Loop Telecom

Access DCS-MUX

## Features :

- Support DACS (Digital Access Cross-connect System) with full cross-connect
- Support full DS0 cross-connect, backplane capacity up to 128 Mbps
- Single controller, dual controller (1+1 protection) option
- Support 1 for 1 protection Y-BOX (Optional)
- Up to 64E1 or 64T1 WAN ports, or 4 E1/ T1 ATM Frame Relay
- Single –48V DC or optional dual –48V DC with load sharing
- 12 DTE plug-in slots
- **Mini plug-in card types:**
  - E1 card
  - T1 card
  - Mini Quad E1
  - E1/T1 ATM/Frame Relay card
  - 10/100baseT Router card
  - Fiber optical card
- **Single-slot plug-in card types:**
  - 4-channel E1/ T1 card
  - 6-channel U card
  - 10-channel U card
  - 3-channel MDSL card without line power
  - 2-channel G.SHDSL card (2 pair) w/o line power
  - 4-channel G.SHDSL card (1 pair) w/o line power
  - 8-channel G.703 card at 64 Kbps data rate
  - 8-channel Dry Contact I/O card
  - 8-channel 2W/4W E&M card
  - 12-channel FXS card
  - 12-channel FXO card
  - 12-channel Magneto card
  - 8-channel OCU-DP card
  - 1-channel low speed optical (C37.94) card
  - 4-channel low speed optical (C37.94) card
  - 8-channel RS232 with X.50 subrate card
- **Dual-slot plug-in card types:**
  - 3-channel MDSL card with line power
  - 6-channel X.21 card
  - 6-channel V.35 card
  - 6-channel V.36 card
  - 6-channel EIA530 card
  - 5-channel RS232 with X.50 subrate card
  - 24-channel FXS card
  - 24-channel FXO card
  - 24-channel Magneto card
  - 2-channel G. SHDSL card (2 pair) with line power
  - 4-channel G. SHDSL card (1 pair) with line power

# Loop-AM3440
# Access DCS-MUX

## Description

The Loop-AM3440 is an access DCS-MUX that can combine various digital access interfaces into E1 or T1 lines for convenient transport and switching. The Loop-AM3440 Access DCS-MUX provides access for a variety of interfaces, including mini Quad E1, Quad E1/T1, ATM/ FR, 10/100baseT Router, FOM, MDSL, G.SHDSL, G.703, U type, X.21, V.35/V36, RS232, E&M, FXS, FXO and Magneto. These interfaces are compatible with other Loop products such as the Loop-H 3900 (MDSL) and the Loop-U 3500 (U). Using these products, a DTE interface can be extended over RS232 copper wire pairs. Up to 120 time slots for the MDSL, U, RS232, X.21, V.36 and V.35 interfaces are then multiplexed to fill an E1 or T1 line, with full flexibility of time slot interchange. AM3440 also support fiber optical plug-in module, which can be used to aggregate up to 4 E1 channels to single fiber optical interface to connect with other AM3440 or O9310.

This unit is a full cross-connect and can act as a mini DACS. This means that one or more of the WAN ports can be used as a Drop & Insert function with fractional E1/T1 lines, which can be muxed into a full E1/T1 line.

Redundancy is available in dual CPU controller and power supply options, making it an excellent fit for critical applications. And, though the chassis does not contain and has no need for fan cooling, a fan tray is available.

The Loop-AM3440 supports local control and diagnostics by using an external 2-line by 40-character LCD display and keypads, or by using a VT-100 terminal connected to the console port. The Loop-AM3440 also supports Ethernet, SLIP, Telnet, and SNMP, so that it can be controlled and diagnosed from remote locations as well. An in-band management channel with GUI are available. In addition to the LCD display, there is LED indication for all plug-in cards.

Finally, the Loop-AM3440 consists of a rugged chassis made from reinforced aluminum, giving this equipment a more durable structure and a longer physical life.

- Telnet, SLIP, SNMP, and Inband management support
- Craft interface port for connection to external LCD display
- Compatible to a GUI network management system

## Ordering Information

To specify options, choose from list below:

**Note:** RoHS compliant units are identified by the letter **G** appearing immediately at the end of ordering code.

| Model | Description | Note |
|---|---|---|
| ***Main Unit*** | | |
| Loop-AM3440-CHA<br>Loop-AM3440-CHA-**G** | Wideband Main Unit without CPU, power, E1/T1 card | Basic Chassis |
| ***CPU Module*** | | |
| Loop-AM3440-CCA-T<br>Loop-AM3440-CCA-T-**G** | CPU card for 128Mbits back plane capacity, with T1 External Clock (order two for redundancy) | For Loop-AM3440-CHA only. |
| Loop-AM3440-CCA-E<br>Loop-AM3440-CCA-E-**G** | CPU card for 128Mbits back plane capacity, with E1 External Clock(order two for redundancy) | |
| ***Mini Plug-in Module*** (Select 1 to 4 cards from below list.) | | |
| Loop-AM3440-E1<br>Loop-AM3440-E1-**G** | E1 Interface | |
| Loop-AM3440-T1<br>Loop-AM3440-T1-**G** | T1 Interface | |
| Loop-AM3440-M4E75<br>Loop-AM3440-M4E75-**G** | Mini Quad E1 Interface w/ 75 ohm | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only.<br>Include a 1M 8-BNC to DB25 Conversion Cable |
| Loop-AM3440-M4E120<br>Loop-AM3440-M4E120-**G** | Mini Quad E1 Interface w/ 120 ohm | Include a 1M 4-Phone Jack to DB25 Conversion Cable |
| Loop-AM3440-AFRE<br>Loop-AM3440-AFRE-**G** | E1 Frame Relay to ATM inter-working or<br>Frame Relay to Frame Relay concentration | |
| Loop-AM3440-AFRT<br>Loop-AM3440-AFRT-**G** | T1 Frame Relay to ATM inter-working or<br>Frame Relay to Frame Relay concentration | |
| Loop-AM3440-RT<br>Loop-AM3440-RT-**G** | Router / Bridge Card | |
| Loop-AM3440-RTA<br>Loop-AM3440-RTA-**G** | 64 WAN ports router/bridge card | |
| Loop-AM3440-FOM-OPT<br>Loop-AM3440-FOM-OPT-**G** | Fiber Optical Interface | |
| ***Single Slot Plug-in Module*** (Shares the 12 available slots with the single slot cards.) | | |
| Loop-AM3440-4E1-**cc**<br>Loop-AM3440-4E1-**cc**-**G** | 4-channel E1 Interface<br>where **cc** = **RJ** for RJ48C connector<br>**BNC** for BNC connector | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-4T1<br>Loop-AM3440-4T1-**G** | 4-channel T1 Interface | |
| Loop-AM3440-6U<br>Loop-AM3440-6U-**G** | 6-channel IDSL plug-in module | |
| Loop-AM3440-10U<br>Loop-AM3440-10U-**G** | 10-channel IDSL plug-in module | |
| Loop-AM3440-3HA<br>Loop-AM3440-3HA-**G** | 3-channel 6Mbits MDSL plug-in module<br>(2Mbits per channel) | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only.<br>With line power, takes 2 DTE slots per card. |
| Loop-AM3440-2GH<br>Loop-AM3440-2GH-**G** | 2-channel G.SHDSL plug-in module (2 pair) | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |

| | | |
|---|---|---|
| Loop-AM3440-4GH<br>Loop-AM3440-4GH-**G** | 4-channel G.SHDSL plug-in module (1 pair) | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-8CD<br>Loop-AM3440-8CD-**G** | 8-channel G.703 Interface at 64 Kbps data rate | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-8DC<br>Loop-AM3440-8DC-**G** | 8-channel dry contact I/O plug-in module | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-8EM-**x**<br>Loop-AM3440-8EM-**x**-**G** | 8-channel 2W/4W E&M plug-in module | |
| Loop-AM3440-12FXS<br>Loop-AM3440-12FXS-**G** | 12-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, without Ground Start and Metering Pulse | 12FXS-GM includes all function of FXS Cards, except 12FXS-P and 12FXS-GMP.<br>For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-12FXS-P<br>Loop-AM3440-12FXS-P-**G** | 12-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, PLAR bit programmable function , without Ground Start and Metering Pulse | |
| Loop-AM3440-12FXS-M<br>Loop-AM3440-12FXS-M-**G** | 12-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, [Metering Pulse] | |
| Loop-AM3440-12FXS-MP<br>Loop-AM3440-12FXS-MP-**G** | 12-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR and PLAR bit programmable function, [Metering Pulse] | |
| Loop-AM3440-12FXS-GS<br>Loop-AM3440-12FXS-GS-**G** | 12-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, [Ground Start] | |
| Loop-AM3440-12FXS-GM<br>Loop-AM3440-12FXS-GM-**G** | 12-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, [Ground Start, and Metering Pulse] | |
| Loop-AM3440-12FXS-GMP<br>Loop-AM3440-12FXS-GMP-**G** | 12-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR and PLAR bit programmable function, [Ground Start, and Metering Pulse] | |
| Loop-AM3440-12FXO<br>Loop-AM3440-12FXO-**G** | 12-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, without Ground Start and Metering Pulse | 12FXO-GM includes all function of FXO Cards.<br>For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-12FXO-M<br>Loop-AM3440-12FXO-M-**G** | 12-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, [ Metering Pulse ] | |
| Loop-AM3440-12FXO-GS<br>Loop-AM3440-12FXO-GS-**G** | 12-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, [ Ground Start ] | |
| Loop-AM3440-12FXO-GM<br>Loop-AM3440-12FXO-GM-**G** | 12-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, [ Ground Start, and Metering Pulse ] | |
| Loop-AM3440-12MAG-1G<br>Loop-AM3440-12MAG-1G-**G** | 12-channel Magneto plug-in module with L1. GND | 12MAG-1G2 includes all function of MAG Cards. |
| Loop-AM3440-12MAG-12<br>Loop-AM3440-12MAG-12-**G** | 12-channel Magneto plug-in module with L1, L2 | |
| Loop-AM3440-12MAG-1G2<br>Loop-AM3440-12MAG-1G2-**G** | 12-channel Magneto plug-in module with L1, L2, and L1. GND | |
| Loop-AM3440-1C37<br>Loop-AM3440-1C37-**G** | 1- channel C37.94 plug-in module | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-4C37<br>Loop-AM3440-4C37-**G** | 4- channel C37.94 plug-in module | |
| Loop-AM3440-ODP | 8-channel OCU-DP plug-in module | |
| Loop-AM3440-8RS232<br>Loop-AM3440-8RS232-**G** | 8-channel RS232 plug-in module with X.50 Subrate (RJ48 Connector) | |

