



ANSI Unit Front View



ETSI Unit Front View

Features:

- 1U height, full front access (ETSI unit) or front and back access(ANSI unit)
- Rack mount, wall mount, and stand-alone
- WAN ports
 - Up to 16 E1/(T1*)
(4 slots, 4 E1/(T1*) ports per hot plug in card)
 - E1/T1* is software configurable
- Tributary ports
 - Fixed on main board
 - Up to 4 10/100 Fast Ethernet (FE)
 - Optional daughter card fixed on panel
 - One Optical FE*
 - Two (copper/fiber) combo Gigabit Ethernet (GBE)*, auto detection
 - One EIA530/V.36 and one RS232*
- Power modules
 - Hot-swappable -48Vdc plug-in modules (-36 to -75 Vdc), dual for redundancy
 - AC plug-in module (100 to 240 Vac), dual for redundancy (ANSI only)
 - AC and DC (coexistent) fixed module (100 to 240 Vac and -36 to -75 Vdc)
- WAN link with virtually concatenated $n \times E1/(T1^*)$, where n can be 1 to 16)
- Protocol: GFP, LAPS and PPP
- Differential delay , up to 256ms for E1 and 384ms for T1*
- VLAN packet transparency
- Packet size up to 12,000 bytes
- Timing sources for primary and secondary clocks are any one of E1/(T1*), V.36*, Internal, external (option)
- Alarm relay
- Firmware download to local unit and remote unit
- Management port and interface
 - Multicolor LED indicators
 - LCD with keypad on ANSI front panel
 - Console port, VT100 menu-driven
 - SNMP port
 - SNMPv1
 - Telnet via SNMP port
 - LoopView GUI EMS
 - Inband management in traffic bandwidth

* Future option

Loop-IP6416

IP-IMUX

Description:

The Loop-IP6416 IP Inverse Mux is a media converter. It allows service providers to offer Ethernet services over the existing copper infrastructure and a typical SONET/SDH platform at the central office.

The Loop-IP6416 has many unique features. When a line card is enabled on the Loop-IP6416, the CPE maps Ethernet frames EIA530/V.36 and RS449 into bonded PDH signals. Connectivity is provided from tributary traffic to E1/T1 WAN through multiple E1/T1s (up to 16 E1/T1 links).

The Loop-IP6416 offers up to 16 E1/T1 ports with an LED for each port. It has automatic E1/T1 channel failure detection and can re-assign the number of E1/T1 channels transporting Ethernet traffic. For example, if there are 16 E1s configured for 10/100 Ethernet traffic transport, and one E1 fails during service, the other 15 will pick up the entire load. This minimizes the loss of IP packets.

Several power options exist including dual DC, front/back AC and hybrid AC/DC. The Loop-IP6416 supports a console port, which allows users to execute in-service diagnostics and fault isolation from a local or remote terminal. The Loop-IP6416 also allows remote site connection to Telnet via the Ethernet port. An Alarm Cut-Off (ACO) button is located on the panel.

**CERTIFIED
ISO-9001**

RoHS Compliance Statement

This product complies with DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the restriction of the use of certain hazardous substances in electrical and electronic equipment, dated 27 January 2003, including ANNEX.

Ordering Information

To order specify:

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

Model (RoHS compliant)	Description	Note
Main Unit		
Loop-IP6416-S-1UA-4FE-s1-s2-s3-s4-pp1-pp2-add2-add3-G	1U height ANSI (rear & front access) unit, stand-alone with 4 FE ports	Where s1, s2, s3,s4, pp1, pp2, add1, add2 and add3 are defined in tables below
Loop-IP6416-S-1UA-3FE-s1-s2-s3-s4-pp1-pp2-add1-add2-add3-G	1U height ANSI (rear & front access) unit, stand-alone with 3 FE ports and daughter board	
Loop-IP6416-S-1UE-4FE-s1-s2-s3-s4-pp1-pp2-add2-G	1U height ETSI unit (front access) unit, stand-alone with 4 FE ports	The add 1 is not applicable for 4 FE
Loop-IP6416-S-1UE-3FE-s1-s2-s3-s4-pp1-pp2-add1-add2-G	1U height ETSI unit (front access) unit, stand-alone with 3 FE ports and daughter board	For allowed pp1, pp2 combinations, refer to NOTE 1
		Future option for 3FE

