

DXC Family

Multiservice Access Node

RAD



FEATURES

- Digital cross-connection for up to 30 n x 56/64 kbps or T1/E1 ports over copper, fiber or HDSL
- The modular DXC family includes the following chassis types:
 - DXC-30 with 15 I/O modules
 - DXC-30E with 15 6U high I/O modules
 - DXC-10A with 5 I/O modules
 - DXC-8R with 4 I/O modules
- Programmable DS0 non-blocking cross-connection
- Optional redundancy for common logic and power supply
- 1:1 protection switching
- T1/E1 conversion supports A-law/ μ -law and signaling conversion
- Transmission of T1 traffic over E1. Complies with ITU-T G.802
- Broadcast support
- Inverse multiplexing module supports up to 8 T1/E1 trunks
- Controlled slip for buffer overflow/underflow
- Management:
 - Out-of-band via V.24 supervisory port or Ethernet management port
 - In-band via TS 0 or dedicated timeslot
- Traffic grooming into E3/DS3 uplinks
- RADview SNMP management system on PC or UNIX (HPOV) platform
- Telnet support
- Separate dial-in/dial-out port
- Supports 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 HDSL modems
- TFTP support for common logic software upgrade
- Test and monitoring at any port

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DESCRIPTION

- The DXC family of modular Multiservice Access Nodes provides non-blocking DS0 cross connect for up to 30 T1/E1 ports and supports built-in Local Loop solutions. Plug-in interface modules supporting $n \times 56/64$ kbps, T1, E1, T3 or E3 transmission over copper, fiber or HDSL, are available. Each interface module (except E3/T3) is equipped with two ports. Also available is the DIM module which provides inverse multiplexing capabilities for $n \times T1$, $n \times E1$.
- Typical applications for the DXCs:
 - Providing Local Loop access solution together with traffic grooming, re-directing voice and data to different trunks (see *Figure 1*)
 - Concentrating multiple T1/E1 lines from a cellular base station (BTS) onto a full E1 link to the mobile switch center (MSC)(see *Figure 2*).
 - Providing conversion/gateway between T1 and E1 networks for both data and voice (see *Figure 3*).

APPLICATIONS

- In order to support the needs of different applications, the DXC family features four unit variants:
 - **DXC-30** (3U high) chassis with 15 I/O module slots
 - **DXC-30E** (6U high) chassis with 15 I/O module slots
 - **DXC-10A** (1U high) chassis with 5 I/O module slots
 - **DXC-8R** (1U high) chassis with 4 I/O module slotsAll units can also be mounted in 19" racks.

CROSS CONNECT

- DXC-30 supports up to thirty T1, E1 or $n \times 56/64$ kbps ports. DXC-10 supports up to ten ports, while the smaller DXC-8R supports up to eight ports. A user-programmable connection table connects any incoming 64 kbps timeslot to any outgoing 64 kbps timeslot. Support is provided for drop & insert and broadcast. Channel relocating and half duplex conferencing are also supported.
- Cross-connection of $n \times 56$ kbps or $n \times 64$ kbps channels is implemented by placing the data onto a T1 or E1 frame, using only the required number of timeslots. This provides Fractional CSU/DSU functionality.

- 1+1 protection through dual cable at the port level (same module) ensures less than 50 msec link redundancy. Y-cable redundancy between modules protects the service from hardware failure.

T1/E1 CONVERTER

- DXC can function as a converter between T1 ports and E1 ports:
 - DXC-30 converts between up to fifteen T1 and twelve E1 ports
 - DXC-10A converts between up to five T1 and four E1 ports
 - DXC-8R converts between up to four T1 and four E1 ports.
- A-law/ μ -law and signaling conversion is performed according to the T1 and E1 standards.

BASIC UNITS

- The basic DXC-30-1 (DXC-30E-1) unit includes one power supply, one common logic module (DCL.2) and fifteen I/O slots for the plug-in interface modules. Optional redundancy for the common logic and power supply is available.
- The basic DXC-10A-1 unit includes one power supply, one common logic module (DCL.2) and five I/O slots for the additional plug-in interface modules.

