

DXC-8R/10A/30/30E



Multiservice Access Nodes



FEATURES

- Modular Multiservice Access Nodes
- Non-blocking digital cross-connection of up to 960 timeslots
- Traffic grooming
- E1/T1 conversion includes A-law/ μ -law and signaling conversion
- Transmission of T1 traffic over E1, complying with ITU-T G.802
- Broadcast support
- Inverse multiplexing module up to 15.6 Mbps
- Test and monitoring at any port
- Controlled slip buffer for overflow/underflow
- The modular DXC family includes the following chassis types:
 - DXC-8R supporting up to 32 ports
 - DXC-10A supporting up to 40 ports
 - DXC-30 supporting up to 120 ports
 - DXC-30E supporting up to 240 ports
- Support STM-1, E3, T3, E1, T1, n x 56/64 kbps and ISDN services over copper, fiber, or xDSL media
- Optional redundancy for common logic and power supply
- 1:1 protective switching
- TFTP support for common logic software upgrade
- Management:
 - Out-of-band via V.24 supervisory port or Ethernet port
 - Inband via TS 0 or dedicated timeslot
- RADview SNMP management system on UNIX (HP OpenView) platform
- Telnet support
- Separate dial-in/dial-out port
- Support SNMP agent and standard management protocols: SLIP, PPP and RIP2
- Local loop access solution with LTU or CSU options for extended range, built-in fiber optic, or 2-wire/4-wire xDSL modems

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DESCRIPTION

- The DXC family of modular Multiservice Access Nodes provides non-blocking cross connection of up to 960 timeslots, using up to 240 ports. Plug-in interface modules provide n x 56/64 kbps, E1, T1, E3, T3 or STM-1 transmission over copper, fiber, HDSL, IDSL or SHDSL lines. Also available is the DIM module which provides inverse multiplexing capabilities of up to 15.7 Mbps.
- Typical applications for the DXC:
 - Local loop access, together with traffic grooming for re-directing voice and data to different trunks (see Figure 1)
 - Concentrating multiple fractional E1/T1 lines from a cellular base station (BTS) onto a full E1/T1 link to the mobile switch center (MSC) (see Figure 2)
 - Conversion/gateway between E1 and T1 networks for both data and voice (see Figure 3).

- Inverse multiplexing of a single higher rate logical channel over up to 8 E1/T1 links (see Figure 4).
- In order to support the needs of different applications, the DXC family features four chassis variants:
 - DXC-8R (1U-high) chassis with 4 I/O module slots
 - DXC-10A (1U-high) chassis with 5 I/O module slots
 - DXC-30 (3U-high) chassis with 15 I/O module slots
 - DXC-30E (6U-high) chassis with 15 6U-high I/O module slots.
 All units can be mounted in 19" racks.

CROSS CONNECT

- DXC-30 and DXC-30E support up to 120 and 240 ports, respectively. DXC-10A supports up to 40 ports, while the smaller DXC-8R supports up to 32 ports. A user-defined connection table sets connection of any incoming 56/64 kbps timeslot to any outgoing 56/64 kbps timeslot. Support is provided for drop & insert and broadcast applications.

- Cross-connection of n x 56 kbps or n x 64 kbps channels is implemented by placing the data onto E1 or T1 frames, using only the required number of timeslots. This provides Fractional CSU/DSU functionality.

E1/T1 CONVERTER

- DXC can function as a converter between E1 ports and T1 ports:
 - DXC-8R converts between up to 16 E1 and 16 T1 ports
 - DXC-10A converts between up to 16 E1 and 16 T1 ports
 - DXC-30/30E converts between up to 16 E1 and 16 T1 ports.
- A-law/ μ -law companding and signaling conversion are performed according to the E1 and T1 standards.

BASIC UNITS

- The basic DXC-30 and DXC-30E units include one power supply, one common logic module and fifteen I/O slots for the plug-in interface modules. Optional redundancy for the common logic and power supply is available.