Accessories

User's Manual		
Loop-IP6416-UM	This is an optional, paper copy. A CD version of the manual is already included as standard equipment.	
Hot-swappable Plug-in modules		
Loop-IP6416-S-ETD-G	Quad E1/T1 with DB25 female connector (E1-120 ohms/E1-75 ohms /T1 software selectable)	Future option for T1
Loop-IP6416-S-EM-G	Quad E1-75 ohm with mini-BNC	
Loop-IP6416-S-ETR-G	Quad E1/T1 with RJ48C connector (E1-120 ohms/T1 software selectable)	Future option for T1
Plug-in Power Modules:		
Loop-IP6416-S-SA-G	Single AC power plug-in module (100 to 240 Vac)	For power redundancy, order a second power module
Loop-IP6416-S-SD48-G	Single -48 Vdc power plug-in module (-36 to -75 Vdc)	For AC choose an appropriate power cord
Conversion Cable		
Loop-ACC-CAB-DB25M-100-8BNM	One DB25 pin Male to eight BNC Male Extension cable (Length: 100 cm)	
Loop-ACC-CAB-DB25M-100-4RJM	One DB25 pin Male to four RJ48C Male Plugs Extension cable (Length: 100 cm)	
Power Cord		
Loop-ACC-PC-USA	AC power cord for Taiwan/America	U
Loop-ACC-PC-EU	AC power cord for Europe	..
Loop-ACC-PC-UK	AC power cord for UK	-L-
Loop-ACC-PC-AUS	AC power cord for Australia	↑
Loop-ACC-PC-CH	AC power cord for China	↑

■ Where **s1, s2, s3** and **s4** are used to select hot swappable plug-in E1/T1 modules for slots 1-4.

s1, s2, s3 and s4=	Description	Note
ETD	Quad E1/T1 with DB25 female connector (E1-120 ohms/E1-75 ohms /T1 software selectable)	Future option for T1
EM	Quad E1-75 ohm with mini-BNC	
ETR	Quad E1/T1 with RJ48C connector (E1-120 ohms/T1 software selectable)	Future option for T1

- Where **pp1** is used to select 1st power module:

pp1 =	Description	Note
P9	Hybrid 100 to 240 Vac and -48 Vdc (-36 to -75 Vdc) coexist fixed power supply	<ul style="list-style-type: none"> P9 is a fixed power supply. If you order P9 then you cannot select any items for pp2 All plug-in power modules are interchangeable. For AC choose an appropriate power cord NOTE 1
SA	Single AC power plug-in module (100 to 240 Vac)	
SD48	Single -48 Vdc power plug-in module (-36 to -75 Vdc)	

- Where **pp2** is used to select 2nd power module.

pp2 =	Description	Note
SA	Single AC power plug-in module (100 to 240 Vac) for ANSI only	<ul style="list-style-type: none"> If you ordered the P9 fixed power supply in pp1 above, then you cannot select any items for pp2 and must leave the pp2 order field blank For redundancy purposes, ordering a second plug-in module will provide dual power. You cannot order a second SA for ETSI unit. For AC choose an appropriate power cord NOTE 1
SD48	Single -48 Vdc power plug-in module (-36 to -75 Vdc)	

NOTE 1: The combinations of pp1 and pp2 power modules:

For ANSI unit:

- pp1=P9** (Fixed AC and DC coexistent power at rear)
- pp1=SA** (Single AC power plug-in in front or at rear)
- pp1=SD48** (Single DC power plug-in at rear)
- pp1=SD48, pp2=SD48** (Dual hot-swappable DC, both rear plug-in)
- pp1=SA, pp2=SA** (Dual hot-swappable AC, one front and one rear plug-in)
- pp1=SA, pp2=SD48** (Hot-swappable AC front and DC rear plug-in)

Note: For ANSI unit, DC power is available in rear panel only

For ETSI unit (all power modules in front):

- pp1=P9** (Fixed AC and DC coexistent power)
- pp1=SA** (Single AC power plug-in)
- pp1=SD48** (Single DC power plug-in)
- pp1=SD48, pp2=SD48** (Dual hot-swappable DC power plug-in)