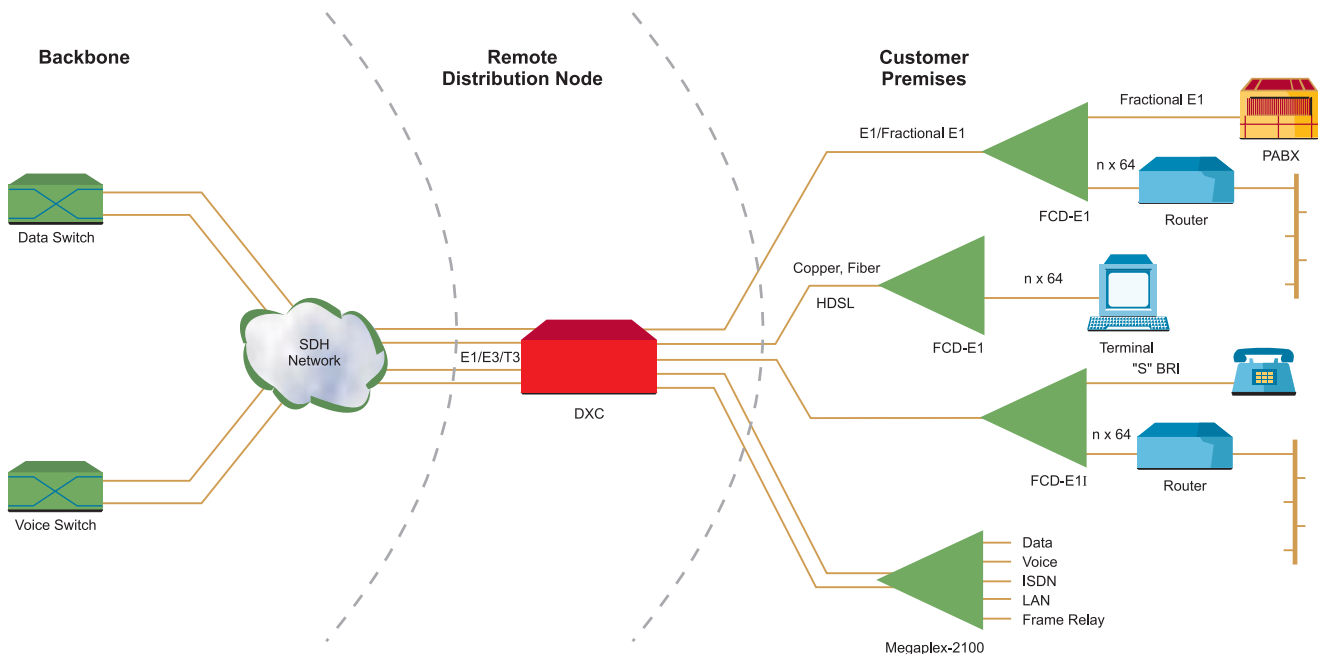


Figure 1. Multiservice Access Platform

Table 1. DXC I/O Modules

| Module | Technology | Description |
|---------------|-------------------|--|
| DE1 | Copper | Two-port E1 interface module |
| DE1B | Copper | Two-port E1 interface module with BERT |
| DT1 | Copper | Two-port T1 interface module |
| DT1B | Copper | Two-port T1 interface module with BERT |
| DE3 | Copper | One-port E3 interface module |
| DE3/F | Fiber optic | One-port fiber-optic E3 interface module |
| DT3 | Copper | One-port T3 interface module |
| DT3/F | Fiber optic | One-port fiber-optic T3 interface module |
| DFO | Fiber optic | Two-port fiber-optic link modules (supports E1 and T1) |
| DHS | Copper | Two-port n x 56/64 kbps data module |
| DIM | – | Digital inverse multiplexer module |
| DHL/E1 | HDSL | Two-port link 2.048 Mbps HDSL module, extended range |
| DHL/T1 | HDSL | Two-port link 1.544 Mbps HDSL module, extended range |



DXC-30 Rear Panel

DXC-30 Rear Panel

Multiservice Access Node

- The basic DXC-8R-1 unit includes two -48 VDC power supplies and two common logic modules (DCL.2) for system redundancy. DXC-8R has four I/O slots for the plug-in interface modules.
- Various timing options cover all timing possibilities for the T1/E1 interface. These include internal clock, external clock, and loopback timing sourcing from any selected T1/E1 port or $n \times 56/64$ kbps port.

