Loop-AM3440-E IP/TDM DCS-MUX

AM3440-E-CHEA

AM3440-E-CHEA

Features

Cross Connect Capability

- Support full non-blocking DS0 cross connect matrix between TDM interfaces and TDMoE Pseudowires
- Suitable for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications
- Auto A-law/μ-law conversion

Ethernet Interface

- 2 x Combo GbE (SFP 100/1000BaseFX and 10/100/1000BaseT)
- IEEE 802.3ad Ethernet Link Aggregation*

Pseudowires

- Up to 64 concurrent pseudowires
- Encapsulation format
  - SAToP
  - CESoPSN
  - MEF-8 (CESoETH)
- Configurable CoS and VLAN
- Packet Delay Variation Compensation Depth up to 256 ms

Timing

- System clock source can be chosen from Internal, External or E1/T1 Line with SSM
- Automatic/Manual Clock Recovery modes
- Adaptive Clock Recovery for Pseudowires
- Jitter and Wander conforms to G.823/824 for Traffic Interface
- SyncE

Management

- RJ45 Ethernet management interface
- SNMPv1/v3, compatible to SNMP-based GUI network management systems and supported by Loop-iNET and Loop-iNMS
- Telnet and SSH v2
- Web GUI Configuration
- USB console port with VT-100 menu driven interface
- 64K timeslot inband management
- Support Access Control List (ACL)

Mechanical and Electrical

- 1U height, 19” rack width. ANSI shelf.
- Up to 7 slots for AM3440 series mini-slot modules.
- All plug-in interface modules are hot swappable
- Up to two ±48Vdc or 100 ~ 240 Vac hot swappable power modules
- Dual DC or AC power with load sharing
- Temperature ranges from -20° to 65°C
- RoHS compliant

Model	AM3440-E-CHEA
Chassis	1U
# of Mini-slots	5
# of HS-slots	2[Note]
Max. E1/T1 Ports	28
Cross-Connect Backplane Capacity	184 Mbps
Note: Supports Mini-slot modules via HS-Slot adaptors	

*Future Option

Description

The Loop-AM3440-E is a compact IP/TDM Access Multiplexer in the Loop Access DCS-MUX series that combines various access interfaces and transport over GbE or E1 uplinks. The Loop-AM3440-E supports SAToP/ CESoPSN/ MEF8 Protocols to transport TDM data streams over packet switched network.

The Loop-AM3440-E provides full non-blocking DS0 cross-connect matrix for up to 28 x E1/T1 + 64 Pseudowires. Traffic grooming and segregation between the TDM interfaces and the Pseudowires provides flexibility and efficiency and makes the Loop-AM3440-E an ideal solution for DACS (Digital Access Cross-Connect System) and ADCB (Add/Drop Channel Bank) applications.

Table of Tributary Modules Applicable to AM3440-E

Mini-Slot Tributary Modules	Description	Supported by AM3440-E-CHEA
1T1	1-channel T1 interface card	✓
1E1(E75)	1-channel E1 plug-in card with 75ohm	✓
1E1(E120)	1-channel E1 plug-in card with 120ohm	✓
4E1(M4E75)	Mini Quad E1 plug-in card with 75ohm	✓
4E1(M4E120)	Mini Quad E1 plug-in card with 120ohm	✓
4T1(M4T1)	Mini Quad T1 plug-in card	✓
M1C37	1-channel C37.94 mini plug-in card	✓
Router-A	2-LAN ports/64WAN port router/bridge plug-in card	✓
FOM	Fiber Optical Module	✓
1X.21 (1X21)	1-channel X.21 plug-in card	✓
1V.35 (1V35)	1-channel V.35 plug-in card	✓
1RS232 (1RS232)	1-channel RS232 plug-in card	✓
3RS232a	3-channel RS232 plug-in card	×
QEMA	4-channel E&M voice plug-in card	✓
QFXSA	4-channel FXS voice plug-in card	✓
QFXO	4-channel FXO voice plug-in card	✓
QMAGA	4-channel Magneto voice plug-in card	*
ECA	Echo Cancellation plug-in card	✓
ABRA	Analog Bridging plug-in card	✓
OCU-DP	1-channel OCU-DP plug-in card	*

Note: ✓ = Supported * = Future Option × = Not Supported

Ordering Information

To specify options, choose from the list below:
Note: RoHS compliant units are identified by the letter **G** at the end of the ordering code.

