFP ports

1 GbE – up to 40 SFP ports

10/100/1000baseT – up to 40 ports

E1/T1 unprotected - up to 630 ports

E1/T1 protected – up to 252 ports

E3/T3 unprotected – up to 60 ports

E3/T3 protected – up to 24 ports

STM-1/OC-3 – up to 88 SFP ports

STM-4/OC-12 – up to 28 SFP ports

STM-16/OC-48 – up to 9 SFP ports

STM-64/OC-192 – up to 2 XFP ports

#### MPLS-TP

MPLS-TP Connection-Oriented Ethernet

VPWS, VPLS, H-VPLS

ELAN, EVLAN, EVPL, EPL, E-TREE

IGMP v1/v2/v3

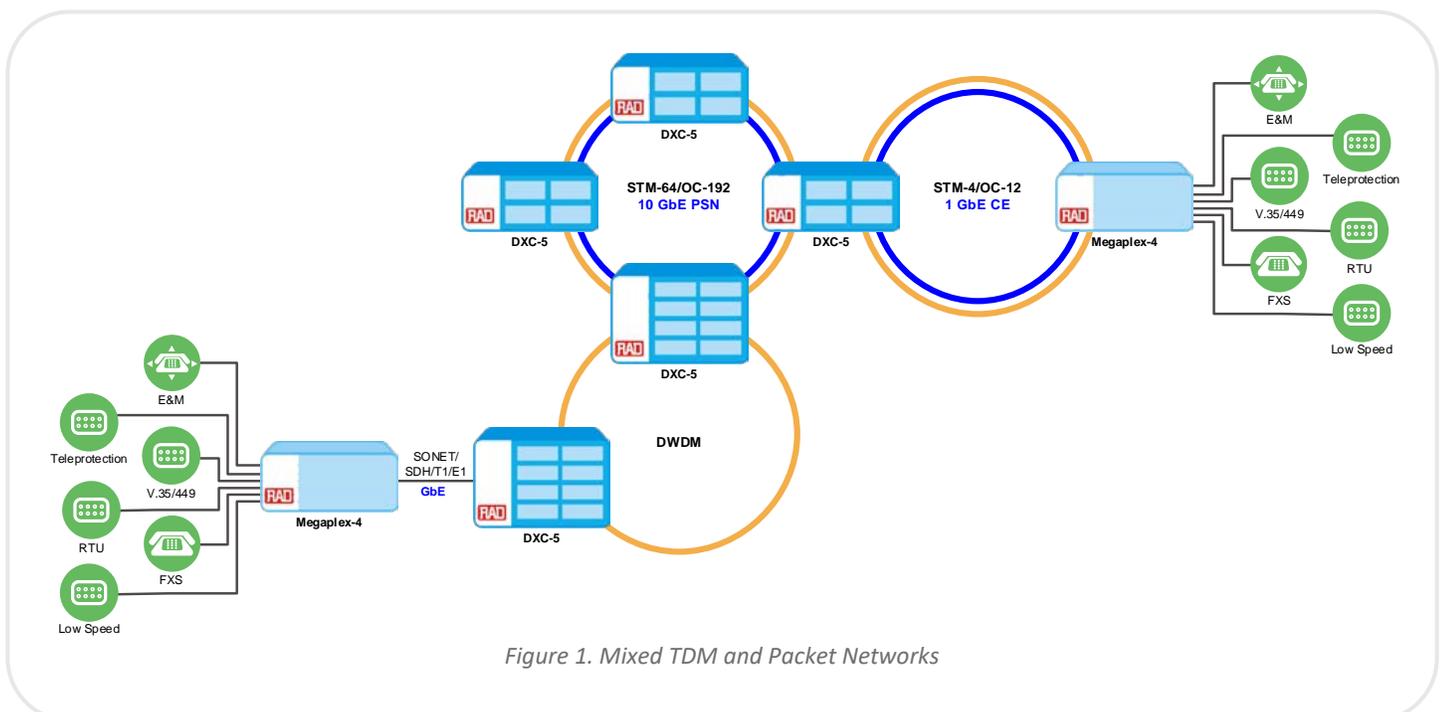


Figure 1. Mixed TDM and Packet Networks

# DXC-5

## High Capacity Hybrid Cross-Connect

### ETHERNET OVER SDH/SONET

VLAN to SDH/SONET VCG Mapping  
MPLS-TP to SDH/SONET VCG Mapping  
Revertive and non-revertive switching  
Ethernet GFP-mapped VCAT and LCAS

### ETHERNET

VLAN, QinQ based services  
Ingress rate limiting at 64 kbps granularity  
Programmable committed/peak rates  
Programmable committed/peak burst sizes  
Egress rate shaping on all ports  
8 classes of service as per IEEE 802.1p  
2 rate, 3 color marking  
Every Ethernet port defined as UNI or NNI