APPLICATION

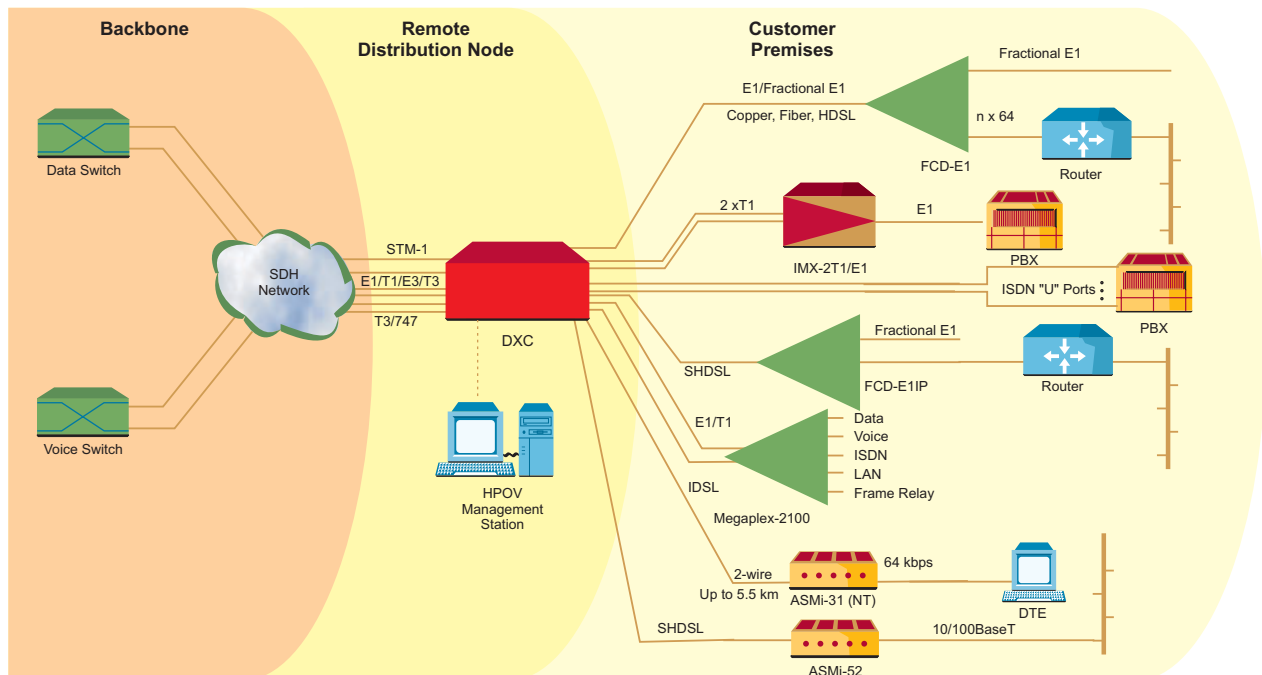


Figure 1. Multiservice Access Platform

Table 1. DXC I/O Modules

Module	Technology	Description
DE1	Copper/Fiber optic	Two-port E1 interface module
DE1B	Copper/Fiber optic	Two-port E1 interface module with BERT
DT1	Copper/Fiber optic	Two-port T1 interface module
DT1B	Copper/Fiber optic	Two-port T1 interface module with BERT
DE3	Copper/Fiber optic	One-port E3 interface module
DT3	Copper/Fiber optic	One-port T3 interface module
DT3/747	Copper/Fiber optic	One-port T3 interface module with G.747 submultiplexing (DCL.2 only)
DHS	Copper	Two-port n x 56/64 kbps data module
DIM	Copper	Digital inverse multiplexer module
DHL/E1	HDSL 4-wire	Two-port 2.048 Mbps HDSL module
DHL/T1	HDSL 4-wire	Two-port 1.544 Mbps HDSL module
DHL/E1/2W	HDSL 2-wire	Two-port 2.048 Mbps 2-wire HDSL module
D4E1, D8E1	Copper	Four or eight-port E1 interface modules
D4T1, D8T1	Copper	Four or eight-port T1 interface modules
D8U, D16U	Copper	Eight or sixteen-port ISDN "U" interface modules
D8SL	SHDSL 2-wire	Eight-port up to 2.048 Mbps 2-wire SHDSL module (DCL.3 only)
DFSTM-1	Copper/Fiber optic	One- or two-port STM-1 module (DCL.3 only)