- Where **add1** must be used to select one daughter card. If add1 is not required leave this field blank.

	add1=	Description	Note
DTE daughter card	DTE	EIA530/V.36 (DB25 connector) + RS232 (DB9 connector) daughter card	<ul style="list-style-type: none"> Select one daughter card only Future option
(1*9) Fiber Transceivers daughter card	NHB3S	Single mode 1*9, 155M, 1310 nm commercial (-0 to +70°C), 30 km, SC duplex optical connector	<ul style="list-style-type: none"> Select one daughter card only See Product Specifications below for optical connector information. Use WHD2S with WHE2S Use WHE2S with WHD2S Future option
	NHB5S	Single mode 1*9, 155M, 1310 nm commercial (-0 to +70°C), 50 km, SC duplex optical connector	
	NHB3F	Single mode 1*9, 155M, 1310 nm commercial (-0 to +70°C), 30 km, FC duplex optical connector	
	NHC2S	Single mode 1*9, 155M, 1550 nm commercial (-0 to +70°C), 15 to 20 km, SC duplex optical connector	
	NHCUS	Single mode 1*9, 155M, 1550 nm commercial (-0 to +70°C), 100 km, SC duplex optical connector	
	WHD2S	WDM mode 1*9 (Bi-direction), 155M, Tx 1310 nm / Rx 1550 nm commercial (-0 to +70°C), 15 to 20 km, SC simplex optical connector	
	WHE2S	WDM mode 1*9 (Bi-direction), 155M, Tx 1550 nm / Rx 1310 nm commercial (-0 to +70°C), 15 to 20 km, SC simplex optical connector	
SFP housing daughter card	SFPC	155M SFP (mini-GBIC) housing daughter card without SFP module	<ul style="list-style-type: none"> Order SFP modules separately from SFP table below. Future option

SFP Optical Module for Fast Ethernet (FE):

Fast Ethernet (FE)	MHBTW	Multi mode (mini GBIC) SFP, 155M, 1310nm commercial (0 to +70°C), 2Km, LC optical connector	<ul style="list-style-type: none"> · User 2 fibers for all SFP optical modules · Future option
	PHB3W	Single mode (mini GBIC) SFP 155M, 1310nm commercial (0 to +70°C), 30Km, LC optical connector	
	PHB5W	Single mode (mini GBIC) SFP 155M, 1310nm commercial (0 to +70°C), 50Km, LC optical connector	
	PHCUW	Single mode (mini GBIC) SFP 155M, 1550nm commercial (0 to +70°C), 1550nm, 100Km, LC optical connector	
	PHCXW	Single mode (mini GBIC) SFP 155M, 1550nm commercial (0 to +70°C), 120Km, LC optical connector	
	PHB3D	Single mode (mini GBIC) SFP 155M, 1310nm commercial (0 to +70°C), 30Km, LC optical connector with digital diagnostic monitoring	
	PHB5D	Single mode (mini GBIC) SFP 155M, 1310nm commercial (0 to +70°C), 1310nm, 50Km, LC optical connector with digital diagnostic monitoring	
	PHCUD	Single mode (mini GBIC) SFP 155M, 1550nm commercial (0 to +70°C), 100Km, LC optical connector with digital diagnostic monitoring	
	PHCXD	Single mode (mini GBIC) SFP 155M, 1550nm commercial (0 to +70°C), 120 Km, LC optical connector with digital diagnostic monitoring	

SFP Optical Module for Gigabit Ethernet (GBE):