Main Unit

Ordering Code	Description	Note
Loop-AM3440-E-CHEA-**mgmt**-**G**	1U height rack chassis with fixed CPU for AM3440-E. • Supports cross-connect and TDMoE onboard. • Supports SAToP (CCPA T1 SAToP*), CESoPSN, and MEF-8 • Up to 64 Pseudowires • Supports SyncE	• 19”/23” ear mount included. • Please order SFP modules separately from SFP optical modules brochure. • Includes two High Speed Slot Adapters (Loop-ACC-HSADTa-**G**) for mini plug-in cards to be used in H1 and H2 slots. • With fixed AM3440-CCPA controller
Loop-AM3440-E-CHEA-NPW-**mgmt**-**G**	1U height rack chassis with fixed CPU for AM3440-E. • Supports SyncE	• 19”/23” ear mount included. • Please order SFP modules separately from SFP optical modules brochure. • Includes two High Speed Slot Adapters (Loop-ACC-HSADTa-**G**) for mini plug-in cards to be used in H1 and H2 slots. • If TDMoE uplink function is required in the future, it can be activated via an activation license. • With fixed AM3440-CCPA controller • If TDMoE uplink function is required in the future, it can be activated via a feature activation license. See Loop-AM3440-CHEA-PWLIC

■ Where **mgmt** is used to select the following functions. Please replace **mgmt** with your selection, or leave it blank for nothing.

mgmt=	Description	Note
LCT	Loop-AM3440-LCT activation license	Used with Loop-LCT Graphical Configuration Software for TDM application.
iXC	Loop-AM3440-iXC activation license	Used with Loop-iXC3440 cross-connect mapping tool for management.
[blank]	No configuration tool for management	If LCT is required in the future, it can be activated by an activation license.

Mini Plug-in Module (Select 1 to 7 cards for CHEA from the list below)		
Transportation		
Loop-AM3440-S1T1-**G**	1-channel T1 interface card	
Loop-AM3440-S1E75-**G**	1-channel of E1plug-in card w/ 75 ohm	
Loop-AM3440-S1E120-**G**	1-channel of E1 plug-in card w/ 120 ohm	
Loop-AM3440-SM4T1-**G**	Mini Quad T1 plug-in card	
Loop-AM3440-SM4E75-**G**	Mini Quad E1 plug-in card with 75 ohm	Includes a three meter conversion cable (Loop-ACC-CAB-DB25M-300-8BNCM).
Loop-AM3440-SM4E120-**G**	Mini Quad E1 plug-in card with 120 ohm	Includes a three meter conversion cable (Loop-ACC-CAB-DB25M-300-4RJ48M).
Loop-AM3440-SFOM-**opt**-**G**	Fiber Optical plug-in card	For **opt** option, please refer to the table below for detail information

Mini Plug-in Module (Select 1 to 7 cards for CHEA from the list below)		
Serial and Digital Access		
Loop-AM3440-S1V35-**G**	1-channel V.35 plug-in card	
Loop-AM3440-S1X21-**G**	1-channel X.21 plug-in card	
Loop-AM3440-S1RS232-**G**	1-channel RS232 plug-in card	
Loop-AM3440-S1ODP*	1 port OCU-DP Interface card	Only non-RoHS compliant model available **Limited Quantity**
Voice and Analog Access		
Loop-AM3440-SQEMA-**wr-m**-T**n-x-G**	Jumper selectable: 2/4 WIRE; A/B side Quad E&M voice card, complied with IEEE1613 standard.	• For -48 Vdc and AC (100 to 240 Vac) power supply only. • For wr, m, n and x option, please refer to the table below for detail information. • Includes a 0.6 meter conversion cable (Loop-ACC-CAB-DB44M-60-4 RJ45M-G)
Loop-AM3440-SQFXO-**x-G**	Quad FXO voice plug-in card used with 4 RJ11	• GS = Ground Start • MP = Metering Pulse Receive 12/16 KHz • For -48 Vdc and AC (100 to 240 Vac) power supply only. • For **x** option, please refer to the table below for detail information.
Loop-AM3440-SQFXO-M-**x-G**	Quad FXO with MP 16 KHz voice plug-in card used with 4 RJ11	
Loop-AM3440-SQFXO-M12-**x-G**	Quad FXO with MP 12 KHz voice plug-in card used with 4 RJ11	
Loop-AM3440-SQFXO-GS-**x-G**	Quad FXO with GS plug-in card used with 4 RJ11	
Loop-AM3440-SQFXO-GM-**x-G**	Quad FXO with GS and MP 16 KHz voice plug-in card used with 4 RJ11	
Loop-AM3440-SQFXSA-**x-pt-G**	Quad FXSA voice plug-in card	• Jumper setting options: Loop Start, Ground Start (GS), Metering Pulse Transmit 12/16 KHz (MP). • For **x** & **pt** option, please refer to the table below for detail information.
Loop-AM3440-SQFXSA-M-**x-pt-G**	Quad FXSA with MP 16 KHz voice plug-in card	
Loop-AM3440-SQFXSA-M12-**x-pt-G**	Quad FXSA with MP 12 KHz voice plug-in card used	
Loop-AM3440-SQFXSA-GS-**x-pt-G**	Quad FXSA with GS plug-in card	
Loop-AM3440-SQFXSA-GM-**x-pt-G**	Quad FXSA with GS and MP 16 KHz voice plug-in card	
Loop-AM3440-SQMAGA-**G***	Quad channel magneto plug-in card	
Data Processing		
Loop-AM3440-SECA-**G**	Echo canceller card	
Loop-AM3440-SABRA-**G**	Analog Bridge Card	
Package Access		
Loop-AM3440-SRTA-**G**	2-LAN ports/64 WAN port router/bridge plug-in card	
Teleprotection Access		
Loop-AM3440-SM1C37-**LSFOM**-**G**	1- channel C37.94 plug-in mini card	For **LSFOM** option, please refer to the table below for detail information.

