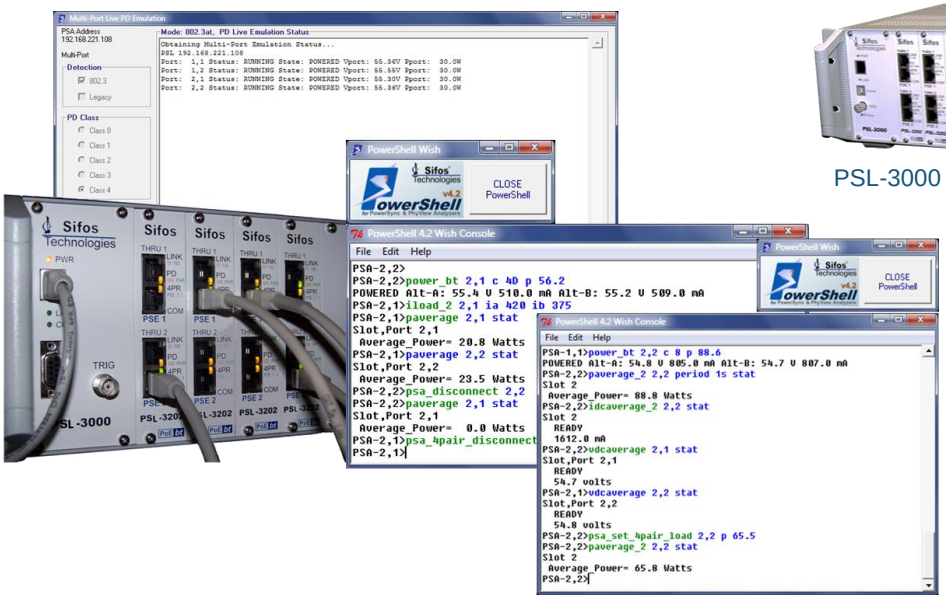
PSL-3202 Load Blade

PowerSync® Programmable Load

IEEE 802.3at & bt Power over Ethernet

Product Overview



PSL-3000 with PSL-3202's

Key Features

- ❑ **Plug Replaceable Upgrade to Existing PSL-3000**
  - **100% Software Compatible with PSL-3102 Blades**
  - **Supports Existing 802.3at PSE Multi-Port Suite & PSL Quick Test**
  - **Supports Existing PoE LLDP Protocol Traces**
- ❑ **4-Pair 802.3bt and Proprietary PSE Loading from Either Port 1 or Port 2**
- ❑ **Emulate Single Signature or Dual Signature PD's**
- ❑ **Greater than 99 Watt Continuous 4-Pair Loading Per Blade**
- ❑ **Load Up to 12 4-Pair PSE Ports Concurrently**
- ❑ **Emulate All Type-3 and Type-4 Multi-Event Classification Signatures**
- ❑ **Emulate Autoclass Signaling and Maximum Load Event**
- ❑ **Coordinated or Independent Control of ALT-A and ALT-B Loads**
  - **Emulate Arbitrary Pair-Pair Load Unbalance**
  - **Emulate Disconnect and Overloads Per Pairset**
- ❑ **Emulate / Test 802.3at and Future 802.3bt PD LLDP Messaging**
- ❑ **Mix with Existing PSL-3102 Test Blades**

Verification, *Simplified.*

IEEE 802.3bt and Pre-802.3bt PSE's

End-Spans

Mid-Spans & Injectors

Powered Connectors

Plug 'n Play PSL-3102 Substitute

Seamless support for:

802.3at PSE Multi-Port System Test Suite

802.3at Live PD Emulation

802.3at PoE LLDP Protocol Traces

All other testing features of the PSL-3102.

