# Loop-G7860A PTN
## MPLS/CE Packet Transport Network



**ETSI Front View of G7860A**

## Description

G7860A supports both MPLS-TP and Carrier Ethernet (EPL, EVPL, EPLAN, EVC defined in MEF) for packet transportation. In addition to native Ethernet transport, G7860A can be used as the gateway for PDH and SDH/SONET networks to enter PSNs using Circuit Emulation and Encapsulation technologies. Encapsulation technologies include TDMoE, TDMoIP, and TDMoMPLS. Circuit Emulation include CESoPSN (NxDS0/64K) with CAS, SAToP (Unframed E1/T1), T3, and CEP (SDH/SONET paths). Pseudowires make grooming and multiplexing DS0, E1/T1, T3 and SDH/SONET paths easier, and service integrity can also be monitored and protected via packet network protection schemes.

One G7860A with up to 81G packet switching capacity supports six GbE/10GbE SFP+ and four 1GbE SFP built-in interfaces along with 16 E1/T1 built-in ports. With two hot-swappable plug-in slots, the system capacity can be scaled up with additional E1/T1 and T3 ports, STM-n/OC-n, or GbE electrical/optical interfaces.

G7860A provides high availability and reliability required by Carrier, Power Utility, Military, Government and Transportation applications by supporting MPLS-TP LSP 1:1/1+1 protection and ERPS, with protection switching time <50ms. Ethernet and MPLS section and end-to-end OAM are also provided for monitoring service integrity and performance. The compact G7860A is only 1U height, but its powerful functions enable customers to provision a service-grooming hub, ring, or mesh 10G packet network with ultimate ease.

## Features

### Mechanical and Electrical

- 1U height, 19” width ETSI unit (front access)
- Power supply: hot swappable DC/AC, dual for redundancy
- Operating Temperature: -20 ºC to 65 ºC

### System Capacity

- Up to 6 x GbE/10GbE SFP+ ports
- Up to 16 x 1GbE Base-T
- Up to 20 x 1GbE SFP
- Up to 80 x E1/T1 ports
- Up to 8 x STM-1/OC-3 ports or 2 x STM-4/OC-12 ports
- Up to 4 x STM-1/OC-3 MSP pairs or 2 x STM-4/OC-12 pairs
- 16 x E1/T1 ports with SCSI interface
- Up to 12 x DS3 ports
- Up to 8 x PoE/PoE+ ports
- Up to 4 x PoE/PoE+/PoE++ ports

### TDM Pseudowire Services

- Circuit Emulation
  - DS0 (64K timeslots): CESoPSN (NxDS0/64K) with CAS & multiframe PW
  - Unframed E1/T1: SAToP PW
  - VC-3/4/11/12, VT-1.5/2, STS-1/3: CEP PW
- PDH Timing recovery: ACR/DCR/System
- ACR/DCR support
  - 32TE1 card: up to 32 instances
  - MB E1/T1: up to 16 instances
  - B16 card: up to 256 instances
- SDH Circuit Emulation over Packet (CEP)
- Encapsulation
  - PW/LSP (TDM over MPLS-TP),
  - MEF 8 (TDM over Ethernet),
  - TDM over IP
- PDH cross-connection to SDH/SONET
- DS0 cross-connection
  - Two-way FE1(N*DS0) to FE1/VC12/STM1

### MPLS-TP
- Any Ethernet port can be configured as NNI (MPLS port) or UNI (Ethernet service port)
- Bi-directional LSP
- Static LSP/PW provisioning via NMS
- Ethernet (VPWS, VPLS, H-VPLS) and TDM (CESoPSN, CEP, and SAToP) services
- MPLS-TP OAM and QoS
- TDM PW Support:
  - 32 TE1 card: up to 256 pseudowires
  - MB E1/T1: up to 256 pseudowires
  - B16 card: up to 512 pseudowires
  - DS3 card: up to 168 pseudowires

### Carrier Ethernet
- L2 Switching/Bridging
- STP, RSTP, MSTP
- LLDP
- Port based VLAN and port isolation
- VLAN Stacking (Q-in-Q)
- CE OAM
  - CFM: Ethernet Service OAM (802.1ag/Y1731)
  - EFM: Ethernet Link OAM (802.3ah)
- Flow Control
- Link Aggregation Control Protocol (LACP)
- Jumbo Frame (MTU) = 9600
- EPL, EVPL, EP-LAN, EPV-LAN, EP-Tree
- E-Access: EPL-Access, EPVL-Access

### Network Protection
- MPLS-TP
  - LSP 1+1/1:1
  - LSP E2E protection switching < 50ms
  - PW Redundancy
  - Based on TP OAM for fault detection
- CE
  - ERPS Ring (G.8032) Protection
  - ELPS (G.8031) Linear Protection
- SDH/SONET
  - STM-n/OC-n MSP 1+1 Protection

### Management
- Fully manageable via SNMP (v1, v2, v3)
- Fully manageable via CLI
  - Serial port
  - SSH, Telnet via Ethernet
- GbE Interface in-bands
- Account Security
  - Two types of privileges: Operator (read only) and Administrator (read and write)
  - Radius Client and 802.1x Authentication
- Upload/Download NE configuration
  - TFTP
  - SFTP
- Syslog, NTP

  cross-connection
  - Two-way FE1(N*DS0) to FE1(N*DS0) cross-connection

### Ethernet Pseudowire Services
- E-Line, E-LAN, E-Tree services as defined by MEF 9 and 14 and using VPWS/VPLS
- Native Ethernet packets supported
- Encapsulation: PW/LSP (MPLS-TP), VLAN tagging (1Q), VLAN double tagging (Q-in-Q)

### VPLS
- VPLS & H-VPS bridging
- 32K MAC addresses
- 256 VPLS instances per device
- Split horizon to prevent forwarding loops

### CoS/QoS
- 8 Priority Queues
- Scheduling: Strict Priority, WRR with Hierarchy
- Ingress Policing & Egress Shaping per service
- CIR / PIR (EIR) 2-rate-3-color
- MPLS: TC/EXP-Inferred-PSC (Per Hop Behavior Scheduling Class) LSP

### Timing
- SSM quality level compatible
- IEEE 1588 v2 (via SyncE only)
  - PTP Clocks: Ordinary/Boundary/Transparent
  - ToD (Time of day) output interface
  - 1-PPS (One Pulse per second) interface
  - G.8265.1 Profile (Frequency Synchronization)
- SyncE
  - Synchronous Ethernet from all built-in and plug-in GbE, 10GbE ports
  - ITU-T ESMC
- Stratum 3 timing
- TDM line clock: E1/T1 and STM/OC ports
- External clock input/output (2 Mbps / 2 MHz / 1.544 Mbps / PPS / ToD for Tx)

### Hardware Protection
- Dual-Power redundancy per box
- Dual-Box Redundancy
  - E1 port protection across two boxes
  - Ethernet port LAG across two boxes
  - STM-1/4 port MSP across two boxes

### L3 Routing
- VRF without multicast protocols
- ARP, Ping, Trace Route, Static Route
- VRRP
- RIP v1/v2
- OSPF v2
- Routing among Physical Ethernet ports, VLAN virtual port (VLAN routing), and PW ports.
- 32 Subinterfaces
- IGMP v2/v3
- PIM-SM
- NTP server/client

# Ordering Information

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

## Main Unit

| Model | Description | Notes |
|---|---|---|
| Loop-G7860A-S-**te1**-**tpr**-**opt**-**mgmt**-**G** | 1U height ETSI chassis with 4 GbE SFP ports, 6GbE/10GbE SFP+ ports, 1 Console, and 1 one Ethernet management port, two slots for plug-in modules specified below (order separately), and two power slots specified below (order separately). | - For the options of **te1**, **tpr**, **opt**, and **mgmt,** please refer to the tables below.<br>- For the options of IEEE 1588 v2 Precision Time Protocol (PTP) function, please refer to the table below.<br>- 10GbE ports can also support 1GbE SFP modules.<br>- Order two for dual-box redundancy |
| Loop-G7860A-S-CHB-**te1**-**tpr**-**opt**-**mgmt**-**G** | 1U height ETSI chassis with 4 GbE SFP ports, 6GbE/10GbE SFP+ ports, 1 Console, and 1 one Ethernet management port, two slots for plug-in modules specified below (order separately), and two power slots specified below (order separately).<br><br>Modules only applicable to the CHB chassis will be specified in the notes of each instance. | - For the options of **te1**, **tpr**, **opt**, and **mgmt,** please refer to the tables below.<br>- For the options of IEEE 1588 v2 Precision Time Protocol (PTP) function, please refer to the table below.<br>- 10GbE ports can also support 1GbE SFP modules.<br>- Order two for dual-box redundancy |