*Future Option

Accessories

Power Module		
Loop-AM3440-E-SAC-**G**	Single AC plug-in power supply (100 to 240 Vac, 50/60 Hz)	• For AC, choose an appropriate power cord. • Order two DC or two AC or (one DC and one AC) power modules for redundancy. • For AM3440-E-CHEA
Loop-AM3440-E-SDC-**G**	Single -48 Vdc (-36 to -72 Vdc) Power Module	• Order two DC or two AC or (one DC and one AC) power modules for redundancy. • For AM3440-E-CHEA
Power Cord (All power cord are RoHS compliant)		
Loop-ACC-PC-USA	AC power cord for Taiwan/America	
Loop-ACC-PC-EU	AC power cord for Europe	
Loop-ACC-PC-UK	AC power cord for UK	
Loop-ACC-PC-AUS	AC power cord for Australia	
Loop-ACC-PC-CH	AC power cord for China	
Power Adaptor (All power adaptor are RoHS compliant)		
Loop-ACC-APA-320-**G**	320 Watt, AC (88~264VAC or 124~370VDC to DC (+48Vdc, 6.7A) Working temperature: -30~+70°C	
Loop-ACC-APE-320-**G**	320Watt, AC (88~264VAC or 124~370VDC to DC (+48Vdc, 6.7A) Working temperature: -30~+70°C	
Loop-ACC-APU-320-**G**	320Watt, AC (88~264VAC or 124~370VDC) to DC (+48Vdc, 6.7A) adapter for UK Working temperature: -30~+70°C	
HS-SLOT ADAPTER		
Loop-ACC-HSADTa-**G**	Mechanical adapter for HS-Slot. Applicable to AM3440-E-CHEA.	• Use with mini-slot modules in H1 and H2 Slots 
Mounting Ear		
19”/23” ear mounts	A pair of 19”/23” ear mounts is supplied as part of standard package. **Note**: For other sizes, please contact your nearest Loop sales representative.	
Conversion Cables (All conversion cables are RoHS compliant)		
Loop-ACC-CAB-HDB15M-100-RJ48M-**G**	One HD-sub 15 pin/Male connector to one RJ48/Male connector; Length: 100 cm	For external clock interface connection
Loop-ACC-CAB-DB25M-300-8BNCM-**G**	DB25/Male to eight BNC/Male cable; Length: 300 cm	Used with Loop-AM3440-SM4E75-**G**
Loop-ACC-CAB-DB25M-300-4RJ48M-**G**	DB25/Male to four RJ48C/Male cable; Length: 300 cm	Used with Loop-AM3440-SM4E120-**G** and Loop-AM3440-SM4T1-**G** plug-in cards
Loop-ACC-CAB-DB25M-30-1M34F-**G**	DSUB-25pin/Male to M34/Female V.35 Conversion cable Length: 30 cm	Used with Loop-AM3440-S1V35-**G** plug-in card
Loop-ACC-CAB-DB44M-60-4RJ45M-**G**	DSUB-44pin/Male to four RJ45 Male (8P8C) conversion cable. Length: 60 cm	Used with Loop-AM3440-SQEMA plug-in card
Blank Panels (All blank panels are RoHS compliant)		
30.002582.A00LF-**G**	Blank Panel for Power Supply Slot (flat)	For AM3440-E-CHEA and AM3440-E-CHEB*
30.000112.A00-**G**	Blank Panel for mini Slot A-E (flat)	For AM3440-E-CHEA only
30.002583.A00LF-**G**	Blank Panel for H1 and H2 slot (flat)	For AM3440-E-CHEA only

Y-Box (All Y-Box are RoHS compliant)		
Loop-VV-B-**G**	1 for 1 protection Y-Box with BNC connectors (4-E1)	Used with M4E75
Loop-VV-R-**G**	1 for 1 protection Y-Box with RJ48C connectors (16-E1)	Used with M4E120 and M4T1
User's Manual (RoHS compliant)		
Loop-AM3440-UME	Optional hard-copy (paper) User's Manual. A CD version of the manual is already included as standard package.	

Feature Activation License		
Loop-AM3440-ERINGLIC	Feature Activation License for AM3440 CPU card to support framed E1 PDH-Ring function	Used with M4E1
Loop-AM3440-TRINGLIC	Feature Activation License for AM3440 CPU card to support framed T1 PDH-Ring function	Used with M4T1.
Loop-AM3440-LCTLIC	Feature Activation License for AM3440 CPU card to support LCT Graphical Configuration Software	Used with Loop-LCT Software.
Loop-AM3440- iXCLIC	Feature Activation License for AM3440 CPU card to support iXC3440 Craft GUI Mapping tool.	Used with Loop-iXC3440 Software
Loop-AM3440-CHEA-PWLIC	Feature Activation License for AM3440-E-CHEA-NPW to support TDMoE uplink.	Used with AM3440-E-CHEA-NPW

Loop-iXC3440 software covers most of AM3440 plug-in cards. Below is the list of cards currently supported by Loop-iXC3440.

