



SESPM1040-541-LT-xx

Self-Enclosed Managed Hardened Gigabit Ethernet PoE++ Switch

(4) 10/100/1000Base-T PoE++ Ports + (1) 10/100/1000Base-T or 100/1000Base-X SFP/RJ-45 Combo Ports



Install Guide

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Record of Revisions

Rev.	Date	Description
C	3/2/20	Add -PD regulatory agency information.
D	8/19/20	Update wire gland install and acceptable PoE port power information.
E	6/7/21	Software Rev 3.0.3: add DHCP Server and 24VDC Passive PoE Module. Update power supply art. Add PoE Negotiation via LLDP. Update BLE firmware to 1.0.5. Add CLI for SNMP community string config. Add CLI show command for DHCP Server pool config and show mac address aging-time. Add 128M tmpfs for upgrades and add SESPМ-2P-24V-CP information.

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1. Introduction

The Transition Networks SESPM1040-541-LT-xx Switch is a Layer 2 managed switch with (4) 10/100/1000Base-T PoE++ (IEEE 802.3bt) ports and (1) combination 10/100/1000Base-T RJ-45 or 100/1000Base-X SFP uplink port (additional optional ports available), that is ideal for use in security and surveillance, PoE lighting, digital signage and many other applications.

The SESPM1040-541-LT-xx switch is self-enclosed in an outdoor NEMA 4X/IP 66 rated enclosure with 6KV surge protection on the AC line to protect against surges in power, built in surge protection on PoE and data ports for lightning protection, and additional fuse protection on PoE and included data port for external circuit cross protection against unintentional intrusion from outside power lines. It can be mounted on a wall or side of a building, or optional brackets are available for mounting on a pole.

The switch is available in multiple configurations: as either an AC- or DC-powered power source (PSE) providing up to 90W on individual ports* (not to exceed 180W total on the AC powered unit or 240W on DC powered unit), **or** as a PoE-powered device (PD) which is also a PSE providing up to 80W of total PoE power. The PD version requires PoE power from an IEEE 802.3 bt Type 4 Class 8 compliant PSE, or it can receive power over copper cable running parallel to a fiber optic cable for data (i.e., composite cable). (*Specific port configuration may apply; see Port Configuration on page 28.) The -PD version includes a 12V Aux port which can be used to provide auxiliary power to a PC, lighting or other accessories.

On all versions, a second 10/100/1000Base-T RJ-45 maintenance or 1000Base-X SFP uplink port can be activated by installing an optional Combo Port Module (sold separately). Alternatively, an optional Passive PoE Combo Port Module can be added to provide 24VDC power to non-standard PoE powered devices such as wireless radios, eliminating the need for an additional external power source for those devices. An optional Digital Input/Output Module with four optical isolators configurable as either inputs or outputs can provide connections for alarms, event notifications, or other customer designated items.

All versions are also equipped with Near Field Communication (NFC) to allow simple, repeatable switch configuration with a user-friendly app on a mobile device prior to connecting or powering up the switch. And on all versions Bluetooth Low Energy (BLE) allows remote access to alarm information or to read or change equipment settings without requiring physical access using inconvenient ladders or scissor lift rental.

The switch also has integrated management software for setup, monitoring, and control of connected devices.

Ordering Information

Model	Description
SESPM1040-541-LT-AC	AC-powered self-enclosed switch with (4) 10/100/1000Base-T PoE++ ports and (1) combo 10/100/1000Base-T RJ-45 or 100/1000Base-X SFP port. Order the -AC version based on the AC power cord for a specific country: SESPM1040-541-LT-AC-AR, -BR, -EU, -JP, -NA, -OZ, -SA, or -UK.
SESPM1040-541-LT-DC	DC-powered self-enclosed switch with (4) 10/100/1000Base-T PoE++ ports and (1) combo 10/100/1000Base-T RJ-45 or 100/1000Base-X SFP port.

SESPM1040-541-LT-PD	PoE-powered Type 4 Class 8 self-enclosed switch with (4) 10/100/1000Base-T PoE++ ports + (1) combo 10/100/1000Base-T RJ-45 or 100/1000Base-X SFP port
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Optional Modules and Accessories (sold separately)

Accessory items are sold and shipped separately and are customer installed. See the [SESPM1040-541-LT webpage](#) Accessories section.

Optional Modules for Port 6 (sold separately)

Note: only 1 of these modules can be used at a time in Port 6:

Model	Description
SESPM-2P-1G-CP	Additional Combo Port Module to activate a 2 nd combination 10/100/1000Base-T maintenance port or 1000Base-X combo uplink port. Note: SFP port from included combo port is only usable on -PD version when unit is powered with parallel power and fiber cables as opposed to PoE.
SESPM-2P-24V-CP	24V Passive PoE Combo Port Module to activate a 2nd combination 10/100/1000Base-T maintenance port or 100/1000Base-X combo uplink port and provide 24VDC for non-standard PoE powered devices.

Optional Accessories (sold separately)

Model	Description
SESPM-4P-DIG	Digital Input/Output Module with 4 optical isolators and a 12V integral power source with 1500VDC isolation.
SESPM-4P-PMB	Pole Mount Bracket Kit. Mounts switch with attached SESPM-4P-PMB to the pole. For metal poles, use pole straps or rubber-lined zip ties (not included) to secure the switch to the pole. For wooden poles, use screws (not included) to secure the switch to the pole.
SESPM-4P-FMK	Fiber Management Kit; includes fiber management tray and alternative cable gland / inserts.
Industrial SFP Modules	Transition Networks offers a full line of small form factor pluggable (SFP) modules. See our Hardened SFP webpage for more information.
Standalone Power Supplies	PS-DC-DUAL-56xxT, 215131, 25079 for the -DC and -PD only when using composite cable or copper cable running parallel to a fiber optic cable. See the SESPM1040-541-LT webpage Accessories section.

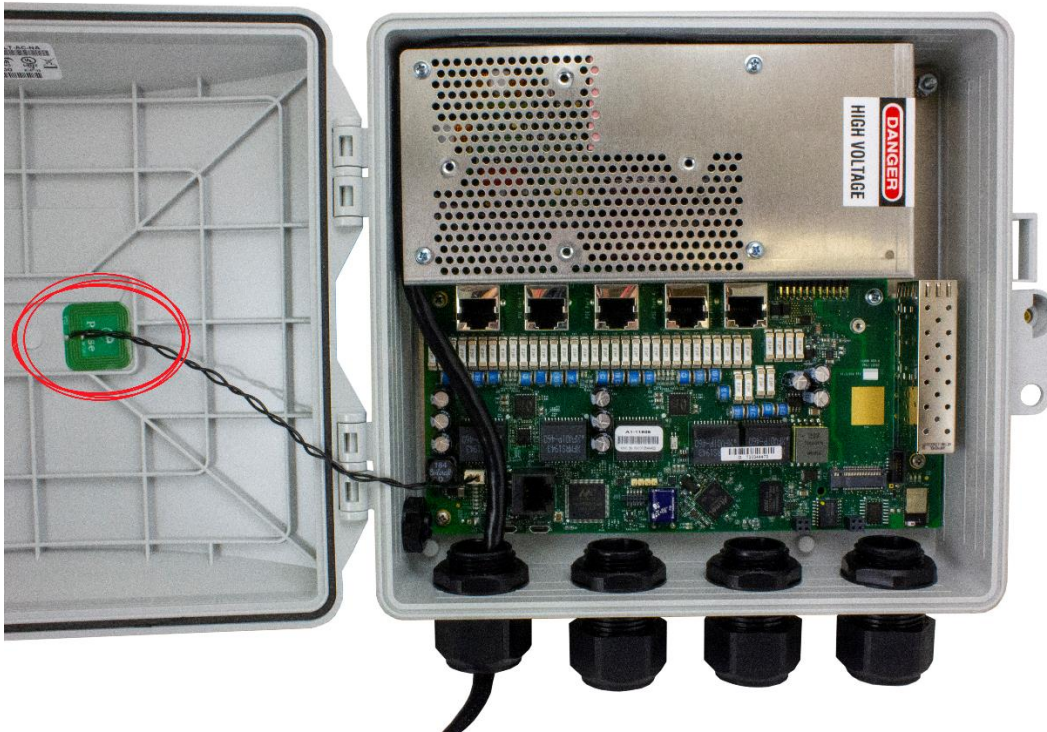
Specifications

Specification	Description
Standards	IEEE 802.3, IEEE 802.3af, IEEE 802.3at, IEEE 802.3bt (Type 4, Class 8), IEEE 802.3ab, IEEE 802.1 VLAN.
Ethernet Ports	(4) 10/100/1000 Mbps RJ-45 ports, (1) 100/1000 Mbps SFP/RJ-45 Combo port. CAT5e cable or higher recommended for 60 Watts; CAT6 cable or higher recommended for 90 Watts.
Auxiliary Power Port	2-position wire terminal block (≤ 12 AWG) with screw retention.
Serial Console Port	RS-232, RJ-45.
MAC Addresses	8K MAC address table.
Max Frame Size	10K bytes.
Alarm Status	Accessible via CLI, BLE interface, or Integrated Management Software.
Digital Output Digital Input	Optional; see SESPM-4P-DIG above. See the SESPM-4P-DIG Option Install Guide for additional details.
Dimensions	Wide: 10.049" [255.3 mm] x Deep: 4.335" [110.1 mm] x High: 8.48" [215.4 mm].
Power Input	-AC Version: Universal input 120-240VAC or 156-339VDC -DC Version (Low Voltage): 48VDC (input range 44-59VDC) -PD Version (PoE Powered): 90W PoE or standalone DC power supply
Power Consumption	-AC version: ≤ 10 vA. -DC version: ≤ 10 W. PoE powered -PD version: < 5 W.
Power over Ethernet (PoE)	Max PoE Budget: -AC version 180 W. -DC version 240 W. ≤ 90 Watts on individual ports (specific port configuration may apply) 12VDC auxiliary power (on -PD version only) 2-position bare wire terminal block with screw retention up to 12AWG wire size
Environment	Operating: -30°C to $+70^{\circ}\text{C}$ (Inside Enclosure). External Operating: -40°C to $+50^{\circ}\text{C}$. Storage: -40°C to $+85^{\circ}\text{C}$. Humidity: 5% to 95% (non-condensing).
Weight	4.8 lbs. [2.18 kg].
Compliance	Emission EN55022, Class A, Immunity EN55024; meets Surge Protection as specified in GR-1089 CORE Issue 4, ITU-T K.21 6 kV on AC lines, Ingress Protection IP66, NEMA 4X, CE, IEC61000-4-2 (ESD), IEC61000-4-4 (EFT), IEC61000-4-5 (Lightning). BLE 4.2. UL IEC60950-1, IEC60950-22, UL EN60950-1 (SESPM1040-541-LT-AC and -DC). NFC ISO/IEC 14443A Part 2 and 3. NFC: NFC Forum Type 2 Tag, ISO/IEC 14443A.
MTBF	POE++ Family (SESPM1040-541-LT-xx): Handbook: Telcordia SR-332, Issue 3. ENV: GB TEMP: 30.00 C CF: 1.00000 MODEL: Serial TELCORDIA CALCULATION METHOD: PartsCount (Method I) PIEL=7.5. -AC Unit: 443,521 hours (Telcordia) -DC Unit: 774,376 hours (Telcordia)

Specification	Description
	-PD Unit: 821,303 hours (Telcordia)
Warranty	2 Years

NFC Flex Stamp Antenna Specifications

The antenna is a small flexible Near Field Communication (NFC) antenna built in to the inside of the front cover (shown below). It is based on well-known antenna concepts and reliable technology, and it is RoHS compliant. Supported standards include ISO/IEC 14443 A / B (MIFARE), ISO/IEC 18092, JIS X 6319-4/FeliCa), NFCIP-1 / ECMA 3-40, and NFC Forum Tag 4. It operates at a Frequency of 13.56 MHz.



Environmental Specifications Applicable to PSEs and PDs

- PD only: Power classification: 8; Power level: 90W over operating voltage range 36V to 57V.
- Port type: 10/100/1000 Base-T.
- Safety warnings: See [Cautions and Warnings](#) on page 18.
- PSE or PD: SESP1040-541-LT-AC and -DC are PSE devices; SESP1040-541-LT-PD is a PD device as well as a PSE.
- Single-signature PD.
- Type 4.

Feature Benefits

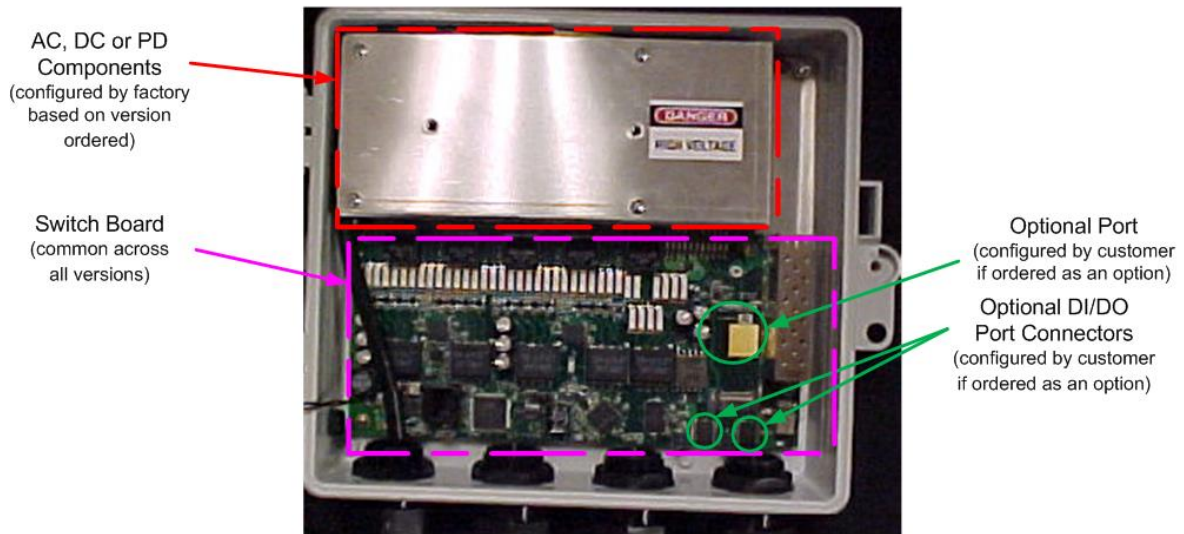
Feature	Benefit
Integrated NFC	Saves time and labor expense by allowing laborers of any skill level to easily configure switch prior to powering up and to repeat the configuration across multiple switches.
Integrated BLE Radio	Allows remote access to switch for troubleshooting and changing settings, reducing time and hassles related to console cables and ladders or scissor lifts.
Auxiliary Port on -PD	Provides additional power source for auxiliary equipment, reducing need for new power outlets. With optional SESPМ-4P-DIG Digital I/O board installed, allows configuration of DIO port type, interrupt type, and output state for connection to alarms, event notifications, or other customer designated items
Mobile App	Provides mobile interface through the BLE and NFC interface to connect to, configure, and diagnose the switch from a smartphone or tablet.
IEEE 802.3af/at/bt Compliant	Enables up to 90 Watts per port on individual ports (not to exceed 180W total on -AC version or 240 Watts total on -DC version).
PSE or PD Configuration	Can be used to provide PoE to other devices or to receive and provide PoE where external power sources are not available.
6kV Surge Protection	Protects switch from lightning or other surges in current.
NEMA 4X/IP66 Rated Enclosure	Protects switch from harsh outdoor environments, including rain, dust, and insects and can be easily mounted on a pole, wall or building.
PoE Auto Power Reset	Set Ping Interval Time, Retry Time, and Failure Action for automatic restarting of remote PDs to reduce service dispatches.
PoE Port Configuration	Configure PoE Mode, Schedule, Priority, Maximum Power, and APR, per port.
PoE Power Scheduling	Provides PoE power preservation / scheduling by configuring 1-16 PoE schedule profiles of scheduled actions (e.g., Power on, Power Off, Reset PD) to be applied at a set day and time.
PoE Monitoring	Monitors PoE PD class, power allocated, requested and used, current used, priority, port status, APR status, and PSU temperature.
Event Notification	Provides notification of events via SNMP traps and System Log.
PVLAN	Provides Private VLAN (PVLAN) configuration of up to 6 PVLANS (with device management from PVLAN 1 only).
Network Time Protocol (NTP)	Clock Sources: Up to 5 NTP Servers configurable or use Local Clock Source.
IMS (Integrated Management Software)	Provides method for simple setup, monitoring, and control of connected devices in the network, reducing installation and maintenance costs.