802.3bt Help… Now

Single Command Emulated 802.3bt Emulated Power-Ups

4-Pair Command Library for Signature Configurations, 4-Pair Connections, 4-Pair Load Control, and 4-Pair Metering

Rugged and Durable

Comprehensive Safety, Emissions, and Susceptibility Compliances

Rated for over 1200 Watt Continuous Loading at 40°C

Overview

The PSA-3000 family of instruments from Sifos Technologies serves as a world-wide virtual standard for testing PoE service from Ethernet Power Sourcing Equipment (PSE). Since the IEEE 802.3at standard was released in 2009, the PSL-3000 platform has provided a low cost means to flexibly emulate PD's for the purpose of evaluating PSE behaviors in PSE system development, QA, and manufacturing settings. The PSL-3000 offers a pure subset of features available in the PSA-3000 platform that serves as the industry standard for PSE specification compliance verification. The PSL-3000 integrates reliable, programmable loading and emulation with high degrees of automation enabling the highest levels of end-user productivity and PSE product quality.

PoE Today and in the Future

The wide adoption of Ethernet PoE as a flexible, low cost combined networking and powering technology is opening opportunities to expand into new frontiers requiring higher power and more efficient power management. The IEEE **802.3bt** standard extends PoE powering capacity by a factor of three, primarily by taking advantage of all four wire pairs in standard, edge access Ethernet copper cabling. The PSL-3202 load blade from Sifos provides the hardware and embedded resources to test future 802.3bt compliant PSE's while also serving as a plug 'n play substitute for existing PSL-3102 load blades.

Protecting PoE Test Investments

The PSL-3202 will operate in all existing PSL-3000 chassis environments. PSL-3202's can be installed side-by-side with existing PSL-3102's so that existing tests covering up to 24 ports on 802.3at compliant PSE's are unaffected by the mix of test blades. PSL-3202's may be used alongside of PSL-3102's or in place of PSL-3102's for 802.3at **Multi-Port Testing**, **Live PD Emulation**, and **LLDP Emulation and Analysis***. Any existing test software written for PSL-3102's will work with their PSL-3202 equivalents seamlessly.

Essential Features for 802.3bt PSE Testing

The PSL-3202 provides flexible emulation of new "multi-event" 802.3bt classification signatures and mutual identification features, including autoclass signature emulation. At any one time, either Port 1 or Port 2 may be configured to emulate a 4-Pair, high power PD including emulation of either "single-signature" or "dual-signature" detection & classification schemes. 4-Pair loading can be "synchronized" between ALT-A/B pairsets but may also be controlled per pairset to emulate pair-pair unbalance and single pairset fault conditions. Working with existing PSL-3000 chassis', continuous power draw totaling over 1200 watts is supported. Future firmware/software upgrades will address new PoE LLDP features as those evolve into the standard.

Future 802.3bt Automation Suites

The PSL-3202 will be a first generation platform to support a future, fully automated test suite for 802.3bt Multi-Port System Testing with capacity to test up to 12 4-Pair PSE ports per PSL-3000 chassis. Live PD Emulation will also evolve on the PSL-3202 to support PSE systems analysis requiring many emulated 802.3bt PD's.

* PSL-3202's require PSA host software version 4.2 or newer.

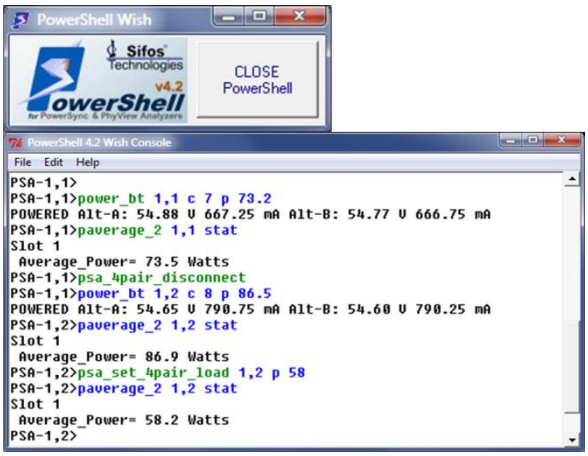
Verification, Simplified.

Evaluating 1st Generation 802.3bt PSE's

Using PSA 4.2 software in conjunction with PSL-3202 load blades, first generation 802.3bt PSE ports may be analyzed through the emulation of flexibly defined 802.3bt Powered Devices (PD's). These emulations and associated measurement capabilities are accessible in **PowerShell PSA** Software.