***Dual Slot Plug-in Module*** (Shares the 6 available slots with the dual slot cards.)

| | | |
|---|---|---|
| Loop-AM3440-6X21A<br>Loop-AM3440-6X21A-**G** | 6-channel X.21 card with DB15 connector | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-6V35A<br>Loop-AM3440-6V35A-**G** | 6-channel V.35 plug-in modules with DB25S connector, for M34 please order conversion cable connector below. (2Mbits per channel) | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only. |
| Loop-AM3440-6V36A<br>Loop-AM3440-6V36A-**G** | 6-channel V.36 card with DB25 connector via conversion cable to DB37 | |
| Loop-AM3440-6E530A<br>Loop-AM3440-6E530A-**G** | 6-channel EIA530 card with DB25 connector | |

| | | |
|---|---|---|
| Loop-AM3440-6RS449A<br>Loop-AM3440-6RS449A-**G** | 6-channel EIA530 card with DB25 connector via conversion cable | |
| Loop-AM3440-5RS232<br>Loop-AM3440-5RS232-**G** | 5-channel RS232 with X.50 subrate plug-in module | |
| Loop-AM3440-24FXS<br>Loop-AM3440-24FXS-**G** | 24-channel FXS plug-in module with /600/ 900 Impedance, Battery Reverse, PLAR, without Ground Start and Metering Pulse | 24FXS-GM includes all function of FXS Cards, except 24FXS-P and 24FXS-GMP. |
| Loop-AM3440-24FXS-P<br>Loop-AM3440-24FXS-P-**G** | 24-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, PLAR bit programmable function , without Ground Start and Metering Pulse | |
| Loop-AM3440-24FXS-M<br>Loop-AM3440-24FXS-M-**G** | 24-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, [Metering Pulse] | |
| Loop-AM3440-24FXS-GS<br>Loop-AM3440-24FXS-GS-**G** | 24-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, [Ground Start] | |
| Loop-AM3440-24FXS-GM<br>Loop-AM3440-24FXS-GM-**G** | 24-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR, [Ground Start, and Metering Pulse] | |
| Loop-AM3440-24FXS-GMP<br>Loop-AM3440-24FXS-GMP-**G** | 24-channel FXS plug-in module with 600/ 900 Impedance, Battery Reverse, PLAR and PLAR bit programmable function, [Ground Start, and Metering Pulse] | |
| Loop-AM3440-24FXO<br>Loop-AM3440-24FXO-**G** | 24-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, without Ground Start and Metering Pulse | 24FXO-GM includes all function of FXO Cards. |
| Loop-AM3440-24FXO-M<br>Loop-AM3440-24FXO-M-**G** | 24-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, [Metering Pulse] | |
| Loop-AM3440-24FXO-GS<br>Loop-AM3440-24FXO-GS-**G** | 24-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, [Ground Start] | |
| Loop-AM3440-24FXO-GM<br>Loop-AM3440-24FXO-GM-**G** | 24-channel FXO plug-in module with 600/ 900 Impedance, Battery Reverse, [Ground Start, and Metering Pulse] | |
| Loop-AM3440-24MAG-1G<br>Loop-AM3440-24MAG-1G-**G** | 24-channel Magneto plug-in module with L1. GND | Future option |
| Loop-AM3440-24MAG-12<br>Loop-AM3440-24MAG-12-**G** | 24-channel Magneto plug-in module with L1, L2 | |
| Loop-AM3440-3HAL | 3-channel 6Mbits MDSL plug-in module with line power source | Factory installed option available with -48 Vdc powered chassis only.<br>Fan tray required. |
| Loop-AM3440-2GHL | 2-channel G.SHDSL plug-in module with line power source (140 VDC, 110mA), (2 pair) | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only.<br>With line power, takes 2 DTE slots per card. |
| Loop-AM3440-4GHL | 4-channel G.SHDSL plug-in module with line power source (190 VDC, 60mA), (1 pair) | For Loop-AM3440-CHA with Loop-AM3440-CCA CPU only.<br>With line power, takes 2 DTE slots per card. |
| ***Accessories*** | | |
| **User's Manual** | | |
| Loop-AM3440-UM | User's Manual (paper, hard copy-optional). A CD version of the manual is already included as standard equipment. | |
| **Power Module** | | |
| Loop-AM3440-SD<br>Loop-AM3440-SD-**G** | Single –48V DC Power Module (100W UM5813) | Order 2 single DC for dual DC application. |
| Loop-AM3440-S5<br>Loop-AM3440-S5-**G** | Single –48V DC Power Module (150W UM5613) | Order 2 single DC for dual DC application.<br>Future option |
| **Adaptor** | | |
| Loop-AM3440-APA-150<br>Loop-AM3440-APA-150-**G** | AC (100-240 Vac) to DC (48 Vdc = 3.3A) adaptor for USA | |
| Loop-AM3440-APE-150<br>Loop-AM3440-APE-150-**G** | AC (100-240 Vac) to DC (48 Vdc = 3.3A) adaptor for Europe | |