Feature	Benefit
RADIUS	Provides RADIUS Client enable/disable and configuration of 1-4 Radius Servers for authentication purposes.
TACACS+	Provides TACACS+ Client enable/disable and configuration of 1-4 TACACS+ Servers for authentication purposes.
SSH v2 Server	Secure Shell (SSH) cryptographic network protocol allows setup of Host and User Public-Key Settings via RSA public-key encryption technology or DSA using FIPS (Federal Information Processing Standard) for digital signatures.
Configuration Backup and Restore	Backup and Restore running-config, startup-config, or default-config via TFTP or SCP (future). For example, save the startup-config file to ensure that the currently active configuration will be used at the next reboot.
Tamper Detection	The switch includes a 3-axis linear accelerometer that detects if the switch has exceeded user-selected vibration limits, indicating someone is tampering with the switch or the switch mount has somehow been compromised.
Cable Diagnostics / Virtual Cable Test (VCT)	The Cable Diagnostics uses TDR (Time Domain Reflectometry) for remote identification of potential cable malfunctions. The Cable Diagnostics detect and report potential cabling issues such as pair swaps, pair polarity, and excessive skew. It can also detect cable opens, shorts, or impedance mismatch in the cable and report accurately within one meter the distance to the fault.
MAC Address Table	Switching of frames is based on the DMAC address contained in the frame. The switch builds a table that maps MAC addresses to switch ports for knowing which ports the frames should go to (based on the DMAC address in the frame). Provides both static and dynamic entries. The static entries are configured by the network administrator to do a fixed mapping between the DMAC address and switch ports.
Port VLAN	Create a VLAN and associate a VLAN ID with it. Assign a Switch Port to a VLAN (create an association between a port on the SESP switch and a previously created VLAN). Define the Switch Port usage type (trunk or access) and set Allowed VLANs.
DMI (Diagnostic Monitoring Information)	View DMI (Diagnostic Monitoring Information) including SFP Temperature, Voltage, Bias, TX and RX power, and Vendor info (part number, serial number, revision, date code).
DHCP Server	This module lets you view and configure up to 5 DHCP server instances. A DHCP Server can automatically provide and assign IP addresses, default gateways and other network parameters to client devices. You can add, modify and delete DHCP Server pool entries on a table to configure Start IP, End IP, Lease Time, Subnet Mask, Default Router, and DNS Server. The page also lets you add a new interface where the VLAN field is configurable.

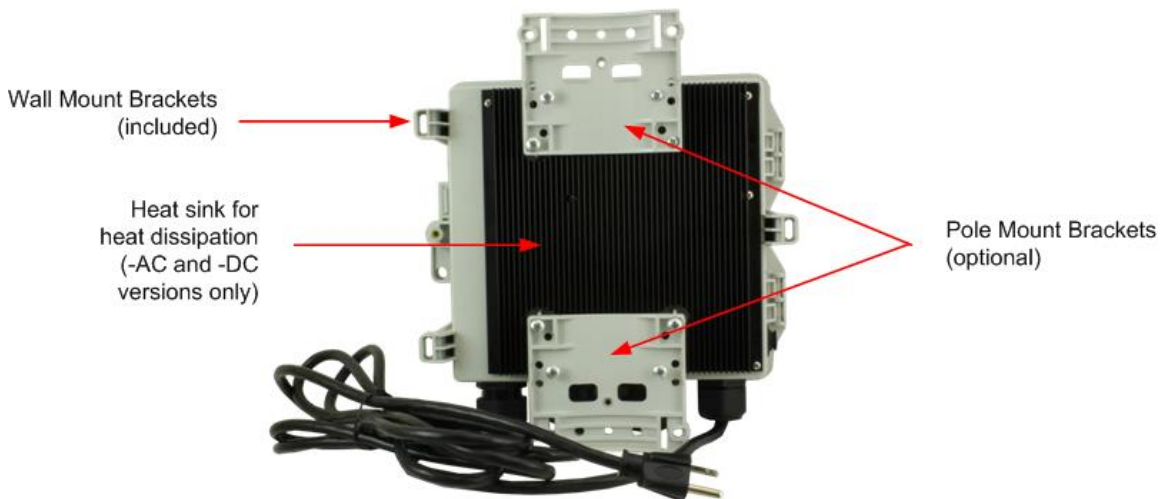
Components View

The basic switch components are shown below.

Basic Switch Components
(SESPM1040-541-LT-AC shown)

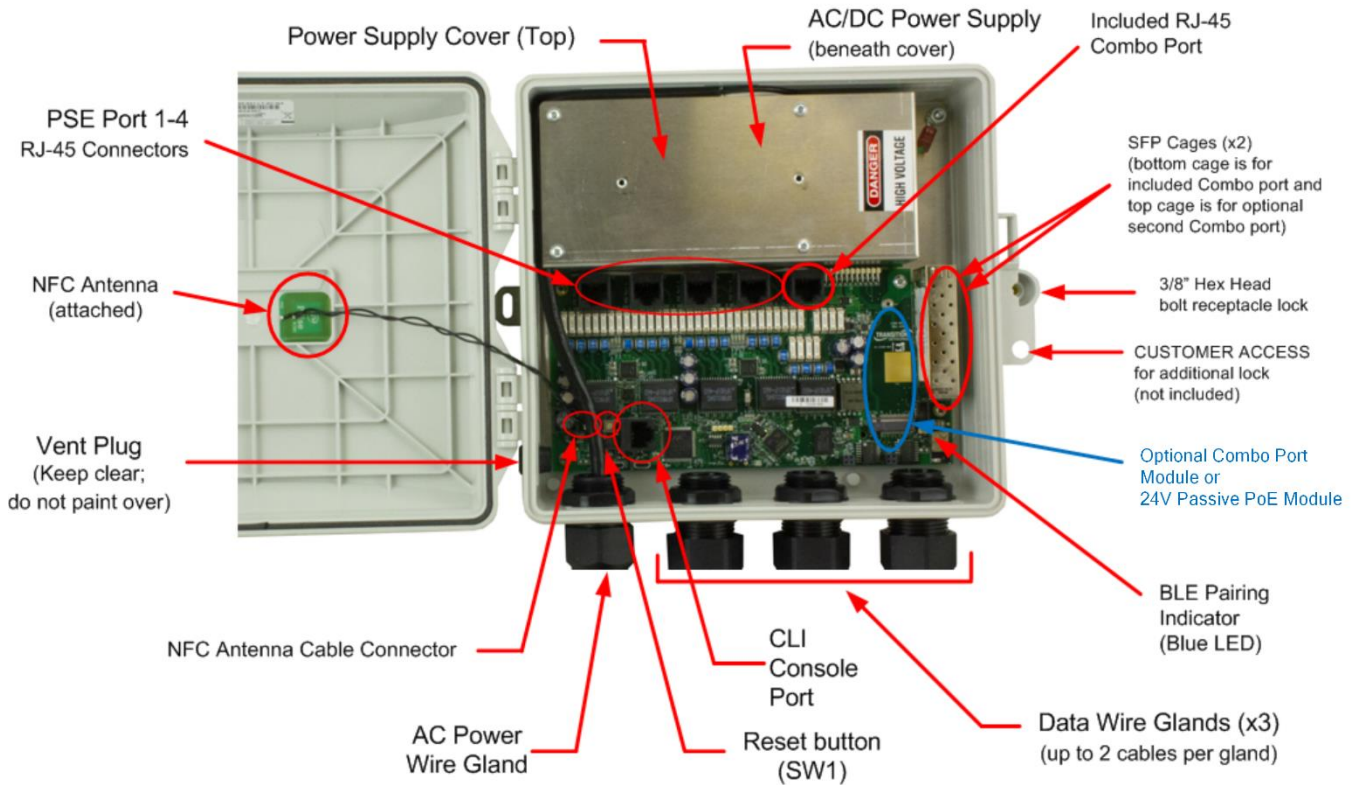


Device Views



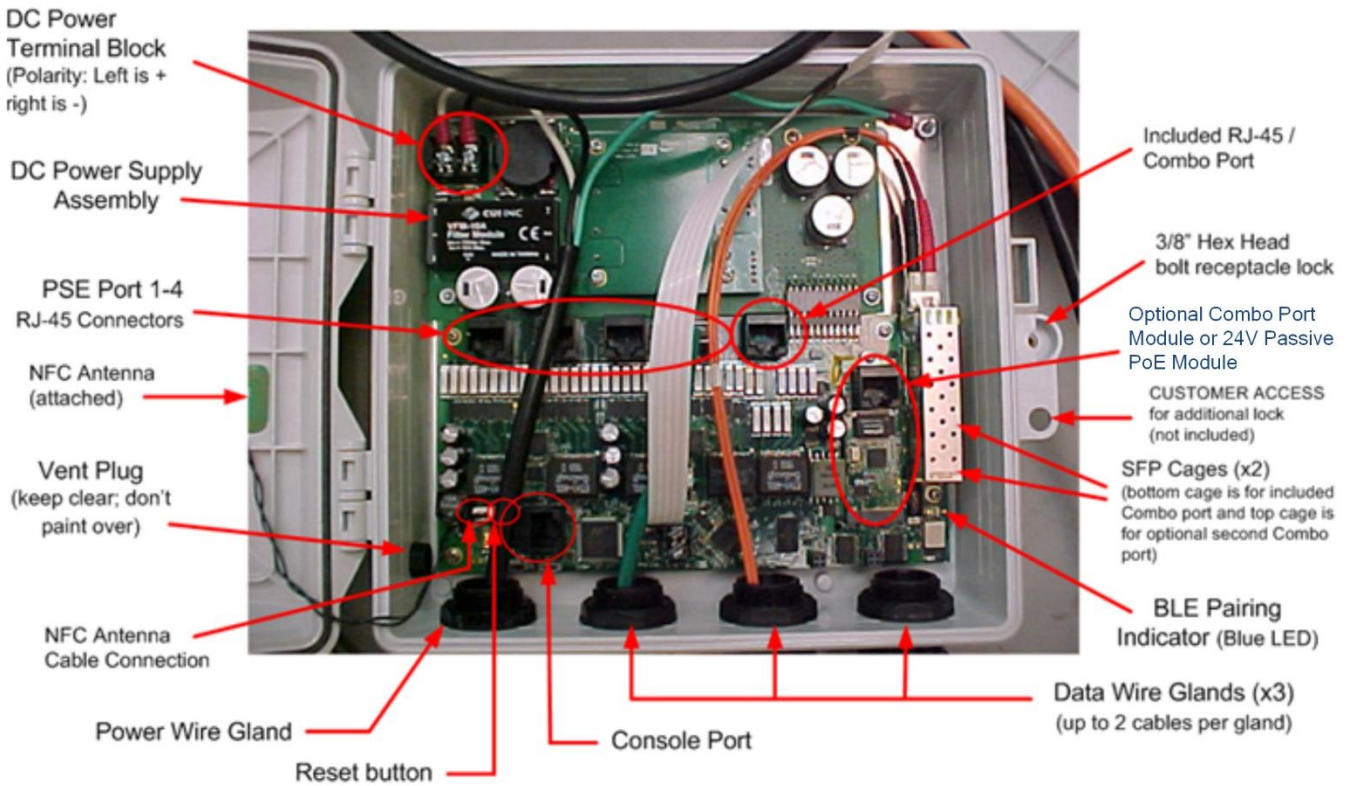
SESPM1040-541-LT-AC Components

SESPM1040-541-LT-AC



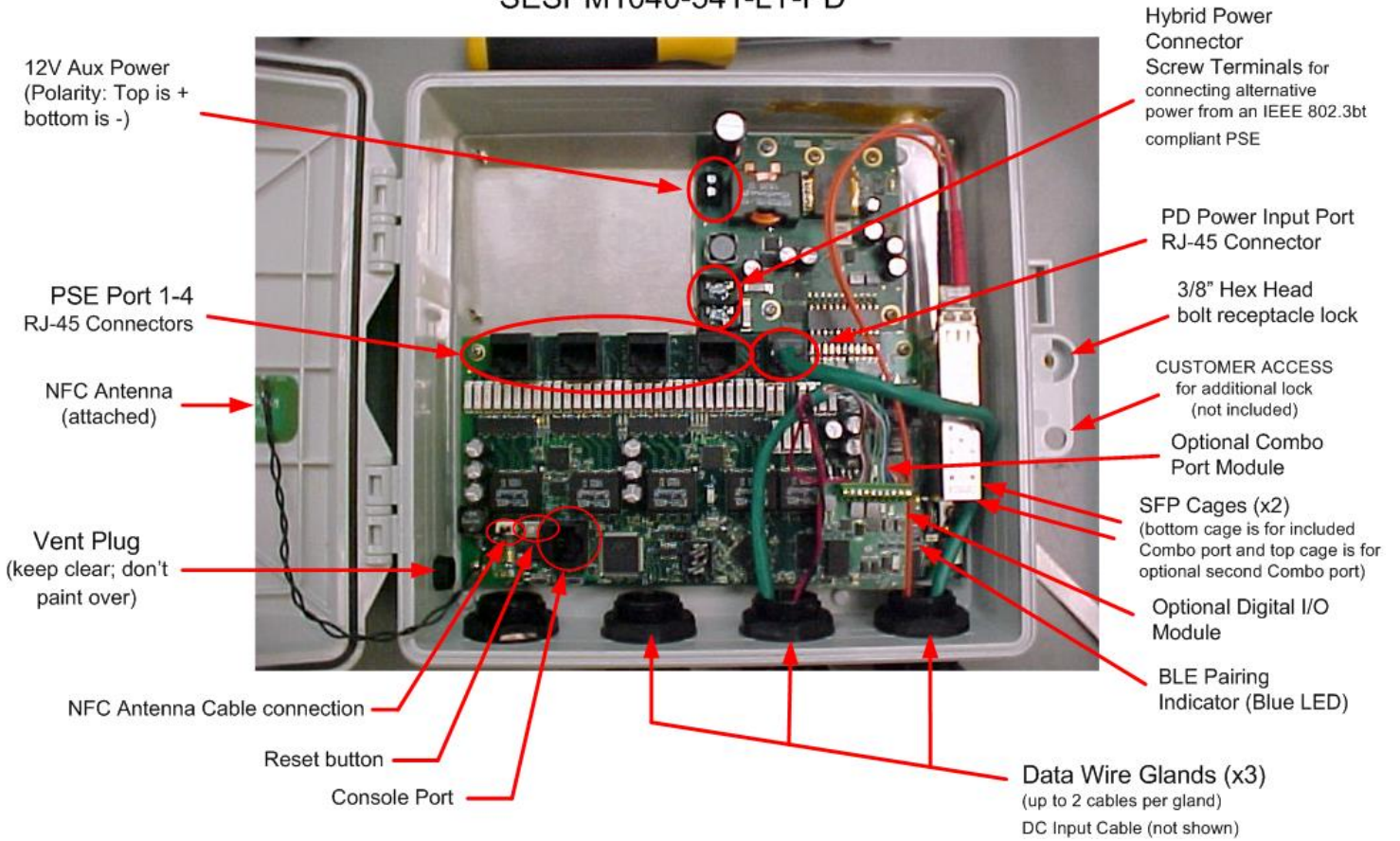
SESPM1040-541-LT-DC Components

SESPM1040-541-LT-DC

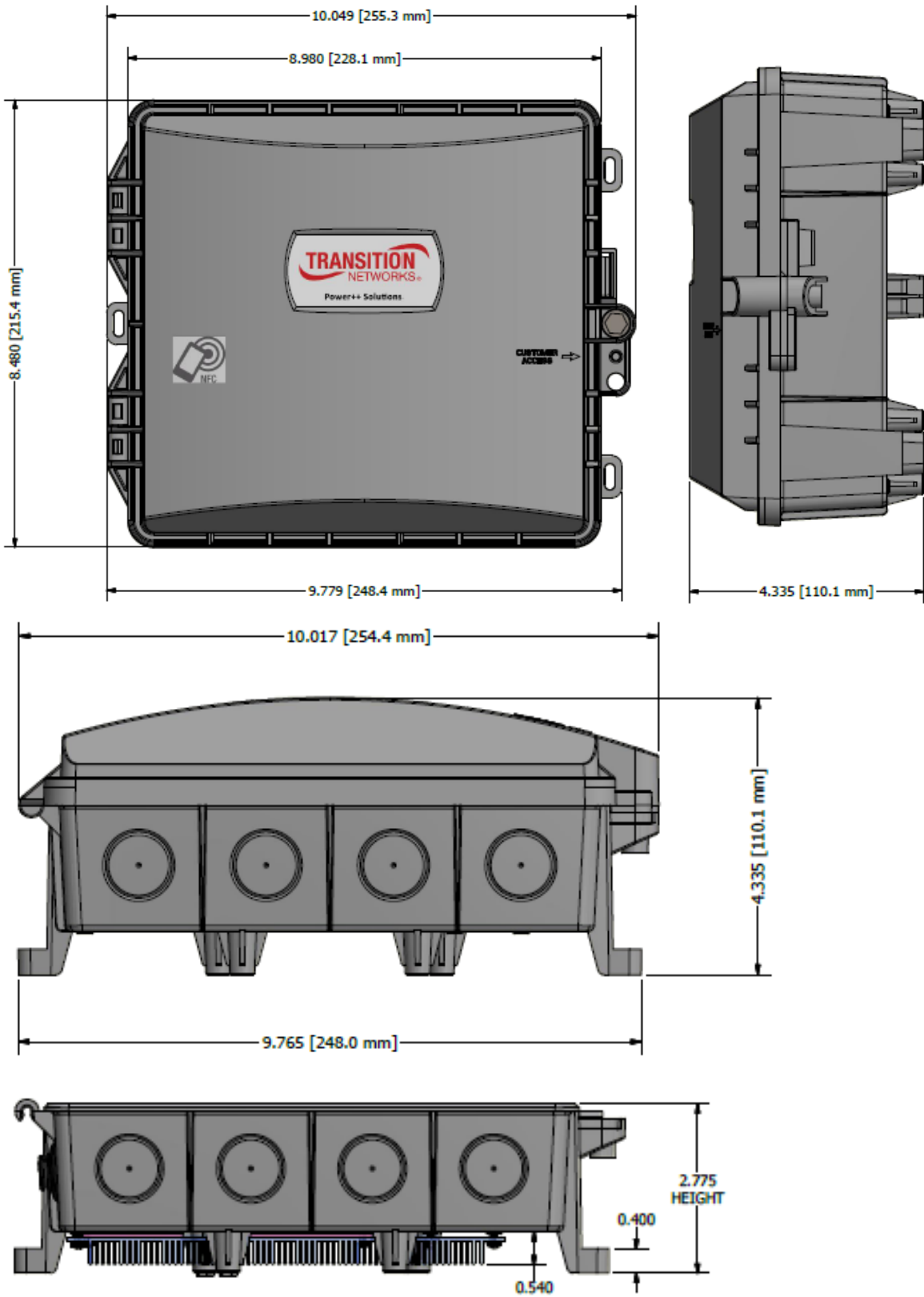


SESPM1040-541-LT-PD Components

SESPM1040-541-LT-PD



Dimensions



Related Manuals

SESPM1040-541-LT-xx Quick Start Guide, 33783

SESPM1040-541-LT-xx Install Guide, 33772 (this manual)

SESPM1040-541-LT-xx Operation Guide, 33773

SESPM-4P-PMB Pole Mount Bracket Kit Option Install Guide, 33774

SESPM-4P-FMK Fiber Management Kit Option Install Guide, 33775

SESPM-4P-DIG Digital Input/Output Kit Option Install Guide, 33776

SESPM-2P-1G-CP One Gb Additional Combo Port Module Option Install Guide, 33779

Switch Manager Mobile App for SESP1040-541-LT-xx User Guide, 33789

SESPM-2P-24V-CP Option Install Guide, 33829

SESPM-2P-24V-CP Option Quick Start Guide, 33832

Release Notes (version specific)

For More Information

A printed Quick Start Guide is shipped with each unit.