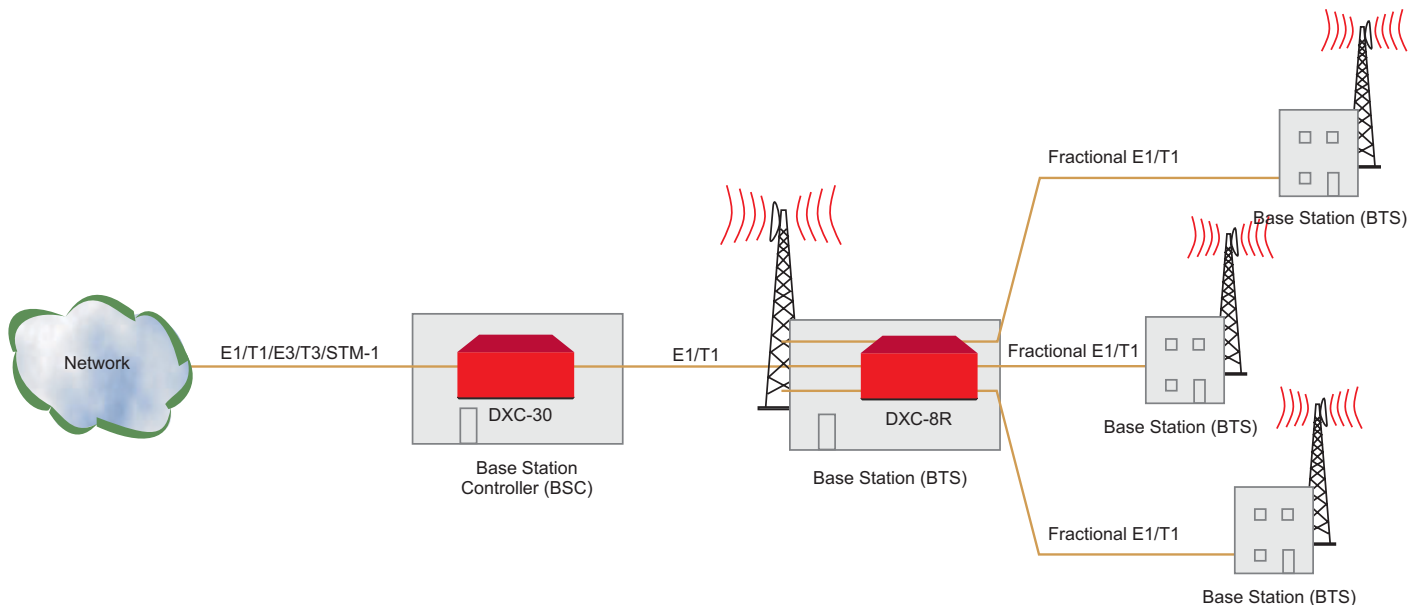


Figure 2. Bandwidth Optimization in a GSM Network using DXC-8R

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- The basic DXC-10A unit includes one power supply, one common logic module and five I/O slots for the additional plug-in interface modules.
- The basic DXC-8R unit includes two power supplies and two common logic modules for system redundancy. The DC power supplies are hot-swappable. DXC-8R has four I/O slots for the plug-in interface modules.