| | | |
|---|---|---|
| Loop-AM3440-APU-150<br>Loop-AM3440-APU-150-**G** | AC (100-240 Vac) to DC (48 Vdc = 3.3A) adaptor for UK | |
| **Fan Tray** | | |
| Loop-AM3440-FAN<br>Loop-AM3440-FAN-**G** | Fan tray | Power supplied from rear of chassis. |
| **External LCD Monitor** | | |
| Loop-AM3440-LCD<br>Loop-AM3440-LCD-**G** | External LCD monitor | Optional |
| **Software** | | |
| Loop-AM3440-ERING | E1 ring software (future option) | Optional (Only available for CHA, CCA, and 4E1) |
| **Conversion Cable** | | |
| Loop-ACC-CAB-DTE-001<br>Loop-ACC-CAB-DTE-001-**G** | V.35 DB25 to M34 conversion cable L: 30cm | |
| **Y-Box** | | |
| Loop-VV-B<br>Loop-VV-B-**G** | 1 for 1 protection Y-Box with BNC connectors (4-E1) | |
| Loop-VV-R<br>Loop-VV-R-**G** | 1 for 1 protection Y-Box with RJ48C connectors (16-E1) | |
| Loop-VV-T<br>Loop-VV-T-**G** | 1 for 1 protection Y-Box with RJ48C connectors (16-T1) | |
| **Tapping Bridge** | | |
| Loop-ACC-TB | T1/E1 Tapping Bridge (T1/E1) | |
| **Blank Panels** | | |
| 30.000333.A00<br>30.000333.A00-**G** | Blank Panel for Power Supply Slot (flat) | |
| 30.000349.A00<br>30.000349.A00-**G** | Blank Panel for Controller Slot (flat) | |
| 30.000335.A00<br>30.000335.A00-**G** | Blank Panel for Slot A-D (flat) | |
| 30.000331.A00<br>30.000331.A00-**G** | Blank Panel for Slot 1-12 (flat) | |
| 30.001028.A00<br>30.001028.A00-**G** | Blank Panel for Power Slot (u-shape) | |
| 30.001029.A00<br>30.001029.A00-**G** | Blank Panel for Controller (u-shape) | |
| 30.001030.A00<br>30.001030.A00-**G** | Blank Panel for Slot A-D (u-shape) | |
| 30.001027.A00<br>30.001027.A00-**G** | Blank Panel for Slot 1-12 (u-shape) | |

**NOTE:** When all these plug-in modules, two CPU cards, four mini Quad E1 cards, ten G.shdsl cards, and one 100W UM5813 power module, are plugged into an AM3440, one more 100W UM5813 power module should be ordered to the AM3440.

**For Example:**

**Loop-AM3440-CHA, Loop-AM3440-CCA, Loop-AM3440-4E1, Loop-AM3440-10U, Loop-AM3440-SD:**

For model 3440 wideband controller with CPU card for 128Mbits backplane capacity, 4-channel E1 interface, one 10-port IDSL plug-in module, and one single DC power.

■ where **OPT** is used to select optical module type:

| **OPT** = | **Description** | **Note** |
|---|---|---|
| **SAA** | single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 30 km reach (20dB) ***- S1.1 physical layer**** | Use 2 fibers<br>Units delivered<br>ITU-T Rec G.957 application code |
| **SBB** | single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 50 km reach (30dB) ***- L1.1 physical layer**** | |
| **SCC** | single optical module with dual uni-directional fiber, 1310 nm, FC optical connector, 30 km reach (20dB) ***- S1.1 physical layer**** | |
| **SDD** | single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 20 km reach (12dB) ***- S1.2 physical layer**** | |
| **SEE** | single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 100 km reach (40dB) ***- L1.2 physical layer**** | |
| **SSM** | single optical module with single bi-directional fiber (master), 1310 nm transmit and 1550 receive, SC optical connector, 30 km reach (20dB) ***- S1.1/ S1.2 physical layer**** | 1310 nm from master to slave<br>Order **SSM** to use with **SSS**<br>Use 1 fiber<br>TU-T Rec G.957 application code |
| **SSS** | single optical module with single bi-directional fiber (slave), 1310 nm receive and 1550 transmit, SC optical connector, 30 km reach (20dB) ***- S1.1/ S1.2 physical layer**** | 1550 nm from slave to master<br>Order **SSS** to use with **SSM**<br>Use 1 fiber<br>ITU-T Rec G.957 application code |

***For other optical modules:***

| | | |
|---|---|---|
| **MMSnn** | Other special optical modules for special order | **nn = 01 to 99**<br>**(contact sales for details)** |

■ where **x** is used to select ABCD signaling bits type:

| **x** = | **Description** | **Note** |
|---|---|---|
| **E** | follows ETSI signaling bits | |
| **A** | follows ANSI signaling bits | selectable together to all channel |
| **R** | reverse for ON-HOOK and OFF-HOOK signaling bits exchange | |
| **S** | follows customer's special bit or function assignment | |
| **T** | trunk condition = OFF-HOOK mode when alarm occur | |
| **AR** | follows ANSI signaling bits and reverse bit | |
| **AT** | follows ANSI signaling bits<br>w/ trunk condition = OFF-HOOK mode | |
| **RT** | reverse bits w/ trunk condition = OFF-HOOK mode | |
| **ART** | follows ANSI signaling bits and reverse bits,<br>w/ trunk condition = OFF-HOOK mode | |

# ***LOOP-AM3440 E1/T1 MUX Product Specifications***

***Network Line Interface - T1***

| | | | |
|---|---|---|---|
| Line Rate | 1.544 Mbps ± 50 bps | Output Signal | DSX1 |
| Line Code | AMI or B8ZS | Framing | D4/ESF (selectable) |
| Input Signal | ABAM cable length up to 655 feet | Connector | RJ48C |

***Network Line Interface - E1***

| | | | |
|---|---|---|---|
| Line Rate | 2.048 Mbps ± 50 ppm | Framing | ITU G.704 |
| Line Code | AMI or HDB3 | Connector | BNC/RJ48C |
| Input Signal | ITU G.703 to -10dB | Electrical | 75 ohm Coax/120 ohm twisted pair |
| Output Signal | ITU G.703 | Jitter | ITU G.823 |

***Network Line Interface - Mini 4E1***

| | | | |
|---|---|---|---|
| Line Rate | 2.048 Mbps ± 50 ppm | Framing | ITU G.704 |
| Line Code | AMI or HDB3 | Connector | DB25S |
| Input Signal | ITU G.703 to -10dB | Electrical | 75 ohm Coax/120 ohm twisted pair |
| Output Signal | ITU G.703 | Jitter | ITU G.823 |