For Transition Networks Drivers, Firmware, etc. go to the [Product Support](#) webpage (logon required).

For Transition Networks Manuals, Brochures, Data Sheets, etc. go to the [Product Resources](#) page (no logon required).

For Industrial SFP Modules see Transition Networks [Hardened SFP webpage](#) for specific information.

Note: Information in this document is subject to change without notice. Note that this manual provides links to third party web sites for which Transition Networks is not responsible.

2. Switch Installation

This chapter provides system requirements, package contents, Cautions and Warnings, pre-installation and Installation Guidelines, Hardware Install Procedures, Cabling, Grounding, Bonding, and Surge protection information. The information applies to the SESP1040-541-LT-AC, -DC, and -PD. Differences are noted where they apply.

System Requirements

- Tablet : any with Android OS and NFC capability
- Smart Phone: any with Android OS and NFC capability
- OS: current Windows or Linux distro
- Browser: current version of most popular web browsers

Package Contents

Verify that you have received the items below. Contact your sales representative if any item is missing. Please save the packaging for possible future use.

- One SESP1040-541-LT-xx Switch
- One Documentation Postcard
- One printed Quick Start Guide
- Hole plugs in a bag

Unpacking

Verify the contents. The switch can be configured directly in the packing box and unpacked at the install location.



Cautions and Warnings

Cautions indicate that there is the possibility of poor equipment performance or potential damage to the equipment. Warnings indicate that there is the possibility of injury to person.

Cautions and Warnings appear here and may appear throughout this manual where appropriate. Failure to read and understand the information identified by this symbol could result in poor equipment performance, damage to the equipment, or injury to persons. **Note** that not all cautions, warnings or notes apply to all switch versions or applications/installations.

See [Electrical Safety Warnings](#) on page 22 for Electrical Safety Warnings translated into multiple languages.

Wiring methods shall be in accordance with the [National Electrical Code/NFPA 70/ANSI](#), and with all local codes and authorities having jurisdiction.

DANGER: High Voltage. Hazard of severe electrical shock or burn.

SESPM1040-541-LT	
4-Port 10/100/1000Base-T Switch	
SESPM1040-541-LT-AC	SESPM1040-541-LT-DC
Input Power:	Input Power:
120-240 VAC ~	48 VDC ---
50/60 Hz 2,75A max	10A max



Warning: NO SERVICABLE PARTS INSIDE OF UNIT

Warnings - PoE ++ Family

This section includes information specifically for installations in hazardous environments. We recommend performing a preliminary configuration of the switch before it is installed in a permanent location.

Pre-Installation

Warnings: These warnings are translated into multiple languages in the Regulatory Compliance and Safety Information for this switch.

Warning: Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.

Warning: Do not work on the system or connect or disconnect cables during periods of lightning activity.

Warning: Before performing any of the following procedures, ensure that power is removed from the DC circuit.

Warning: Read the installation instructions before you connect the system to its power source.

Warning: This equipment must be grounded. Never defeat the ground conductor (-AC version) or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Warning: This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.

Warning: Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Warning: Ultimate disposal of this product should be handled according to all national laws and regulations.

Warning: To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 122°F (50°C).

Warning: Installation of the equipment must comply with local and national electrical codes.

Caution: If installer is providing cabling for an IP66/NEMA 4X rated environment, the cables must be suitably rated for IP66/NEMA 4X requirements EMC Environmental Conditions for Products Installed in the European Union. This section applies to products to be installed in the European Union.

Installation Guidelines

When determining where to place the switch, observe these guidelines.

Environment and Enclosure Guidelines: Review these guidelines before installation:

This equipment is considered Group 1, Class A industrial equipment, according to IEC/CISPR Publication 11.

Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

General Guidelines: Before installation, observe these general guidelines:

Caution: Proper ESD protection is required whenever you handle this equipment. Installation and maintenance personnel should be properly grounded by using ground straps to eliminate the risk of ESD damage to the switch. Do not touch connectors or pins on component boards. Do not touch circuit components inside the switch.

When determining where to place the switch, observe these guidelines:

- * For 10/100 and 10/100/1000 ports, cable length from switch to attached device cannot exceed 328 ft (100 m).
- * Operating environment is within the ranges listed in "Technical Specifications".
- * Keep the switch out of the sun if possible. Try to install the switch so it is in the afternoon shade or under the eave of a building. In the northern hemisphere, install the switch with the heat sink plate facing north. In the southern hemisphere, install the switch with the heat sink plate facing south.
- * Make sure ambient temperature does not exceed 122°F (50°C).
- * Keep cabling away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures.

Tools and Equipment

- A single or a pair of stud size 6 ring terminals for use as a protective ground connector (-DC or -PD version only; -AC version already grounded)
- Crimping tool
- 12 – 18 gauge copper ground wire (or as appropriate)
- Wire-stripping tools for stripping 12 – 18 gauge wires
- Number-2 Phillips screwdriver
- Flat-blade screwdriver
- Torque Driver
- 3/8" nut driver for locking and unlocking enclosure
- Wire gland tool for tightening/loosening wire glands

Note: The position of the power supply may vary on different switch models.

Note: Tighten the earth-ground wire connection screw (-DC and -PD only) to 8-10 in.-lb of torque.

Caution: The input voltage source of the alarm output relay circuit must be an isolated source and limited to less than or equal to 36 VDC max.

High Risk Activities Disclaimer: Components, units, or third-party products used in the product described herein are NOT fault-tolerant and are NOT designed, manufactured, or intended for use as on-line control equipment in the following hazardous environments requiring fail-safe controls: the operation of Nuclear Facilities, Aircraft Navigation or Aircraft Communication Systems, Air Traffic Control, Life Support, or Weapons Systems ("High Risk Activities"). Transition Networks and its supplier(s) specifically disclaim any expressed or implied warranty of fitness for such High Risk Activities.

Notice: Not Designed for Use in Life Support Equipment or Applications: These products are not designed for use in life support equipment or applications that would cause a life-threatening situation if any such product failed. Do not use this product in these types of equipment or applications.

Warning: Visible and invisible laser radiation when open: Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

Notice: The information in this manual is subject to change. For the most current information refer to the online manual at the [SESPM1040-541-LT Product Page](https://www.transition.com).

Safety and Labeling info from IEEE 802.3bt Standard

See PoE Modes, Compliance, Standards and Troubleshooting on page 47 for Safety and Labeling info from Approved Standard for Ethernet Amendment 2: Power over Ethernet over 4 Pairs (IEEE 802.3bt) (below).

General Safety

Equipment shall comply with all applicable local and national codes related to safety.

Network Safety

This subclause sets forth a number of recommendations and guidelines related to safety concerns. The list is neither complete nor does it address all possible safety issues. The designer is urged to consult the relevant local, national, and international safety regulations to verify compliance with the appropriate requirements. LAN cabling systems described in this clause are subject to at least four direct electrical safety hazards during their installation and use. These hazards are as follows:

- a) Direct contact between LAN components and power, lighting, or communications circuits.
- b) Static charge buildup on LAN cabling and components.
- c) High-energy transients coupled onto the LAN cabling system.
- d) Voltage potential differences between safety grounds to which various LAN components are connected.

Such safety hazards should be avoided or appropriately protected against for proper network installation and performance. In addition to provisions for proper handling of these conditions in an operational system, special measures should be taken to verify that the intended safety features are not negated during installation of a new network or during modification of an existing network.

Patch Panel Considerations

It is possible that the current carrying capability of a cabling cross-connect may be exceeded by a PSE. The designer should consult the manufacturer's specifications to verify compliance with the appropriate requirements.

Electromagnetic Emissions

The PD and PSE powered cabling link shall comply with applicable local and national codes for the limitation of electromagnetic interference.

Temperature and Humidity

The PD and PSE powered cabling link segment is expected to operate over a reasonable range of environmental conditions related to temperature, humidity, and physical handling. Specific requirements and values for these parameters are beyond the scope of the standard.

Electrical Safety Warnings

Electrical Safety

IMPORTANT: This equipment must be installed in accordance with safety precautions.

Elektrische Sicherheit

WICHTIG: Für die Installation dieses Gerätes ist die Einhaltung von Sicherheitsvorkehrungen erforderlich.

Elektrisk sikkerhed

VIGTIG: Dette udstyr skal installeres i overensstemmelse med sikkerhedsadvarslerne.

Elektrische veiligheid

BELANGRIJK: Dit apparaat moet in overeenstemming met de veiligheidsvoorschriften worden geïnstalleerd.

Sécurité électrique

IMPORTANT: Cet équipement doit être utilisé conformément aux instructions de sécurité.

Sähköturvallisuus

TÄRKEÄÄ: Tämä laite on asennettava turvaohjeiden mukaisesti.

Sicurezza elettrica

IMPORTANTE: questa apparecchiatura deve essere installata rispettando le norme di sicurezza.

Elektrisk sikkerhet

VIKTIG: Dette utstyret skal installeres i samsvar med sikkerhetsregler.

Segurança eléctrica

IMPORTANTE: Este equipamento tem que ser instalado segundo as medidas de precaução de segurança.

Seguridad eléctrica

IMPORTANTE: La instalación de este equipo deberá llevarse a cabo cumpliendo con las precauciones de seguridad.

Elsäkerhet

OBS! Alla nödvändiga försiktighetsåtgärder måste vidtas när denna utrustning används.

Surge Protection / Grounding and Bonding

Surge Protection

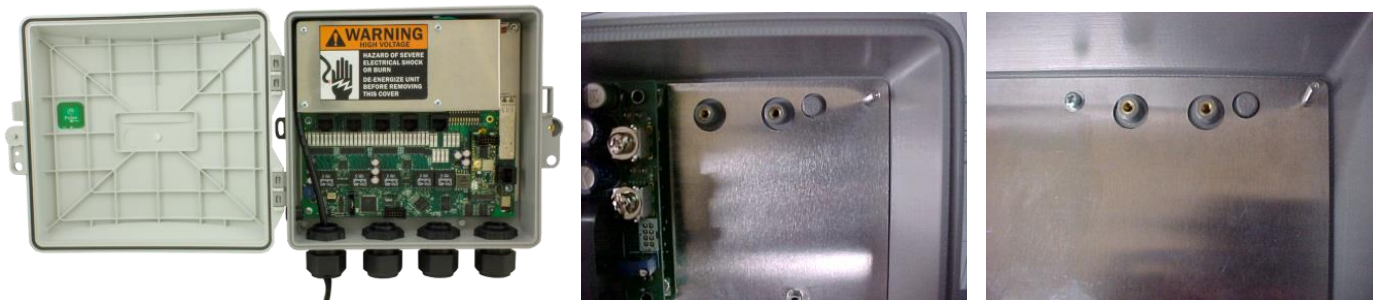
Security cameras can act as lightning rods, drawing the voltage through the copper cabling to the networking equipment. If a lightning strike hits within a few hundred feet of a cable, it can produce thousands of volts and several million watts. Without proper protection, this can seriously damage or destroy networking equipment. In a networked video surveillance system, the IP-based cameras can run on a dedicated video network or connect directly back to the data center or telecom room. On a dedicated video network, a high-voltage surge can cause extensive damage to sensitive electronics (e.g., Ethernet switches, network servers, and storage devices). The surge can cause serious damage to mission-critical equipment if the IP cameras are connected to the main production network.

Each of the PoE port interfaces' four data pairs, as well as the included combo port's RJ-45 interface, are fused and have gas discharge tubes and other solid state devices to meet the outdoor exposure requirements for power faults and lightning protection required in the following standards. No other external protection devices are required.

- Meets Surge Protection as specified in GR-1089 CORE Issue 4
- ITU-T K.21 6kV on AC Line
- IEC61000-4-2 (ESD) & 4-4 (EFT)
- IEC61000-4-5 Lightning

Grounding and Bonding

The SESP1040-541-LT-xx has an internal grounding post. This post must be tied to earth ground as close to the device as practical. In the AC powered switch, this is done at the factory through the ground wire in the AC power cable. On the -DC or -PD switches, grounding (which is required for the ESD circuits to work in this switch) must be done with a user-provided ground wire tied between the internal ground post and a local earth ground as close to the switch as practical. This should be done by a qualified installer. External exposed grounding connection points are typically prohibited in outdoor equipment due to corrosion concerns.

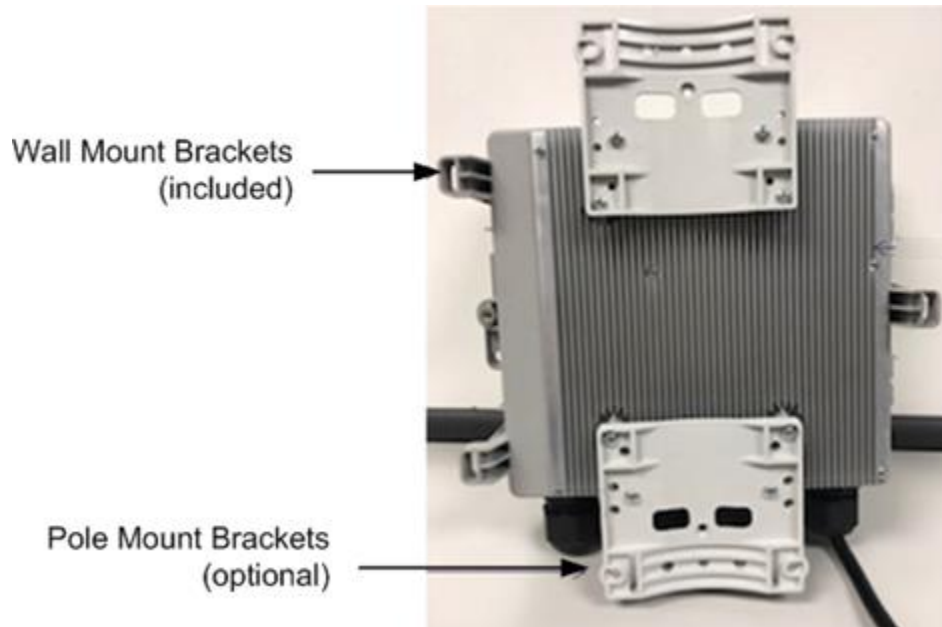


Hardware Install Procedures

All three switch models have the same hardware mounting procedures.

Wall Mount Installation

1. Place unit at desired location and secure with mounting screws (not included).
2. Ground the switch before connecting other cables.
3. Disconnect the grounding only after disconnecting all other cables.

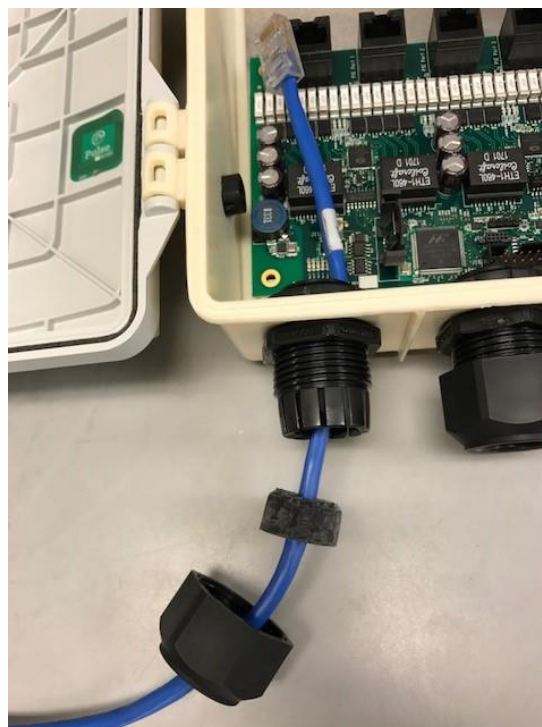


Pole Mount Installation

For mounting to a pole, use optional Pole Mount Bracket Kit and follow instructions provided with the kit. Screws, pole mounting straps or rubber-lined zip ties are required to secure brackets to pole (installation-specific and not provided).