■ **te1** option specifies types of the built-in E1/T1 interface. Please select from the options below.

| te1 = | Description | Notes |
|---|---|---|
| 16TE1 | 16 port E1/T1 with SCSI interfaces | Conversion panels and cables are listed in the tables below. |
| [blank] | If blank, it means there are **NO E1/T1 ports** equipped on the Main Unit. | |

■ **tpr** option specifies types of the cooling system. Please select from the options below.

| tpr = | Description | Notes |
|---|---|---|
| FAN | Chassis with 1 internal fan and 1 air filter for operating temperature: -20 ºC to 65 ºC | |
| FL* | Chassis with fan-less version for operating temperature: -20 ºC to 65 ºC | |

* Future option

■ **opt** option specifies types of the alarm board. Please select from the options below.

| opt = | Description | Notes |
|---|---|---|
| ALM | 4 ports of alarm input and<br>3 ports of alarm output | |
| [blank] | If blank, it means there in no alarm board equipped on the Main Unit. | |

■ **mgmt** option specifies types of configuration software tool. Please replace **mgmt** with your selection or leave it blank for nothing.

| mgmt = | Description | Notes |
|---|---|---|
| LCT | Loop-G7860A-LCT activation license | Used with Loop-LCT Graphical Configuration Software. |
| [blank] | No configuration tool for management | If the above configuration tool is required in the future, it can be activated by an activation license. |

| SFP Optical Modules |
|---|
| Please place your order using the 5-digit alphanumeric codes listed in the separate SFP Optical Module Brochure.<br>**NOTE 1:** Non-Loop SFP modules are not guaranteed to work with our equipment. It is strongly recommended to buy Loop-logo SFP modules.<br>**NOTE 2:** Non-Loop 10G SFP modules do not work with our equipment. Please buy Loop-logo modules for 10G SFP functions. |

| Feature Activation License | |
|---|---|
| **IEEE 1588 v2 PTP Software Upgrade (optional)** | |
| Loop-G7860A-1588UPGR | Software Upgrade to support IEEE 1588v2. Customers who desire to use the IEEE 1588 v2 Precision Time Protocol (PTP) function can purchase this option. This option will provide an activation code and instructions on how to activate the function on the device. G.8265.1 profile (frequency synchronization) is only available on hardware sub-version 2. |
| Loop-G7860A-LCTLIC | Feature Activation License for G7860A to support LCT Graphical Configuration Software. **Note: Loop-LCT Software is purchased separately.** |

## Plug-in Modules

**Plug-in Modules for** Main Unit with FAN version (Loop-G7860A-S-**te1**-**FAN**-**G** and Loop-G7860A-S-CHB-**te1**-**FAN**-**G**)

| Model | Description | Notes |
|---|---|---|
| Loop-G7860A-32TE1-**G** | 32-port T1 or 32-port E1 (software-configurable 75 ohm or 120 ohm) card with SCSI interfaces for operating temperature: -20 ºC to 65 ºC | Please order separately for conversion panels and cables listed in below tables. |
| Loop-G7860A-B16-**G** | Four STM-1/OC-3 or one (w/ or w/o protection) STM-4/OC-12 interfaces w/o SFP (mini-GBIC) optical modules for operating temperature: -20 ºC to 65 ºC. SDH/SONET software configurable. | Please order SFP optical modules separately. See separate SFP module brochure |
| Loop-G7860A-6DS3-**G** | 6 port DS3 card with DIN 1.0/2.3 connectors for operating temperature: -20 ºC to 65 ºC | - 6DS3 plug-in module does not support T2 functions.<br>- For 6DS3 Y-protection, it is required to use with the 6DS3 Y-box (Loop-ACC-Y-12RFC-6BNC-6DS3-**G**) |
| Loop-G7860A-8SFP-**G** | Eight port GbE card with SFP housing for operating temperature: -20 ºC to 65 ºC | Please order SFP optical modules separately. See separate SFP module brochure |
| Loop-G7860A-8SFP-02-**G*** | Eight port GbE/FE card with SFP housing for operating temperature: -20 ºC to 65 ºC | Please order SFP optical modules separately. See separate SFP module brochure |
| Loop-G7860A-8GE-**G** | Eight 1000/100/10M Twisted Pair Ethernet Functions are supported. | |
| Loop-G7860A-8GE-8POE-**G** | Eight ports of PoE/PoE+ capability on **port (P1~P8)**. Supports up to 30W per port. | - Applicable to **G7860A CHB** version only<br>- Under the limitation of total 150W per card.<br>- Supported from S2 slot only. |
| Loop-G7860A-8GE-4POEP-**G** | Four ports of PoE/PoE+/PoE++ capability on **port (P5~P8)**. Supports up to 90W per port. | - Applicable to **G7860A CHB** version only<br>- Under the limitation of total 150W per card.<br>- Supported from S2 slot only. |

**Plug-in Modules for Main Unit with Fan-Less version (**Loop-G7860A-S-**te1-FL-G***)

| Model | Description | Notes |
|---|---|---|
| Loop-G7860A-8GE-FL-**G*** | Eight port Gigabit Ethernet (1000/100/10M BaseT) card with RJ45 interfaces for operating temperature: -20 ºC to 65 ºC<br>Supports fan-less model | |
| Loop-G7860A-8SFP-FL-**G*** | Eight port GbE card with SFP interfaces for operating temperature: -20 ºC to 65 ºC<br>Supports fan-less model | Please order SFP optical modules separately. See separate SFP module brochure |
| Loop-G7860A-32TE1-FL-**G*** | 32 port T1/E1 (120-ohm) card with SCSI interfaces for operating temperature: -20 ºC to 65 ºC<br>Supports fan-less model | Please order separately for conversion panels and cables listed in Accessories. |
| Loop-G7860A-B16-FL-**G*** | Four STM-1/OC3 or STM-4/OC12 interfaces without SFP (mini-GBIC) optical modules for operating temperature: -20 ºC to 65 ºC<br>SDH/SONET software configurable.<br>Supports fan-less model | Please order SFP optical modules separately. See separate SFP module brochure |