***Network Line Interface - 4T1***

| | | | |
|---|---|---|---|
| Line Rate | 1.544 Mbps ± 50 bps | Output Signal | DSX1 |
| Line Code | AMI or B8ZS | Framing | D4/ESF (selectable) |
| Input Signal | ABAM cable length up to 655 feet | Connector | RJ48C |

***Network Line Interface - 4E1***

| | | | |
|---|---|---|---|
| Line Rate | 2.048 Mbps ± 50 ppm | Framing | ITU G.704 |
| Line Code | AMI or HDB3 | Connector | BNC, RJ48C |
| Input Signal | ITU G.703 to -10dB | Electrical | 75 ohm Coax/120 ohm twisted pair |
| Output Signal | ITU G.703 | Jitter | ITU G.823 |

***ATM Frame Relay Network Line Interface***

Supporting Network Interworking (FRF.5) and service interworking (FRF.8).
Network Interface:

- T1 Module: *T1 ATM UNI*
  *FR (n x 64 Kbps, n=1 to 31)*
- E1 Module: *E1 ATM UNI*
  *FR (n x 64 Kbps, n= 1 to 31)*

Up to 31 logical FR channels can be concentrated/ de-concentrated to FR or ATM.
Service Ports:

- T1/FT1 interface: *n x 64 Kbps, n=1 to 24*
- E1/FE1 interface: *n x 64 Kbps, n= 1 to 31*

Support HDLC to FR
Support HDLC to ATM
Supporting FR to FR multiplexing.
Support up to 128 DLCIs for total of 31 FR interfaces.
Support up to 128 VCs.
Peak cell rate on DLCI basis.
Manufacturing disable/enable ATM scrambling for internal testing (E1 ATM only).
AAL0 and AAL5 are supported in the ATM adaptation layer.
Support VBR service.
ITU FR management protocols are supported.
Flash memory software download through RS485.
Only the PVC type of ATM/FR service is supported.

***Router Interface***

| | |
|---|---|
| Number of ports | 2 LAN ports, Max. 31 WAN ports |
| Physical Interface | 10 Base T x 1, 10/100 BaseT x 1 |
| Connector | RJ45 |
| Routing protocol | RIP-I, RIP-II |
| Data Rates | Channelized N x 64 Kbps up to T1/E1 capacity |
| Supporting Protocols | TCP/IP, PPP, HDLC |
| Management | VT-100, SNMP |

***Optical Fiber Interface Characteristics***

| Optical Module | Fiber Direction | Wavelength (nm) | Connector | Distance (km) | Power (dB) |
|---|---|---|---|---|---|
| SAA | Dual uni-direction | 1310 | SC (Subscriber Connector) | 30 | 20 |
| SBB | Dual uni-direction | 1310 | SC (Subscriber Connector) | 50 | 30 |
| SCC | Dual uni-direction | 1310 | FC (Fiber Connector) | 30 | 20 |
| SDD | Dual uni-direction | 1550 | SC (Subscriber Connector) | 20 | 12 |
| SEE | Dual uni-direction | 1550 | SC (Subscriber Connector) | 100 | 40 |
| SSM | Single bi-direction (master) | 1310/1550 | SC (Subscriber Connector) | 30 | 20 |
| SSS | Single bi-direction (slave) | 1550/1310 | SC (Subscriber Connector) | 30 | 20 |

**NOTE: Other fiber optical options available on special order**

***U Interface***

| | |
|---|---|
| Data Port | Up to twelve 10-port or 6-port DTU cards |
| Type | Full duplex with echo cancellation |
| Line Type | Unconditioned twisted pair 19-26 AWG |
| Line Rate | 56, 64, 112 or 128 Kbps |
| Line Coding | 2B1Q |
| Connector | RJ48C |

***2M MDSL Line Interface***

Up to twelve 3-port MDSL cards without line power.
Up to six cards with line power option, as the line power cards use two plug-in slots.
Up to 2M max. data rate for each MDSL card.
Full duplex with adaptive echo cancellation MDSL line coding.
Unconditioned 19-26 AWG twisted pair.
Line rate: 272, 400, 528, 784, 1168, 1552, 2064, 2320 for data rates n x 64 Kbps.

***6M MDSL Line Interface***

Up to twelve 3-port MDSL cards without line power.
Up to six cards with line power option, as the line power cards use two plug-in slots.
Per port up to 2M max. data rate.
Full duplex with adaptive echo cancellation MDSL line coding.
Unconditioned 19-26 AWG twisted pair.

Line rate: 272, 400, 528, 784, 1168, 1552, 2064, 2320 for data rates n x 64 Kbps.

***G.shdsl Line Interface***

Number of port: 4 or 2
Line code: 16-TCPAM, full duplex with adaptive echo cancellation
Line rate for 4-channel G.shdsl: n x 64Kbps (n= 3 to 31)
Line rate for 2-channel G.shdsl: n x 64Kbps (n= 3 to 15)
Electrical: Unconditioned 19-26 AWG twisted pair
Connector: RJ45
Sealing current: Max. 20 MA source current

**Clock**
Source: From System, Line
**Diagnostics Test**
G.shdsl Loopback: To-LINE, To-bus
BERT: QRSS

***DTE Interface (X.21)***

| | | | |
|---|---|---|---|
| Data Rate | 56 or 64 Kbps *n (n=1 - 24/31) | Connector | DB15 |
| Mapping | Any sequential time slots | Remote Sending | ESF Mode, proprietary message |