Mini Plug-in Module	Description	Note
E1	1-channel E1 plug-in card	
T1	1-channel T1 plug-in card	
sDTE	1-channel DTE plug-in card	
MQE1	Mini Quad E1plug-in card	
MQT1	Mini Quad T1plug-in card	
RTA	2-LAN ports/64 WAN port Router/Bridge plug-in card	
FOM	Mini Fiber Optical plug-in card	
QFXO	Quad FXO voice plug-in card	
1OCUDP*	1-channel OCU-DP plug-in card	
ECA	Echo Cancellation plug-in card	
ABRA	Analog Bridge plug-in card	
M1C37	Mini 1-channel C37.94 plug-in card	

For QEMA card (Quad E&MA card):

■ where **wr** is used to select wire type:

wr =	**Description**	**Notes**
2w	2 wire	
4w	4 wire	

■ Where **m** is used to select QEM card signaling side (must select one):

m =	**Description**	**Notes**
B	B (carrier side) connects to A side.	
A	A (exchange side) connects to B side. A side M lead to B side M lead, A side E lead to B side E lead.	

■ Where **n** is used to select QEM card signaling type (must select one):

n =	**Description**	**Notes**
O	For voice transmission only.	Circuit Type doesn't matter.
1	Type I (Original) E&M Signaling Circuit	M lead provides discharge for the A side.
2	Type II Circuit. This design attempts to reduce ground noise by adding two leads: SB (Signal to Battery) and SG (Signal to Ground)	Reduced ground noise. Ground current is eliminated at the cost of two more wires per circuit.
3	Type III Circuit. The SG lead serves as a discharge for the M lead. Reduces delay caused by combination of (a) low current electronic detectors, and (b) long runs of the E and M leads.	Type III is rare because ground currents on the E return would cause noise
4	Type IV Circuit. Based on the Type 2 circuit. This E&M circuit provides symmetry.	
5	Type V Circuit. For applications where ground noise is not an issue. Based on the Type 2 circuit.	

For voice card (QEMA/QFXO/QFXSA):

■ Where **x** is used to select all of voice card signaling bits. If this option is not required, omit the **x** field in the ordering code.

QEMA	**E**	Follows ETSI signaling bits	
	A	Follows ANSI signaling bits	
	S	Follows customer's special bits assignment	
QFXO	**A**	Follows ANSI signaling bits	
	S	Follows customer's special bits assignment	
	E	Follows ETSI signaling bits	
	T	Trunk condition OFF-HOOK	
	AT	Follows ANSI signaling bits w/ trunk condition OFF-HOOK	
	ST	Follows customer's special bits assignment w/ trunk condition OFF-HOOK	
QFXSA	**A**	Follows ANSI signaling bits	
	E	Follows ETSI signaling bits	
	S	Follows customer's special bits assignment	

Note:

1. For S (customer's special bit), please contact your nearest Loop sales representative.
2. If **x** is not selected from table above, the default setting for signaling bits is ETSI and for trunk condition is ON-HOOK.

For QFXSA:

■ Where **pt** is used to select the power :

pt=	**Description**	**Notes**
PWR	Use with ±48Vdc (SDPC) and AC (SAC) power modules	Used with Loop-AM3440-E-CHEA

For mini LS Optical module (mini C37.94):

■ Where **LSFOM** is to select **LS**-**F**iber **O**ptical **M**odule option, each module has 5 letters.

LSFOM Code	Description										Notes
	Mode		Data Rate		Wavelength		Distance		Connector/ Interface		
	Code	Description	Code	Description	Code	Description	Code	Description	Code	Description	
ZRATT	Z	1 * 8 Multi-mode	R	2 M	A	820nm	T	2km	T	ST/UPC	1 * 8 Separate transceiver & receiver
QRATT	Q	1 * 9 Multi-mode	R	2 M	A	850nm	T	2km	T	ST/UPC	1 * 9
***NFB3T**	N	1 x 9 Single mode	F	125 M	B	1310nm	3	30km	T	ST/UPC	
***QFBTT**	Q	1 x 9 Multi-mode	F	125 M	B	1310nm	T	2km	T	ST/UPC	
***NHC2S**	N	1 x 9 Single mode	H	155 M	C	1550nm	2	20km	S	SC/UPC	