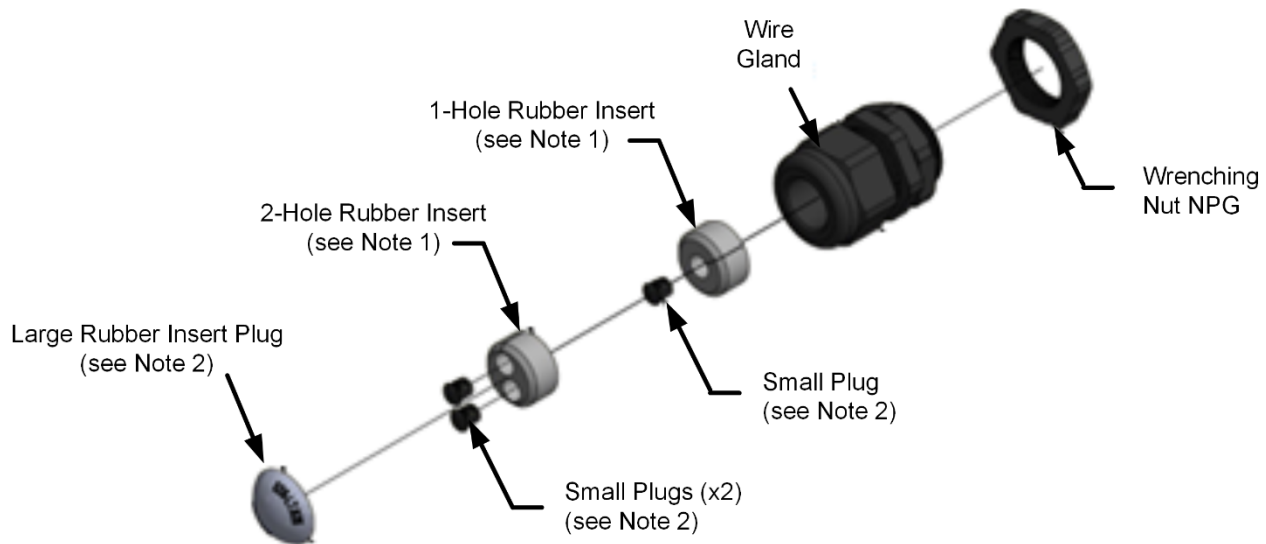
Cable and Cabling

- The 802.3bt standard allows Cat 5e for 60W but requires Cat 6 cable for 90W.
- You can use Category 5e or 6A cable, but remember:
 - Cat 6A has larger bundle sizes,
 - Cat 6A can go longer reaches with PoE, and
 - Category 6A is 4.3 W more efficient per link.
- For Cat 5e use 4-pair Category 5e or higher. Use UV-resistant Cat5e or Cat 6 cable.
- If the channel is standards compliant Cat 5e to Cat 6A at 100 meters or less, the PD will get the power it needs.
- Standards governing cabling PoE:
 - IEEE 802.3bt Task Force: overall standard governing equipment and cabling.
 - TIA TSB-184-A: Technical Service Bulletin on “Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling”.
 - ISO/IEC TR-29125 and CENELEC TR 50174-99-1 (International cabling guidelines for PoE++).
 - ANSI/TIA-568-C.2 (familiar standard covering cabling performance).
 - IEC 60512-99-002 (standard for connectivity with engaging / disengaging PoE).
- Recommend: understand ambient temperature and bundle temperature specs and requirements.
- The 2017 NEC® Code applies to power supplied over a communications cable when power levels are over 60 watts (i.e., for PoE++ Type 4).
- Heat of cable is governed by Ambient temperature, Type of PoE used, Category cable type (and its implementation), and Bundle size. Consult your cable vendor for specific performance.
- If using more than one 90W port, alternate ports (i.e., no adjacent 90W ports). Use ports 1 and 3, or ports 1 and 4, or ports 2 and 4. Exception: using ports 2 and 3 for 90W each is allowed.



Wire Gland Plug Kit

Various wire gland inserts are provided. To maintain NEMA/IP rating and Switch warranty, be sure to use the most appropriately sized insert for your cable and fill all unused holes with the hole plugs provided.



Note 1: There is either a 1-hole Rubber Insert or a 2-hole Rubber Insert in each Wire Gland (not both).

Note 2: The Small Plugs and Large Rubber Insert Plug are used separately; however, the Large Rubber Insert Plug can be used on either the 1-Hole or 2-Hole Rubber Insert.

Wire Gland Plug Kit

Note: You can use 3/4" water proof whip (rigid or flexible) in place of wire gland inside or outside a building.

Note: Split gland is easiest to use. Press finger or tool through and press split gland out.

Note: Install cabling before connecting power.

Warning: You must connect a Ground wire on the PD and DC versions; the ground wire is attached at the factory in the AC version.

Note: Try to keep the switch out of direct sunlight and try to maximize space around switch to maximize air flow.

Grommet sizes available for the entrance locations of the fiber and cables: there are (2) 7mm holes in each wire gland standard on the switch. The Fiber Management Kit comes with (1) replacement wire gland with a single oval shaped hole to accommodate max 3.5mm x 15.5mm sized fiber cable and (1) replacement wire gland with a single round hole to accommodate a range of 6.4 to 12.4mm fiber cable.

The grommets are not gel filled. As you tighten the wire gland nut, the insert squeezes tight around the cable. This meets IP67 rating.

To insert cables through the wire glands:

The 2-hole wire gland will support up to 7mm diameter cables. (If using fiber, the optional fiber management kit comes with replacement wire glands to accommodate fiber cables.)

A pre-terminated patch cord can be used with the wire glands. Here are the suggested installation steps:

- Unscrew the wire gland nut from the ferule.
- Push out the rubber insert from the inside of the switch (use a blunt tool so as not to damage the insert).
- Insert the pre-terminated cable(s) through the nut.
- Insert the pre-terminated cables through the ferule into the switch (up to 2 cables if using the 2-hole rubber insert; insert one cable at a time).
- Connect the cable(s) to the connectors, allowing enough slack for a service loop.
- Attach the split rubber insert around the cable with the chamfer facing out (down).
- Squeeze the rubber insert and push it into the ferule.
- Screw the wire gland nut back onto the ferule. The rubber insert will tighten around the cable as you go; continue to tighten until the insert is snug around the cables and plug any unused holes with the provided hole plugs to maintain NEMA/IP rating and Warranty.

Flexible Metal Conduit (FMC)

Short segments of FMC are often used as circuit pigtails between junction boxes and fixtures. Whip assemblies are available for sale and can save you time when you need several of these pigtails. Check local codes for more NEC regulations on conductivity and grounding.

Cabling Procedure

For standard installs, plug the AC power cord into an outdoor-rated receptacle.

If you choose to hardwire the switch, perform these steps:

1. Connect cable glands or $\frac{3}{4}$ NPT conduit connectors to the face of the switch. Ensure that connectors are fully installed to guarantee waterproof operation.
2. Thread outdoor rated waterproof AC cable (must comply with all local, national and country electrical codes) from source through piping/gland to the terminal block.
Pair and secure ground, line, and neutral to the appropriate positions on the three pin terminal block and reattach the protective covering.
Note: if using the cable gland, the outer seal nut must be fully tightened to close rubber seal to protect against ingress of water.
3. The IEEE 802.3bt standard allows Cat 5e for 60W but requires Cat 6 cable for 90W.
4. Using waterproof outdoor rated Cat5e or Cat 6 Ethernet cable, thread through cable glands or conduit to the appropriate RJ45 connector and ensure each portal is properly sealed.
5. For option connection see the related option kit install guide.

Port Configuration

Ports 1-4 are 10/100/1000Base-T PoE++ PSE Ports.

Port 5 is a combo 10/100/1000Base-T or a 100/1000Base-X uplink port. On the -AC and -DC version, it can either be used as a copper or fiber port. However, on the -PD version, it is normally used for PoE power input, in which case the SFP option is not available unless you are using fiber cable running in parallel to a copper cable as the power input, then port 5 can be used as a fiber port (or copper) instead of using it exclusively as the PoE power input port.

Port 6 becomes available when you add either the optional Additional Combo Port Module or the optional 24V Passive PoE Module. The optional Additional Combo Port Module allows you to activate a second combo 10/100/1000Base-T maintenance port or second 1000Base-X uplink port. Port 6 can be used to aim cameras, etc. Alternatively, port 6 can be used for the optional 24V Passive PoE Module. (Because they share the same port, the Additional Combo Port Module providing the 10/100/1000Base-T maintenance port or second 1000Base-X uplink port and the 24V Passive PoE Module cannot be used at the same time.)

The optional SESPM-2P-1G-CP is an Additional Combo Port Module with secondary surge protection, but not primary or cross power. If using the optional SESPM-2P-1G-CP, users must provide the primary or cross power protection outside the switch enclosure.

Note: If using more than one 90W port, alternate ports (i.e., no adjacent 90W ports). Use ports 1 and 3 or ports 2 and 4. Exception: using ports 2 and 3 for 90W is allowed. Since the -PD version cannot supply more than 90W, port configuration on the -PD is not restricted. Total PD power available will always be less than 90 Watts but the lower end of the power available will vary, determined by the equipment and cable used to power the PD.

PoE Port Power Shutdown Order

The -AC powered version of the switch is capable of supplying 180W total PoE across all ports. The -DC powered version of the switch are capable of supplying 240W total PoE across all ports. Each port is capable of supporting up to 90W (not to exceed 180 W or 240W total respectively).

The switch should be able to supply 90W to two ports (180W) under all normal circumstances. It is recommended that Port 1 and Port 3 be used for the most critical devices and set to Critical PoE Port Priority to ensure power remains up on those ports in the event the connected devices attempt to draw too much power.

If the switch exceeds the 180W (-AC) or 240W (-DC) PoE limit, then it will begin to shut power down on ports according to PoE Port Priority settings (Low Priority ports first, then High Priority ports, then Critical Priority ports last). If ports are set to the same priority, then the order of shutdown is Port 4 → Port 2 → Port 3 → Port 1.

Order of Port Power Shutdown in Case of Overpowering of Connected Devices

Configured Priority	PoE Port			
	Port 1	Port 2	Port 3	Port 4
Low	4	2	3	1
High	8	6	7	5
Critical	12*	10	11*	9

For the POE powered version (-PD), the same priority rules apply, although the maximum total power is 90W.

There are temperature sensors within the switch to monitor the temperature inside the switch. If the power supply within the switch gets too hot, all ports will be shut down regardless of priority. This is to prevent the switch from overheating and causing permanent damage.

PoE Port Acceptable Power

Port 1 Device Power (W)	Port 2 Device Power (W)	Port 3 Device Power (W)	Port 4 Device Power (W)	Acceptable for -AC Version?	Acceptable for -DC Version?	Acceptable for -PD Version?
15.4	15.4	15.4	15.4	Yes	Yes	Yes
30	30	30	30	Yes	Yes	No, total power exceeds 90W
30	30	30	0	Yes	Yes	Yes, if using 802.3bt compliant PSE
60	60	60	60	No, total power exceeds 180W	Yes	No, total power exceeds 90W
60	45	45	30	Yes	Yes	No, total power exceeds 90W
90	0	0	0	Yes	Yes	Yes, if using 802.3bt compliant PSE
90	90	0	0	No, 90W devices adjacent	No, 90W devices adjacent	No, total power exceeds 90W
90	0	90	0	Yes	Yes	No, total power exceeds 90W
90	15.4	90	15.4	No, total power exceeds 180W	Yes	No, total power exceeds 90W
90	90	90	90	No, total power exceeds 180W	No, total power exceeds 240W	No, total power exceeds 90W

CUSTOMER ACCESS

Use a 3/8" nut driver to unlock the enclosure. Push in and lift up on the plastic lever to the right of the 3/8" bolt.

There is also access for an additional lock (not included).



Console Port

The Console port provides an RJ45 connector for serial connection to a network PC running a terminal emulation package such as HyperTerm or PuTTY. See the SESP1040-541-LT-xx Operation Guide for CLI command information.

SFP Installation

Each of the SESP1040-541-LT-xx versions has one combo 10/100/1000Base-T

RJ-45 or 100/1000Base-X SFP port. You can install or remove a mini-GBIC SFP module from a SFP port without having to power off the switch.

The SFP cages are oriented with the bottom SFP cage used for the included combo port and the top SFP cage used for the optional second combo port operation.



1. On the bottom SFP cage insert the SFP with the label down.
2. On the top SFP cage insert the SFP with the label up.

Note: The SFP ports must use industrial-rated optical transceiver product, Rated 3.3Vdc, Laser Class 1. See the SFP manual for specific Cautions, Warnings, and instructions.

Industrial SFP Modules: Transition Networks offers a full line of small form factor pluggable (SFP) modules. Industrial rated models must be used for outdoor switch installation. See Transition Networks [Hardened SFP webpage](#) for more SFP information.

SFP Orientation



SFP orientation:

- * **Bottom** SFP cage used for the included combo port.
- * **Insert bottom SFP first with Label Down.**
- ** **Top** SFP cage used for the optional second combo port operation.
- ** **Insert top SFP with Label Up.**

The FOA (Fiber Optic Association) is an international non-profit educational organization chartered to promote professionalism in fiber optics through education, certification and standards. See the FOA [User's Guide To Fiber Optic System Design and Installation](#) for fiber optics/fiber cabling issues. The FOA's [Guide To Fiber Optics & Premises Cabling](#) includes almost a thousand pages of materials created by the FOA covering the basics to advanced topics on fiber optics and premises cabling.

To install an SFP in the SESP1040-541-LT-xx:

1. Position the SFP device at the proper installation slot, with the label facing correctly (see SFP Orientation above).
2. Carefully slide the SFP device into the slot, aligning it with the internal installation guides.
3. Ensure that the SFP device is firmly seated against the internal mating connector.
4. Connect the fiber cable to the fiber port connector of the SFP device.

SFP Removal

Caution: Be careful when removing the SFP from a device. Some SFP transceiver module temperatures may exceed 160°F (70°C) and be too hot to touch with bare hands. **Note:** Do not remove and replace the SFP modules more often than necessary; excessive SFP removing and replacing can shorten the SFPs useful life.

1. Disconnect any fiber that is connected to the SFP module.
2. Push back the locking lever on the SFP.
3. Pull out SFP module.

PCB Configuration (Reset button, LEDs, etc.)

Factory Reset Pushbutton (SW1)

The Factory Reset button is located in the lower left corner of the switch, above the far left Wire Gland. It can be used as follows:

- Short press (less than 10 seconds) will issue a power down (system) reset.
- Long press (more than 10 seconds) to reset to factory defaults.

If the reset is unsuccessful the message "*Command failed*" displays in the Web UI.

If the reset is successful, the message "*Set to factory settings*" displays in the Web UI.

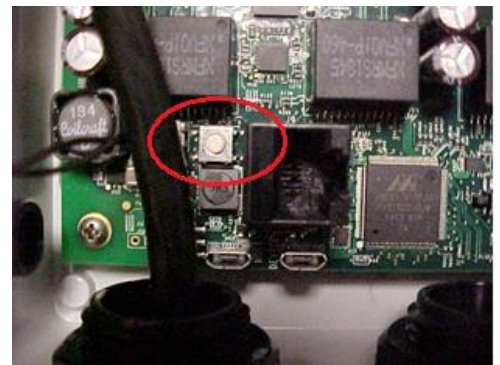
Note that you can also perform a Restart or Reset from the Web UI. You can perform a Restore system configuration (copy command) or Reload (reload command) from the CLI.

Reset (System) button (FW v 2.1.0.3 and above)

If the Reset (System) button on the switch PCB is pressed and released in less than .5 seconds (500 milliseconds), the system considers this to be unintentional and nothing changes on the system. The following messages will be printed to the user console (RJ-45 console):

```
Reset Button pressed...
Reset Button released...
Reset Button held for 0.000000 seconds (95.000000ms)
Reset Button - accidental press - ignoring.
```

If the Reset (System) button is held for greater than .5 seconds and less than 10 seconds, the system considers this a reset command. The system will reboot. The following messages will appear on the user console:



```
System Button pressed...
System Button released...
System Button held for 4.000000 seconds (4329.000000ms)
System Button - pressed - Resetting...
```

If the Reset (System) button is held for >10 seconds, the system considers this a factory reset command. The system will execute a 'reload defaults'. The system will not reboot, and the system will not store the default-config as the startup-config. With access to the system restored, you can execute those tasks when desired. The following messages will appear on the user console (note that there will be a delay before the last line appears while the factory settings are applied to the system):

```
System Button pressed...
System Button released...
System Button held for 14.000000 seconds (14283.000000ms)
System Button - long press - Restoring Factory Defaults...
System Button - Factory Settings restored
```

3. Applying Power

Power Connection Descriptions

Each of the three switch models has different procedures for applying power.

SESPM1040-541-LT-AC-xx: AC-powered power source (PSE) provides up to 90 Watts on individual ports (specific port configuration may apply), not to exceed 180 Watts total. Power to the SESPM1040-541-LT-AC-xx is via a built-in 12-foot 16 AWG power cable with a country specific plug. The -AC option is powered by an internal power supply (120-240VAC, 47-63Hz). The AC input is via a hardwired AC cord or hardwired into AC mains via customer supplied conduit and conduit connectors.