***DTE Interface (V.35/ V.36)***

| | |
|---|---|
| Data Port | Up to six 6-port DTE V.35/ V.36 cards |
| Data Rate | n x 64 Kbps, n = 1 to 32 |
| Connector | For V.35 card: DB25S (optional conversion cable DB25S to M34 connector) |
| | For V.36 card: DB25S (optional conversion cable DB25S to DB37 connector) |

***DTE Interface (EIA530)***

| | |
|---|---|
| Data Port | Up to six 6-port EIA530 DTE card |
| Data Rate | n x 64 Kbps, n = 1 to 32 |
| Connector | DB25S (optional conversion cable DB25S to M34 connector) |

***DTE Interface (RS232-X.50 mux. 5-port)***

| | | |
|---|---|---|
| Data Port | Up to six 5-port RS232 cards with X.50 plug-in, subrate, with subrate mux | |
| MUX | (a) 5 independent RS232, or (b) 5 subrate RS232 (X.50) muxed to 64K | |
| Data Rate | Mode (a) 5 independent RS232： | 1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 48K , 64K SYNC |
| | | 1.2K, 2.4K, 4.8K, 9.6K, 19.2K ASYNC |
| | Mode (b) 5 mux together： | 1.2K, 2.4K, 4.8K, 9.6K SYNC |
| | | 1.2K, 2.4K, 4.8K, 9.6K ASYNC |
| | NOTE: Mode (a) and mode (b) cannot be mixed. | |
| Connector | DB25S | |

***DTE Interface (RS232-X.50 mux. 8-port)***

***Co-directional Interface***

| | |
|---|---|
| Interface | ITU G.703 64 Kbps co-directional interface |
| Connector | 120ohm, RJ48 |
| Line Distance | Up to 500 meters |
| Loopack | DTE Payload Loopback, Local Loopback |

***C37.94 Interface***

| | |
|---|---|
| Source | LED |
| Wavelength | 820nm 1.7Km reach |
| Connector | ST |
| Optical Budget | 50 Mircon core/9.6 db |
| | 62.5 Mircon core/ 15db |

***Dry Contact I/O card***

| **Inputs -** | | **Outputs -** | |
|---|---|---|---|
| 8-channel | 2-port per card, 4-pair per port | 8-channel | 8-pair per card |
| Connector | RJ45 | Connector | Screw type |
| Internal Resistance | 1 K | Initial Insulation Resistance | Min. 100M ohm (at 500Vdc) |
| Activation Current | 3 ma | Max. Current | 5A |
| Deactivation Current | 1.5 ma | Max. Voltage | 100Vdc, 250Vac |
| Allowable Current | 4 ma | Short-circuit Current | 5A |

***Voice Card (E&M)***

| | |
|---|---|
| Connector | RJ45 x 8 |
| Alarm Conditioning | CGA busy after 2.5 seconds of LOS, LOF |
| Encoding | A-law or μ-law, user selectable together for all |
| Impedance | Balanced 600 or 900 ohms |
| Longitudinal Conversion Loss | > 46dB |
| Gain Adjustment (Per-port setting) | -10 to +7 dB / 0.1dB step for transmit (D/A) gain |
| | -10 to +14 dB / 0.1dB step for receive (A/D) gain |
| I/O power range | A/D input level: -66 dBm (0.00039 Vrms) ~ + 3 dBm (1.09 Vrms) |
| | D/A output level: -66 dBm (0.00039 Vrms) ~ + 7 dBm (1.74 Vrms) |
| Signal/Distortion | > 25dB with 1004 Hz, 0dBm input |
| Frequency Response | - 0.25 to -1 dB from 300 to 3400 Hz |
| Carrier connection | Side A ( exchange side) and Side B (carrier side) setup by side switch |

| | |
|---|---|
| wire mode | 2 wire and 4 wire |
| Signaling | Type 1, Type 2, Type 3, Type 4, and Type 5, Transmit only (programmable) |

All in-band signaling tones are carried transparently by the digitizing process.
Customer is responsible for in-band signaling compatibility between a telephone and a switch, or between a PBX and a switch.

***OCUDP Interface***

| | |
|---|---|
| Ports | 8 Ports for each card |
| Line Status Indicator | Per Port 1 dual color LED; Red for LOS, Green for SYNC |
| Network Connector | RJ48S |
| Electrical network connection | Tip/Ring and Tip1/Ring1 |
| Transmit Source Impedance | 135 Ohms +/- 20% |
| Receive Input Impedance | 135 Ohms +/- 20% |
| Receiver Sensitivity/ Dynamic Range | 0 to 43 dB loop loss at 72K & 56K<br>0 to 34 all other rates Automatic line equalization |

***Voice Card (12FXS,12FXO,24FXS,24FXO)***

| | |
|---|---|
| Connector | RJ11 x 12 for 12FXS, 12FXO<br>RJ21X (Teleco 50pin) for 24FXS, 24FXO |
| Alarm Conditioning | CGA busy after 2.5 seconds of LOS, LOF |
| Encoding | A-law or μ-law, user selectable together for all |
| Impedance | Balanced 600 or 900 ohms (selectable together for all) |
| Longitudinal Conversion Loss | > 46dB |
| Cross talk measure | Max -70dBm0 |
| Gain Adjustment | -21 to +10 dB / 0.1dB step transmit & receive |
| Signal/ Distortion | > 25dB with 1004 Hz, 0dBm input |
| Frequency Response | - 0.25 to -1 dB from 300 to 3400 Hz, coincide with ITU-T G.712 |
| Idle Channel Noise | Max. –65 dBm0p |
| Variation of Gain | ±0.5dB |
| FXO Minimum Detectable Ringing | 25 Vrms |
| FXS Loop Feed | Normal - 48Vdc with 25mA current limit |
| FXS signaling | Normal / Automatic Ringdown |
| FXS Ringing | 1 REN at 5K meters per port<br>16.5Hz, 20Hz, 25Hz, 50Hz, user selectable for all<br>38 to 85 Vrms (sine wave), 76 Vrms for default Vrms<br>2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR |
| Signaling | Loop Start, DTMF, pulse, PLAR, Battery Reverse |
| Optional Signaling (for special order) | Ground Start, Metering pulse (12KHz, 16KHz), and P( in PLAR mode, PLAR signalling bits are programmable. |
| Signaling Bit A,B,C,D | Programable |