* Future option

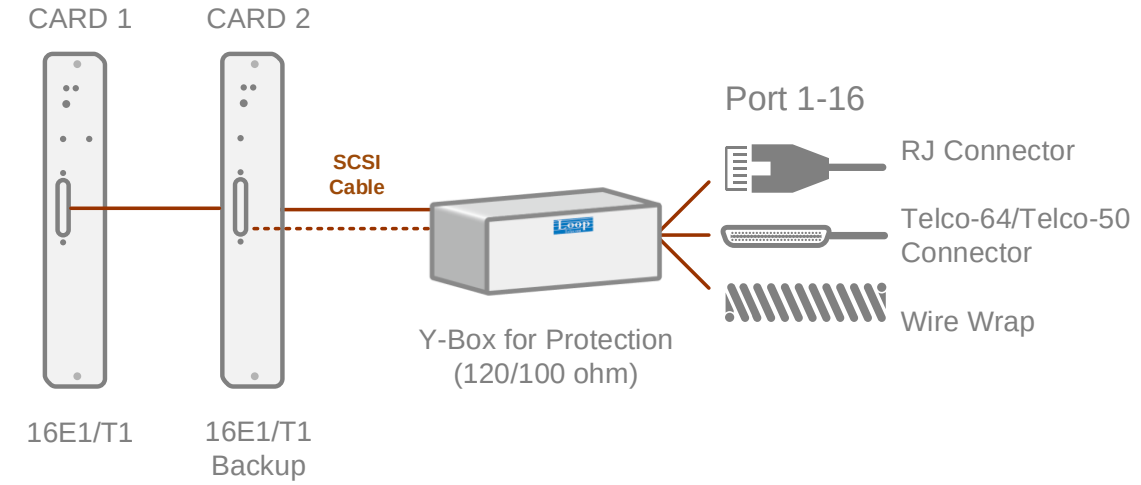
## Power Modules

| Model | Description | Notes |
|---|---|---|
| **Power Module** | | |
| Loop-G7860A-SD48-**G** | Single -48Vdc power plug-in module<br>(Input voltage: -36 to -72 Vdc) | - Order two power modules to provide power redundancy.<br>- SD48 power module is applicable to both **G7860A** and **G7860A CHB** chasses.<br>- Applicable for both fan and fan-less version.<br>- Power modules for both AC and DC are situated in the front and back of the G7860A panel.<br>- For AC, please order an appropriate power cord separately from accessary section below.<br>- AC module protrudes from the panel after being mounted.<br>- Not applicable for POE+/POE++ cards |
| Loop-G7860A-SA-**G** | Single AC power plug-in module<br>(Input voltage: 100 to 240 Vac) | |
| Loop-G7860A-SD55-**G** | Single -55Vdc power plug-in module supplies POE functions (Input voltage: -55 to -58 Vdc) | - Order two power modules to provide power redundancy.<br>- SD55 power module is applicable to **G7860A CHB** chassis only.<br>- For non-POE application, the input voltage is -36 to -72 Vdc.<br>- Please note that **all** POE+/POE++ cards (Loop-G7860A-8GE-8POE-**G**, Loop-G7860A-8GE-4POEP-**G**, and Loop-G7860A-8GE-**G**) require usage of SD55. |

## Accessories

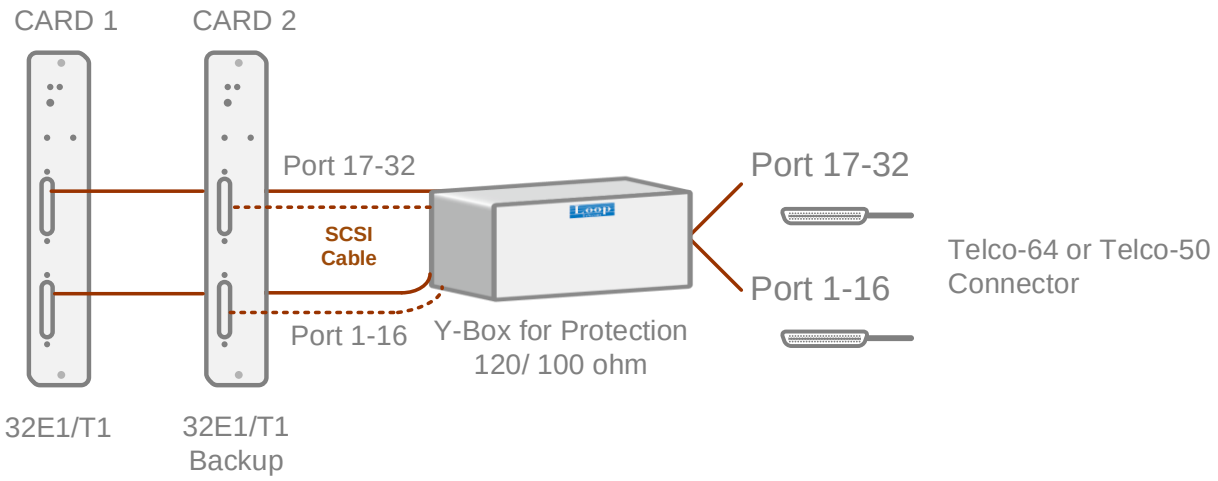
| Model | Description | Notes |
|---|---|---|
| **Power Cord** | | |
| Loop-ACC-PC-C5-USA | AC power cord for Taiwan/America | |
| Loop-ACC-PC-C5-EU | AC power cord for Europe | |
| Loop-ACC-PC-C5-UK | AC power cord for UK | |
| Loop-ACC-PC-C5-AUS | AC power cord for Australia | |
| Loop-ACC-PC-C5-CH | AC power cord for China | |
| **Conversion Panels** | | |
| Loop-ACC-P-1SCSI-16RJ-G  | 16-port 1u panel for one SCSI to 16 RJ connectors without cable<br>432x44x23mm (WxHxD) | **Order One** for<br>Loop-G7860A-S-16TE1-FAN-ALM-G<br>Loop-G7860A-S-16TE1-FAN-G<br>**Order Two** for<br>Loop-G7860A-32TE-G<br>Loop-G7860A-32TE1-FL-G*<br><br>Please order Conversion Cable separately for connection between card and Conversion Panel.<br><br>- Used with:<br>Loop-G7860A-32TE1-G<br>Loop-G7860A-32TE1-FL-G*<br>Loop-G7860A-S-16TE1-FAN-ALM-G<br>Loop-G7860A-S-16TE1-FAN-G<br>Loop-O9400-R-16TE-G<br>Loop-O9400-R-32TE-G<br>Loop-O9400-R-63TE-G<br>Loop-O9500-R-16TE-G<br>Loop-O9500-R-32TE-G<br>Loop-O9500-R-63TE-G |
| Loop-ACC-P-1SCSI-16WW-G  | 16-port 1u panel for one SCSI to 16 Wire Wrap connectors without cable<br>432x44x40mm (WxHxD) | |
| Loop-ACC-P-1SCSI-16BNC-G  | One SCSI to sixteen BNC (1.5u height) without cable | **Order Two** for<br>Loop-G7860A-32TE-G<br><br>For use in E1-75 mode only |
| **6DS3 Y-box for 6DS3 plug-in module** | | |
| Loop-ACC-Y-12RFC-6BNC-6DS3-G  | 1U 6DS3 Y-box with twelve RF DIN 1.0/2.3 connectors to six BNC connectors without cable | - 6DS3 Y-box is required only when 6DS3 module Y-protection is needed.<br><br>- Dimension: 438x44x80mm (WxHxD)<br><br>- Weight: 1404g<br><br>- Used with Loop-G7860A-6DS3-G<br>- A pair of 19”/23” ear mounts is supplied<br><br>- Please purchase 24 pcs of coaxial cable (Loop-ACC-CAB-MRFC-120-MRFC-G) separately for connection between 6DS3 plug-in modules and 6DS3 Y-box |

