



## Digital Inverse Multiplexer Module



- E1/T1 interface provided by DE1, D4E1, D8E1, DT1, D4T1, D8T1 link modules
- Cross-connects timeslots with any other DXC module
- Fully compatible with RAD's IMX-4E1, IMX-4T1 and IMX-2T1/E1 units
- Fits into any DXC chassis

### DESCRIPTION

- DIM is a Digital Inverse Multiplexer module for the modular Digital Cross Connect units. The DIM module, working in conjunction with up to eight E1/T1 ports of DE1B, DT1B, D4E1, D8E1, D4T1, or D8T1 modules, enables the DXC to function as an inverse multiplexer.
- DIM enables transmission of a single high speed data stream of up to 15.36 Mbps over multiple E1/T1 lines. The inverse multiplexing technique breaks down the high speed signals into multiple E1/T1 lines, and routes these signals over different paths or facilities while ensuring transmission integrity.
- The DIM module bridges the bandwidth gap between E1/T1 and E3/T3, allowing bridges and routers to operate at their fastest rates.
- DIM occupies a single DXC chassis module slot. It can be installed in the DXC system together with other modules, to provide a combination of cross connect and inverse multiplexing capabilities.
- DIM complies with ACCUNET Fractional T45 service (AT&T), providing a choice of four new transmission speeds that are intermediate between T1 and T3 rates.

### FEATURES

- Splits a single higher rate logical channel into up to 8 E1/T1 links
- Sync interfaces supported are V.35, X.21, RS-530, HSSI
- High speed data rates of  $n \times 1.920$  Mbps (E1) or  $n \times 1.472$  Mbps (T1), with automatic fallback
- Optional high-speed 10/100BaseT Ethernet bridge data port with VLAN support according to ITU Rec. 802.1
- Optional E1 port for inverse multiplexing of a standard E1 frame over two T1 links
- Compensates for differential delays up to 64 msec
- Built-in BERT, loopback capabilities

- Differential delays of up to 64 msec between the E1/T1 lines are tolerated. DIM compensates for such delays, and the original stream is reconstructed.
- For E1 links, the total data rate is in multiples of 1.920 Mbps, up to 15.36 Mbps; for T1 links, the total data rate is in multiples of 1.472 Mbps, up to 11.776 Mbps. (Not relevant for E1 port version)
- The automatic rate fallback feature ensures that the logical channel remains open even if individual E1/T1 links fail, by automatically dropping to the next lower rate. When failed links are recovered, DIM automatically returns to original rate.
- DIM is available with a number of options for the user data port, including an Ethernet bridge, an E1 port, or a choice of sync data interfaces: V.35, RS-530, X.21 or HSSI (High Speed Serial Interface).
- DIM is available with a number of options for the user data ports, including an 10/100BaseT Ethernet bridge with VLAN support, an E1 port, or a choice of sync data interfaces: V.35, RS-530, X.21 or HSSI (High Speed Serial Interface).
- The V.35 and RS-530 channel interfaces terminate in 25-pin D-type female connectors. Pin assignment is compatible with RS-530 specifications. Special adapter cables can be ordered to connect the V.35 channel to standalone V.35 equipment. The X.21 channel interface terminates in a 15-pin D-type female connector. The HSSI channel interface terminates in a 50-pin SCSI-2 connector.

# DIM

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- The E1 port option enables a DIM, working in conjunction with a DT1B, D4T1 or D8T1 module, to function as a rate converter for E1 to T1. Each E1 frame (2.048 Mbps) received by the DIM E1 port, is converted into two T1 frames (2 x 1.544 Mbps), and then transmitted simultaneously over the two T1 links of the DXC T1 interface module. DIM with the E1 port complies with AT&T TR-54019 for E1 access over T1 facilities, and is fully compatible with RAD's IMX-2T1/E1 inverse multiplexer.
- When equipped with the 10/100BaseT Ethernet interface, DIM enables virtual LAN connection over n x 56 kbps, or n x 64 kbps lines. DIM with the 10/100BaseT bridge filters Ethernet/Fast Ethernet frames, forwarding only frames destined to the WAN. The 10/100BaseT module can also block broadcast and multicast messages.

- Diagnostic capabilities include local and remote DTE loopbacks, and a built-in BERT. When activated, the BERT replaces the DTE input and transmits a test pattern to all of the connected E1/T1 links.
- DIM has four user-selectable clock modes for the user data port:
  - DCE:** DIM provides both TX and RX clocks to user DTE
  - External-DCE:** DIM provides RX clock to user while receiving TX clock from user.

The above two modes provide a gapped clock signal.

  - Smooth:** same as DCE, but providing a smooth (constant rate) clock
  - External-Smooth:** same as External-DCE, but providing a smooth (constant rate) clock.

**Note:** E1 and HSSI ports operate in External-DCE mode only; Ethernet port operates in DCE mode only.

- The 3U-high DIM module version occupies one I/O slot in DXC-8R, DXC-10A, DXC-30 or DXC-STM-1 chassis. The 6U-high module version occupies one slot in a DXC-30E chassis.