***** *For the orders of the listed optical modules, please contact your Loop sales representative.*

For FOM card

■ Where **opt** is used to select optical module type (All optical modules are RoHS compliant):

opt =	**Description**	**Note**
NHB3S (was SAA)	Single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 30 km ***- S1.1***	• Use dual fiber • Units delivered ITU-T G.957 application code
NHB5S (was SBB)	Single optical module with dual uni-directional fiber, 1310 nm, SC optical connector, 50 km ***– L1.1***	• Use dual fiber • Units delivered ITU-T G.957 application code
NHB3F (was SCC)	Single optical module with dual uni-directional fiber, 1310 nm, FC optical connector, 30 km ***– S1.1***	• Use dual fiber • Units delivered ITU-T G.957 application code
***NHC2S (was SDD)**	Single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 20 km ***– S1.2***	• Use dual fiber • Units delivered ITU-T G.957 application code * For the orders of the listed optical modules, please contact your Loop sales representative.
NHCUS (was SEE)	Single optical module with dual uni-directional fiber, 1550 nm, SC optical connector, 100 km ***– L1.2***	• Use dual fiber • Units delivered ITU-T G.957 application code
WHD2S (was SSM)	Single optical module with single bi-directional fiber (master), 1310 nm transmit and 1550 receive, SC optical connector, 30 km ***– S1.1/ S1.2***	1310 nm from master to slave Order **SSM** to use with **SSS** Use 1 fiber ITU-T G.957 application code
WHE2S (was SSS)	Single optical module with single bi-directional fiber (slave), 1310 nm receive and 1550 transmit, SC optical connector, 30 km ***- S1.1/ S1.2***	1550 nm from slave to master Order **SSS** to use with **SSM** Use 1 fiber ITU-T G.957 application code

Note: For other special optical modules, please contact your nearest Loop sales representative.

Loop-AM3440-E Access DCS-MUX Product Specifications

AM3440-E-CHEA with on-board CCPA Controller

Number of Ports	2
Speed	10/100/1000M bps
Connector	RJ45 for twisted pair GbE, LC for optical GbE, auto detection
Ethernet Function	
Basic Features	MDI/MDIX for 10/100/1000M BaseT auto-sensing Ping function contained ARP
Pseudowire	
Concurrent PW	Up to 64
Encapsulation Format	SAToP, CESoPSN, MEF-8 (CESoETH)
QoS	User configurable 802.1p CoS, ToS in out-going IP frame
Clock Source	Internal, Line Interface, External (E1/T1/2048 KHz), Adaptive Clock Recovery for Pseudowires, SyncE
Alarm Relay	Max. Current: 1A for 24VDC, 0.625A for 48VDC Fuse alarm, performance alarm
Management	
Console	Micro USB Connector User Interface: Menu driven VT-100
Ethernet	2 Combo (RJ45 & SFP) GbE port SNMPv1/v3, Telnet/SSH, support Radius client function Web GUI Support
Inband Management	Inband 64 Kbps, support HDLC/PPP
System Configuration Parameters	Active Configuration, Stored Configuration, and Default Configuration (Stored in Non-volatile Memory)
Performance Monitor	
Performance Registers	Last 24 hours performance in 15 minute intervals and last 7 days in 24 hour summaries
Separate Registers	Network, user, and remote site
Performance Reports	Reports include E1 Bursty Errored Second, Severe Errored Second, Degraded Minutes. Also available in Statistics (%)
Alarm Queue	To record the latest alarm type, location, date and time
Threshold	Bursty Seconds, Severely Errored Second, Degraded Minutes
Diagnostics	
Loopback	E1/T1 interface (Line Loopback, Payload Loopback, Local Loopback), DTE Loopback (DTE-to-DTE, DTE to Line)
Test Pattern	For Controller: 2^{20}-1, 2^{15}-1, 2^{11}-1, 2^{9}-1, and 4-byte user define pattern
Front Panel	
Controller LED Indicators	Power, ACTIVE, ALARM

*Future Option

Transportation Cards

Network Line Interface - T1

Line Rate	1.544 Mbps ± 50 bps	Output Signal	DSX1
Line Code	AMI or B8ZS	Framing	ESF, ESF&T1.403, G.802, D4
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	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	Electrical	75 ohm Coax/120 ohm twisted pair
Output Signal	ITU G.703	Jitter	ITU G.823

Network Line Interface - Mini 4T1

Line Rate	1.544 Mbps ± 32 ppm	Framing	ESF, ESF&T1.403, None, D4
Line Code	AMI/B8ZS	Connector	DB25S
Input Signal	ITU G.703 DSX-1 0dB to -30dB w/ALBO	Output Signal	ITU G.703 DSX-1 w/o, -7.5, -15dB LBO ITU G.703 DSX-1 w/short (0-110, 110-220, 220-330, 330-440, 440-550, 550~660 feet)
Jitter	AT&T TR 62411	Pulse Template	AT&T TR 62411
Data Rate	n * (64) Kbps (n=1-24)		

Fiber Optical Interface (FOM)

Source	MLM Laser	Line Code	Scrambled NRZ
Wavelength	1310 ± 50 nm, 1550 ± 40 nm	Detector Type	PIN-FET
50 Km reach		Protection	Optional 1+1 APS

NOTE: Longer or shorter, 15 to 120Km, on special order.