**16- and 32-Port HS Y-box for 120/ 100 ohm**




**16-port HS Y-Box (120-ohm E1 / 100-ohm T1)**

**(Loop-ACC-Y-2SCSI-16RJ-G)**



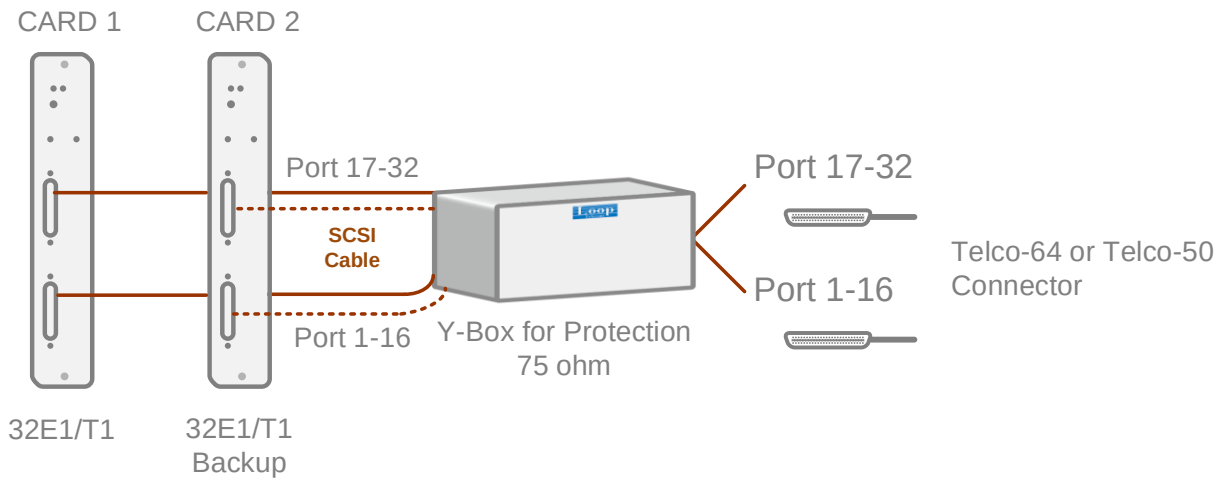

**32-port HS Y-Box (120 ohm E1 / 100 ohm T1)**

**(Loop-ACC-Y-4SCSI- 4T50P8-32TE-G)**

**(Loop-ACC-Y-4SCSI- 3T50P12-32TE-G)**

**(Loop-ACC-Y-4SCSI- 2T64P16-32TE-G)**

| | | |
|---|---|---|
| Loop-ACC-Y-2SCSI-16RJ-G  | 1u 16-port Y-box for two SCSI (120-ohm E1 or 100-ohm T1) to 16 RJ (E1/T1) connectors without cable | - Used with Loop-G7860A-S-16TE1-opt-G<br>- Dimension: 432x44x100mm (WxHxD) |
| Loop-ACC-Y-4SCSI-4T50P8-32TE-G  | 1u 32-port Y-box (120-ohm E1 or 100-ohm T1) for four SCSI to four TELCO-50 (120-ohm E1 or 100-ohm T1) connectors (8 ports per TELCO-50 connector) without cable | - Used with:<br>Loop-G7860A-32TE1-G<br>Loop-O9400-R-32TE-G<br>Loop-O9400-R-63TE-G<br>Loop-O9500-R-32TE-G<br>Loop-O9500-R-63TE-G<br>- Dimension: 432x44x100mm (WxHxD) |
| Loop-ACC-Y-4SCSI-3T50P12-32TE-G  | 1u 32-port Y-box (120-ohm E1 or 100-ohm T1) for four SCSI to three TELCO-50 (120-ohm E1 or 100-ohm T1) connectors (12 ports to the first TELCO-50 connector, 12 ports to the | |

| | | |
|---|---|---|
| | second TELCO-50 connector and 8 ports to the third TELCO-50 connector) without cable | |
| Loop-ACC-Y-4SCSI- 2T64P16-32TE-**G**  | 1u 32-port Y-box (120-ohm E1 or 100-ohm T1) for four SCSI to two TELCO-64 (120-ohm E1 or 100-ohm T1) connectors (16 ports per TELCO-64 connector) without cable | |
| **32-Port HS Y-box for 75 ohm** | | |
|   | | |
| **32-port HS Y-Box (75-ohm E1)** | | |
| Loop-ACC-Y-4SCSI- 2T64P16-32E75-**G**  | 1u 32-port Y-box for four SCSI (120-ohm E1) to two TELCO-64 (75-ohm E1) connectors (16 ports per TELCO-64 connector) without cable | - Dimension: 432x44x100mm (WxHxD)<br>- Used with<br>Loop-G7860A-32TE1-**G**<br>Loop-O9400-R-32TE-**G**<br>Loop-O9400-R-63TE-**G**<br>Loop-O9500-R-32TE-**G**<br>Loop-O9500-R-63TE-**G** |
| Loop-ACC-Y-4SCSI- 3T50P12-32E75-**G**  | 1u 32-port Y-box for four SCSI (120-ohm E1) to three TELCO-50 (75-ohm E1) connectors (12 ports to the first TELCO-50 connector, 12 ports to the second TELCO-50 connector and 8 ports to the third TELCO-50 connector) without cable | |
| Loop-ACC-Y-4SCSI- 4T50P8-32E75-**G**  | 1u 32-port Y-box for four SCSI (120-ohm E1) to four TELCO-50 (75-ohm E1) connectors (8 ports per TELCO-50 connector) without cable | |
| **Conversion Cable (All conversion cables are RoHS compliant)** | | |
| Loop-ACC-CAB-SCSI68M-200-1SCSI68M-**G**  | SCSI68/ Male to one SCSI68/ Male; Length 200 cm cable for connection between Card and Conversion Panel. | - Used to connect G7860A and end device or intermediate panel.<br>- This cable is also compliant with O9400R and O9500R's Y-Box and conversion panels. |
| **Conversion Cable (All conversion cables are RoHS compliant)** | | |
| Loop-ACC-CAB-HDB15M-100-2BNCM-3RJ48M-DB9F-**G** | One HD-sub 15 pin/ Male connector to two BNC/ Male, three RJ48/ Male, and one DB9/ Female connector; Length: 100 cm | - Used for Clock interfaces, including external, PPS, and ToD clocks<br>- Used with:<br>Loop-G7860A-S-te1-tpr-opt-**G**<br>Loop-G7860A-S-CHB-te1-tpr-opt-**G**<br>Loop-O9400-R-CBPA-**G**<br>Loop-O9500-R-CBPD-**G**<br>Loop-O9500-R-CBPD-OW-**G**<br>Loop-O9500-R-CBPD-2POEP- |

| | | |
|---|---|---|
| | | **G** |
| Loop-ACC-CAB-SFP10G-100-SFP10G-AOC-**G** | Stacking cable using SFP+ 10Gbps AOC (Active Optical Cable)<br>Length: 100 cm | - Used to inter-connect two G7860A devices for dual-box redundancy.<br>- Order 5 pcs of stacking cables for a set of G7860A box redundancy. |
| Loop-ACC-CAB-SFP10G-200-SFP10G-AOC-**G** | Stacking cable using SFP+ 10Gbps AOC (Active Optical Cable)<br>Length: 200 cm | - Used to inter-connect two G7860A devices for dual-box redundancy.<br>- Order 5 pcs of stacking cables for a set of G7860A box redundancy. |
| **Connection Cable (All conversion cables are RoHS compliant)** | | |
| Loop-ACC-CAB-MRFC-120-MRFC-**G**<br> | Coaxial cable with RF DIN 1.0/2.3 male plugs at both ends<br>Length: 120 cm | - Used to connect the two 6DS3 plug-in modules to the DS3 Y-box<br>- Each 6DS3 Y-box will require 24 such connection cables.<br>- Each 6DS3 card will require 12 such connection cables |
| Loop-ACC-CAB-MRFC-300-BNC-**G**<br> | Coaxial cable with one RF DIN 1.0/2.3 Male to one BNC Male<br>Length: 300 cm | - Used to connect the DS3 ports on 6DS3/ G7860A with end device or intermediate panel.<br>- Each 6DS3 card will require 12 such connection cables |
| **User's Manual** | | |
| Loop-G7860A-UM | User's Manual and Command Line Reference Guide (optional, paper printed copy). Electronic version of both on a CD are already included as standard package. | |
| **SFP Optical Modules** | | |
| SFP (small form-factor pluggable) optical modules are **NOT** included. To order please check the SFP optical module brochure or contact your Loop sales representative. | | |
| **Blank Panels** | | |
| 30.002522.A00LF | Blank panel to cover empty power slot | |
| 30.001862.A00LF | Blank panel to cover empty slot 1 or slot 2 | |
| **Fan and Filter Modules** | | |
| Loop-G7860A-FAN-**G** | Combined Fan/Console port module. The console port is on the exterior, and the fan is located inside. | Fan and filter modules are included in main unit Loop-G7860A-S -te1-FAN-**G** and Loop-G7860A-S-CHB-te1-FAN-**G** models. Use this ordering code if original fan breaks.<br>For the fanless main unit Loop-G7860A-S-te1-FL-**G**, fan and filter are not required. |
| Loop-G7860A-FIL-**G** | Air filter module for the G7860A | |
| **Ear Mounts** | | |
| 19"/23" ear mounts | A pair of 19"/23" ear mounts is supplied as part of the standard package. For other sizes please contact your Loop sales representative. | |
| **VoIP Phone** | | |
| Loop-ACC-OW-2088-USA-**G** | Multifunctional IP Phone set with LCD. Includes an external AC power adaptor (AC 100~240V input and DC 5V/ 1A output) for USA/Taiwan | " |
| Loop-ACC-OW-2088-EU-**G** | Multifunctional IP Phone set with LCD. Includes an external AC power adaptor (AC 100~240V input and DC 5V/ 1A output) for Europe with plug adapter | " |