COMMON LOGIC

The DCL.2 common logic module stores matrix configuration and event information, as well as configuration for alarm mask. It communicates with the management station using a SLIP/PPP/Ethernet connection (by means of an SNMP agent). DCL.2 can pass management information received from 30 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

- **DT1**, the two-port T1 interface module, supports both D4 or ESF framing formats and AMI line code (zero suppression is selectable for either Transparent, B7ZS or B8ZS). For long range applications, a CSU option is available. The **DT1B** version provides BERT, loopback per timeslot, and 1+1 redundancy.
- **DE1**, the two-port E1 interface module, supports both 2 and 16 frames per multiframe (256N and 256S, respectively), TSO multiframe with CRC-4 and HDB3 line code. For long range applications, a CSU option is available. The **DE1B** version provides BERT, loopback per timeslot, and 1+1 redundancy.
- **DT3**, the single-port T3 interface module, supports multiplexing of up to 28 T1 channels into a T3 frame with C-bit parity per ANSI T1.404 or M13 framing options. DT3 is available with both coax and fiber interfaces.
- **DE3**, the single-port E3 interface module, supports multiplexing of up to 16 E1 channels into an E3 frame per ITU-T G.751. DE3 is available with both coax and fiber interfaces.
- **DHS**, the two-port $n \times 56/64$ kbps data module, provides two high speed synchronous data channels. Each channel is independently selected for either V.35 or RS-422/V.11 interface. Each channel can support bit rates of $n \times 56$ kbps or $n \times 64$ kbps, where:
 - $n = 1$ to 24 for T1,
 - $n = 1$ to 31 for E1.
- **DFO**, the two-port E1/T1 Fiber Optic Link modules, enables DXC to connect directly to a fiber optic network, eliminating the need for an external fiber optic modem or repeater. DFO modules operate with different grades and sizes of single/multimode fiber optic cable and are available with LED and laser diode optical interfaces.
- **DIM**, the Digital Inverse Multiplexer module, working in conjunction with dual-port DE1, DE1B, DT1, DT1B, DE3 or DT3 interface modules, enables DXC to function as an inverse multiplexer. DIM allows transmission of high speed signals over up to eight T1/E1 lines. This is achieved by breaking down the high speed signals over the multiple T1/E1 lines and routing these signals over different paths or facilities, while ensuring transmission integrity.