Supported 4-Pair PD emulations include:

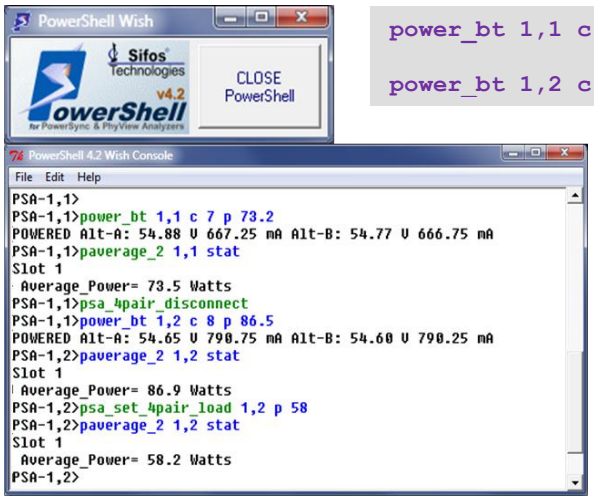
- **Single Signature PD's** emulating **Class 1 through Class 8** with loading from 0.1W to over 99W
- **Dual Signature PD's** emulating **Dual Class 1** through **Dual Class 5** including mixed Classifications by pairset
- Single and Dual Signature PD's supporting **Autoclass** protocol
- **Aberrant PD's** with illegal multi-event class signatures
- **Aberrant PD's** with marginal detection signatures
- Compliant and Non-Complaint **pairset unbalance** loading



PowerShell PSA Command Interface

Emulated Single Signature Power-Up

Powershell PSA provides high-level, single-command emulated 802.3bt PD connections and power-ups. Here, two different 802.3bt Single Signature PD's seeking 4-pair powering are sequentially connected.




```
power_bt 1,1 c 7 p 73.2

power_bt 1,2 c 8 p 86.5
```

Class 7 4-Pair Power-Up and Shutdown on Port 1 followed by Class 8 Power-Up on Port 2

The **power_bt** command in PSA 4.2 software provides the means to simulate a 4-pair 802.3bt PD connection. In this example, a Class 7 (Single Signature) emulated PD at Slot 1, Port 1 is "physically" connected to the PSE port and draws 73.2 watts after power-up. The **paverage_2** measurement reports combined 4-pair power. PD disconnect is then simulated with the **psa_4pair_disconnect** command.

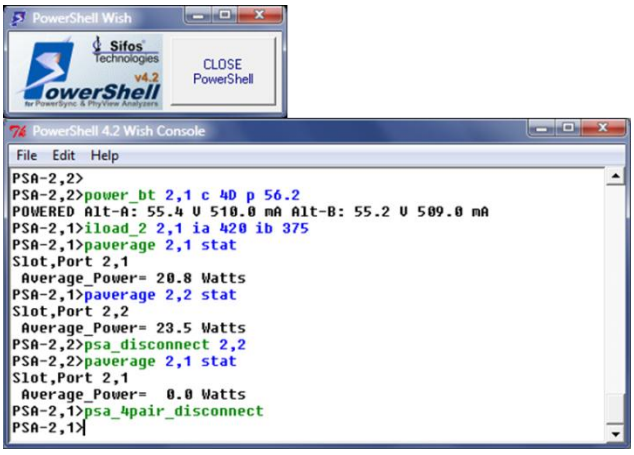
The same **power_bt** command is then used to emulate a 4-pair PD from Slot 1, Port 2 connected to a PSE port. Here the PD draws 86.5 watts at the PSE interface and **paverage_2** reports actual measured power load. The **psa_set_4pair_load** then provides single command alteration of total 4-pair power load, in this case to 58 watts.

Emulated Dual Signature Power-Up

In this example, a dual Class 4 (Dual Signature) power-up is emulated and analyzed. This represents a PD that has independent power interfaces on the Alt-A and Alt-B pairsets and presents up to Class 4 loading (e.g. 30 watts) on each pairset.

```
power_bt 2,1 c 4D p 56.2
```

Again, **power_bt** effects and reports status of the 4-pair power-up emulating a Dual Signature PD drawing a total of 56.2 watts. In this example, following the power-up, the **iload_2** command alters load current per pairset to provide different loads of 420mA on Alt-A and 375mA on Alt-B. Powers are then measured per



Dual Class 4 Signature Power-Up and PSE Response to Single Pairset Disconnect

pairset using **paverage** meters on each port (Port 2 for Alt-A and Port 1 for Alt-B). These report 20.8 watts and 23.5 watts respectively.