SESPM1040-541-LT-DC: a DC-powered power source (PSE) provides up to 90 Watts on individual ports (specific port configuration may apply) (not to exceed 240 Watts total). Power to the SESPM1040-541-LT-DC is from an external source with an input range of 40-57VDC (48VDC nominal) to a 2-pin terminal block (can accept up to 12AWG wire).

SESPM1040-541-LT-PD: a PoE-powered device (PD) receiving power over Ethernet or over parallel fiber and copper cable and providing up to 80W of total PoE power. The -PD version includes a 12V Aux port which can be used to provide auxiliary power to a PC, lighting or other accessories. PoE power to the SESPM1040-541-LT-PD is via an external PSE that can classify with IEEE 802.3bt Type 4 Class 8 devices such as the SESPM1040-541-LT-AC and -DC. The -PD can also be powered by a standalone DC power supply. The -PD version features an optional Aux port for spitting some of the incoming PD power out to an isolated 12VDC power port.

Auxiliary 12V power port: 2-position bare wire terminal block with screw retention up to 12AWG wire size.

Note: Constant power must be provided for the real time clock; the switch has a super Cap that provides backup to the real time clock for up to 12 hours. Beyond that, battery backup must be provided externally through a UPS.

Last Gasp

In the event of power failure, the switch will send an SNMP trap notification of the power failure.

The notification will only be sent on switch port 5.

The 'Last Gasp' feature provides 10W for 5mS; however, POE power is not protected on failure.

AC Power Cords

Due to the integrated power supply, the AC power cord comes installed in the switch from the factory. The following versions are available, and the product should be ordered with the appropriate suffix to ensure the correct country/region cord is installed. The –AC version has these AC power cords available:

SESPM1040-541-LT-AC- AR = Argentina	SESPM1040-541-LT-AC- NA = North America, Dominican Republic
SESPM1040-541-LT-AC- BR = Brazil	SESPM1040-541-LT-AC- OZ = Australia
SESPM1040-541-LT-AC- EU = Europe, Chile, Thailand	SESPM1040-541-LT-AC- SA = South Africa
SESPM1040-541-LT-AC- JP = Japan	SESPM1040-541-LT-AC- UK = United Kingdom, Ireland, Malaysia, Asia

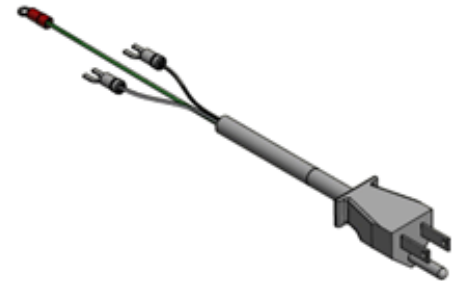
AC Power Cord Specifications

Ratings: Voltage: 300 VAC. Temperature: 105 deg. C. Flame Rating: VW-1.

Conductor: Wire Size: 18-AWG. Number: 3-Conductor. Material: Bare Copper.
Stranding: 41/0.16 mm.

Insulator: Material: PVC. Color: White, Black, Green/Yellow. Nominal Thickness: 0.38 mm. Outer Diameter: 2.0 mm.

Outer Jacket: Material: PVC. Color: Black. Nominal Thickness: 0.76 mm.
Diameter: 2.0 mm.



Configuration Procedures

There are several ways to configure the SESP1040-541-LT-xx: using NFC (the easiest way), Web UI, or CLI.

NFC Pre-Configuration (Configuring the Switch Directly in the Box)

After you verify the contents of the box, you can configure the switch directly in the box and unpack the box contents later at the install location.

1. Open the packing box.
2. Configure each switch using the Mobile App on an NFC-enabled smart device.
3. Select the saved configuration.
4. Move the device closely over the NFC target on the front cover of the switch.
5. Hit Tap and Go.



Basic Installation Steps

1. Pre-configure one or more switches using NFC, BLE, CLI or GUI. Note the BLE MAC address.
2. If pole mounting, attach optional pole mount brackets. See the SESP1040-541-LT-xx Pole Mount Kit Option Install Guide.
3. Attach switch to pole or wall.
4. For –DC and –PD versions, attach ground wire. See [Surge Protection / Grounding and Bonding](#) on page 23.
5. If using any optional modules, install them now. See the Related Manuals on page 16.
 - a. For 24V Passive PoE module or Combo Port module, install provided thermal pad under module.
6. Connect data to switch:
 - a. Run Ethernet cable through cable glands and insert into port 5, or
 - b. run fiber cable(s) through wire glands and route through fiber management; insert SFP into SFP cage and connect fiber to SFP.
7. Connect PDs to switch; run Ethernet cable from switch PSE ports 1-4 to devices to be connected & powered.
 - a. Note if connecting multiple 90W devices, it is recommended that those devices be connected to ports that are separated from one another. Examples: ports 1 and 3, or ports 1 and 4, or ports 2 and 4; it is also OK to use ports 2 and 3 although they are not separated.
6. Connect power to switch:
 - a. -AC: plug in switch to AC outlet
 - i. If hard wiring, cut off power connector and:
 1. Connect to junction box (if allowed);
 2. run cable through conduit and hardwire to junction box (if code requires).
 - b. -DC: run DC power cable to switch; connect power.
 - c. PoE: Attach PoE cable from power source through cable gland and insert into port 5 or if using parallel fiber and power cable, run low voltage DC power cable through cable gland and connect to terminal block on switch.
9. Close switch door and lock enclosure using hex driver or tool.
10. When successfully installed, configure ports, power, etc. via BLE, CLI or Web UI. Note the BLE MAC address.

Defaults: IP = 192.168.1.10. Login = admin/admin. Console port = 23. Bits per second = 115200, Data bits = 8, Parity = None. Stop bits = 1. Flow control = None.

Power Connection Procedures

-AC Version

Plug into approved AC outlet using supplied AC power cord. If the application calls for routing through conduit or hard wiring, the AC plug can be cut off of the supplied cord and hard wired into junction box if code allows). (The provided wire gland can be replaced with a conduit connector.) We do not recommend taking the protective cover off of the switch to re-wire. The AC cable is already connected to the Ground Post in the switch at the factory.

-DC Version

Route the DC power cable through the designated Power Wire gland. Connect the green ground wire to the Ground Post in upper right corner of the enclosure.

Connect DC wires to DC Power Terminal Block in upper left corner of enclosure. Note polarity as indicated; the -DC switch is diode protected against reverse polarity. Local earth ground must be provided for ESD protection. **Warning:** Do not add any large (>100 μ H) common mode chokes as they may interfere with the operation of the inrush current limiting function of the switch.

-PD Version

The -PD version can be powered in one of three ways: 1) using PoE from an -AC or -DC Version, 2) from a -DC version using Parallel Copper/Fiber (composite) Cable, or 3) from a DC Power Supply.

If powering via PoE, connect an Ethernet cable from the PSE to the PD Port as shown on the next page.

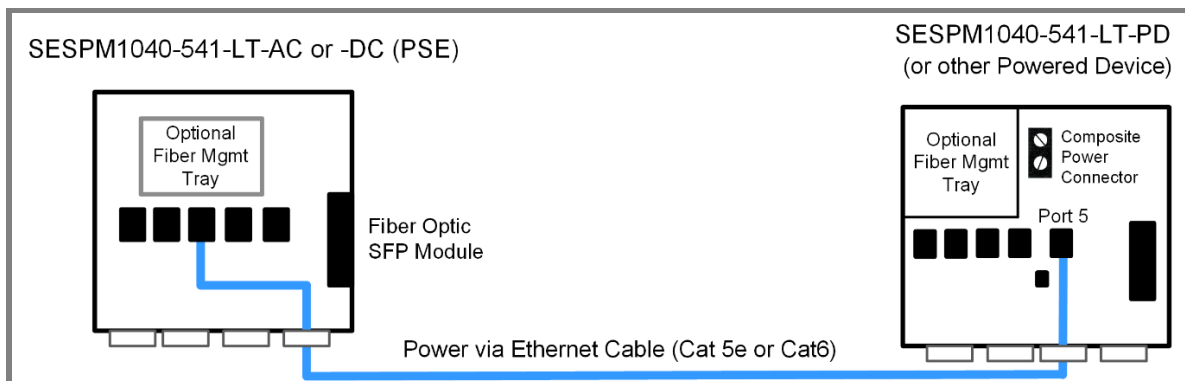
If powering over copper cable (with parallel fiber optic cable), splice DC cable to Ethernet cable stub, plug stub into a PSE port on a -AC or -DC switch, then connect wires to screw terminals on the hybrid connector per the diagram below. Note that the hybrid connector is polarity agnostic on the -PD switch. Local earth ground must be provided for ESD protection.

1. Powering a -PD from AC or DC (within 100m)

Typical -PD powering: -AC or -DC unit providing PoE power to a -PD at 100m or less. For PoE power to PD Unit, PoE must be from an IEEE 802.3bt Type 4 Class 8 compliant PSE device. For applications longer distance from power source, Composite cable can be used to power the -DC or -PD unit.

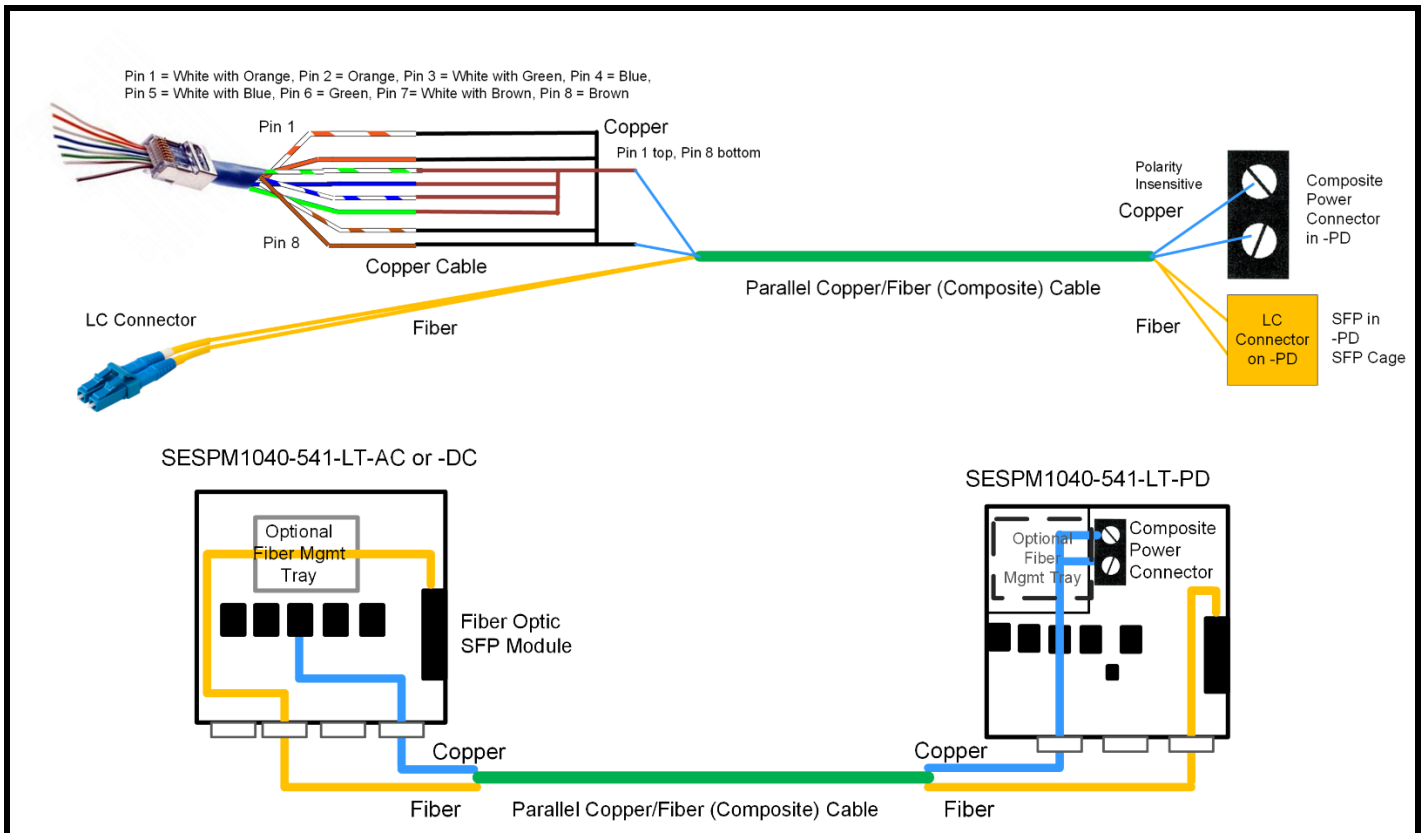
- Data over the fiber
- Power over the copper

Powering a -PD from a Standalone DC Power Supply: Several Transition Networks Standalone DC Power Supplies are available (order separately). You can use any standalone power supply that meets the -PD power requirements; see [Specifications](#) on page 7.

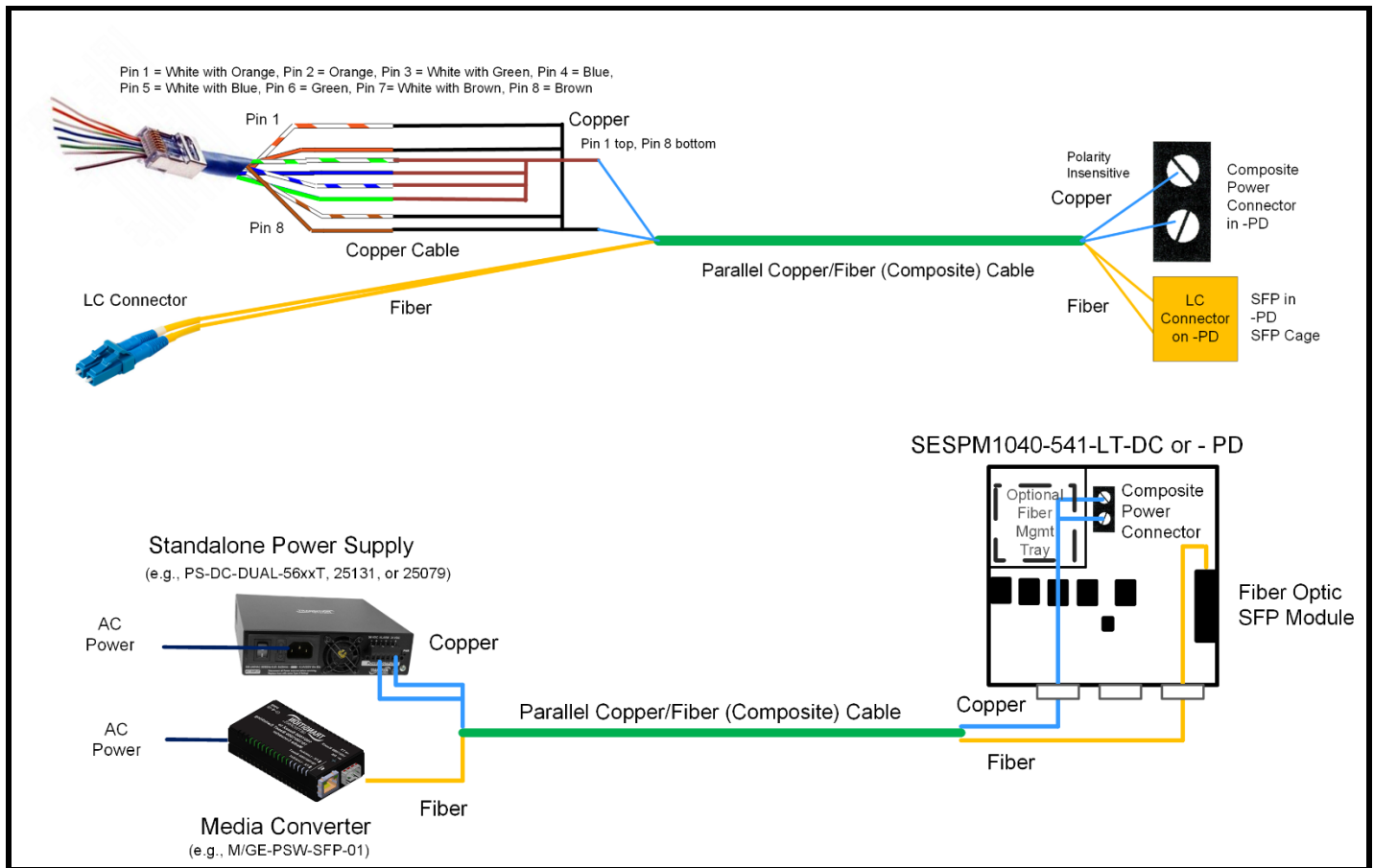


2. Powering a -PD (beyond 100m)

2a. Powering a -PD (beyond 100m) from -AC or -DC using Parallel Copper/Fiber (Composite) Cable



2b. Powering a -PD (beyond 100m) from one external power source using parallel copper/fiber (Composite) cable



Composite Fiber

For parallel fiber and copper power cable applications, grounding is done the same as for the -DC version; ground post to be tied to earth ground close to the switch.

For terminating the power cable, there is a screw terminal block on the DC input module or the PD Aux board within the switch. For terminating the fiber cable, a fiber tray option is available.