Gigabit Ethernet (GBE)	MTAFW	multi-mode optical module with dual uni-directional fiber, 1.25G, 850nm, LC connector, 550M reach (8.5dBm)	<ul style="list-style-type: none"> · User 2 fibers for all SFP optical modules · Future option
	MTATW	multi-mode optical module with dual uni-directional fiber, 1.25G, 850nm, LC connector, 2Km reach (10dBm)	
	MTAFD	multi-mode optical module with dual uni-directional fiber, 1.25G, 850nm, LC connector with DDM, 550M reach (8.5dBm)	
	MTATD	multi-mode optical module with dual uni-directional fiber, 1.25G, 850nm, LC connector with DDM, 2Km reach (10dBm)	
	PTB1W	single-mode optical module with dual uni-directional fiber, 1.25G, 1310nm, LC connector, 10Km reach (15dBm)	
	PTB3W	single-mode optical module with dual uni-directional fiber, 1.25G, 1310nm, LC connector, 30Km reach (20dBm)	
	PTB4W	single-mode optical module with dual uni-directional fiber, 1.25G, 1310nm, LC connector, 40Km reach (19dBm)	
	PTC5W	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector, 50Km reach (20dBm)	
	PTC6W	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector, 60Km reach (22dBm)	
	PTC8W	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector, 80Km reach (24dBm)	
	PTC9W	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector, 90Km reach (27dBm)	
	PTCVW	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector, 110Km reach (30dBm)	
	PTCXW	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector, 120Km reach (23dBm)	
	PTB1D	single-mode optical module with dual uni-directional fiber, 1.25G, 1310nm, LC connector with DDM, 10Km reach (15dBm)	
	PTB3D	single-mode optical module with dual uni-directional fiber, 1.25G, 1310nm, LC connector with DDM, 30Km reach (20dBm)	
	PTB4D	single-mode optical module with dual uni-directional fiber, 1.25G, 1310nm, LC connector with DDM, 40Km reach (19dBm)	
	PTC5D	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector with DDM, 50Km reach (20dBm)	
	PTC6D	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector with DDM, 60Km reach (22dBm)	
	PTC8D	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector with DDM, 80Km reach (24dBm)	
	PTC9D	single-mode optical module, with dual unidirectional fiber, 1.25G, 1550nm, LC connector with DDM, 90Km reach (27dBm)	

	PTCVD	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector with DDM, 110Km reach (30dBm)	
	PTCXD	single-mode optical module with dual uni-directional fiber, 1.25G, 1550nm, LC connector with DDM, 120Km reach (23dBm)	

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

■ Where **add2** is used to select an external clock. If an external clock is not required leave this field blank.

add2=	Description	Note
EXT	External Clock	

■ Where **add3** is used to select a LCD display. If an LCD display is not required leave this field blank.

add3=	Description	Note
LCD	LCD (2 x 16) front panel display	LCD is supported for ANSI unit only

Loop-IP6416 IP I-MUX Product Specifications

Optical Module Characteristics for Fast Ethernet (FE)

Optical Module	Fiber Direction	Wavelength (nm)	Connector	Distance (km)	Power (dB)
NHB3S	Single mode dual uni-directional fiber	1310	SC (Subscriber Connector)	30	19
NHB5S	Single mode dual uni-directional fiber	1310	SC (Subscriber Connector)	50	30
NHB3F	Single mode dual uni-directional fiber	1310	FC (Fiber Connector)	30	19
NHC2S	Single mode dual uni-directional fiber	1550	SC (Subscriber Connector)	15~20	17
NHCUS	Single mode dual uni-directional fiber	1550	SC (Subscriber Connector)	100	34
WHD2S	WDM mode single bi-directional fiber	1310 Tx / 1550 Rx	SC (Subscriber Connector)	15~20	19
WHE2S	WDM mode single bi-directional fiber	1550 Tx / 1310 Rx	SC (Subscriber Connector)	15~20	19

Optical SFP Module Characteristic for Fast Ethernet (FE)

SFP Optical Module	Direction	Wavelength (nm)	Connector	Distance
MHBTW	Dual uni-directional fiber	1310nm	LC	2 km
PHB3W	Dual uni-directional fiber	1310nm	LC	30 km
PHB5W	Dual uni-directional fiber	1310nm	LC	50 km
PHCUW	Dual uni-directional fiber	1550nm	LC	100 km
PHCXW	Dual uni-directional fiber	1550nm	LC	120 km
PHB3D	Dual uni-directional fiber	1310nm	LC (with DDM)	30 km
PHB5D	Dual uni-directional fiber	1310nm	LC (with DDM)	50 km
PHCUD	Dual uni-directional fiber	1550nm	LC (with DDM)	100 km
PHCXD	Dual uni-directional fiber	1550nm	LC (with DDM)	120 km

Optical SFP Module Characteristic for Gigabit Ethernet (GBE)