Optical Module	Fiber Direction	Wavelength (nm)	Connector/ Interface	Distance (km)	Power (dB)
NHB3S (was SAA)	Dual uni-direction	1310	SC/UPC	30	19
NHB5S (was SBB)	Dual uni-direction	1310	SC/UPC	50	30
NHB3F (was SCC)	Dual uni-direction	1310	FC/UPC	30	20
*NHC2S (was SDD)	Dual uni-direction	1550	SC/UPC	20	12
NHCUS (was SEE)	Dual uni-direction	1550	SC/UPC	100	30
WHD2S (was SSM)	Single bi-direction (master)	1310/1550	SC/UPC	30	20
WHE2S (was SSS)	Single bi-direction (slave)	1310/1550	SC/UPC	30	20

NOTE: Other fiber optical options available on special order

* For the orders of the listed optical module, please contact your Loop sales representative.

Serial and Digital Access

DTE Interface (X.21)

Data Port	Up to nine 1-port DTE X.21 card
Data Rate	56 or 64 Kbps, n = 1 to 32
Connector	DB15

DTE Interface (V.35)

Data Port	Up to nine 1-port DTE V.35 card
Data Rate	56 or 64 Kbps, n = 1 to 32
Connector	DB25S (optional conversion cable DB25S to M34 connector)

DTE Interface (RS232)

Data Port	1-port RE232 card
Data Rate	56 or 64 Kbps *n, n=1 - 2
Mapping	Any sequential time slots

1 Port OCU-DP Interface Card*

Ports	1 Ports card
Operating Modes	4-wire DDS or switched 56
Dedicated Rates	SYNC: 2.4, 4.8, 9.6, 19.2, 56 and 64k clear channel
	Conforms with AT&T Pub 41458
OCU DP Operation	Conforms with AT&T 62310 and ANSI T1.410
Local Loop Signal	Bipolar return to zero, 50% duty cycle
Transmit Amplitude	+/- 1.5 V (+/- 10%) peak, all rates except 9.6k
	+/- 0.75 V (+/- 10%) peak at 9.6k
Transmit Source Impedance	135 Ohms +/- 20%
Receive Input Impedance	135 Ohms +/- 20%
Receiver Sensitivity/ Dynamic	0 to 43 dB loop loss at 72K & 56K
Range	0 to 34 all other rates
Physical Interface	4-wire loop interface
	RJ45 modular connector
Network to Loop Test Codes	Zero code suppression, Idle
Loop to Network Test Codes	Zero code suppression, Idle, latch/non-latch, DSU loop-back

*Future Option

Voice and Analog Access

Voice Card (QEMA)

Connector	One 44-pin connector, adapter cable included for 4 RJ45 connectors.
Power	110-220Vac, ±48Vdc
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ-law, user selectable as a group
Impedance	Balanced 600Ω or 900Ω
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
Gain Variation	± 0.5 dB at 0 dBm0 input
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
I/O Power Range	A/D Analog input level: -66 dBm (0.00039 Vrms) ~ + 3 dBm (1.09 Vrms) D/A Analog output level: -66 dBm (0.00039 Vrms) ~ + 4 dBm (1.22 Vrms)
Longitudinal Balance	> 63dB
Longitudinal Conversion Loss	＞ 46dB
Total Distortion	＞ 35 dB at 0 dBm0 input
Idle Channel Noise	＜ -65 dBm0p
Wire Mode	2 wire and 4 wire
Signaling	Type I, Type II, Type III, Type IV, Type V, and also TO (Transmit Only)
M Lead Output Current	18 mA (maximum)
E Lead Sensor Current	0.3 mA (minimum)
EM Type Setting	Jump Selectable
Operational Temp.	0°C to +50°C
Relative Humidity	0% to 95%
Carrier Connection	Side A and side B setup by Jump

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.

Voice Card (QFXO)

Quad FXO voice card (4 FXO per plug-in)

Connector	QFXO: 1, 2, 3, or 4 FXO per RJ11 connector	
Power for QFXO	110-220Vac, -24Vdc, and –48Vdc	
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF	
Encoding	A-law or μ-law, user selectable together for all	
AC impedance	Balanced 600 or 900 ohms (selectable together for all)	
Longitudinal Rejection	55 dB	
Loss Adjustment	0, 3, 6, or 9 dB transmit & receive	
Signal/ Distortion	> 46dB with 1004 Hz, 0dBm input	
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712	
FXS Loop Feed	Supports line power with 25mA (default) current limit (30mA and 35mA, Jump selectable)	
FXO	Ringing REN	0.5B (AC)
	Detectable Ringing	25 Vrms
	Loop Resistance	≤ 1800 Ω
	DC impedance (ON-HOOK)	> 1M Ω
	DC impedance(OFF-HOOK)	235 Ω @ 25mA feed 90 Ω @ 100mA feed
FXS Ringing	Supports 2 REN per port (1 REN = 6930Ω + 8 μF) 20 Hz, other frequencies: 16.7Hz, 25 Hz, 50Hz (Jump selectable) 78 Vrms (sine wave) (45 Vrms to 86 Vrms wide range by Resistor selectable) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR	
Metering Pulse	12KHz/ 16KHz • Power: 10dBm • Sensitivity: -27dBm (-21dBm to -45dBm by Resistor selectable)	
Signaling	Loop Start, GND-Start, Metering Pulse (12KHz, 16KHz), DTMF, Dialing Pulse, PLAR, Battery Reverse (supports Line Reverse Signaling for Billing)	

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.