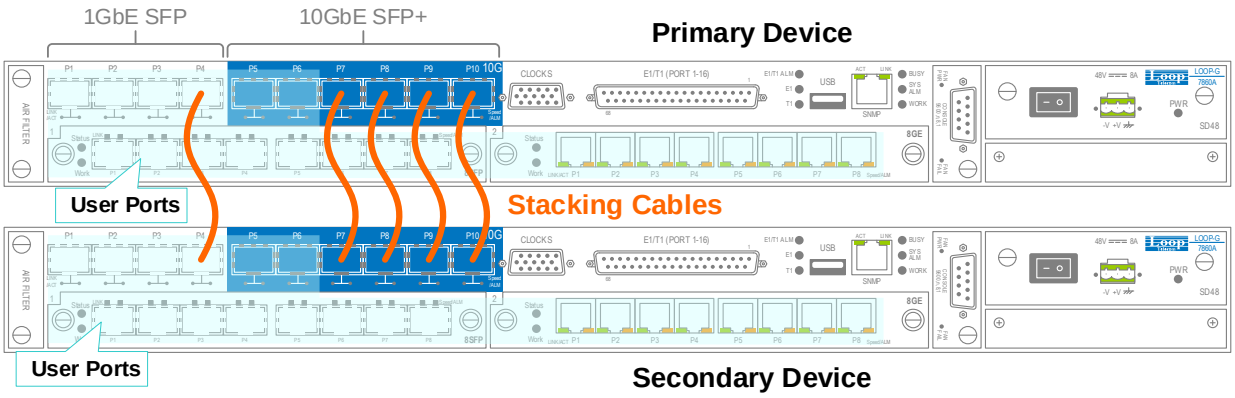
**Order Example #1:**

| **Main unit:** | |
|---|---|
| Loop-G7860A-S-16TE1-FAN-G | x 1 |
| **Plug-in modules:** | |
| Loop-G7860A-8GE-G | x 2 |
| **Power modules:** | |
| Loop-G7860A-SD48-G | x 2 |
| **Description:** | • One 1U height ETSI fan version Main Unit with 16 x E1/T1 with SCSI interfaces, 4 x GbE SFP ports; 6 x GbE/10GbE SFP/SFP+ ports, Console, and NMS RJ45 ports, operation temperature range is -20 ºC to 65 ºC;<br>• Two plug-in modules each with 8 x GbE (10/100/1000BaseT) RJ45 ports, operation temperature range is -20 ºC to 65 ºC;<br>• Two DC (-48Vdc input) power modules. |

**Order Example #2 (For Redundancy):**

| **Main unit:** | |
|---|---|
| Loop-G7860A-S-16TE1-FAN-G | x 2 |
| **AOC Stacking cables:** | |
| Loop-ACC-CAB-SFP10G<br>-100-SFP10G-G | x 5 |
| **Plug-in modules:** | |
| Loop-G7860A-8GE-G | x 2 |
| **Power modules:** | |
| Loop-G7860A-SD48-G | x 4 |
| **Description:** | • Two 1U height ETSI fan version Main Unit with 16 x E1/T1 with SCSI interfaces, 4 x GbE SFP ports; 6 x GbE/10GbE SFP/SFP+ ports, Console, and NMS RJ45 ports, operation temperature range is -20 ºC to 65 ºC;<br>• Five Stacking cables - SFP+ 10Gbps Active Optical Cables (AOC) ;<br>• Two plug-in modules each with 8 x GbE (10/100/1000BaseT) RJ45 ports, operation temperature range is -20 ºC to 65 ºC;<br>• Four DC (-48Vdc input) power modules. |

**Stacking cables (shown in orange) as used in G7860A Chassis Redundancy:**



# Loop-G7860A Product Specifications

*E1 Tributary Interface (plug-in card & built-in)*

| | |
|---|---|
| Number of ports | 32TE1 card: 32 ports, two SCSI connectors<br>Built-in: 16 ports, one SCSI connector |
| Line Rate | 2.048 Mbps ± 50 ppm |
| Line Code | AMI/ HDB3 |
| Framing | ITU G.704 (CRC: on/off, CAS: on/off, unframed) |
| Output Signal | ITU G.703 |
| Input Signal | ITU G.703 |
| Jitter | ITU G.823 |
| Connector | SCSI-II 68 pin |
| E1/T1 mode | Software configurable |
| Impedance | 75 ohm or 120 ohm (software configurable) |

*T1 Tributary Interface (plug-in card & built-in)*

| | |
|---|---|
| Number of ports | 32TE1 card: 32 ports, two SCSI connectors<br>Built-in: 16 ports, one SCSI connector |
| Line Rate | 1.544 Mbps ± 32 ppm |
| Line Code | AMI / B8ZS (selectable) |
| Framing | D4 / ESF/ ESF&T1.403/ OFF (clear channel) |
| Output Signal | DS1 with LBO Setting |
| Input Signal | DS1 |
| Pulse Template | Per AT&T TR 62411 |
| Connector | SCSI-II 68 pin |
| E1/T1 mode | Software configurable |
| Impedance | 100 ohm |

*B155/622 (B16) Interface (plug-in card)*

| | |
|---|---|
| Line Rate | 155/622 Mbps |
| Number of Channels | 1 x STM-4/OC-12 or 4 x STM-1/OC-3 |
| Protection | 1 x STM-4/OC-12 pair or 2 x STM-1/OC-3 MSP (1+1) pairs<br>Uni-directional /Bi-directional protection switching<br>Revertive/non-revertive protection switching |
| Operational Modes | SDH (STM-1/4) or SONET (OC3/12) mode software configurable |

*GbE Interface (plug-in card & built-in)*

| | | |
|---|---|---|
| Ports | Built-in | 4 SFP ports |
| | SFP card | 8 SFP ports, maximum = 2 cards per chassis |
| | 8GE card | 8 RJ45 ports, maximum = 2 cards per chassis |
| | 8GE-8POE card | 8 RJ45 ports with PoE/PoE+,<br>maximum = 1 card per chassis |
| | 8GE-4POEP card | 4 RJ45 ports with PoE/PoE+/POE++,<br>maximum = 1 card per chassis |

*GbE/10GbE Interface (Built-in)*

| | |
|---|---|
| Connector | SFP+; use SFP+ module for 10GbE and SFP module for GbE |
| Number of ports | 6 |

*T3 Interface*

| | |
|---|---|
| Number of ports | 6DS3 card: 6 ports, 12 DIN(RF) 1.0/2.3 connectors |
| Connector | DIN (RF) 1.0/2.3 |
| Line Rate | 44.736 Mbps |
| Line Code | B3ZS |
| Framing | M-13 / C-bit / Unframed |
| Output signal | ITU G.703 |
| input signal | ITU G.703 |
| pulse template | Bellcore GR-499-CORE |

**Note:** Only Loop brand optical/electrical SFP modules are certified with full compatibility with G7860A. Please refer to SFP module brochure for detailed SFP specifications.

### *Management and Administration*

| | |
|---|---|
| Management ports | VT-100 Console (DB9 connector) and Ethernet port (RJ45 connector) |
| CLI | Fully manageable with Command Line Interface (CLI) |
| Remote login | Telnet, SSH |
| SNMP | SNMP v1, v2, v3 via Ethernet port LAN connection |

### *QoS*

Eight priority queues
Scheduling – Strict Priority, Weighted Round Robin (WRR) with hierarchy
Ingress policing per service
Egress shaping per service
Two-rate, three-color – Committed Information Rate (CIR), peak or expected information rate (CIR/PIR)
E-LSP: EXP-Inferred PSC (Per Hop Behavior Scheduling Class) LSP. (label switching path)
Congestion management – Weighted Random Early Detection (WRED)

### *Physical and Environmental*

| | |
|---|---|
| Dimensions (W x H x D) | 438 mm x 44 mm x 225.5 mm (17.24” x 1.73” x 8.90”) |
| Net Weight | 4.0 Kg (8.82 lbs) |
| Operating Temperature | -20 to +65°C |
| Humidity | 5-95% RH (non-condensing) |
| Mounting | Desk-top stackable, rack mount |