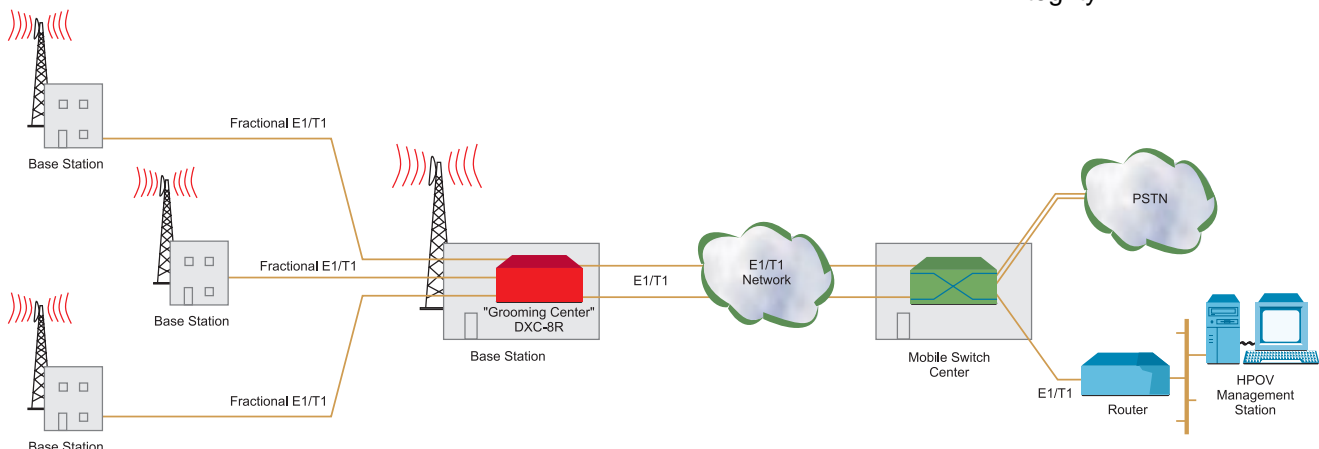


Figure 2. Bandwidth Optimization in a GSM Network using DXC-8R

- **DHL/E1**, the two-port link module, uses HDSL technology to extend the range of the DXC up to 4.0 km (2.5 miles) over 24 AWG (0.5 mm), 4-wire copper cable. It works opposite other RAD products with HDSL technology (such as HCD-E1, HTU-E1, HTU-E1L, HTU-2 and Megaplex-2100 with ML-H modules). DHL/E1 complies with ITU-T G.704 and ETSI ETR-152 standards.
- **DHL/T1**, the two-port link module, uses HDSL technology to extend the range of the DXC up to 4.0 km (2.5 miles) over 24 AWG (0.5 mm), 4-wire copper cable. It works opposite other RAD products with HDSL technology (such as HTU-T1, HTU-T1L and Megaplex-2100 with ML-H modules). DHL/T1 complies with ITU-T G.704 and ANSI T1E1.4.

MANAGEMENT

- Setup, control and diagnostics can be performed out-of-band 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 of T1/E1 trunk, or Telnet.
- DXC provides diagnostic loopback support for each T1/E1 and $n \times 56/64$ kbps module.

DT1B/DE1B modules support loopbacks per timeslot including an internal BERT, loopbacks toward the local or remote DTE, and 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 AT&T 54016 (Local Support); E1 CRC-4 diagnostics per ITU-T Rec. G.706 are performed in a manner similar to AT&T Pub. 54016.
- 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.
- Multiple DXC chassis can be managed by a UNIX-based or PC-based SNMP management system. The software is user-friendly, GUI-based and runs under PC/Windows (RADview-PC/TDM) or HP-Openview UNIX (RADview-HPOV/TDM) systems. In addition, configuration and monitoring is provided via Telnet or a dumb terminal.
- Network management provides centralized control of all network nodes, including interfaces configuration, connection setup, alarm and management. Alarm status and system configurations are available at all times.

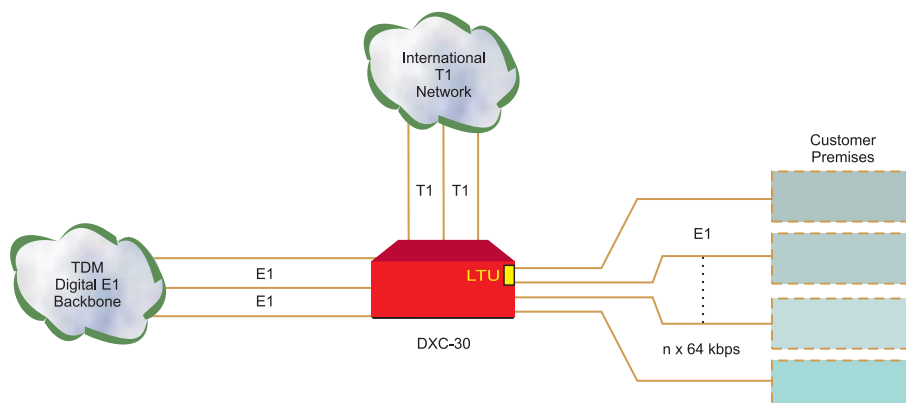


Figure 3. T1/E1 Conversion and Access to Carrier Backbone

Multiservice Access Node

- Programming and setup of a remote DXC is accomplished either:
 - Via TS 0
 - Through the supervisory port of the remote unit, over a modem link or over a FRAD
 - Over a full in-band dedicated timeslot, supporting SLIP, PPP and RIP2 standard protocols.