#### Ethernet Switch Capacity

Up to 64 Gbps bidirectional

#### Interfaces to Ethernet Switch

10 GbE – up to 4 XFP  
1 GbE – up to 24 ports  
FE (10/100baseT) – up to 24 ports

### OPTICS

SFP and XFP  
Tunable XFP  
FEC for 10G and 622M ports

### RESILIENCY

#### TDM

Unprotected, 1+1 APS  
UPSR, BLSR, 2F MS-SPRing  
1:N line protection  
1:1 E3/T3 protection  
1:N E1/T1 protection

#### Ethernet

Ethernet ring protection ITU-T G.8032  
1:1 bidirectional linear protection LSP (RFC6378)  
Link Aggregation Group (LAG)  
Port mirroring and loopback

### MANAGEMENT

Web-based GUI  
End to End Network Management  
SNMPv3

### CIRCUIT EMULATION

E1: SAToP RFC4553/MEF8  
T1: SAToP RFC4553/MEF8

### TIMING AND SYNCHRONIZATION

SyncE , DCR, ACR

### GENERAL

#### Physical (W x H x D)

444 mm x 88 mm x 235 mm (base chassis)  
444 mm x 220 mm x 235 mm (with expansion)  
ETSI and 23" rack mount options

#### Power Supply (Optional Redundancy)

-36V to -60V DC  
230V AC, 50Hz  
120V AC, 60Hz

#### Power Consumption

300W max

#### Environment

Operating Temperature: 0°C to 50°C  
Relative Humidity: 10% to 90%, non-condensing

## DXC-5

## High Capacity Hybrid Cross-Connect

Table 1. DXC-5 Aggregation and Tributary Modules

Module	Description	Power Consumption	
Aggregation Modules			
	<b>Aggregate interface</b>	<b>Tributary interface</b>	
DXC-5000M-AGG/XA10G	1xSTM-4/16/OC-12/OC-48	2xSTM-1/OC-3	25 W
DXC-5000M-AGG/XA20G (SDH only)	1xSTM-16 Agg with + 1xSTM-4/1	2xSTM-1	30 W
	2xSTM-16 Agg		
DXC-5000M-AGG/XA60G	1xSTM-64/OC-192/OTU2	2xSTM-16/4/OC-48/12/OTU1/GE	70 W
		2xSTM-4/1/OC-12/3GE	
Tributary Modules			
DXC-5000M-IO/6E3DS3	DS3/E3		8.5 W
DXC-5000M-IO/SOT18	8xSTM-1/OC-3 or 2xSTM-4/OC-12 or 1xSTM-16/OC-48		17 W
DXC-5000M-IO/ST63E1T1	63 *E1/T1		8.5 W
DXC-5000M-IO/CEF1	2xGE SFP + 1x1000 + 3x10/100		30 W
DXC-5000M-IO/CEF9P	1xGE SFP + 4x1000 + 4x10/100 (SDH Only)		30 W
DXC-5000M-IO/CEL-5	2xGE SFP + 2x1000 + 4x10/100		28 W
DXC-5000M-IO/CEL-6	8xGE SFP		32 W
DXC-5000M-IO/CEF-4 (Switch)	2x 10GE XFP 2x GE SFP		80 W
Tributary Modules (Circuit Emulation Only)			
DXC-5000M-IO/ST24DS3	24*DS3/E3		28 W
DXC-5000M-IO/ST63DS1CEM	63 *E1/T1		24 W
DXC-5000M-IO/CEM1	8*SFP (STM-1/4/16/OC-3/12/48)		70 W
Tributary Modules (Expansion/Protection chassis)			
DXC-5000M-EXP/S63EIO	63E1/DS1 I/O ports for DXC-5000-EXP Expansion/Protection chassis		16 W
DXC-5000M-EXP/S63EWP	63E1/DS1 WP ports for DXC-5000-EXP Expansion/Protection chassis		16 W
DXC-5000M-EXP/S12E3IO	12 E3/DS3 ports for DXC-5000-EXP Expansion/Protection chassis		18 W
DXC-5000M-EXP/S12E3WP	12 E3/DS3 ports for DXC-5000-EXP Expansion/Protection chassis		18 W

Pulse Supply  
 909 Ridgebrook Road., Sparks, Maryland  
 21152, USA TEL : +1-410-583-1701  
 FAX : +1-410-583-1704  
 E-mail: sales@pulsesupply.com https://  
[www.pulsesupply.com/rad](http://www.pulsesupply.com/rad)  
[www.pulsesupply.com/rad](http://www.pulsesupply.com/rad)



Your Network's Edge®

555-100-06/19 (4.1) Specifications are subject to change without prior notice. © 2015–2019 RAD Data Communications Ltd. RAD products/technologies are protected by registered patents. To review specifically which product is covered by which patent, please see [ipr.rad.com](http://ipr.rad.com). The RAD name, logo, logotype, and the product names MiNID, Optimux, Airmux, IPmux, and MiCLK are registered trademarks of RAD Data Communications Ltd. All other trademarks are the property of their respective holders.