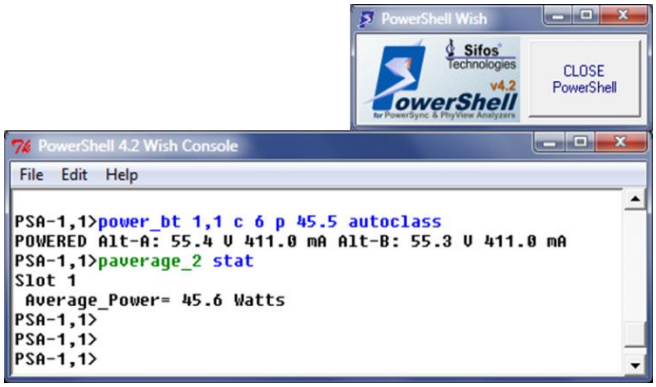
The Alt-A pairset is then disconnected using the **psa_disconnect** addressed to Port 2 and then Alt-B pairset is measured using **paverage** addressed to Port 1. This shows 0.0 watts meaning this PSE has removed power from both pairsets.

Emulated Autoclass Power-Up

Under the 802.3bt standard, **Autoclass** capability is conveyed from a PD to a PSE by "notching" the end of the first classification event with a Class 0 signature load (e.g. 2mA). This can be emulated using the **autoclass** command option to **power_bt**.

```
power_bt 1,1 c 6 p 45.5 autoclass
```

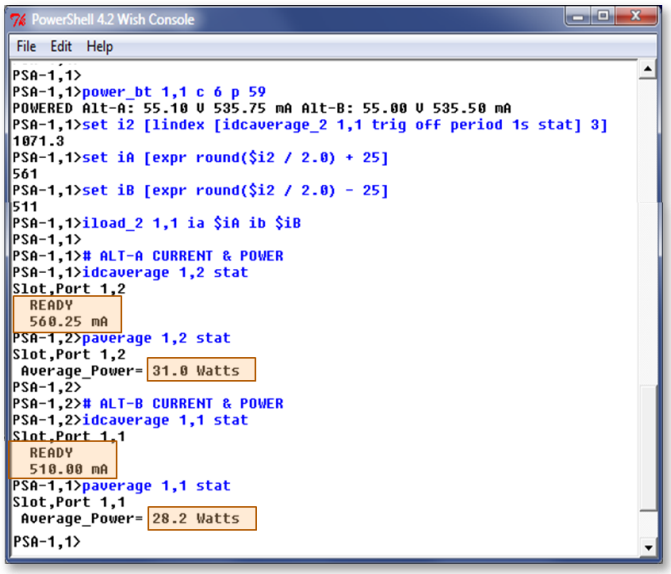
In this example, a Class 6 PD supporting autoclass protocol is emulated. Users can specify a power or a load current target that will be sampled by the PSE during the power-on state.



Emulated Class 6 (Single Signature) Power-Up with Autoclass

Asymmetric Pairset Loading to Assess Pairset Unbalance Response

When Single Signature PD's are powered using 4 pairs, the load current flowing to and back from the PD is not assured of spitting evenly between two pairsets. For this reason, PSE's must tolerate a specified level of pair-to-pair current unbalance while the PD and the cabling are restricted as to how much pair-to-pair load, or resistive, unbalance they introduce in both the feed and return side connections.



Class 6, 59W Power-Up followed by 50 mA Unbalance

In this example, a PSE port powers a Class 6 Single Signature PD drawing 59 watts at the PSE interface. The load current is then unbalanced by 50 mA such that one pairset (Alt-A) is loading 560mA and the other pairset (Alt-B) is loading 510mA. This amounts to an unbalance of 2.8 watts between pairsets.

The PSE maintains power to both pairsets as it is required to do unless one or the other pairset exceeds 682mA of load current.

This analysis utilizes several PowerShell PSA commands:

power_bt
iload_2
idcaverage_2
paverage_2

For **Technical Specifications** associated with the PSL-3202, see the **PSL-3000 Product Overview**.