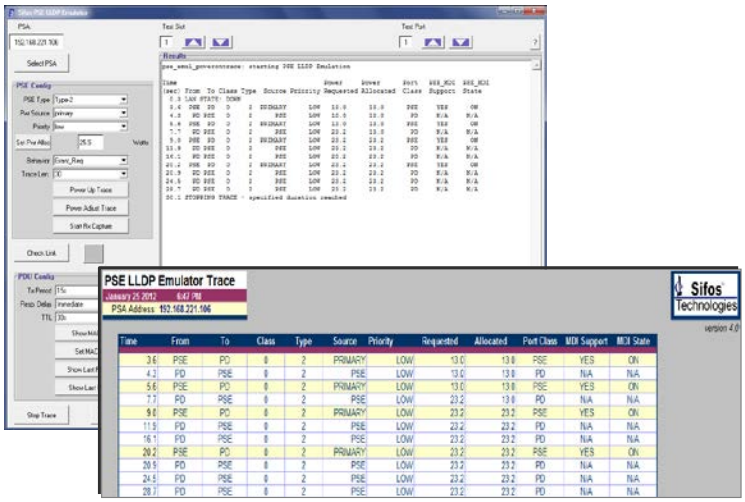
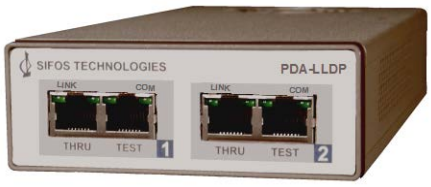
PDA-LLDP

Powered Device LLDP Analyzer

IEEE 802.3at Power over Ethernet

Product Overview





Key Features

- **Enables Powered Device Verification to IEEE 802.3 Clauses 33 and 79**
- **Flexible PSE LLDP Modeling and Configuration**
- **One-Button LLDP Protocol Capture and Analysis**
- **Enables Flexible Emulation of 802.3at Type-2 LLDP PSE's when combined with a Sifos PDA-300**
- **Compact, Portable 2-Port Emulation**
- **Overcomes Coverage Limitations of End-Span & Mid-Span PSE's**
- **PSA Interactive Graphical User Interface**
- **PowerShell PSA Automation Scripting**
- **Pop-Up Excel Spreadsheet Protocol Trace Reports**
- **Also Available on any PSA-3000 or PSL-3000 Enabled for LLDP**

Verification, *Simplified.*

802.3at PD's

All Type-2 PD's

Type-1 PD's with LLDP Support

Flexible PSE Emulation

PSE Type, Source, & Priority

Max Power Allocation

Grant Logic

LLDP Period, TTL

Request Response Delay

One-Button Protocol Analysis

Bi-Directional Analysis

Message Content

Message Timing

Colorized Spreadsheet Report

Cost Effective

Less Expensive Than Many Type-2 PSE's

Less Expensive Than Programmable Packet Generators

No Programming Necessary

Overview

With the 802.3at standard, PoE has moved in the direction of augmenting layer 1 Powered Device (PD) classification with a MAC (or Link) Layer PD classification that offers significantly improved power management accuracy and enables dynamic negotiation of power levels between PSE and PD.

The link layer scheme uses a PoE-specific Link Layer Discovery Protocol (LLDP) as specified in the new Clause 79 of IEEE 802.3 with additional protocol rules defined in Clause 33 (IEEE 802.3at). Normally, LLDP is a link (point-to-point) MAC protocol historically used to allow switches and routers to automatically "discover" what is around them and to populate and maintain an SNMP MIB that can be used for viewing and managing a network topology. Under IEEE 802.3at, LLDP is extended to perform a link configuration function related to power negotiation between a PSE and a PD.

LLDP PSE Emulation and Analysis

IEEE 802.3at allows PSE's that deploy LLDP for PoE power management considerable latitude in how they implement LLDP protocol. Since PSE's are the master of this protocol, PD's must work within the constraints established by a PSE.

PSE LLDP Emulation involves modeling various IEEE 802.3at-compliant PSE LLDP behaviors in the interest of assessing Powered Device responses. Characteristics that may be modeled are **PSE Power Allocation** decisions, **periodicity** of packet transmission, **timing** of responses to power requests, PSE initiated **Power Allocation Changes**, LLDP **time-to-live**, and the content of various TLV fields that communicate **device status** and **information**.

LLDP Analysis involves capturing and analyzing bi-directional PoE-specific LLDP packets and associated packet timing during PD power-ups and during ongoing (post power-up) power adjustments.

Why Not Use PSE's or Packet Analyzers ?