All in-band signaling tones are carried transparently by the digitizing process.
Customer is responsible for in-band signaling compatibility between a telephone and a switch, or between a PBX and a switch.

***Magneto (old crank-handle hot-line telephones), MRD (Manual Ring Down) Voice Card***

| | |
|---|---|
| Connector | RJ11 x 12 |
| Alarm Conditioning | CGA busy after 2.5 seconds of LOS, LOF |
| Encoding | A-law or μ-law, user selectable together for all |
| Impedance | Balanced 600 or 900 ohms (for magneto telephone impedance ) |
| Longitudinal Conversion Loss | > 46dB |
| Gain Adjustment | -21 to +10 dB / 0.1dB step transmit & receive |
| Signal/ Distortion | > 25dB with 1004 Hz, 0dBm input |
| Frequency Response | - 0.25 to -1 dB from 300 to 3400 Hz, coincide with ITU-T G.712 |
| Idle Channel Noise | Max. –65 dBm0p |

***Signaling***

| | |
|---|---|
| Minimum Detectable Ringing Voltage | 16 Vrms |
| Ringing Detectable Across | L1 and L2 (Tip and Ring), L1 and GND (Tip and GND) |
| Ringing Generation | Voltage: 76 Vrms (sine wave)<br>Frequency: 20Hz<br>Cadence: 1 sec on 2 sec off, or 2 sec on 4 sec off |
| Ringing Send Across | L1 and L2 (Tip and Ring), L1 and GND (Tip and GND) |
| Signaling | Magneto MRD(Ringing across Tip and Ring or Tip and Ground) |
| Signaling Bit A,B,C,D | Programable |

Signaling is carried transparently by the digitizing process.
Use Magneto card default setting for communications between magneto telephones
Use Magneto card PLAR mode setting for communications between a magneto telephone and a regular telephone

***Clock Source***

Internal, E1/T1 Line, External

***Alarm Relay***

Alarm Relay, Fuse alarm, and performance alarm

***System Configuration Parameters***

Active Configuration, Stored Configuration, and Default Configuration (Stored in Non-volatile Memory)

***Supervisor***

| | |
|---|---|
| RS232, VT100 - front panel | 10 Base-T, Ethernet, SNMP - front panel |
| CONSOLE/SLIP - front panel | In-band 64 Kbps |

***Performance Monitor***

| | |
|---|---|
| Performance Registers | Last 24 hours performance in 15 minutes interval and last 7 days in 24 hours summary |
| Separate Registers | 12 MDSL ports, network, user, and remote site |
| Performance Reports | Reports include MDSL port unsync Date & Time, Errored Second, Unavailable Second, E1 Bursty Errored Second, Severe Errored Second, Degraded Minutes, and Controlled Slip Second. Also available in Statistics (%) |
| Alarm Queue | Containing 40 alarm records which record the latest alarm type, location, and date & time |
| Threshold | Bursty Seconds, Severely Errored Second, Degraded Minutes |

***Diagnostics Test Line***

| | |
|---|---|
| Loopback | E1/T1 interface (Line Loopback, Payload Loopback, Local Loopback)<br>MDSL interface (Payload Loopback, Local loopback)<br>U interface (Local Loopback, Payload Loopback) |
| Test Pattern | E1/T1 interface ($2^{15}$-1 PRBS, 3-in-24, 1-in-8, 2-in-8, 1:1 patterns)<br>U/MDSL/DTE interface ($2^{11}$-1 BERT) |

***Front Panel***

| | |
|---|---|
| LED | 1 per U/MDSL/V.35-interface, ACO, Power, SYNC/TEST, LOF, BPV, RAI/AIS |