### *Electrical*

| | |
|---|---|
| Power module | 2 modules per chassis for redundancy , AC + AC, DC + AC, or DC + DC |
| DC power module | -48Vdc (-36 to -72V), 8A (for CHA chassis)<br>-55Vdc (-55 to -58 Vdc), 7A (for PoE functions on CHB chassis) |
| AC power module | 100 to 240 V, 50/60Hz, 2A |

### *Power consumption*

| | |
|---|---|
| Main Unit | 45W |
| 32E1/T1 plug-in card | 11W |
| 8GE plug-in card | 7W |
| B16 plug-in card | 10W |
| DS3 plug-in card | 27W |

### *Standard Compliance*

**IEEE**

| | |
|---|---|
| 802.1d | STP |
| 802.1w | RSTP |
| 802.1s | MSTP |
| 802.1q | VLAN |
| 802.1ad | VLAN Tag Stacking (Q-in-Q) |
| 802.1ag | Ethernet OAM (CFM) |
| 802.3ad | Link Aggregation Control Protocol |
| 802.3ah | Ethernet in the First Mile (EFM) |
| 802.3x | Flow Control |
| 1588 v2 | Precision Time Protocol (PTP) |
| 802.1AB | Link Layer Discovery Protocol (LLDP) |

**RFC (IETF)**

| | |
|---|---|
| 6378 | MPLS-TP Linear Protection |
| 4842 | Circuit Emulation over Packet (CEP) |
| 3985 | Pseudowire End-to-end Emulation (PWE3) |
| 5806 | CESoPSN |

**ITU-T**

| | |
|---|---|
| G.8031 | ELPS |
| G.8032 | ERPS |
| G.8113.2 | MPLS-TP OAM |
| Y.1731 | Ethernet OAM |

**MEF**

8
9
14

**EMC/EMI**

FCC Part 15 Class A
EN 55032 Class A
BS EN 55032 Class A
EN 55035
BS EN 55035
EN 50121-4
IEC 61850-3*