End-span PSE's that support LLDP, when available, typically don't offer much in the way of configuration and control for LLDP PoE protocol. So while they can power a PD, they will only present one of many possible LLDP protocol and timing scenarios while restricting user intervention into power management decisions. Type-2 (high power) mid-span PSE's and non-LLDP end-span PSE's can power a PD but when doing so, must offer 2-event classification that will automatically grant full power to a Type-2 PD before any LLDP negotiation could ever start, thus corrupting the model of an LLDP power-up. Older Type-1 mid-span PSE's won't power PD's beyond 15.4 watts.

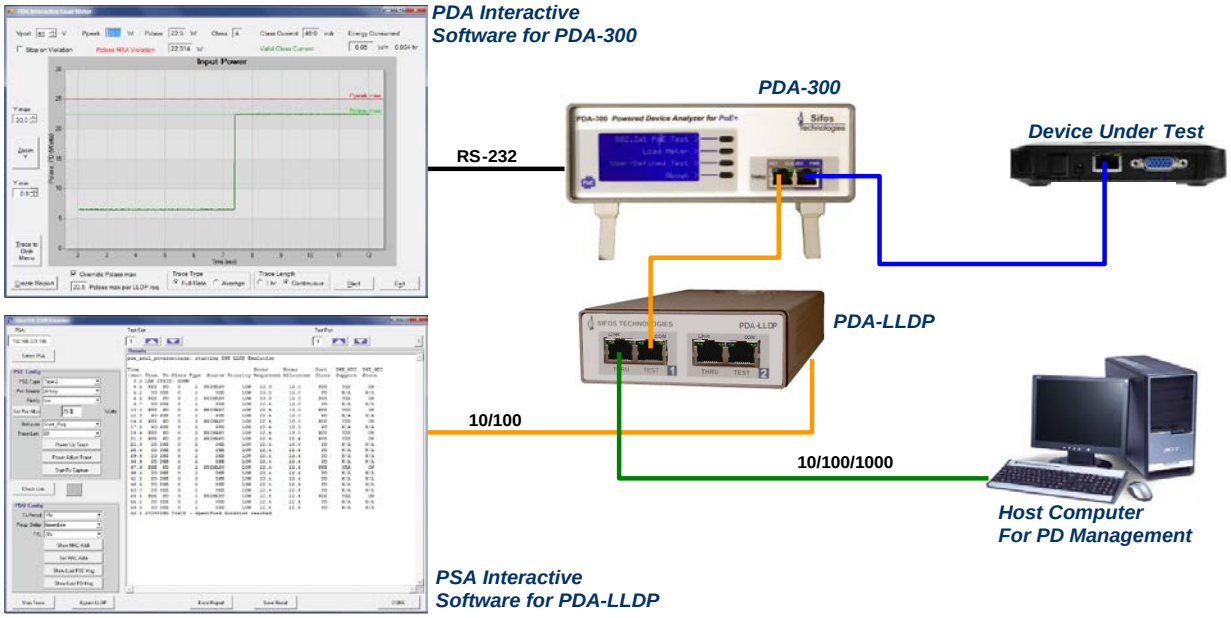
Packet analyzers must be programmed to implement PoE LLDP including ability to handshake and echo incoming fields in real time. While this might be feasible, it requires creation of custom software tools. These tools must then be combined with and synchronized to a PD (DC) powering device that will forward LLDP traffic without providing 2-event classification grants.

Hardware Support for PSE LLDP Emulation

The PDA-LLDP is a low cost, dedicated platform for PSE LLDP emulation. In combination with the Sifos PDA-300 PD Analyzer, PD developers have all the tools required to assess Power Device performance under the 802.3at specification. Flexible PSE LLPD emulation and modeling is also freely available to those who already own PSA-3000, PSA-3002, and/or PSL-3000 platforms with LLDP features enabled.

Verification, Simplified.

Test Configuration



The **PDA-LLDP** is used to assess PoE LLDP protocol from a Powered Device (PD). It is readily used in tandem with a **PDA-300** that provides power to the PD and monitors (or charts) it's real-time power loading, including load state changes that might be resultant from PoE LLDP negotiation and power adjusts. For further information regarding the PDA-300 from Sifos, see the **PDA-300 Product Overview** available at www.sifos.com.

LLDP protocol transactions and protocol traces are easily configured and initiated by PSA Interactive software. Captured protocol traces can be loaded to Microsoft Excel with a single click.

The PDA-LLDP offers two independent test ports. Each port can be configured to flow through traffic from another network destination to the PD either prior to or following LLDP protocol transactions associated with PD power-ups.

One-Button LLDP Protocol Traces

The LLDP Power On Trace

The LLDP Power On Trace allows the behavior of a PD starting from a power-down state to be evaluated, showing the LLDP post-power-up negotiation. Users can specify the PSE **Allocated Power** level, the **trace duration**, and the **response delay** of the PSE to PD transmitted Power Request packets. During the course of the trace, all packet contents and timing are captured in both directions until the trace completes. Information is displayed in real time and may optionally be routed to a pre-formatted pop-up Excel spreadsheet for protocol value and timing analysis.