SFP Optical Module	Direction	Wavelength (nm)	Connector	Distance
MTAFW	dual uni-directional fiber	850	LC without DDM	550 m
MTATW	dual uni-directional fiber	850	LC without DDM	2 km
MTAFD	dual uni-directional fiber	850	LC with DDM	550 M
MTATD	dual uni-directional fiber	850	LC with DDM	2 km
PTB1W	dual uni-directional fiber	1310	LC without DDM	10 km
PTB3W	dual uni-directional fiber	1310	LC without DDM	30 km
PTB4W	dual uni-directional fiber	1310	LC without DDM	40 km
PTC5W	dual uni-directional fiber	1550	LC without DDM	50 km
PTC6W	dual uni-directional fiber	1550	LC without DDM	60 km
PTC8W	dual uni-directional fiber	1550	LC without DDM	80 km
PTC9W	dual uni-directional fiber	1550	LC without DDM	90 km
PTCVW	dual uni-directional fiber	1550	LC without DDM	110 km
PTCXW	dual uni-directional fiber	1550	LC without DDM	120 km
PTB1D	dual uni-directional fiber	1310	LC with DDM	10 km
PTB3D	dual uni-directional fiber	1310	LC with DDM	30 km
PTB4D	dual uni-directional fiber	1310	LC with DDM	40 km
PTC5D	dual uni-directional fiber	1550	LC with DDM	50 km
PTC6D	dual uni-directional fiber	1550	LC with DDM	60 km
PTC8D	dual uni-directional fiber	1550	LC with DDM	80 km
PTC9D	dual uni-directional fiber	1550	LC with DDM	90 km
PTCVD	dual uni-directional fiber	1550	LC with DDM	110 km
PTCXD	dual uni-directional fiber	1550	LC with DDM	120 km

NOTE:

1. WHD2S (Master) is used with WHE2S (Slave).
2. For other special optical modules, please contact your nearest Loop sales representative.

WAN - E1 Interface

Line Rate	2.048M bps ± 50 ppm
Line Code	AMI/ HDB3
Framing	ITU G.704
Output signal	ITU G.703
Input Signal	ITU G.703
Connector	RJ48C (120 ohm), DB25 (120 ohm) or BNC (75 ohm)
Jitter	ITU G.823

WAN - T1 Interface

Line Rate	1.544M bps ± 32 ppm
Line Code	AMI / B8ZS (selectable)
Framing	D4 / ESF (selectable)
Output Signal	DS1 with 0, -7.5, -15 dB LBO
Input Signal	DS1 with 0 dB to -26 dB ALBO
Connector	RJ48C or DB25
Pulse Template	Per AT&T TR 62411
Surge Protection	FCC Part 68 SubPart D

Tributary-Fast Ethernet (FE)

Ethernet functions	10/100BaseT, IEEE802.3 Auto-negotiation (10/100M) Auto MDI/MDIX Full or half duplex
Connector	RJ45

SNMP Ethernet

Ethernet functions	10/100BaseT, IEEE802.3 Auto-negotiation (10/100M) Auto MDI/MDIX Full or half duplex
Connector	RJ45

Tributary - Optical Fast Ethernet

Speed	100M Base-FX
Connector	FC/SC, LC

Tributary – Combo Gigabit Ethernet (GBE)

Speed	10/100/1000M bps
Connector	RJ45 for twisted pair GBE, LC for optical GBE, auto detection

Tributary - EIA530/V.36

Data Rate	N x 64K bps (N= 1 to 128), 64K to 8.192M bps
Connector	DB25S, female, DCE

Tributary - RS232 Tributary Interface

Rate	up to 19.2K bps, Asynchronous
Connector	DB9,female, DCE

Clock Source

Primary Clock	E1/T1, V.36, Internal, external BNC External BNC is manufacture option. The type can be any one of a) 2.048M bps E1-120, b)2.048M bps E1-75 and c) 1.544M bps T1, which are software selectable
Secondary Clock	E1/T1, V.36, Internal, external (manufacture option)

Alarm Relay

Alarm Relay	Fuse alarm and performance alarm
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Management