SESPM-4P-FMK Fiber Tray Option

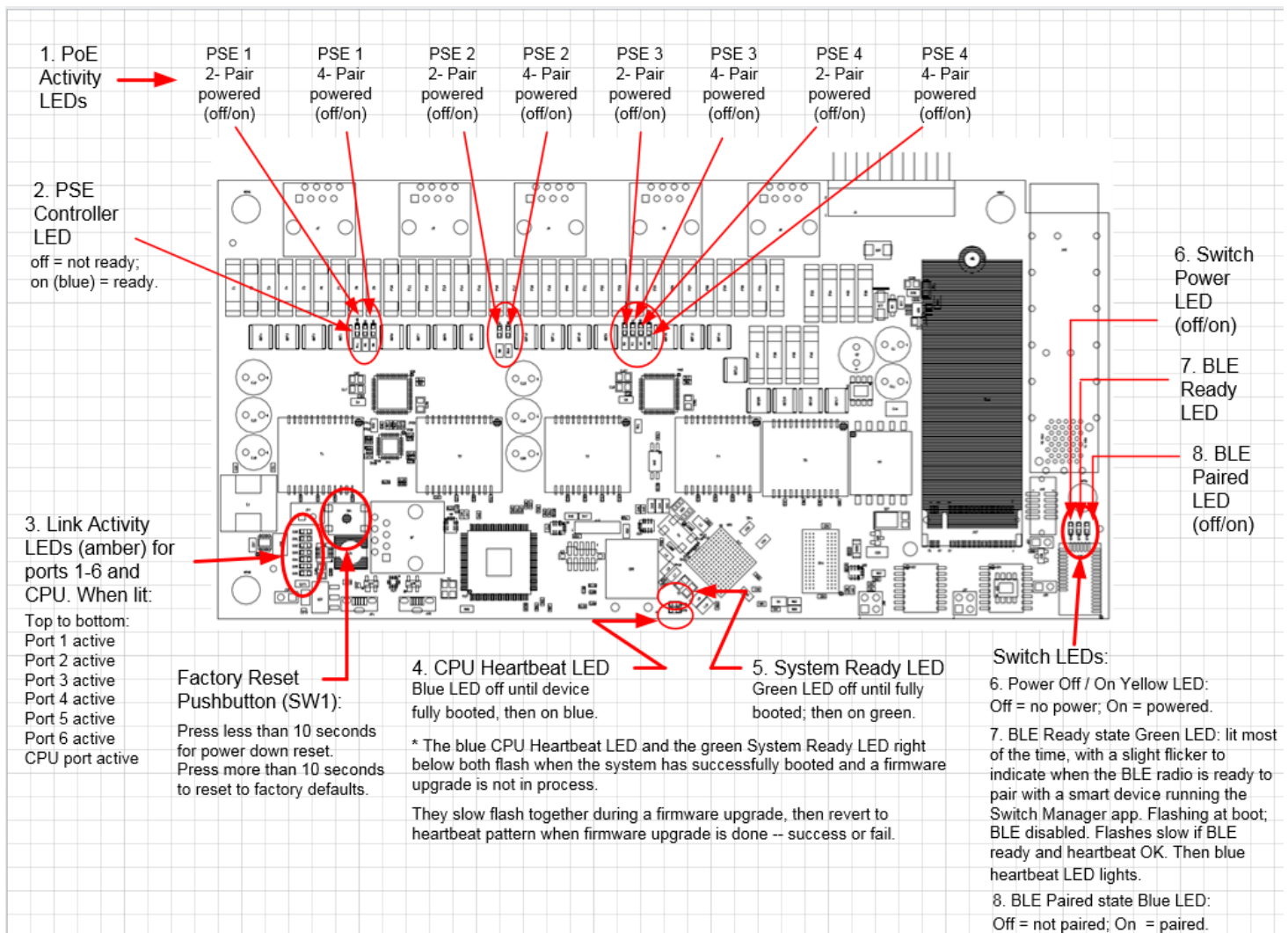
A fiber tray option is available for terminating the fiber cable. See the *SESPM-4P-FMK Option Install Guide* for details.

Boot Process

After power up the SESMP1040-541-LT can take about 1-1/2 minutes to boot up. The LED indicators on the PCB will light after about a minute and a half.

LED Locations

The LEDs on the SESP1040-541-LT-xx switch board are shown below.



LED Descriptions

LEDs are provided to report PoE activity, link activity, system readiness, and switch power and BLE pairing information as shown and described below.

1. PoE Activity LEDs (PSE Pair Powered LEDs):

PSE Port 1: off = no power; amber = 2-pair powered; green = 4-pair powered.

PSE Port 2: off = no power; amber = 2-pair powered; green = 4-pair powered.

PSE Port 3: off = no power; amber = 2-pair powered; green = 4-pair powered.

PSE Port 4: off = no power; amber = 2-pair powered; green = 4-pair powered.

2. PSE Controller LED:

PSE Controller off = not ready;

PSE Controller on (blue) = ready.

3. Link Activity: amber LEDs from top to bottom:

Port 1: off = no activity; on = link activity.

2: off = no activity; on = link activity.

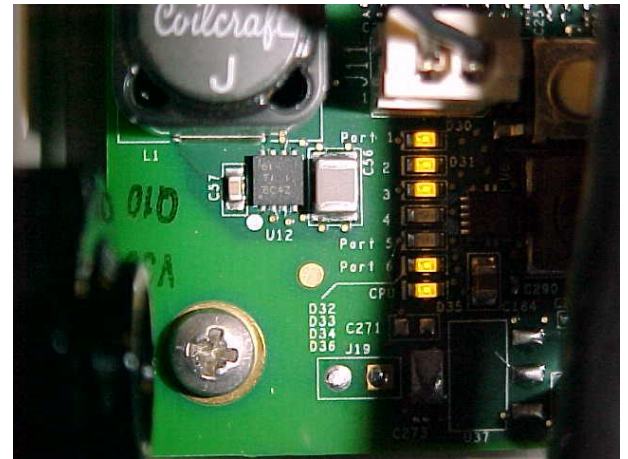
3: off = no activity; on = link activity.

4: off = no activity; on = link activity.

Port 5 (included combo port): off = no activity; on = link activity.

Port 6 (optional combo port): off = no activity; on = link activity.

CPU Port: off = no CPU activity; on = CPU activity.



4. CPU Heartbeat LED: Blue LED off until device fully booted.

5. System Ready LED: Green LED off until fully booted; then on green.

4 and 5. The blue CPU Heartbeat LED and the green System Ready LED right below it flash in unison when the system has successfully booted and a firmware upgrade is not in process. They slow flash together during a firmware upgrade, then revert to heartbeat pattern when firmware upgrade is done -- success or fail.

Switch LEDs (6, 7, and 8):

6. Power Off / On Yellow LED: Off = no power; On = powered.

7. BLE Ready state Green LED: Lit most of the time, with a slight flicker to indicate when the BLE radio is ready to pair with a smart device running the Switch Manager app. Flashing at boot; BLE disabled. Flashes slow if BLE ready and heartbeat OK. Then blue heartbeat LED lights.

BLE Ready state: constant off = not ready; on (green but blinking off about every 10 seconds) = ready.

8. BLE Paired state Blue LED: Off = not paired; On = paired.

Removing the Switch

Caution: Disconnect the grounding only after disconnecting all other cables. To remove (uninstall) the switch:

1. Disconnect the data cables.
2. Disable the supply voltage.
3. Disconnect the grounding.
4. Unmount the switch.
5. Place the switch in the original shipping package.

4. Additional Information

Q & A

Q1. What are some applications for using the switch?

A1. The switch comes in three different configurations: An AC-powered PSE, a DC-powered PSE and a PoE-powered PSE/PD and can be used to connect and provide power to advanced security and surveillance cameras such as PTZ, dome and high-speed cameras, PoE lighting, digital signage, and building access and control systems.

Q2. How much power does the switch provide?

A2. Up to 90W per port on any individual port; up to 180W total on -AC version and up to 240W total -DC version. The PD-powered version provides up to 80W total but also includes a 12V auxiliary power port for powering heaters, fans and other misc. accessory items.

Q3. If the IEEE 802.3bt spec says a PSE can send up to 90W and a PD can receive 71.3W, why do you say your SESPM1040-541-LT-PD switch can receive 80W?

A3. The IEEE802.3bt standard has an Annex Clause 145.3.8.2.1 for input average power exceptions. In closed systems (e.g., one in which a Transition Networks' SESPM1040-541-LT-AC or -DC version switch is providing power to Transition Networks' SESPM1040-541-LT-PD switch, this clause allows the -PD to determine resistance and draw power up to, but not exceeding, the amount the PSE puts out.

Q4. Does the switch have a fiber port?

A4. The switch comes with (1) 10/100/1000Base-T RJ-45 or 100/1000Base-X Combo Port. In addition, an optional second 10/100/1000Base-T RJ-45 or 1000Base-X Combo Port is available.

Q5. What is the 24V Passive PoE Module?

A5. The optional 24V Passive PoE Module provides 24VDC power to non-standard PoE powered devices such as wireless radios, eliminating the need for an additional external power source for those devices.

Q6. Can all the ports be used at once?

A6. All ports can be used simultaneously with these exceptions:

- The additional combo port module cannot be used along with the 24V Passive PoE module.
- On the PoE-powered -PD version, the SFP on the included combo port is only available when using a fiber cable run in parallel with a copper cable to power the unit. See [Port Configuration](#) on page 27.

Q7. What does the NFC feature do?

A7. The Near Field Communication antenna located inside the cover of the switch lets you configure the switch prior to connecting or powering it up simply by holding a smart device with the Switch App over the NFC antenna and transferring data. It also lets you duplicate the configuration across multiple switches. All of this saves the customer time and money, as well as simplifying setup and installation of the switch(es).

Q8. How can you configure the switch without it being powered up?

A8. When the NFC-enabled device (smartphone or tablet) and the NFC "tag" or antenna on the switch are in close proximity, a magnetic field is formed and the power from that magnetic field uses modulation to transfer data. The NFC antenna/tag contains a nonvolatile EEPROM which retains the data transferred from the

smartphone or tablet even after it moves out of proximity, and the configuration is transferred into the switch's memory once the switch is fully powered up.

Q9. What does the BLE feature do?

A9. The Bluetooth Low Energy feature allows remote access to the switch without having to physically connect with a cable, so monitoring and troubleshooting and changes can be made prior to leaving the job site or after ladders or scissor lifts have been removed. The range is approximately 100m.

Q10. Are the BLE and NFC features safe and secure enough for my network?

A10. NFC is considered very secure and is frequently used for contactless payments (e.g., Apple Pay). A secure channel is established and uses encryption for sending sensitive information. However, we always recommend users have antivirus software and passwords on their devices in case they are lost or stolen.

BLE uses Advanced Encryption Standard (AES), 128/256, SHA-1, SHA-2 (SHA-224 and SHA-256) and ECC (Elliptic Curve Cryptography) encryption. It uses an authenticated encryption algorithm designed to provide both authentication and confidentiality. AES was adopted by the US Government in 2002 and is used worldwide.

Q11. Does the switch need to be mounted in a cabinet?

A11. No, the switch is housed in its own NEMA 4X/IP66 rated enclosure and can be wall-mounted or pole mounted (requires optional brackets). It also includes 6kV surge protection for lightning protection or other current surges and additional fuse protection to protect from unintentional intrusions from outside power lines.

Q12. How does the parallel power and fiber connection work?

A12. To extend the Ethernet signals beyond the 100m Ethernet cable limitation, a combined fiber cable running in parallel to a copper cable for the power input cable can be used, or parallel power and fiber cables can be used. A fiber cable for the data can be run alongside a typical 16 AWG cable for the power.

Q13. Are there any management features?

A13. Yes, the switch IMS features include Auto Power Reset (APR) to re-boot remote devices and reduce service dispatches. The switch has port management and PoE management, including the ability to preserve and schedule power. Other integrated management software features include management of devices and cable diagnostics for finding cable faults or connection issues.

Q14. What is the app used for?

A14. The Switch Manager Mobile App interfaces with the NFC and BLE features to allow switch configuration, remote diagnosis and troubleshooting without having to climb a ladder or scissor lift to connect to the switch.

Q15. What is the Digital I/O feature used for?

A15. The digital input/digital output has four optical isolators independently configurable as either inputs or outputs. The Digital I/O option includes an isolated 12V DC power source that can be used for alarms, event notifications, or other customer-designated items (e.g., door open alarms, glass breakage alarms, etc.).

See the SESP-4P-DIG Option Install Guide for more information.

Q17. How can I tell if someone is tampering with the switch?

A17. The switch includes tamper detection. A 3-axis linear accelerometer detects if the switch has exceeded user-selected vibration limits, indicating someone may be tampering with the switch or if the switch mount has somehow been compromised.

Troubleshooting

The BLE app, Console Port or Web UI can be used for troubleshooting the switch.

1. Verify that your model supports the function you are trying. See “[Feature Benefits](#)” on page 9.
2. Check the Release Notes for any known issues.
3. Check the [SESPM1040-541-LT-xx webpage](#) for the more current firmware.
4. Verify the “[System Requirements](#)” on page 17.
5. Verify the “[Cautions and Warnings](#)” on page 23.
6. Verify the “[Cable and Cabling](#)” on page 25.
7. Monitor and document the “[LEDs](#)” described on page 41.
8. Make sure related hardware (Cameras, WAPs, SFPs, Injectors, etc.) is connected and operating correctly. See the related device manuals and helps.
9. Make sure related applications (BLE, NFC, etc.) are configured and running properly.
10. Make sure related options (e.g., SESP-4P-DIG, SESP-4P-FMK, SESP-2P-1G-CP) are installed and operating properly. See the related option kit install guide.
11. If you suspect a PoE problem, see “[PoE Standards Comparison, Modes & Compliance, & Troubleshooting](#)” on page 47 below.
12. If you suspect a NFC problem, see “[NFC Troubleshooting](#)” on page 46.
13. If you suspect a Bluetooth problem, see “[Bluetooth Troubleshooting](#)” on page 46.
14. Contact Tech Support; see “[Contact Us](#)” on page 57.

PoE Troubleshooting

1. Get as much detail as possible regarding the symptom, including any system messages from the PoE switch. For example, does a PD not power up at all, or does it power up briefly and then power down?
2. Determine if the trouble occurred on initial installation or after the PD had been working normally?
3. If the trouble started after the PD was working, what changed? Were there any hardware or software changes?
4. Verify that the port is not shut down, disabled, or errored.
5. Verify that the Ethernet cable from the PD to the switch port is good.
6. Verify that the total cable length from the switch front panel to the connected PD is not more than 100 meters. Some of the power from the switch port is dissipated in the cable due to wire resistance, especially on cables as long as 100 meters. Only the remaining power is available to the PD.
7. Verify that the PSE switch power budget can power the PD. If the switch power budget is depleted, additional PDs will not power-on when connected to a PoE port. Verify that the switch power budget (available PoE) is not depleted before or after the PD is connected. Verify that sufficient power is available for the PD type.
8. Verify if non-powered Ethernet devices can establish an Ethernet link on any port and that PoE devices do not power up on the same port.
9. Review alarms reported previously by system messages.
10. If a working IP camera or WAP intermittently reloads or disconnects from inline power, verify all electrical connections from the switch to the PD. An unreliable connection results in power interruptions and intermittent PD operation, such as PD disconnects and reloads.
11. Check for changes in the electrical environment at the switch site. What is happening at the PD when the disconnect occurs? Check for error messages reported by the switch at the same time of the disconnect.
12. Verify that an IP camera is not losing access just before a reload occurs (a network problem, not a PoE problem).
13. Pre-standard and post-standard IP camera may use different detection and connect / disconnect methods. Note that PD detection occurs when an Ethernet device is first connected to a PoE port. If a non-PoE device is connected to a PoE port, detection is deactivated. If the non-PoE device is later disconnected and replaced by a PD, the switch may not detect it immediately.
14. Verify that the PD is not causing an overcurrent condition on the port. Specifically: does the IP camera WAP, or lighting initially power on and then disconnect? If so, the problem may be an initial current surge that exceeds a current-limit threshold for the switch port. Some PDs may have excessive “surge in” current when first connected to a PoE port. The switch initially provides power to the port, and then quickly removes power due to a momentary overcurrent condition. The PD starts to power up, but then quickly powers down.
15. The SESP1040-541LT-xx has voltage and current regulators that detect an overcurrent threshold and disconnect power from the line. This prevents excessive current from being delivered by the PoE port, which could possibly result in damage to port-level components.

NFC Troubleshooting

Check if you have NFC. Not all phones and tablets have NFC. Check your phone's Settings menu:

1. On your [Android](#) device, tap on Settings.
2. Tap More.
3. Scroll down and you should see NFC and Android Beam options.

If your device has NFC, check that the chip and Android Beam are activated so that you can use NFC:

1. Go to Settings > More.
2. Tap on the NFC switch to activate it. The Android Beam function will also automatically turn on.
3. If the Android Beam does not automatically turn on, just tap it and select Yes to turn it on.