COMMON LOGIC

- The DCL.2/DCL.3 common logic module stores the matrix configuration and event information, as well as the configuration for alarm masking. It communicates with the management station using a SLIP/PPP/Ethernet connection (by means of an SNMP agent). DCL.2/DCL.3 can pass management information received from 30 different remote sites, over a single dedicated timeslot or TS 0, to the central management site. Flash for software download, Telnet and ASCII terminal management are also supported.

I/O MODULES (see enclosed data sheets for detailed specifications)

- **DT1B**, the two-port T1 interface module, supports D4, ESF framing formats or unframed operation. For long range applications, a CSU option is available. DT1B provides BERT, loopback per timeslot, and 1:1 redundancy. DT1B is available with either copper or fiber optic interface.

- **DE1B**, the two-port E1 interface module, supports both 2 and 16 frames per multiframe formats, TS 0 multiframe with CRC-4 and HDB3 line code, and unframed operation. For long range applications, an LTU option is available. DE1B provides BERT, loopback per timeslot, and 1:1 redundancy. DE1B is available with either copper or fiber optic interface.
- **DT3**, the single-port T3 interface module, multiplexes up to 28 T1 channels into a T3 frame with either C-bit parity or M13. DT3 is available with either copper or fiber optic interface.
- **DT3/747**, the single-port T3 interface module (supported by DCL.2 only) submultiplexes 21 E1 channels into a single DS3 data stream. Mixed (E1 and T1) traffic applications are also supported. The DT3/747 module is available with either copper or fiber optic interface.
- **DE3**, the single-port E3 interface module, multiplexes up to 16 E1 channels into an E3 frame. DE3 is available with either copper or fiber optic interface.
- **DHS**, the two-port $n \times 56/64$ kbps data module, provides two high speed synchronous data channels. Each channel can be independently ordered as V.35, V.11/RS-422, V.24 or X.21 interface. Ethernet 10/100 bridge and IP router versions are also available. Synchronous channels support data rates of $n \times 56$ kbps, or $n \times 64$ kbps, where n is 1 to 24 for T1 and 1 to 31 for E1.
- **DIM**, the Digital Inverse Multiplexer module, enables transmitting a single higher rate RS-530, V.35, X.21,

HSSI, E1 or ETH signal over up to 8 separate E1/T1 lines. DIM splits and then transmits the individual signals via DE1B, DT1B, DE3, DT3, D8E1, D8T1 or DFSTM-1 interface modules, allowing the use of different paths or facilities, while ensuring transmission integrity.

- **DHL/E1**, the two-port HDSL module, uses HDSL technology to extend the range of DXC up to 4.0 km (2.5 miles) over 24 AWG (0.5 mm), 4-wire copper cables. It works opposite other RAD products with HDSL technology.
- **DHL/E1/2W**, the two-port HDSL module, uses HDSL technology to extend the range of DXC up to 3.0 km (1.9 miles) over 24 AWG (0.5 mm), 2-wire copper cables. In conjunction with HCD-E1/2W, it extends the range of the traditional subscriber loop, while saving on the copper infrastructure.
- **DHL/T1**, the two-port HDSL module, uses HDSL technology to extend the range of DXC up to 4.0 km (2.5 miles) over 24 AWG (0.5 mm), 4-wire copper cables. It works opposite other RAD products with HDSL technology.
- **D4E1** and **D8E1**, the 4- or 8-port E1 interface modules, provide 4 or 8 E1 links over copper cables, with built-in LTU, supporting E1 or Fractional E1 rates.
- **D4T1** and **D8T1**, the 4- or 8-port T1 interface modules, provide 4 or 8 T1 links over copper cables, with built-in CSU, supporting T1 or Fractional T1 rates.
- **D8U** and **D16U**, the 8- or 16-port ISDN "U" interface modules, provide independent ISDN "U" ports, each supporting 2B + D channels, for a total payload data rate of up to 128 kbps per port. D8U/D16U can be configured either to extend ISDN lines over non-ISDN facilities (/I mode), or as a dedicated LTU (line termination unit) for RAD's ASM-31 or ASMi-31 short-range modems.
- **D8SL**, the eight-port I/O module, uses the SHDSL technology to extend the range of DXC up to 8 km (5 miles) over 24 AWG