Voice Card (QFXSA)

Quad FXSA voice card (4 FXS per plug-in)

Connector	1, 2, 3, or 4 FXS per RJ11 connector
Power for QFXS	±48Vdc
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ-law (user selectable)
AC impedance	Balanced 600 or 900 ohms (user selectable)
Longitudinal Rejection	55 dB
Gain Adjustment	-21 to +3 dB / 0.1 dB step for transmit (D/A) & receive (A/D) gain
Signal/ Distortion	> 46dB with 1004 Hz, 0dBm input
Frequency Response	± 0.5 dB from 300 to 3400 Hz, coincide with ITU-T G.712
Loop Feed	±48Vdc with 25mA current limit per port Jumper selectable: 25mA, 30mA, 35mA
Ringing	Support 2 REN per port (1 REN = 6930Ω + 8 μF) 16.7Hz, 20Hz, 25Hz, 50Hz (user programmable) Default 78 Vrms (sine wave) (64 Vrms by jumper setting) 2 sec on 4 sec off, or 1 sec on 2 sec off optional for PLAR (user programmable)
Metering Pulse	12KHz/ 16KHz (2.4Vrm/1Vrm user programmable)
Signaling	Loop Start (Metering Pulse, DTMF, Dialing Pulse, PLAR), GND-Start (Tip Open, Ring GND), OOS Alarm, Battery Reverse

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

Voice Card(QMAGA)*

Connector	RJ11 x 4
Power	110-220 Vac or ±48 Vdc
Alarm Conditioning	CGA busy after 2.5 seconds of LOS, LOF
Encoding	A-law or μ-law, user selectable per card configurable
Impedance	Balanced 600 or 900 ohms (for magneto telephone impedance)
Longitudinal Conversion Loss	> 46dB
Gain Adjustment	-16 to +7 dB / 0.1dB step transmit gain (D-A) -16 to +13 dB/0.1dB step receive gain (A-D)
Signal/ Distortion	> 25dB with 1004 Hz, 0dBm input
Frequency Response	± 0.5 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
Crank Detectable Across	L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND) per port software programmable
Crank Detected time	Valid crank: more than 250 ms Invalid crank: less than 160 ms
Ringing Generation	Voltage: 76 Vrms (sine wave) Frequency: 25Hz
Ring duration	Software configurable options: 1. PLAR OFF (Continuous Mode) Ring duration depends on cranking time 2. PLAR OFF (One-time) Mode Crank the phone for one time, and the ring duration of the far-end phone could be 0.7, 1.0, 1.5 or 2.0 sec 3. PLAR ON When FXS phone off-hooked, the ring duration of the far-end magneto phone could be 0.7, 1.0, 1.5 or 2.0 sec
Ringing Send Across	L1 & L2 Mode (Tip and Ring), L1 & GND Mode(Tip and GND)
Signaling	Turn Magneto Phone crank (Ringing across Tip and Ring or Tip and Ground)
Signaling Bit A,B,C,D	Programmable

- 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

*Future Option

Data Processing

Analog Bridge Card (ABRA)

Group	Up to 8 groups per card, 16 members per group
Analog Bridge Mode	Master/Slave Architecture Downstream : 2 to many Upstream : many to 2
Voice Conference Mode with CAS Signalling	Any-to-any conference bridge Up to 16 members in one conference group Silence detection/suppression
RS232 Data Bridge Mode	Master/Slave Architecture Downstream : 2 to many (up to 14 Slave units) Upstream : many to 2
Voice Protection Mode	One Master to two Slaves for 1+1 protection Analog signals only 42 protection groups
OCU-DP Data Bridge Mode (MJU Mode)	Master/Slave Architecture Downstream: 1 to many (up to 14 Slave units) Upstream: many to 1
PCM encoder/decoder	Compatible with ITU-T G.711 A-law/Mu-law coding.
LED Indicator	Multi-color indication

Echo Canceller Card

Echo Cancellation	64ms uni-directional, 64ms bi-directional and 128ms uni-directional
Channel	Up to 64 channels
Functions	- one way or bi-direction cancellation from PCM bus to ECA card - E1/T1 multichannel echo cancellation
PCM encoder/decoder	Compatible with ITU-T G.711 A-law/Mu-law coding.
LED Indicator	Multi-color indication
Compliant	ITU-T G.165 and ITU-T G.168-2000 and 2002

Packet Access

Router-A Interface

Number of Ports	2 LAN ports, Max. 64 WAN ports, Each WAN port has data rate n x 64K bps, 1≤ n ≤32 (≤ 4Mbps for total of all 64 WAN ports
Physical Interface	10/100 BaseT x 2
Connector	RJ45
Routing Protocol	RIP-I, RIP-II, OSPF, Static
Supporting Protocols	PPP (IPCP/BCP), MLPPP, HDLC, Frame Relay, and Cisco compatible HDLC, NAT/NAPT, DHCP
Diagnostic	Ping, Trace route
QoS	Rate limit