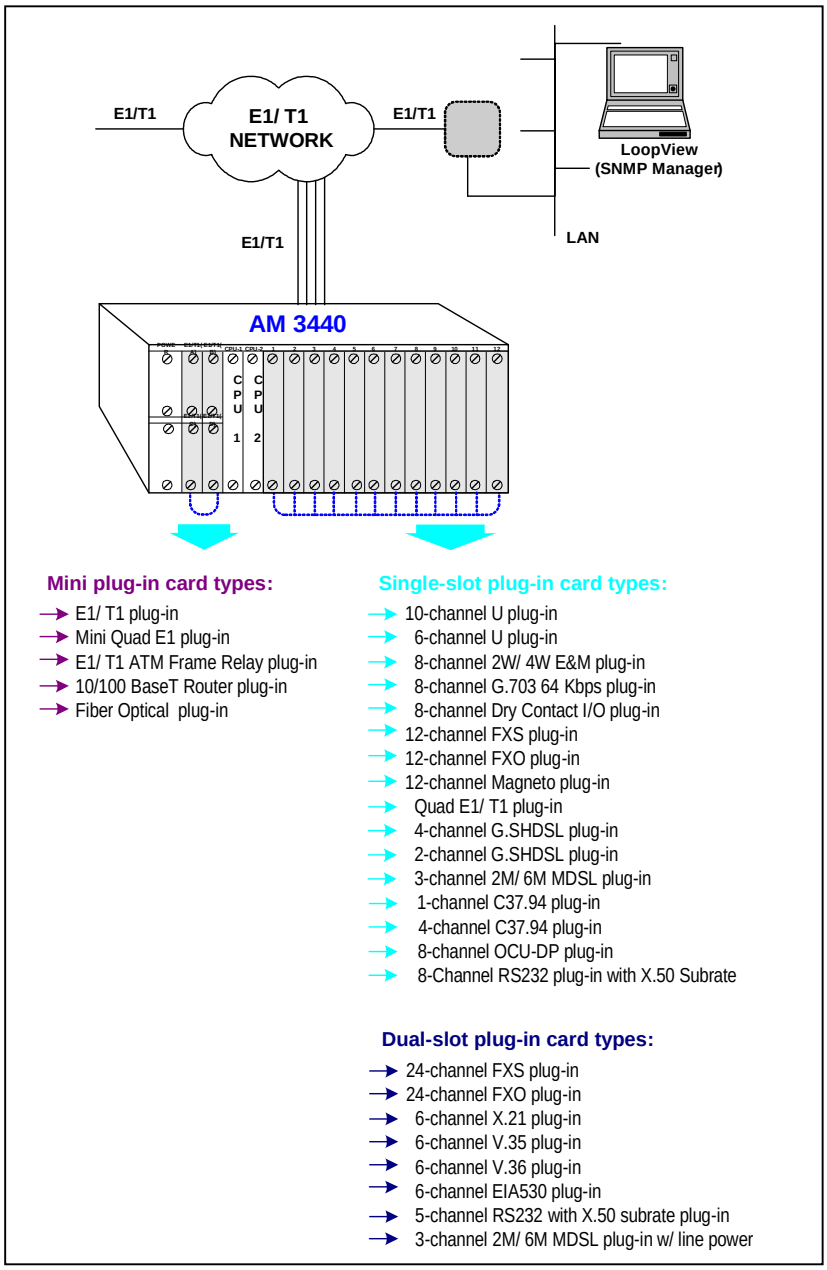
***Physical /Electrical***

| | |
|---|---|
| Dimensions | 432.4 x 220 x 223.5 mm (W×H×D) |
| Power | Single/ Dual -48V DC, 100 Watts max. |
| Temperature | 0-50°C |
| Humidity | 0-95%RH (non-condensing) |
| Mounting | Desk-top stackable, 19" /23" rack mountable |
| Line Power Supply | (For MDSL card only) Available only with DC power.<br>(For MDSL card only) 60 mA constant current source, selectable peak voltage of 190 Vdc |
| Sealing Current Supply | (For MDSL card only) 20 mA constant current source. |

***Compliance***

EN55022 Class A, EN50024, FCC Part 15 Class A, FCC Part 68, CS-03, IEC60950, UL60950
ITU G.703, G.704, G.706, G.732, G.736, G.823, G.826, G.711, G.775, O.151
ITU-T V.11, V.28, V.54

# Application Illustration:




**Mini plug-in card types:**

- E1/ T1 plug-in
- Mini Quad E1 plug-in
- E1/ T1 ATM Frame Relay plug-in
- 10/100 BaseT Router plug-in
- Fiber Optical plug-in

**Single-slot plug-in card types:**

- 10-channel U plug-in
- 6-channel U plug-in
- 8-channel 2W/ 4W E&M plug-in
- 8-channel G.703 64 Kbps plug-in
- 8-channel Dry Contact I/O plug-in
- 12-channel FXS plug-in
- 12-channel FXO plug-in
- 12-channel Magneto plug-in
- Quad E1/ T1 plug-in
- 4-channel G.SHDSL plug-in
- 2-channel G.SHDSL plug-in
- 3-channel 2M/ 6M MDSL plug-in
- 1-channel C37.94 plug-in
- 4-channel C37.94 plug-in
- 8-channel OCU-DP plug-in
- 8-Channel RS232 plug-in with X.50 Subrate

**Dual-slot plug-in card types:**

- 24-channel FXS plug-in
- 24-channel FXO plug-in
- 6-channel X.21 plug-in
- 6-channel V.35 plug-in
- 6-channel V.36 plug-in
- 6-channel EIA530 plug-in
- 5-channel RS232 with X.50 subrate plug-in
- 3-channel 2M/ 6M MDSL plug-in w/ line power


LoopTelecom.com

***LOOP TELECOMMUNICATION INTERNATIONAL, INC.***

***Worldwide***
8F, No. 8, Hsin Ann Road,
Science-Based Industrial Park
Hsinchu, Taiwan 300
Tel:+886-3-578-7696
Fax:+886-3-564-6272
www.LoopTelecom.com
sales@loop.com.tw

***Taipei, Taiwan***
2F, No. 40, Section 2,
Tuan-Hwa S. Road,
Taipei, Taiwan 106
Tel:+886-2-2784-4000
Fax:+886-2-2754-2325

***North America***
8 Carrick Road
Palm Beach Gardens
Florida 33418, U.S.A.
Tel:+1-561-627-7947
Fax:+1-561-627-6615
jimber561@aol.com

***Suzhou China***
Tel:+86-512-6252-0456
Fax:+86-512-6252-7641
Sales@looptech.com.cn

***Tianjin China***
Tel:+86-22-8789-2753
Fax:+86-22-8789-0344
Loop@loop-tj.com

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