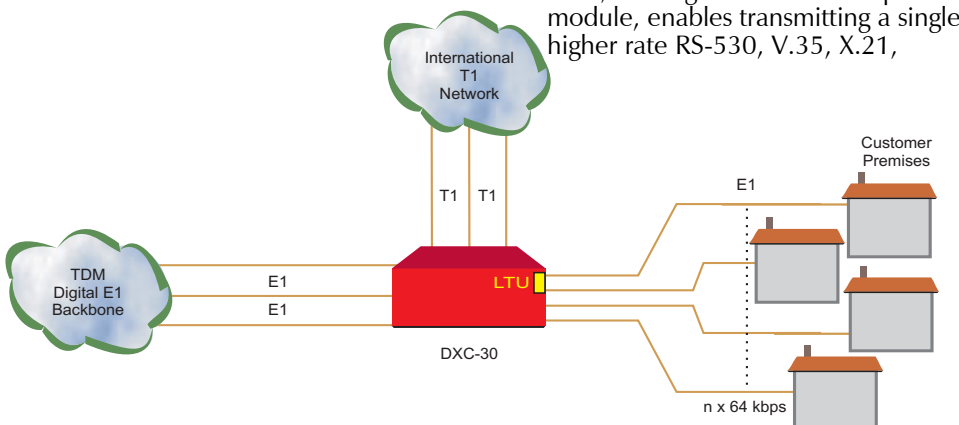


Figure 3. E1/T1 Conversion and Access to Carrier Backbone

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2-wire copper cables. In conjunction with RAD's ASMi-52, FCD-IP or standard SHDSL CPE, it extends the range of traditional subscriber loop while saving on the copper infrastructure.

- **DFSTM-1**, the fractional STM-1 module, provides direct access to Synchronous Digital Hierarchy (SDH) transmission cores, at the STM-1 level (155.520 Mbps). An optional second interface is available for redundancy or linear ADM (daisy-chain) configurations.

MANAGEMENT

- Setup, control and diagnostics can be performed via a V.24 supervisory port or optional Ethernet management port, using an ASCII terminal with SLIP or PPP protocols. A built-in SNMP agent enables remote management for configuration and diagnostics of remote devices (up to 30 remote locations) using TS 0, a dedicated timeslot on the E1/T1 trunk, or Telnet.
- A separate dial-in/dial-out port supports remote configuration (dial-in) and automatic alarm indication (dial-out). For dial-out operation, an external modem is activated to automatically dial a pre-programmed number whenever an alarm event occurs.
- Network management provides centralized control of all network nodes, including interface configuration, connection setup, alarm and management. Alarm status and system configurations are available at all times.
- Multiple DXC hubs can be managed by a UNIX-based user-friendly SNMP management system, RADview-HPOV/TDM.

- Programming and setup of a remote DXC can be performed:
 - Out-of-band: either via the Ethernet management port, or through the supervisory port of the remote unit, over a modem link, or over a FRAD
 - Inband: via either TS 0/F-bit, or over a full inband dedicated timeslot, supporting FR, PPP and RIP2 standard protocols.

DIAGNOSTICS

- DXC provides diagnostic loopbacks for each E1/T1 or n x 56/64 kbps module. E1 and T1 interface modules support loopbacks per timeslot, including an internal BERT, and loopbacks toward the local or remote DTE. T1 interface modules also support PLB or LLB code injection per ANSI T1.403. Any port can be configured to test and monitor data on any given port of the enclosure.
- Enhanced statistics include T1 ESF diagnostics according to ANSI T1.403 and RFC 1406; E1 CRC-4 diagnostics per ITU-T Rec. G.706; T3 diagnostics per RFC 1407, ANSI T1 107/107a; E3 diagnostics per RFC 1407, and STM-1 diagnostics per RFC 2258.