LEDs	Multi-color LEDs
ACO	A button of alarm cut-off
LCD	2 line by 16 character LCD with keypad
Console port	Electrical: RS232, DCE Protocol: Menu driven VT-100 Connector: DB9S, female
Telnet	Access via SNMP Ethernet port
SNMP	SNMPv1
Inband Management	Inband management in traffic bandwidth

Diagnostics Test

Loopbacks	E1/T1 Line Loopback
Bert	Off/QRSS/PRBS/2 ⁿ 11-1/2 ⁿ 23-1

Performance Monitor

E1/T1 Performance

Performance Store	Last 24 hours performance in 15-minute intervals and last 7 days in 24-hour summary line, user
Performance Reports	Date & Time, Errored Second, Unavailable Second, Bursty Errored Second, Severe Errored Second count.
Monitor Registers	User, Line
Alarm History	Alarm Type (i.e. Master Clock Loss, RAI, AIS, LOS, BPV, ES, UAS)
Alarm Queue	Maximum 100 alarm records which record the latest alarm type, location, and date & time
Alarm Threshold	BPV, ES, UAS

Power

AC module	100 to 240 Vac
-48Vdc module	-36 to -75 Vdc
AC and DC module	100 to 240 Vac and -48 Vdc (-36 to -75 Vdc) fixed on panel
Power Consumption	< 30 watts

Physical

Dimensions	438 mm x 44 mm x 228 mm (WxHxD)
Temperature	0 -50°C
Humidity	0-95% RH (non condensing)
Mounting	Desk-top stackable, wall mount

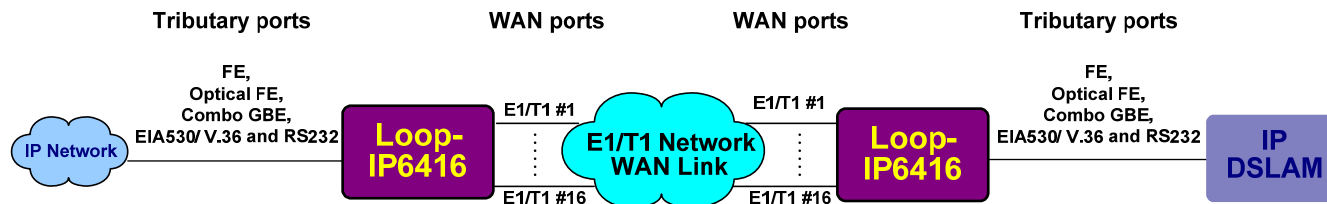
Standards Compliance

ITU-T	G.704, G.705, G.775, G.806, G.7041/Y.1303, G.7042/Y.1305, G.7043/Y.1343, G.8021/Y.1341, G.8040/Y.1340
ATIS/ANSI	T1.107
IEEE	802.3
IETF	RFC1661