**Safety**

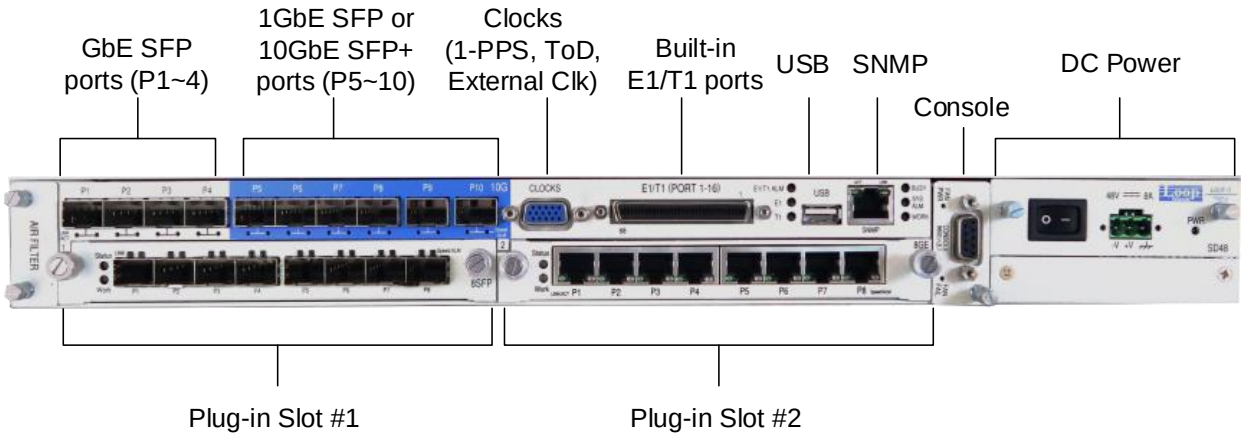
EN 62368-1
BS EN 62368-1

**UL94 Flame Class**

UL94V-0

* Future option

## Front Panel View




## Plug-in Modules

***32-port E1/T1 Plug-in Module (32TE1)***



***8-port GbE Plug-in Module (8GE)***



***B16 Plug-in Module (B16)***



***8-port GbE Plug-in Module with PoE/PoE+ (8GE-8POE)NOTE***



***6-port DS3 Plug-in Module (6DS3)***



***8-port GbE Plug-in Module with 4-port POE/POE+/POE++ (8GE-4POEP) NOTE***

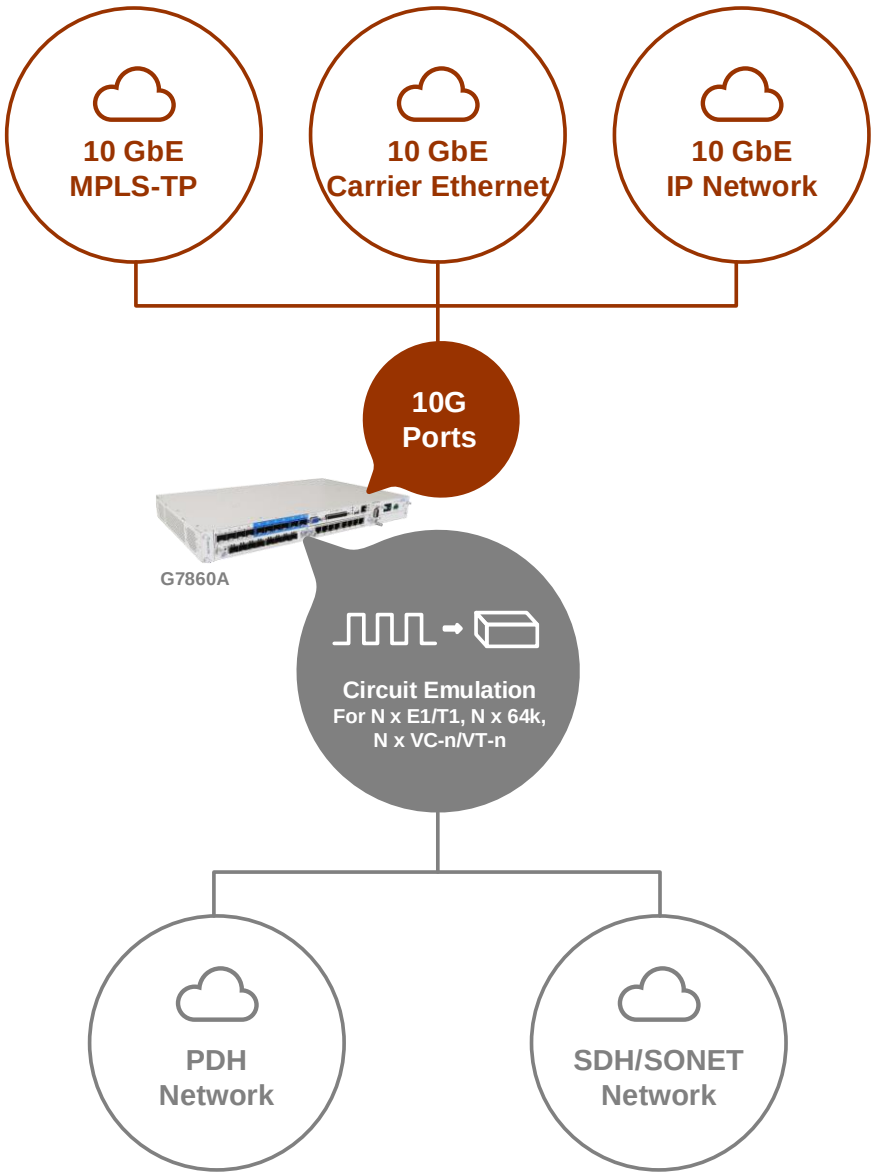


***8-port GbE Plug-in Module (8SFP)***



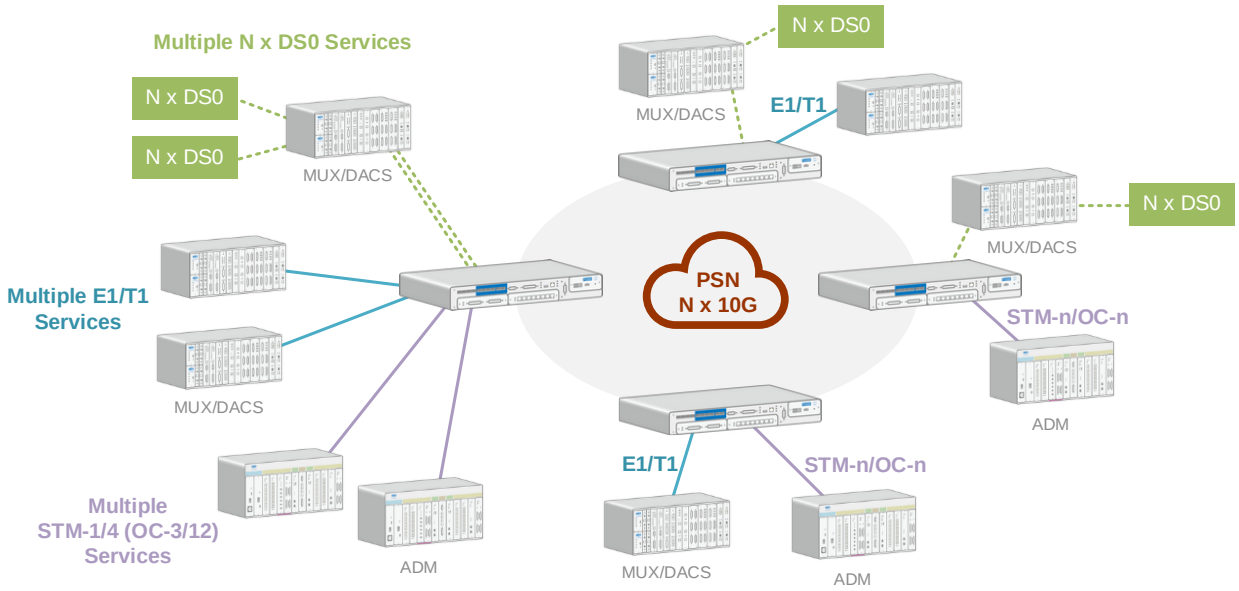
**NOTE: Can only be used in Plug-in Slot #2.**

## Application Illustration



## TDM Service Grooming/multiplexing

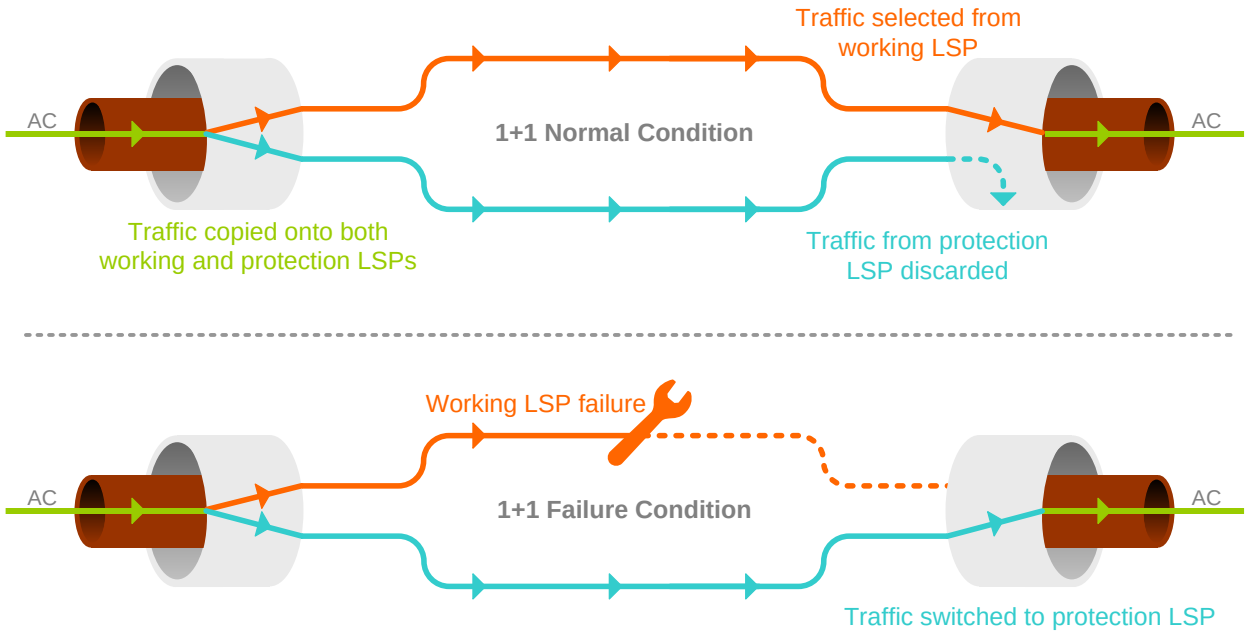
In addition to native Ethernet traffic, TDM circuits including DS0 timeslots, E1/T1 channels, and SDH/SONET paths can all be emulated as packets via pseudowires, multiplexed by G7860A, and switched to different sites via packet networks.



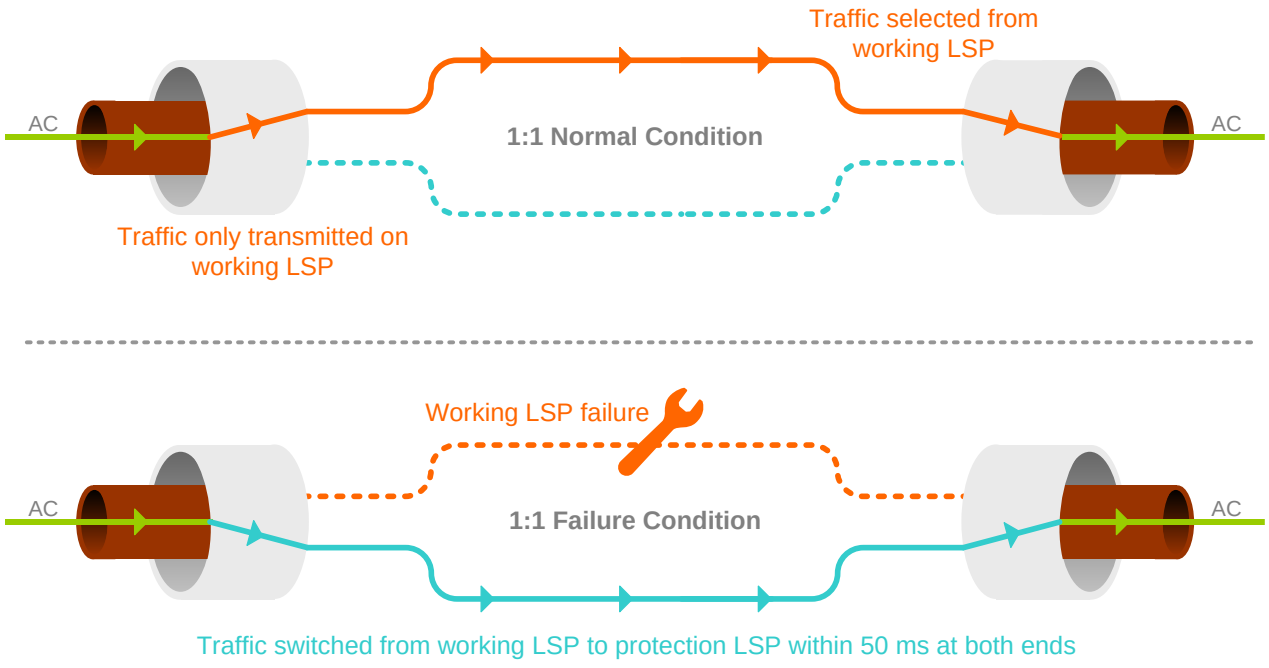
## MPLS-TP Protection Schemes

Protection scheme of an MPLS-TP network is standardized as part of the protocol. By deploying static nodes in the network, traffic transported by a tunnel between remote ends is protected by two label switching paths (LSPs) to achieve **1:1** or **1+1** protection.

**In 1+1 mode**, traffic is copied onto both working and protection LSPs. When receiving traffic, the remote LER only selects traffic from one of the two LSPs to decapsulate.




**In 1:1 mode**, traffic flows only on the working LSP. When a failure occurs on the working LSP, traffic is then switched to the protection LSP within 50 ms.