TIMING

- Timing options for the E1/T1 interface include: internal clock, external station (master) clock, or loopback timing from any selected E1/T1 or n x 56/64 kbps port.

REDUNDANCY

- System hardware redundancy is provided through optional redundant power supply and common logic (all chassis versions except DXC-10A)

- DXC I/O modules support three types of redundancy:
 - Line (single-slot, 1:1) redundancy ensures protective switching within less than 50 msec, between ports on the same module
 - Hardware (Y-cable) redundancy between modules protects the service from hardware failure. This type of redundancy is supported by copper interfaces only.
 - Line and hardware (dual-slot) redundancy is ensured by installing two DE3/DT3 modules in a chassis (only one is active).

SPECIFICATIONS

- **Timeslots Mapping**
Any timeslot to any timeslot, with/without A-law/ μ -law and/or signaling conversion per timeslot
- **Unused Timeslot Code**
Any user defined code
- **Timing**
System clock source:
 - Internal clock (± 32 ppm)
 - External clock (G.703, RS-422)
 - Receive clock (from any port)
- **Station Clock Interface**
Data rate:
 - 1.544/2.048 Mbps (selectable)Compliance: ITU-T Rec. G.703 or V.11/RS-422
Connectors:
 - Balanced: RJ-45
 - Unbalanced: BNC coaxial
- **Elastic Buffer**
Buffer length: ± 1 E1/T1 frame
Underflow: 1 frame repeated
Overflow: 1 frame skipped
(No frame sync loss for buffer overflow or underflow)
Data delay: up to 375 μ sec
Signaling buffer: ± 1 E1/T1 multiframe

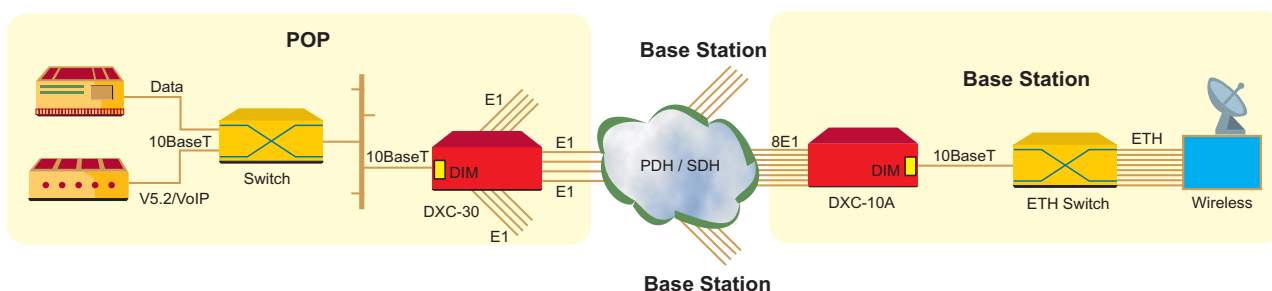


Figure 4. Inverse Multiplexing Application

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- **Diagnostics**
 - Local loopbacks on all external and internal ports (apart from VC-4)
 - Remote loopbacks on all external and internal (apart from VC-4, VC-12) ports
 - Code activated network loopbacks per ANSI T1.403 on T1 interface modules
 - Loopback for any timeslot per ANSI 403 RDL on E1 and T1 interface modules
 - Built-in BERT on all external E1, T1, DHS and DIM ports
 - Alarm mask (user-defined)
- **Statistics**

T1, ESF diagnostics:

 - Full support according to ANSI T1.403; local support according to AT&T 54016 and RFC 1406
 - Transparent FDL between ports

T3 diagnostics:

 - RFC 1407, ANSI T1 107, ANSI T1 107a

E1 CRC-4 diagnostics:

 - Per ITU-T Rec. G.706; RFC 1406, 1407
 - Local support equivalent to AT&T 54016

E3 diagnostics: RFC 1407

STM-1 diagnostics: RFC 2258
- **Management Port**
 - Dial Port (SP-MODEM) with V.24/RS-232, async interface; Data rate: 0.3–57.6 kbps, or autobaud
 - Connector: D-9 female, DTE
 - Ethernet 10BaseT (DCL.2 only)
 - Ethernet 10/100BaseT (DCL.3 only)
 - Ethernet 10Base2 (DCL.2 only)
- **Indicators**

Front panel:

 - Major Alarm, Minor Alarm, Test, On-line (per power supply)
 - On-line (per common logic)

Rear panel: module indicators (see separate data sheets)
- **Physical**

DXC-30E

Height: 26.6 cm / 10.5 in (6U)
Width: 43.8 cm / 17 in
Depth: 25.4 cm / 10 in
Weight: Less than 16 kg / 35 lb

DXC-30

Height: 13.2 cm / 5.25 in (3U)
Width: 43.8 cm / 17 in
Depth: 25.4 cm / 10 in
Weight: Less than 8 kg / 17 lb

DXC-10A and DXC-8R

Height: 4.4 cm / 1.75 in (1U)
Width: 44.0 cm / 17.3 in
Depth: 25.4 cm / 10 in
Weight: Less than 2.5 kg / 5.5 lb
(Weights are of fully equipped hubs)

- **Power Supply**

100-240 VAC, 47 to 63 Hz
-48 VDC nominal
- **Power Consumption (max)**

DXC-8R: 80W (DC), 60W (AC)
DXC-10A: 80W (DC), 55W (AC)
DXC-30: 90W (DC), 120W (AC)
DXC-30E: 180W (DC), 188W (AC)
- **Temperature**

DXC-8R, 10A: 0–50°C/32–122°F
DXC-30, 30E: 0–45°C/32–113°F

Note: For extended temperature ranges, contact RAD representative.
- **Humidity**

Up to 90%, non-condensing

ORDERING

Basic units and I/O modules, as well as any additional System modules, are ordered separately. See separate data sheets for I/O module ordering.

BASIC UNITS

DXC-30-#/?/*/~/!

Basic unit includes 3U-high chassis with 15 I/O slots, one power supply and one common logic module

DXC-30E-#/?/*/~

Basic unit includes 6U-high chassis with 15 I/O slots, one power supply and one common logic module

DXC-10A-#/?/*/~/!

Basic unit includes 1U-high chassis with 5 I/O slots, one power supply and common logic module

DXC-8R-#/?/*/~

Basic unit includes 1U-high chassis with 4 I/O slots, two power supplies, two common logic modules

SYSTEM MODULES

DXC-30M-CL.2/? , DXC-30M-CL.3/?

Common Logic Modules with management, cross-connect matrix and software remote upgrade

DXC-30ME-CL.2/? , DXC-30ME-CL.3/?

Common Logic Modules with management, cross-connect matrix and software remote upgrade for DXC-30E (6U high)

DXC-30M-PS/~

Power supply module for DXC-30

DXC-8RM-PS/48

DC power supply module for DXC-8R

DXC-30ME-PS/~

Power supply module for DXC-30E

ORDERING OPTIONS

- # Specify DXC common logic:
 - 1 for DCL.2
 - 3 for DCL.3
- ? Specify management port interface:
 - UTP for Ethernet 10BaseT (DCL.2) or Ethernet 10/100BaseT (DCL.3)
 - BNC for Ethernet 10Base2 (DCL.2)
 - V24 for V.24/RS-232 dial port
- * Specify R for power supply and common logic redundancy
- ~ Specify power supply:
 - AC for 100 to 240 VAC operation
 - 48 for -48 VDC operation
- ! Specify N3 for NEBS-3 compliant chassis (DCL.2 only)



data communications

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