Time (sec)	From	To	Class	Type	Source	Priority	Power Requested	Power Allocated	Port Class	PSE_MDI Support	PSE_MDI State
0.5	LAN STATE: DOWN										
2.6	PD	PSE	4	2	PSE	LOW	15.2	13.0	PD	N/A	N/A
3.0	PD	PSE	4	2	PSE	LOW	13.0	13.0	PD	N/A	N/A
4.3	PSE	PD	4	2	PRIMARY	LOW	13.0	13.0	PSE	YES	ON
5.9	PSE	PD	4	2	PRIMARY	LOW	13.0	13.0	PSE	YES	ON
6.2	PD	PSE	4	2	PSE	LOW	15.2	13.0	PD	N/A	N/A
7.9	PSE	PD	4	2	PRIMARY	LOW	15.2	15.2	PSE	YES	ON
9.0	PD	PSE	4	2	PSE	LOW	15.2	15.2	PD	N/A	N/A

LLDP Power Modification Protocol Trace

The LLDP Power Modification Trace allows the behavior of a PD to be assessed starting from an already-powered state. This trace tracks the protocol sequencing associated with a PSE initiated Power Change Request, or if the PD is capable of altering advertised power load, a PD initiated Power Change Request.

These requests can work in either direction – adjusting power up or down. During the course of the trace, all packet contents and timing are captured in both directions until the trace completes. Information is displayed in real time and may optionally be routed to a pre-formatted pop-up Excel spreadsheet for protocol value and timing analysis.

```
Time                                          Power     Power      Port   PSE_MDI  PSE_MDI
(sec) From  To Class Type  Source Priority Requested Allocated  Class  Support  State
  0.0  PSE  PD    4    2  PRIMARY      LOW    25.5      25.5      PSE     YES      ON
  7.6   PD PSE   4    2      PSE      LOW    18.0      25.5       PD     N/A      N/A
  9.7  PSE  PD    4    2  PRIMARY      LOW    18.0      25.5      PSE     YES      ON
 17.6  PSE  PD    4    2  PRIMARY      LOW    18.0      25.5      PSE     YES      ON
 35.5  PSE  PD    4    2  PRIMARY      LOW    18.0      25.5      PSE     YES      ON
 37.8   PD PSE   4    2      PSE      LOW    22.3      25.5       PD     N/A      N/A
 40.0  PSE  PD    4    2  PRIMARY      LOW    22.3      25.5      PSE     YES      ON
 43.3   PD PSE   4    2      PSE      LOW    22.3      25.5       PD     N/A      N/A
 46.1 STOPPING TRACE - specified duration reached
```

Technical Data: LLDP Emulation and Analysis

PSE LLDP Emulation

Parameter	Value
Supported Platforms	PDA-LLDP, PSA-3102 Test Blade, PSL-3102 Load Blade, PSA-3002
Test Port Connection	"**connect**" or "**bypass**" LLDP Termination
LLDP Physical Layer	10BaseT
PSE LLDP Framing Control	**MAC Address** **LLDP Channel ID Type and Value**: 4, MAC Address **LLDP Port ID Type and Value**: 3, MAC Address **LLDP Time-To-Live**: 1 – 65535 seconds
PSE PoE TLV	**MDI Capability**: Port Class, PSE Power Support, Power State, Pair Control **PoE Plus Type**: PSE Type 1 & PSE Type 2 **PoE Plus Source**: Primary, Backup & Unknown **PoE Plus Priority**: Low, High, Critical & Unknown **PoE Plus Power Allocation Field**: Grant exact PD request or Fixed Value

PD LLDP Frame Acquisition

Parameter	Value
Capture State	LAN_NOT_CONNECTED, LINK_DOWN, IDLE, RUNNING
PoE LLDP Receive Parameters *Most Recent Message Only*	**Buffer Depth**: 1 packet (*Trace Depth: Duration Dependent*) **Receive Packet Count** (since last 'clear') **Power Request, Echoed Power Allocation** **Power Type, Power Source, Priority** **Source MAC Address** **MDI Power (PD) Class**
LLDP Frame Parameters	**LLDP Destination Address** **Ethernet Type** **Chassis ID Type and Value** **Port ID Type and Value** **Time-To-Live** **VLAN State** (PCP, CFI, VID values *if VLAN enabled*)

Ordering Information

PDA-LLDP, Powered Device LLDP Analyzer, PSA Interactive Software, PowerShell PSA Scripting Software

Sifos Technologies, Inc.
1061 East Street
Tewksbury, MA 01876
+1 (978) 640-4900
www.sifos.com
sales@sifos.com

Verification, Simplified.