SPECIFICATIONS

GENERAL

- **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)
- **External Clock Interface**
Data rate:
1,544/2,048 Mbps
(selectable)
Compliance: ITU-T Rec. G.703 or RS-422/V.11
Connectors:
RJ-45, balanced;
BNC coaxial, unbalanced
- **Elastic Buffer**
Buffer length: ± 1 T1/E1 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 T1/E1 multiframe
- **Diagnostics**
Local T1 or E1 loopback
Remote T1 or E1 loopback
Local and remote $n \times 56/64$ kbps data port loopback
Code activated network loopbacks per ANSI T1.403 (DE1B/DT1B)
Loopback for any timeslot (DE1B/DT1B)
Built-in BERT (DE1B/DT1B)
Alarm mask

- **Statistics**

T1 ESF diagnostics:

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

E1 CRC-4 diagnostics:

- per ITU-T Rec. G.706;
- local support equivalent to AT&T 54016

- **Management Port**

- Dial Port (SP-MODEM) with V.24/RS-232, async interface; Data rate: 0.3 - 57.6 kbps, autobaud
- Connector: 9-pin D-type female, DTE
- Ethernet with UTP (DCL.2 only)
- Ethernet with BNC (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)

- **Power Supply**

- 115/230 VAC ($\pm 10\%$), 47 to 63 Hz (DXC-30, DXC-10A only)
- 48 VDC/24 VDC ($\pm 10\%$)

- **Physical**

- DXC-30E**

- Height: 26.6 cm / 10.5 in (3U)
- Width: 43.8 cm / 17 in
- Depth: 25.4 cm / 10 in
- Weight: Less than 16 kg for fully equipped hub

- 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 for fully equipped hub

- 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

- **Environment**

- Temperature: 0-45°C / 32-113°F (0-40°C for DXC-30/30E)
- Humidity: up to 90%, non-condensing

ORDERING

Basic units and I/O modules, as well as any additional System modules, are ordered separately.

BASIC UNITS

DXC-30-1/?/#/+

Basic unit includes chassis, one power supply and one *DCL.2* common logic module (no I/O modules)

DXC-30E-1/?/#/+

Basic unit includes 6U high chassis, one power supply and one *DCL.2* common logic module (no I/O modules)

DXC-10A-1/?/*

Basic unit includes chassis, AC power supply and *DCL.2* common logic module (no I/O modules)

DXC-8R-1/\$

Basic unit includes chassis, two DC power supplies, two *DCL.2* common logic modules (no I/O modules)

SYSTEM MODULES

DXC-30M-CL.2/?

DCL.2 Common Logic No.2 Module with enhanced management, FLASH EPROM for upgrade

DXC-30M-PS/AC

115 to 230 VAC power supply (for DXC-30-1 only)

DXC-30M-PS/DC

-48 VDC or 24 VDC power supply (for DXC-30-1 only)

To order a 6U-high module version

for DXC-30E chassis, add **E** after the **DXC-M** prefix of the corresponding option, for example: **DXC-30ME/PS/AC**

I/O MODULES

See separate data sheets

Multiservice Access Node

ORDERING OPTIONS

? Specify management port interface:

(default is for V.24/RS-232 dial port)

UTP for Ethernet 10BaseT

BNC for Ethernet 10Base2

Specify **R** for power supply and common logic redundancy

+ Specify DXC-30-1/DXC-30E-1 power supply:

AC for 115 to 230 VAC

operation

48 for -48 VDC operation

24 for -24 VDC operation

* Specify DXC-10A-1 power supply:

115 for 115 VAC operation

230 for 230 VAC operation

48 for -48 VDC operation

\$ Specify DXC-8R-1 power supply:

48 for -48 VDC operation

24 for -24 VDC operation



data communications

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