Bluetooth Troubleshooting

Note: Use the Switch Manager Mobile App for Bluetooth pairing; do not use the Android Bluetooth pairing function. If your Bluetooth accessory won't pair or connect to your Android device:

1. On your [Android](#) device, go to Settings > Bluetooth and make sure that Bluetooth is on. If you can't turn on Bluetooth or you see a spinning gear, restart your Android device.
2. Make sure that your Bluetooth accessory and Android device are close to each other.
3. Turn your Bluetooth accessory off and back on again.
4. Make sure that your Bluetooth accessory is on and fully charged or connected to power. If your accessory uses batteries, see if they need to be replaced. If you still can't pair or connect your Bluetooth accessory:
5. When using the BLE feature on the Switch Manager App: If your configured switch does not appear in the in the list of Pairing Devices, select Retry Scan. Once paired, the switch configuration should remain highlighted in green until you Disconnect. If you lose pairing, try closing out of the Switch Manager App, go back into the app and pair again.
6. Contact Tech Support if you still have any of these issues:
 - You can't turn on Bluetooth or the setting is grayed out.
 - You can't connect any Bluetooth accessories with your device.
 - The accessory manufacturer confirmed that your accessory is working correctly.

PoE Modes, Compliance, Standards and Troubleshooting

The switch is a Type 4 device (Class 8) that supports IEEE 802.3af/at/bt Power-over-Ethernet.

PoE History

PoE first emerged to solve the problem of powering Voice over Internet Protocol (VoIP) phones. PoE gained momentum in 2001 and 2002, when WAP makers, and other manufacturers took advantage of the technique. IEEE 802.3af can use a single standard RJ45 connector and CAT 5 (or even CAT 3) cable.

PoE+ (PoE Plus) provides extended support for new end devices with higher power requirements. The IEEE 802.3at standard provides up to 30 W of power to include newer end devices such as IEEE 802.11n wireless access points, surveillance cameras, etc.

PoE++ (IEEE 802.3bt): As manufacturers continued to advance the use of PoE, another option became available for PoE with greater output. PoE++ delivers up to 90 watts of power using the 802.3bt standard. PoE++ is delivered using 4 Pairs. PoE++ is ideal for IP surveillance cameras that require more throughput or a various other equipment such as LCD displays, computer workstations, and biomedical equipment. Minimum cable type Cat5e; recommend Cat 6A cabling.

Passive PoE: Passive PoE describes Ethernet power sources (like PoE switches or PoE injectors) that send raw unnegotiated energy down Ethernet cables to connected devices. The device connected to that cable will receive the electricity, whether it is able to handle it or not. If using a Passive PoE, make sure you properly understand the voltage requirement for your device before you plug it in.

PoE Standards Comparison

PoE Type 1 / PoE+ Type 2 / 802.3bt Type 3 / 802.3bt Type 4

Property	802.3af PoE (Type 1)	802.3at PoE+ (Type 2)	802.3bt Type 3	802.3bt Type 4
Power Available at PD	12.95 W	25.50 W	51 W	71 W
Max. Power from PSE	15.40 W	30.0 W	60 W	90 W
Voltage Range (at PSE)	44.0 – 57.0 V	50.0 – 57.0 V	50.0 – 57.0 V	52.5 – 57.0 V
Voltage Range (at PD)	37.0 – 57.0 V	42.5 – 57.0 V	42.5 – 57.0 V	41.1 – 57.0 V
Max. current	350 mA	600 mA per mode	1200 mA	1371 mA
Max. cable resistance	20 ohms (Cat 3)	12.5 ohms (Cat 5)	6.25 ohms	6.25 ohms
Power management	3 power class levels negotiated by signature	4 power class levels negotiated by signature or 0.1 W steps negotiated by LLDP	3 power class levels negotiated by signature or 0.1 W steps negotiated by LLDP	0.1 W steps negotiated by LLDP

Supported cabling	Cat 3 and Cat 5	Cat 5	Cat 5	Cat5e or Cat 6; Cat 6A recommended
Supported modes	Mode A (endspan), Mode B (midspan)	Mode A, Mode B	Mode A, Mode B, 4-pair mode	4-pair mode

PoE Types

See below for PoE type, PD power, cabling, and classes.

PD Type	PD Power	Cable Category	Classes
Type 1	up to 12.95	Cat 3 and Cat 5	2 pairs class 1-2
Type 2	up to 25.5W	Cat 5	2 pairs class 3-4
Type 3	40 – 51 W	Cat5e	4 pairs class 5-6
Type 4	62 – 71 W	Cat5e	4 pairs class 7-8

Type 1 : Also known as PoE, 2-pair PoE. Related standard: IEEE 802.3af. Maximum power to port: 15.4W. PoE Type 1 utilizes two pairs to connect many types of lower-powered devices to the network. Based on the initial IEEE 802.3af-2003 standard, it provides up to 15.4W of DC power to each PoE port (up to 12.95W of power for each device). PoE Type 1 can support devices such as VoIP phones, sensors/meters, wireless access points with two antennas and simple, static surveillance cameras (no pan, tilt or zoom).

Type 2 : Also known as PoE+, and PoE Plus. Related standard: IEEE 802.3at. Maximum power to port: 30W. Higher-powered devices are connected to the network using PoE Type 2, based on the IEEE 802.3at-2009 standard. It is backward compatible (supports PoE Type 1 devices) and provides 30W of DC power to each PoE port (up to 25.5W of power for each device). PoE Type 2 can support devices such as more complex surveillance cameras that pan, tilt or zoom, as well as wireless access points with six antennas, LCD displays, biometric sensors, and tablets.

Type 3 : Also known as 4-pair PoE, 4P PoE, PoE++, and UPOE. Related standard: IEEE 802.3bt. Maximum power to port: 60W. PoE Type 3 uses all four pairs in a copper cable. Currently in development with IEEE 802.3bt Type 3 Work Group. It provides 60W of DC power to each PoE port (up to 51W of power for each device). PoE Type 3 can support devices such as videoconferencing system components and building management devices.

Type 4: Also known as higher-power PoE. Related standard: IEEE 802.3bt. Maximum power to port: 90W. Growing power requirements of network devices are pushing the need for higher power delivered through network cabling – which is where PoE Type 4 comes into play. It provides up to 90W of DC power to each PoE port (up to 71W of power for each device – see *IEEE 802.3bt Annex Clause 145.3.8.2.1* - Input average power exceptions). PoE Type 4 can support devices such as laptops and TVs.

Related Information

See the IEEE 802.3bz standard at <http://standards.ieee.org/getieee802/download/802.3bz-2016.pdf>.

Note that this manual provides links to third part web sites for which Transition Networks is not responsible.

Requesting and Sourcing Power Type and Class of PoE Device:



PoE Classes

PoE Classification is where the PSE detects the PD’s power requirements by using Physical Layer Classification or LLDP. The IEEE 802.3bt standard specifies mutual identification to address four-pair operation. Additional clauses were added, defining the following:

Class	PSE Output Power[W]	PD Input Power[W]	PD Type	Standard
0	15.4	12.95	1	IEEE 802.3af
1	4	3.84	1	
2	7	6.49	1	
3	15.4	12.95	1	
4	30	25.5	2	IEEE 802.3at
5	45	40	3	IEEE 802.3bt
6	60	51	3	
7	75	62	4	
8	90	73	4	

PoE Deployment Environments A and B

IEEE802.3at-2009 defines two deployment environments in section 33.4.1:

Environment A: when both PSE and PD are located indoors, inside the same building. In this environment, there has to be electrical isolation between the PoE circuitry and the data circuitry inside a PSE. Multi-port PSE’s can all share the same ground isolation. Environment A is therefore an *indoor PSE – indoor PD* environment (a.k.a. *indoor/indoor*).

Environment B: when the PSE and PD are not located in the same building. In this environment there needs to be electrical isolation between PoE and data, as well as between every port in a multi-port PSE.

In summary, the PD-PSE environment is one of these three combinations:

1. PoE Source is indoor, PD is indoor (Env. A)
2. PoE Source is indoor, PD is outdoor (Env. B)
3. PoE Source is outdoor, PD is outdoor (Env. B)

Option 3 is the most challenging environment since both the PD and PSE are installed outdoors. The switch is an indoor or outdoor device. It can be used with outdoor devices such as outdoor IP cameras or outdoor Wi-Fi Aps.

Mode A vs. Mode B

Alternative A, also known as Mode A, uses the data pairs of an Ethernet link to deliver power. Data Pairs include pins 1,2 and 3,6. PSEs using Mode A supply a positive voltage to pins 1 and 2. Alternative B, also known as Mode B, uses the spare pairs to deliver power. Spare Pairs include pins 4,5 and 7,8.

802.3af/at Standard “compliant” vs “compatible” PDs

Knowing the difference between PoE “compliant” devices and “compatible” devices can help avoid interoperability and connectivity issues. Compliant and compatible PoE devices are not held to the same 802.3af/at standard:

- 802.3af/at “compliant” PDs fulfill the IEEE strict requirement to support both Mode A and Mode B power modes.
- 802.3af/at “compatible” PDs typically can provide power using only Mode B.

Typical PD Power Requirements

- 1.8 Watts: Transition Networks’ M/GE-ISW-SFP-01-PD (Class 1 Powered Device (0.44 Watts – 3.84 Watts)).
- 13W: IP Camera, VoIP Phone, Wireless Access Point, Networked Audio.
- 30W: IP Telephone, WiMAX Access Point, PTZ Camera, Remote Computer Terminal.
- 60W : Door Access System, Video Phone, Thin Client.
- 100W: Digital Signage Display, Point-of-Sale System, LCD TV, Computer Monitor.
- 200W: Larger TV, Larger Display, Larger Monitor, Laptop.

After eliminating basic network factors, ask your PD vendor for the PD’s power supply mode and polarities supported and exact power consumption.

Mixing POE and Non-POE Devices

You can mix POE and non-POE devices on the same POE switch (i.e., you can put PCs on the same POE switch as a WAP or an IP camera). The PSE (your switch) will only send power if requested by the PD.

Legacy PD Detection / Capacitor Detection

Legacy PDs refers to powered devices manufactured before the IEEE standard was finalized and do not have the expected PD signature required by the PSE’s detection signal. Such PDs usually feature large capacitance as the detection signature that does not completely comply with the 802.3af specs. By enabling this option, the switch will probe for legacy PDs and if a legacy PD is detected, the switch will provide power to the PD.

PoE ++ Connectivity, Arcing, and Temperature Issues

- PoE is not live until powered device (PD) and powered sourcing equipment (PSE) handshake.
- When unplugging live PoE, an arc (or spark) occurs between plug and jack contacts.
- Arcing can occur with all mated PoE connections. **Note:** the switch uses a gel-filled RJ45 connection to reduce damage from arcing. Also, we recommend always disconnecting power from the ports before unplugging.
- Ensure jack meets IEC 60512-99-001 for compliance.
- Ambient jack temperature must be 5 deg. C below maximum jack operating temperature. To operate in 60 deg. C ambient, you need a 65 deg. C rated jack.

See the BICSI webpage for your particular type of PoE (e.g., for [PoE++](#)). See the [ANSI/NECA/BICSI 568-2006](#) Standard for Installing Commercial Building Telecommunications Cabling. ANSI/NECA/BICSI 568 describes minimum requirements and procedures for installing the infrastructure for telecoms, including balanced twisted-pair copper cabling and optical fiber cabling that transport telecommunications signals (e.g., voice, data, and video). The 2008 NEC standard is a safety code widely adopted in the USA as minimum required safety rules for the electrical industry. The 2008 NEC points to the ANSI/NECA/BICSI 568 standard as a best practices source document.

PoE/PoE+/PoE++ Comparison Chart

The table below compares the three types of PoE supported.

Type	Standards	Max. Current	Twisted pairs used	Power at Source	Power at Device	Max. Data Rate	Standard Ratified
PoE	IEEE 802.3af (802.3at Type 1)	350 mA	2 pairs	15.4 W	13 W	1000Base-T	2003
PoE+	802.3at Type 2	600 mA	2 pairs	30 W	25.5 W	1000Base-T	2009
PoE++	Approved IEEE 802.3bt Type 3 / Approved IEEE 802.3bt Type 4	600 mA / 900 mA	4 pairs	60 W / 90 W	51 W / 71.3 W	10Gbase-T	Sept 2018

Network Safety

This subclause sets forth a number of recommendations and guidelines related to safety concerns. The list is neither complete nor does it address all possible safety issues. The designer is urged to consult the relevant local, national, and international safety regulations to verify compliance with the appropriate requirements. LAN cabling systems described in this clause are subject to at least four direct electrical safety hazards during their installation and use. These hazards are as follows:

- a) Direct contact between LAN components and power, lighting, or communications circuits.
- b) Static charge buildup on LAN cabling and components.
- c) High-energy transients coupled onto the LAN cabling system.
- d) Voltage potential differences between safety grounds to which various LAN components are connected.

Such safety hazards should be avoided or appropriately protected against for proper network installation and performance. In addition to provisions for proper handling of these conditions in an operational system, special measures should be taken to verify that the intended safety features are not negated during installation of a new network or during modification of an existing network.

Installation and Maintenance Guidelines

From IEEE Approved Draft P802.3bt/D3.7 Sept 2018 145.6.3: It is a mandatory requirement that sound installation practice, as defined by local codes and regulations, be followed in every instance in which such practice is applicable. In particular, users are cautioned to be aware of the ampacity of cabling, as installed, and local codes and regulations, e.g., ANSI/NFPA 70 – National Electric Code® (NEC®), relevant to the maximum class supported.

It is a mandatory requirement that, during installation of the cabling plant, care be taken to verify that non-insulated network cabling conductors do not make electrical contact with unintended conductors or ground.

Patch Panel Considerations

It is possible that the current carrying capability of a cabling cross-connect may be exceeded by a PSE. The designer should consult the manufacturer's specifications to verify compliance with the appropriate requirements.

Electromagnetic Emissions

The PD and PSE powered cabling link shall comply with applicable local and national codes for the limitation of electromagnetic interference.

Temperature and Humidity

The PD and PSE powered cabling link segment is expected to operate over a reasonable range of environmental conditions related to temperature, humidity, and physical handling. Specific requirements and values for these parameters are beyond the scope of the standard.

Backward Compatibility

Although new features were added, higher power is supported and some algorithms were changed to ensure interoperability. The idea is that the system will work with legacy Type 1 and Type 2 devices. It should work automatically, as long as the PSE is capable (in terms of power) of supporting the PD and both are standard compliant. Should the PD require higher power (IEEE 802.3bt PD) and the PSE cannot support it (IEEE 802.3af PSE), the PD will either remain off or it will turn on and consume only the power available from the PSE. The table on PoE backward compatibility is updated every six weeks, after the [IEEE802.3bt Task Force](#) meetings take place. The SESP1040-541-LT-PD requires Type 4 Class 8.

Identification

145.7 Protocol Implementation Conformance Statement (PICS) proforma for Clause 145, PoE

From IEEE Approved Draft P802.3bt/D3.7 Sept 2018 145.7.2.

145.7.2.1 Implementation identification

Supplier ¹	Transition Networks
Contact point for inquiries about the PICS ¹	Stephen Anderson
Implementation Name(s) and Version(s) ^{1,3}	SESPM1040-541-LT-xx Series
Other information necessary for full identification- e.g., name(s) and version(s) for machines and/or operating systems; System Name(s) ²	Power ++ Family

NOTE 1-Required for all implementations

NOTE 2-May be completed as appropriate in meeting the requirements for the identification.

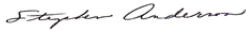
NOTE 3-The terms Name and Version should be interpreted appropriately to correspond with a supplier’s terminology (e.g., Type, Series, Model).

145.7.2.2 Protocol summary

Identification of protocol standard	IEEE Std 802.3bt-201x, Clause 145, Power over Ethernet
Identification of amendments and corrigenda to this PICS proforma that have been completed as part of this PICS	
Have any Exception items been required? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (See Clause 21; the answer Yes means that the implementation does not conform to IEEE Std 802.3bt-201x.)	
Date of Statement	1/22/19

Compliance Information

Declaration of Conformity

<i>Declaration of Conformity</i>	
<i>Transition Networks, Inc.</i> <small>Manufacturer's Name</small>	
<i>10900 Red Circle Drive, Minnetonka, Minnesota 55343 U.S.A.</i> <small>Manufacturer's Address</small>	
Declares that the Power++ Solutions family of products: SESPM1040-541-LT-AC, SESP1040-541-LT-DC, SESP1040-541-LT-PD	
Conforms to the following Product Regulations:	
EN 55032: 2012/AC: 2013, Class A; CISPR 32:2012. FCC Part 15, Subpart B, Class A; EN 55024: 2010. EN 61000-4-2: 2009, EN 61000-4-3: 2006 + A1: 2008 + A2: 2010, EN 61000-4-4: 2004 + AC: 2006 + A1: 2010. EN 61000-4-5: 2006, EN 61000-4-6: 2009, EN 61000-4-8: 2010, EN 61000-4-11: 2004. EN 60950-1: 2006 / A11: 2009 / A1: 2010 / A12: 2011 / A2:2013; National Differences. IEC 60950-1:2005/AMD2:2013, IEC 60950-1:2005/AMD1:2009, IEC 60950-1:2005, IEC 60950-22:2016. UL 60950-1, 2 nd Edition, 2019-05-09 (IT Equipment – Safety - Part 1: General Requirements) (SESPM1040-541-LT-AC and SESP1040-541-LT-DC).	
With the technical construction on file at the above address, this product carries the	
CE Mark	
I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standards(s).	
<u>Minnetonka, Minnesota</u> <small>Place</small>	<u>March 3, 2020</u> <small>Date</small>
 <hr style="width: 100%;"/>	
<u>Stephen Anderson</u> <small>Full Name</small>	<u>Vice President of Engineering</u> <small>Position</small>
<small>28141B</small>	

FCC Regulations

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device complies with Part 18 of the FCC Rules. This Industrial, scientific, and medical (ISM) equipment. Equipment or appliances designed to generate and use locally RF energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunication.