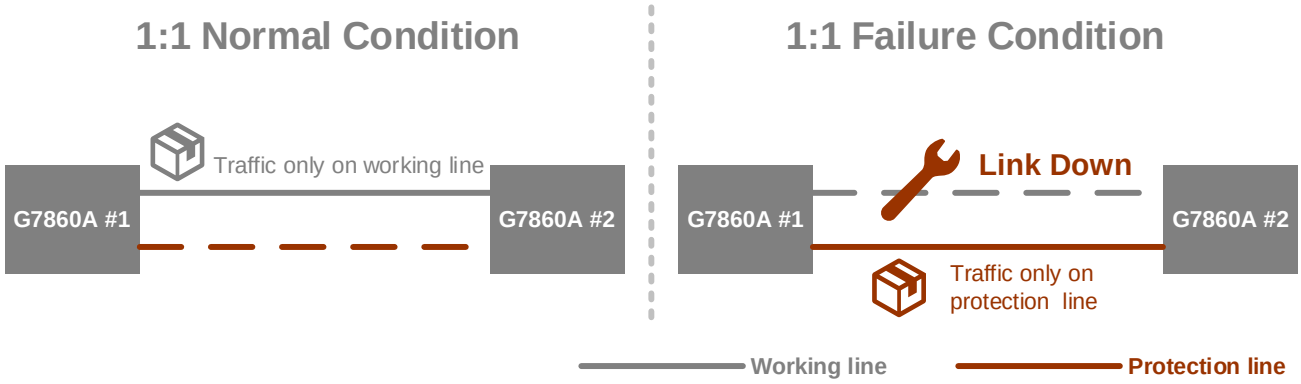


## Carrier Ethernet Protection Schemes

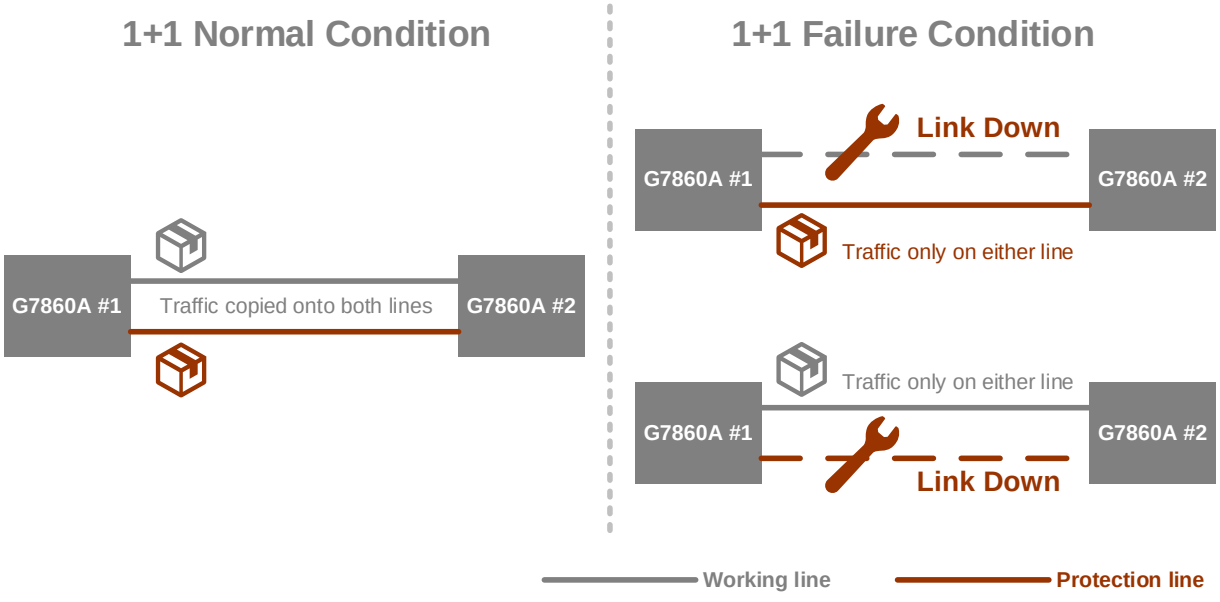
In Carrier Ethernet networks, protection schemes of static route provisioning are usually required for service providers to achieve service reliability and monitoring. **Ethernet linear protection switching (ELPS)** standardized in ITU-T G.8031 and **Ethernet ring protection switching (ERPS)** standardized in ITU-T G.8032 are the two most commonly adopted protection schemes.

**ELPS** is provisioned between two nodes by constructing point-to-point VLAN or Q-in-Q tagging. A pair of lines (i.e. working line and protection line) achieves either **1+1** or **1:1** protection.

In **1:1 protection** mode, traffic only travels on the working line, and will only switch to the protection line when failure of the working line is detected.

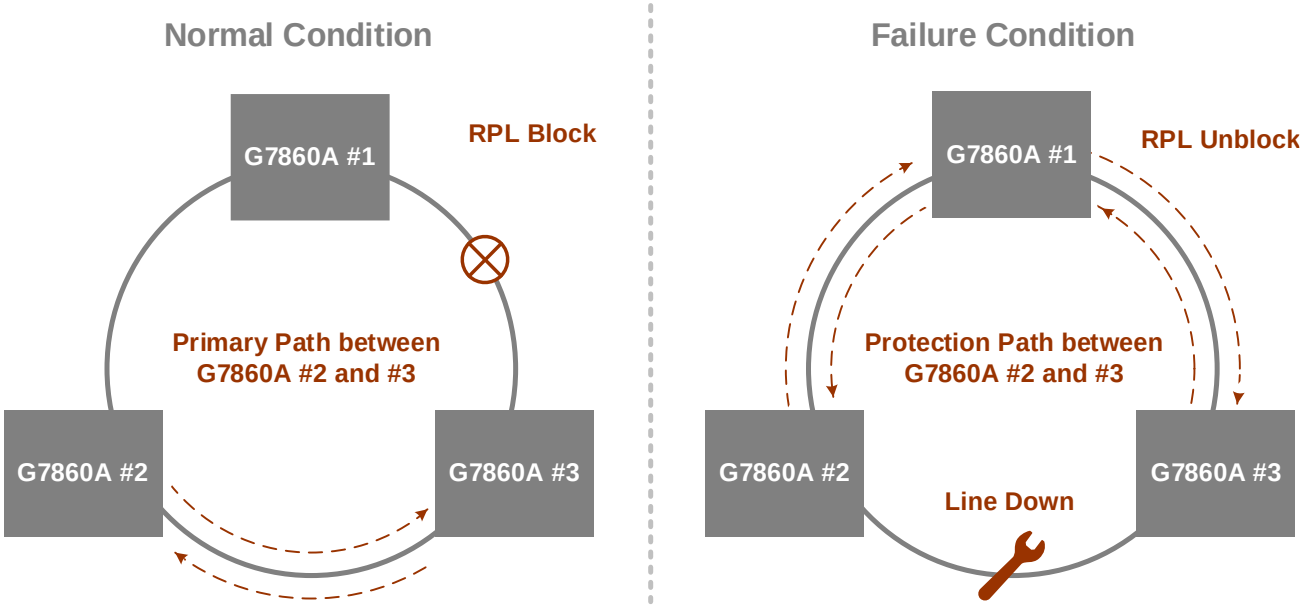



In **1+1 protection** mode, traffic from the head end of a 1+1 link is copied and transmitted on both lines. When line failure occurs in either line, the other line will then become the sole working line.



**ERPS** is a highly reliable and stable protection mechanism in ring networks with loop prevention. In a ring network, each given node is connected to at least two neighbor nodes via separate links. Multiple nodes in tandem then form a ring. Any two nodes in the ring can be connected via at least two paths, serving as a protection scheme. The two ports on both ends of a line on the neighboring devices of the ring are known as ring ports. The minimum amount of nodes in a ring is three. Provisioning is also achieved via VLAN.

To avoid the occurrence of a loop, traffic is allowed to flow on all ring sessions except for the **Ring Protection Link (RPL)**. Under normal conditions, the RPL is blocked from any traffic by the host switches. When a failure in the network is detected, the RPL host unblocks the RPL to allow traffic to pass through. Failure activates protection switching via **Ring Automatic Protection Switching (R-APS)** message relay.




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