Teleprotection Access

Mini C37.94 Card

820nm

Ordering Code
ZRATT
Mode
1*8 Multi-Mode
Data Rate (Mb/s)
2.048Mbps
Wavelength (nm)
820
Distance (km)
2
Connector
ST

TX Power (dBm Peak)				RX Power (dBm Peak)				Note
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength	
-19.8	---	-12.8	792/820/865	---	---	---	---	50/125 μm Fiber Cable
-16	---	-9		---	---	---		62.5/125 μm Fiber Cable
---	---	---	---	-25.4	---	-9.2	792/820/865	Peak Optical Input Power Logic Level LOW

850nm

Ordering Code
QRATT
Mode
1*9 Multi-Mode
Data Rate (Mb/s)
2.048Mbps
Wavelength (nm)
850
Distance (km)
2
Connector
ST

TX Power (dBm Peak)				RX Power (dBm Peak)				Note
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength	
-23	---	-11	790/---/870	-32	---	-11	790/---/870	50/125 μm Fiber Cable
-19	---	-11		-32	---	-11		62.5/125 μm Fiber Cable

1310nm

Ordering Code
NFB3T
Mode
1*9 Single-Mode
Data Rate (Mb/s)
125Mbps
Wavelength (nm)
1310
Distance (km)
30
Connector
ST

TX Power (dBm)				RX Power (dBm)			
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength
-15	---	-8	1261/1310/1360	-34	---	0	1260/---/1610

1310nm

Ordering Code
QFBTT
Mode
1*9 Multi-Mode
Data Rate (Mb/s)
125M
Wavelength (nm)
1310
Distance (km)
2
Connector
ST

TX Power (dBm)				RX Power (dBm)				Note
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength	
-20	---	-14	1270/1310/1380	-32	---	8	1260/---/1610	Output Optical Power 62.5/125 μm fiber
-23.5								Output Optical Power 50/125 μm fiber

1550nm

Ordering Code
NHC2S
Mode
1*9 Snigle-Mode
Data Rate (Mb/s)
155Mbps
Wavelength (nm)
1550
Distance (km)
20
Connector
SC

TX Power (dBm)				RX Power (dBm)			
MIN.	TYP.	MAX.	Wavelength	MIN.	TYP.	MAX.	Wavelength
-15	---	-18	1480/1530/1576	-34	---	0	1260/---/1610

Physical /Electrical

Model		AM3440-E-CHEA
Dimensions		442 x 44 x 297 mm (W×H×D)
Power		Single/ Dual -48 Vdc (-36 to -72 Vdc) Single/ Dual AC plug-in power supply (100 to 240 Vac, 50/60 Hz)
Temperature	Operating	-20 to 65°C
	Storage	-30 to 70°C
Weight	Net Weight	5.5 Kg (12.13lbs)
	Max. Weight	7.5 Kg (16.53lbs)
Humidity		0-95%RH (non-condensing)
Mounting		Desk-top stackable, 19” /23” rack mountable
Power Consumption (Max.)		30 Watts

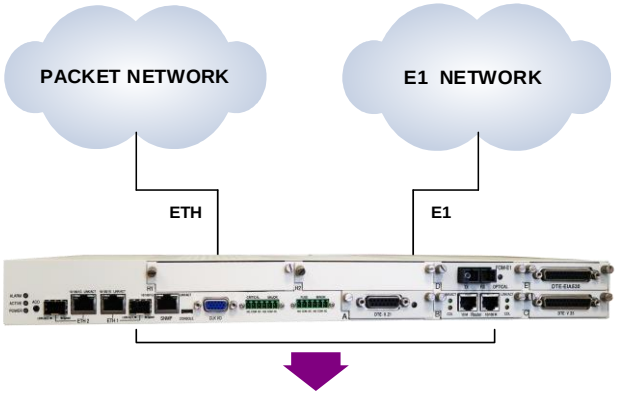
Certification

EN55032 Class A, EN55035, FCC Part 15 Class A, EN62368-1

Compliance

ITU G.703, G.704, G.706, G.732, G.736, G.823, G.826, G.711, G.712, G.775, O.151, V.11, V.28, V.54
IETF SNMP v.3 (RFC2571~2575), ITU-T Rec.G.821, ITU-T Rec.G.827

Application Illustration



Mini Slot Plug-in Cards

- 1-channel T1 interface card
- 1-channel E1 plug-in card with 75ohm
- 1-channel E1 plug-in card with 120ohm
- Mini Quad E1 plug-in card with 75ohm
- Mini Quad E1 plug-in card with 120ohm
- Mini Quad T1 plug-in card
- 1-channel C37.94 mini plug-in card
- 2-LAN ports/64WAN port router/bridge plug-in card
- Fiber Optical Module
- 1-channel V.35 plug-in card
- 1-channel X.21 plug-in card
- 1-channel RS232 plug-in card
- 4-channel E&M voice plug-in card
- 4-channel FXS voice plug-in card
- 4-channel FXO voice plug-in card
- Echo Cancellation plug-in card
- Analog Bridging plug-in card

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