ISM equipment shall be designed and constructed in accordance with good engineering practice with sufficient shielding and filtering to provide adequate suppression of emissions on frequencies outside the frequency bands specified in §18.301. (b) Subject to the exceptions in paragraphs (c) and (d) of this section and irrespective of whether the equipment otherwise complies with the rules in this part, the operator of ISM equipment that causes harmful interference to any authorized radio service shall promptly take whatever steps may be necessary to eliminate the interference.

Canadian Regulations

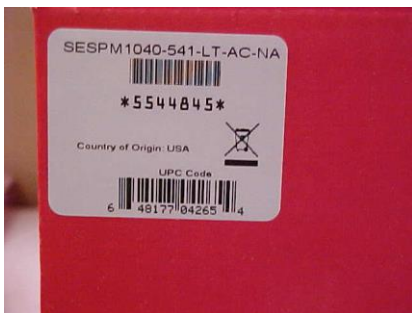
This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out in the radio interference regulations of the Canadian Department of Communications.

Le radioéel appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectriques édicté par le ministère des Communications du Canada.

Service, Warranty and Support

Product Label and Box Label

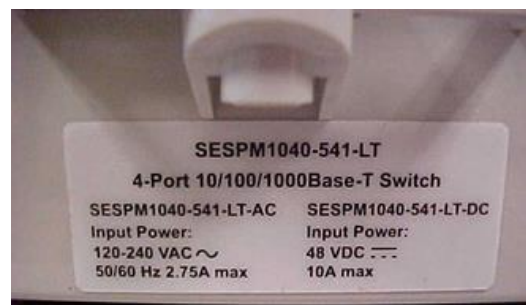
You can find device information in the CLI and Web GUI and on the product labels and box label.



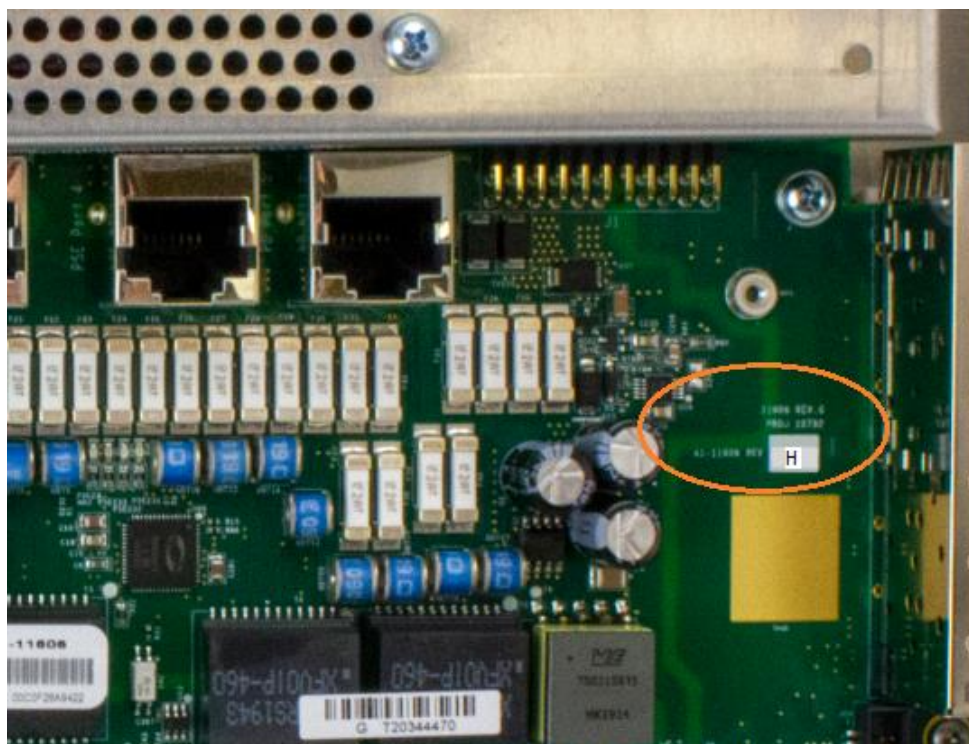
Box Label



Device Label inside top cover



Device Label above USER ACCESS Latch



PCB Hardware Revision (example only)

Record Device and System Information

After performing the troubleshooting steps, and before calling or emailing Technical Support, please record as much information as possible in order to help the Transition Networks Tech Support Specialist.

1. In the Web UI, select the **System Information** webpage. From the CLI, use the **show** commands to gather the information below or as requested by the TN Tech Support Specialist.

2. Record Model Number: _____ PCB Hardware Revision: _____

Serial Number: _____ Software Revision: _____

BLE Firmware Version: _____ NFC State: _____

3. Record Port Configuration, PoE Configuration, and PoE Status: _____

4. SESP1040-541-LT options installed: _____

5. Provide additional information to your Tech Support Specialist. See the "Troubleshooting" section above.

Your Transition Networks service contract number: _____

Describe the failure: _____

Describe any action(s) already taken to resolve the problem (e.g., changing mode, rebooting, etc.): _____

The model and serial numbers of other Transition Networks devices in the network: _____

Describe your network environment (layout, cable type, etc.): _____

Network load and frame size at the time of trouble (if known): _____

PD equipment used: _____

The device history (i.e., have you returned the device before, is this a recurring problem, etc.): _____

Any previous Return Material Authorization (RMA) numbers: _____

Contact Us

Technical Support: Technical support is available 24-hours a day

US and Canada: 1-800-260-1312

International: 00-1-952-941-7600

Main Office

tel: +1.952.941.7600 | toll free: 1.800.526.9267 | fax: 952.941.2322

sales@transition.com | techsupport@transition.com | customerservice@transition.com

Address

Transition Networks

10900 Red Circle Drive

Minnetonka, MN 55343, U.S.A.

Web: <https://www.transition.com>

Warranty

Two-Year Limited Hardware Warranty

Transition Networks warrants to the original consumer or purchaser that each of its SESPM1040-541-LT-xx products and all components thereof, will be free from defects in material and/or workmanship for a period of two years from the original factory shipment date. Any warranty hereunder is extended to the original consumer or purchaser and is not assignable. Transition Networks makes no express or implied warranties including, but not limited to, any implied warranty of merchantability or fitness for a particular purpose, except as expressly set forth in this warranty. In no event shall Transition Networks be liable for incidental or consequential damages, costs, or expenses arising out of or in connection with the performance of the product delivered hereunder. Transition Networks will in no case cover damages arising out of the product being used in a negligent fashion or manner.

This warranty does not cover damage from accident, acts of God, neglect, contamination, misuse or abnormal conditions of operation or handling, including over-voltage failures caused by use outside of the product's specified rating, or normal wear and tear of mechanical components.

Transition Networks will, at its option:

- Repair the defective product to functional specification at no charge
- Replace the product with an equivalent functional product
- Refund a portion of purchase price based on a depreciated value

To return a defective product for warranty coverage, contact Transition Networks' Customer Support for a return authorization number.

Send the defective product postage and insurance prepaid to the following address:

Transition Networks, Inc.
10900 Red Circle Drive
Minnetonka, MN 55343
USA

Attn: RETURNS DEPT: CRA/RMA # _____

Failure to properly protect the product during shipping may void this warranty. The return authorization number must be written on the outside of the carton to ensure its acceptance. We cannot accept delivery of any equipment that is sent to us without a CRA or RMA number.

CRA's are valid for 60 days from the date of issuance. An invoice will be generated for payment on any unit(s) not returned within 60 days.

Upon completion of a demo/ evaluation test period, units must be returned or purchased within 30 days. An invoice will be generated for payment on any unit(s) not returned within 30 days after the demo/ evaluation period has expired.

The customer must pay for the non-compliant product(s) return transportation costs to Transition Networks for evaluation of said product(s) for repair or replacement. Transition Networks will pay for the shipping of the repaired or replaced in-warranty product(s) back to the customer (any and all customs charges, tariffs, or/and taxes are the customer's responsibility).

Before making any non-warranty repair, Transition Networks requires a \$200.00 charge plus actual shipping costs to and from the customer. If the repair is greater than \$200.00, an estimate is issued to the customer for authorization of repair. If no authorization is obtained, or the product is deemed not repairable, Transition Networks will retain the \$200.00 service charge and return the product to the customer not repaired. Non-warranted products that are repaired by Transition Networks for a fee will carry a 180-day limited warranty. All warranty claims are subject to the restrictions and conventions set forth by this document.

Transition Networks reserves the right to charge a \$50 fee for all testing and shipping incurred, if after testing, a return is classified as "No Problem Found."

THIS WARRANTY IS YOUR ONLY REMEDY. NO OTHER WARRANTIES, SUCH AS FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSED OR IMPLIED. TRANSITION NETWORKS IS NOT LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE OR THEORY. AUTHORIZED RESELLERS ARE NOT AUTHORIZED TO EXTEND ANY DIFFERENT WARRANTY ON TRANSITION NETWORKS'S BEHALF.

Glossary of Terms

Note that the mention or definition of a term here does not imply that the switch supports that particular feature.

802.11b standard has a maximum raw data rate of 11 Mbit/s and uses the same media access method defined in the original standard. 802.11b products appeared on the market in early 2000, since 802.11b is a direct extension of the modulation technique defined in the original standard. The dramatic increase in throughput of 802.11b (compared to the original standard) along with simultaneous substantial price reductions led to the rapid acceptance of 802.11b as the definitive wireless LAN technology. Devices using 802.11b experience interference from other products operating in the 2.4 GHz band. Devices operating in the 2.4 GHz range include microwave ovens, Bluetooth devices, baby monitors, cordless telephones, and some amateur radio equipment.

802.11g modulation standard was ratified in June 2003. This works in the 2.4 GHz band (like 802.11b) but uses the same OFDM based transmission scheme as 802.11a. It operates at a maximum physical layer bit rate of 54 Mbit/s exclusive of forward error correction codes, or about 22 Mbit/s average throughput. 802.11g hardware is fully backward compatible with 802.11b hardware, and therefore is encumbered with legacy issues that reduce throughput by ~21% when compared to 802.11a.

802.11n is an amendment that improves upon the previous 802.11 standards by adding multiple-input multiple-output antennas (MIMO). 802.11n operates on both the 2.4 GHz and the 5 GHz bands. Support for 5 GHz bands is optional. Its net data rate ranges from 54 Mbit/s to 600 Mbit/s. The IEEE has approved the amendment, and it was published in October 2009. Prior to the final ratification, enterprises were already migrating to 802.11n networks based on the Wi-Fi Alliance's certification of products conforming to a 2007 draft of the 802.11n proposal.

BLE (Bluetooth Low Energy): Bluetooth® Low Energy (LE) enables short-burst wireless connections and uses multiple network topologies. The Bluetooth LE broadcast topology supports localized information sharing and is well suited for beacon solutions, such point-of-interest (POI) information and item-finding and way-finding services. Bluetooth Low Energy (Bluetooth LE, BLE, formerly marketed as "Bluetooth Smart" is a wireless personal area network technology designed and marketed by the Bluetooth Special Interest Group ([Bluetooth SIG](#)) aimed at novel applications in the healthcare, fitness, beacons, security, and home entertainment industries. Compared to Classic Bluetooth, Bluetooth Low Energy is intended to provide considerably reduced power consumption and cost while maintaining a similar communication range. BLE broadcasting can be disabled via the CLI or the Web UI.

Endspan: PSE type located at the end of the twisted-pair channel. For example, a switch.

IEEE 802.3bt: Trade names of PoE++, 4Ppoe. Types 1, 2, 3, and 4. Max speed of 10GBASE-T. Power on 4 out of 4 pairs, up to 960mA / pair (480mA / wire); PSE: Max of 99.9 W, PD: Max of 71 W.

IP 66: IP (Ingress Protection) ratings are defined in international standard EN 60529 (British BS EN 60529:1992, European IEC 60509:1989). IP ratings are used to define levels of sealing effectiveness of electrical enclosures against intrusion from foreign bodies (tools, dirt, etc.) and moisture. The numbers that follow IP each have a specific meaning. The first indicates the degree of protection (of people) from moving parts, as well as the

protection of enclosed equipment from foreign bodies. The second defines the protection level that the enclosure enjoys from various forms of moisture (drips, sprays, submersion etc.).

IP66 Enclosure = IP rated as “dust tight” and protected against heavy seas or powerful jets of water. These enclosures are constructed for indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, and hose-directed water; and that will be undamaged by the external formation of ice on the enclosure. See <https://www.nema.org/Products/Documents/nema-enclosure-types.pdf> for more information. See NEMA Standards Publication 250-2003, “Enclosures for Electrical Equipment (1000 Volts Maximum)”. This Standards Publication as well as all other NEMA publications are available from IHS @ 800 854-7179 or <http://www.global.ihs.com>.

Midspan: PSE type located between a non-PoE switch and a PD. Also called a PoE injector.

NDEF: (NFC Data Exchange Format) is a light-weight binary format, used to encapsulate typed data. It is specified by the NFC Forum, for transmission and storage with NFC, however it is transport agnostic. NDEF defines messages and records. An NDEF Record contains typed data, such as MIME-type media, a URI, or a custom application payload. An NDEF Message is a container for one or more NDEF Records.

NEMA 4X: In Non-Hazardous Locations, the specific enclosure Type, its applications, and the environmental conditions it is designed to protect against, when completely and properly installed. Type 4X Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against access to hazardous parts; to provide a degree of protection of the equipment inside the enclosure against ingress of solid foreign objects (windblown dust); to provide a degree of protection with respect to harmful effects on the equipment due to the ingress of water (rain, sleet, snow, splashing water, and hose directed water); that provides an additional level of protection against corrosion; and that will be undamaged by the external formation of ice on the enclosure.

NFC (Near Field Communication) is a form of contactless communication between devices like smartphones or tablets. Contactless communication allows a user to wave the smartphone over a NFC compatible device to send information without needing to touch the devices together or go through multiple steps setting up a connection. NFC technology lets smartphones and other enabled devices communicate with other devices with a NFC tag. NearFieldCommunication.org is devoted to educating individuals, small businesses, and large companies alike on the merits of near field communication. NFC establishes a secure channel and uses encryption for sending sensitive information. Recommend users have anti-virus software and passwords on their devices in case they are lost or stolen. NFC state can be disabled via the CLI or the Web UI.

For more information about the official standards and regulations surrounding near field communication, check out the [NFC Forum](http://NFCForum.org).

PD (Powered Device): A device that receives power from a PSE over the twisted-pair copper cabling channel (e.g., an IP phone, WAP, or IP camera).

PSE (Power Sourcing Equipment): A device that delivers (sources) power over a twisted-pair copper cabling channel to a powered device (e.g., a switch).

RP-SMA (Reverse Polarity SMA) is a variation of the SMA connector which reverses the gender of the interface. The term “reverse polarity” refers only to the gender of the connector’s contact pin and not to the signal polarity.

SMA (Sub-Miniature Version A) are coaxial RF connectors. SMA connectors are coaxial RF connectors developed in the 1960s as a minimal connector interface for coaxial cable with a screw type coupling mechanism. The SMA connector has a 50 Ω impedance. It offers excellent electrical performance from DC to 18 GHz.

Tag Types are contactless cards based on currently available products capable of storing NDEF (NFC Data Exchange Formatted) data. See the [NFC Forum](#) for Tag 4 information.

From IEEE P802.3bt/D3.7 Sept 2018:

Ampacity: the maximum current, in ampere, that a conductor can carry continuously under the conditions of use without exceeding its temperature rating.

Dual-signature PD: A PD that has independent detection signatures, class signatures, and maintains power signatures on each pairset.

Link section: the portion of the link between the PSE Power Interface (PI) and the PD PI.

Pairset: Either of two valid 4-conductor connections, Alternative A or Alternative B, as listed in IEEE 802.3, 145.2.4. The PSE Alternative A and Alternative B connections are referred to as Mode A and Mode B, respectively, at the PD.

Power Sourcing Equipment (PSE): A DTE or midspan device that provides power to a single link section which may also carry data.

Single-signature PD: A PD that simultaneously shares the same detection signature, class signature, and maintains power signature between both pairsets.

Type 1 PD: A PD that requests Class 0 to Class 3 during Physical Layer classification and that is not a PoDL PD.

Type 1 PSE: A PSE that supports Class 0 to Class 3 power levels and provides power over 2 pairs.

Type 2 PD: A PD that requests Class 4 during Physical Layer classification, supports 2-Event Classification, and supports Data Link Layer classification.

Type 2 PSE: A PSE that supports Class 0 to Class 4 power levels and provides power over 2 pairs.

Type 3 PD: A single-signature PD that requests Class 1 to Class 6, or a dual-signature PD that requests Class 1 to Class 4 on both Modes, during Physical Layer classification. Additionally, the PD implements Multiple-Event classification, and accepts power on both Modes simultaneously.

Type 3 PSE: A PSE that supports up to Class 6 power levels, supports short MPs, and may support 4-pair power.

Type 4 PD: A single-signature PD that requests Class 7 or Class 8, or a dual-signature PD that requests Class 5 on at least one Mode during Physical Layer classification. Additionally, the PD implements Multiple-Event classification, is capable of Data Link Layer classification, and accepts power on both Modes simultaneously.

Type 4 PSE: A PSE that supports at least Class 7 power levels, in addition to lower PD Classes, short MPS, and 4-pair power.



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SESPM1040-541-LT-xx Install Guide, 33772 Rev. E