Certification

EMC	EN55022 Class A, EN55024, FCC Part 15 Class A
Safety	EN60950-1, IEC60950-1

Application Illustration



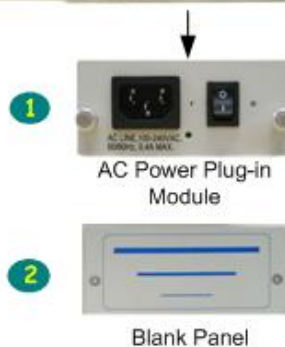
ANSI Unit Front Panel Views



Panel 1 ANSI Unit Front Panel with LCD

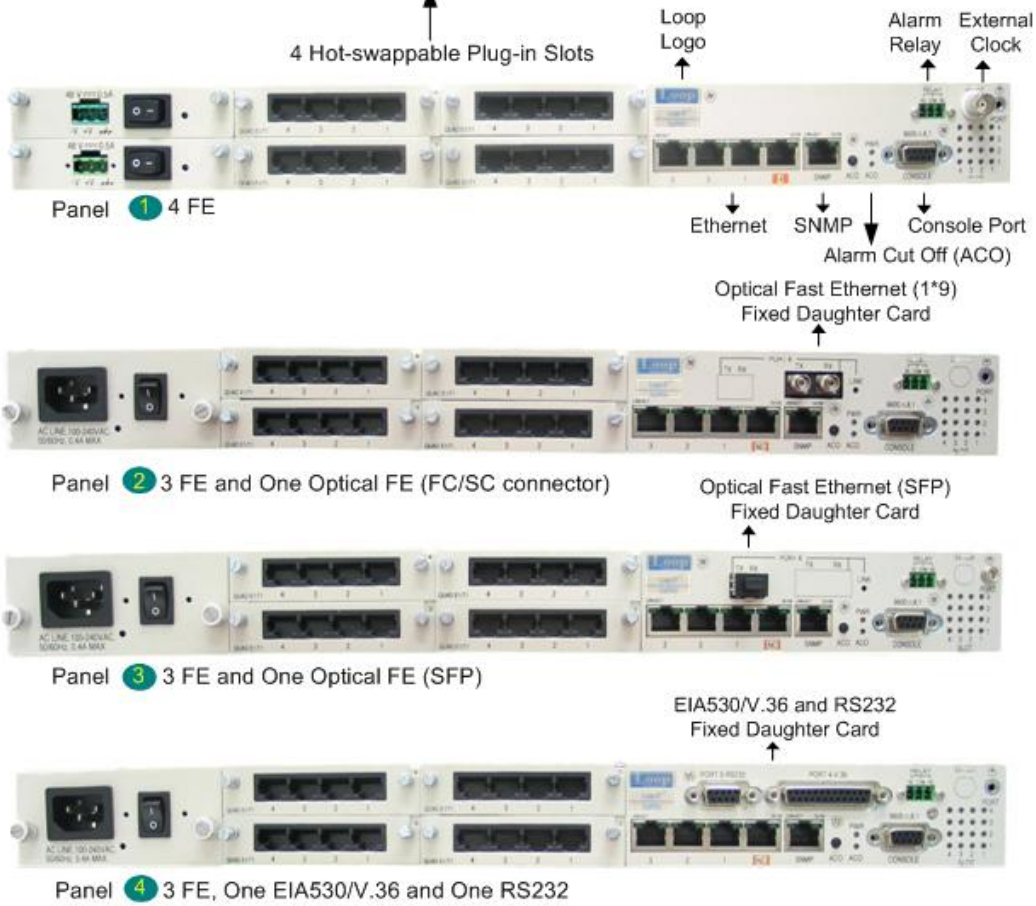


Panel 2 ANSI Unit Front Panel without LCD



ANSI Unit Rear Panel Views and ETSI Unit Front Panel Views

- 1 Quad E1/T1 (RJ48C connector) Plug-in Module
- 2 Quad E1/T1 (DB25 connector) Plug-in Module
- 3 Quad E1 (BNC connector) Plug-in Module
- 4 Blank Panel



- 1 -48 Vdc Power Plug-in Module
- 2 AC Power Plug-in Module
- 3 AC and DC (coexistent) Power Fixed Module
- 4 Blank Panel
- 5 Blank Panel

Note: ANSI: no logo, ETSI: with logo

ETSI Rear Panel Views



Loop-IP 6416 Maximum Capacity Reference Table

Combination	Max. Capacity of WAN port	Max. Capacity of Tributary Port on Main Board	Max. Capacity of Tributary on a Fixed Daughter Card	Note
Combination 1	16 E1/T1	4 FE	No daughter card	
Combination 2	16 E1/T1	3 FE	1 optical FE (FC/SC connector)	Future option
Combination 3	16 E1/T1	3 FE	1 optical FE (LC connector)	Future option
Combination 4	16 E1/T1	3 FE	2 combo GBE	Future option
Combination 5	16 E1/T1	3 FE	1 EIA530/V.36 and 1 RS232	Future option



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
sales@loop.com.tw

Taipei, Taiwan

6F, No. 36, Ally 38,
Lane 358,
Rui Guang Road, Neihu,
Taipei, Taiwan 11492
Tel:+886-2-2659-0399
Fax:+886-2-2659-2325
michael_tzeng@loop.com.tw

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

99 Suquian Road
China-Singapore
Suzhou Industrial Park
Suzhou 215021 China
Tel:+86-512-6252-0456
Fax:+86-512-6252-7641
chowfei@looptech.com.cn
chowfei@looptech.com.cn

Tianjin China

No240 Baidi Road
Nankai District
Tianjin 300192 China
Tel:+86-22-8789-4027
Fax:+86-22-8789-0344
wym@loop-tj.com