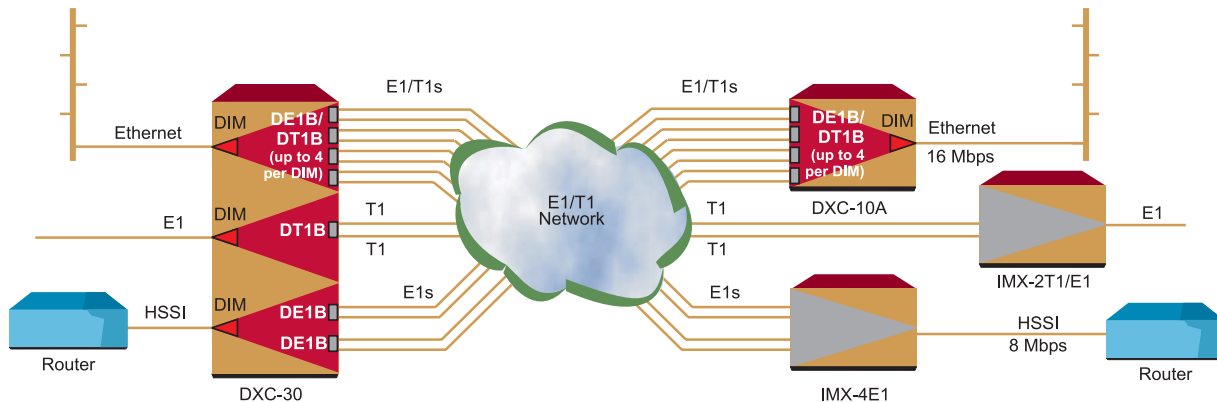
## SPECIFICATIONS

- Inverse Multiplexing**  
Up to 8 E1/T1 links  
(2 T1 for E1 port version)
- Data Rate (for user data port)**  
E1: any multiple of 1.920 Mbps, up to 15.360 Mbps  
T1: any multiple of 1.472 Mbps, up to 11.776 Mbps
- Automatic Rate Fallback**  
When individual E1/T1 link fails, DIM automatically falls back to next lower data rate
- E1/T1 Differential Delay**  
Up to 64 msec
- Clock Modes (for user data port)**  
DCE, External-DCE, Smooth, External-Smooth

### SYNC DATA PORT

- Interfaces and Connectors**  
V.35: 34-pin female (via adapter cable)  
RS-530: 25-pin D-type female  
X.21: 15-pin D-type female  
HSSI: 50-pin SCSI-2, female

## APPLICATION



*Digital Inverse Multiplexer Module***E1 PORT**

- **Data Rate**  
2.048 Mbps
- **Connectors**  
Balanced: one RJ-45  
Unbalanced: two BNC coaxial
- **Framing**  
E1 unframed
- **Compliance**  
AT&T TR-54019 for E1 access  
over T1 facilities

**10/100 FAST ETHERNET PORT**

- **LAN Table**  
1,024 MAC addresses with  
5-minute automatic aging
- **Filtering and Forwarding**  
150,000 frames per second
- **Frame Size**  
1535 bytes maximum
- **Buffer**  
85 frames (average)
- **Line Code**  
10BaseT: Manchester  
100BaseT: MLT3
- **Data Rate**  
10BaseT: 10 Mbps  
100BaseT: 100 Mbps
- **Connector (per channel)**  
RJ-45
- **WAN Protocol**  
HDLC
- **Indicators**  
LINK, ACT, 100M
- **Compliance**  
Conforms to IEEE 802.3/Ethernet,  
IEEE 802.1P

**GENERAL**

- **Timing (DXC System)**  
System clock source:
  - Internal ( $\pm 32$  ppm)
  - Station clock
  - Receive clock (from any link)
- **Diagnostics**  
Local and remote DTE loopbacks,  
BERT
- **Physical**  
Occupies a single slot in  
DXC-8R, DXC-10A, DXC-30,  
DXC-30E or DXC-STM-1 chassis
- **Power Consumption**
  - HSSI: 9.5W
  - ETUB: 7.75W
  - Other interfaces: 5.5W
- **Environment**  
Temperature: 0-40°C / 32-104°F  
Humidity: Up to 90%,  
non-condensing



## Digital Inverse Multiplexer Module

### ORDERING

#### DXC-M/DIM/^

Digital Inverse Multiplexer Module,  
3U high version

#### DXC-ME/DIM/^

Digital Inverse Multiplexer Module,  
6U high version

^ Specify user port type:

**V35** for V.35 interface

**530** for RS-530 interface

**X21** for X.21 interface

**HSSI** for High Speed Serial  
Interface

**E1** for E1 interface (E1 over  
two T1 links)

**ETUB** for Ethernet bridge port  
with 10/100BaseT (UTP)  
interface

#### CABLES

The following cables adapt the DIM  
V.35 user ports DB-25 connectors to  
the specified applications. Cable  
length is 2m (6 ft).

**CBL-HS2/V/1/@** to connect a V.35  
DTE using DCE clock  
mode

**CBL-HS2/V/2/@** to connect a V.35  
DCE using DCE  
External clock mode

@ Specify cable connector type on  
user side:

**F** for female connector

**M** for male connector



data communications

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