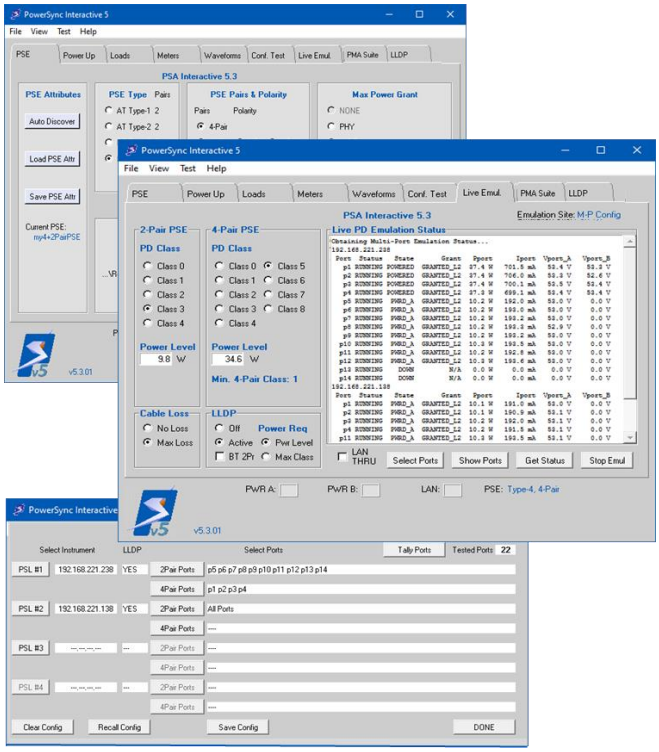
Multi-Port Live PD Emulation

*for **2-Pair, 4-Pair, Hybrid Pair PSE's***

IEEE 802.3 Power over Ethernet

Product Overview



PSA-3424A, PSL-3424L

Key Features

- ❑ **Flexibly Mimic Class 0 to Class 8 Powered Device Per PSL-3424 Test Port**
- ❑ **Configure up to 96 IEEE 802.3 PD's on Any Combination of 2-Pair and 4-Pair PSE Ports with Loading up to 100W on Every Port**
- ❑ **Emulated PD's Automatically Handle PSE Power Demotions (Assigned Class)**
- ❑ **Simultaneously Connect Class 0-4 PD's to Every 2-Pair PSE Port and Class 0-8 PD's to Every 4-Pair PSE Port**
- ❑ **User-Defined Powered Device Load with Optional Cable Loss Modeling**
- ❑ **Emulate 802.3at and 802.3bt PoE-LLDP* Negotiations and Power Adjustments**
- ❑ **Monitor Multi-Port Live Emulation Status**
- ❑ **Support PSE Power Management and Power Administration Analyses**
- ❑ **Support Snake Path Data Traffic while Emulating PD's**
- ❑ **Available License Option to PSL-3424A and PSL-3424L Instruments**

Verification, *Simplified.*

IEEE 802.3 PSE's

802.3at 2-Pair PSE's

802.3bt 2-Pair and 4-Pair PSE's

Combination 2-Pair/4-Pair PSE's

No PD "Banks" Required

Emulate up to 24 PD's per Instrument, up to 96 PD's Total

802.3 Compliant PD Emulations - Respond to PSE Power Demotion

Flexibly Emulate 802.3at Class 0 – 4 PD's including LLDP*

Flexibly Emulate 802.3bt Class 1 – 8 PD's including LLDP*

Arbitrarily Combine 802.3at and 802.3bt PD Emulations to Hybrid-Pair PSE's

Evaluate PoE Admin & Power Management Decisions

Verify PSE Management Functions and Interfaces

Verify PSE Management Reporting

Verify Power Capacity

* *LLDP Emulation requires the PSL- 3424L instrument.*

Overview

Power Sourcing Equipment (PSE) system developers and system test personnel are routinely confronted with the challenge to connect many Powered Devices (PD's) to many PSE ports in order to evaluate PSE administrative and power management behaviors. With IEEE 802.3bt extending power-per-port to 90 watts while opening the door for PSE's combining 2-pair ports powering up to 30W with 4-pair ports powering up to 90W, the challenges to PSE system power management are ever increasing. PoE LLDP is also extended under the 802.3bt specification to allow precise power allocations up to 90W.

Further complicating the PSE testing challenge is a general lack of availability and very high cost of 802.3bt compliant PD's that properly manage power demotions and LLDP negotiations.

Multi-Port Live PD Emulation

Live PD Emulation represents a behavioral state where each Test Port in each PSL-3424A or PSL-3424L instrument autonomously behaves as a user-specified IEEE 802.3 compliant PD regardless of the state of the PSE. If a PSE administratively disables PoE service and then restores it, the PSE will detect a PD and re-apply power. If a patch cord is disconnected and reconnected, the PSA/PSL Test Port will behave just as if an actual specification-compliant PD were at the end of the link. Users may specify PD Classification, PD Power Load, and worst case Cable Loss Emulation when modeling PD's. PD Classifications range from 0 to 8 and PD Power Loads range from 0.5 to 76 watts. Cable Loss Emulation is automatically responsive to powered pair count and PSE output voltage. Power Demotions are also automatically handled with emulated PD's drawing PSE assigned class power.

Using PSA Interactive software, users may configure up to 96 Test Ports across up to 4 PSL-3424A and PSL-3424L instruments to simultaneously emulate arbitrary combinations of 2-pair and 4-pair powered PD's.

Multi-Port Live PD Emulation with LLDP*

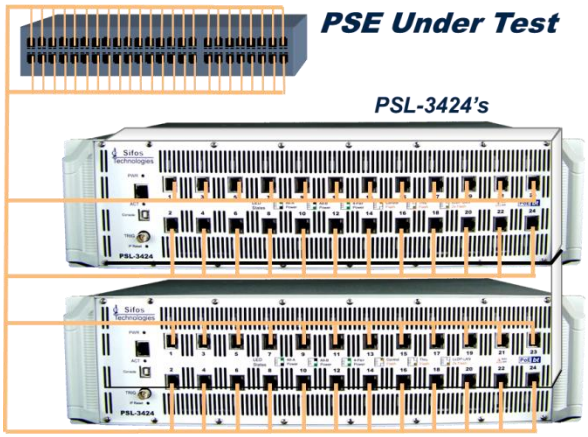
Live PD Emulation can be extended to model PoE (802.3at and/or 802.3bt) LLDP messaging and protocol from a PD. LLDP power requests then govern both PD power draw and, if specified, cable loss power draw escalations. Emulated PD's will honor power demotions until LLDP allocations are received from each PSE port. As with physical classification, emulated LLDP power requests and LLDP protocol versions can be segmented between the 2-pair powered PD's and the 4-pair powered PD's.

Live Status Monitoring

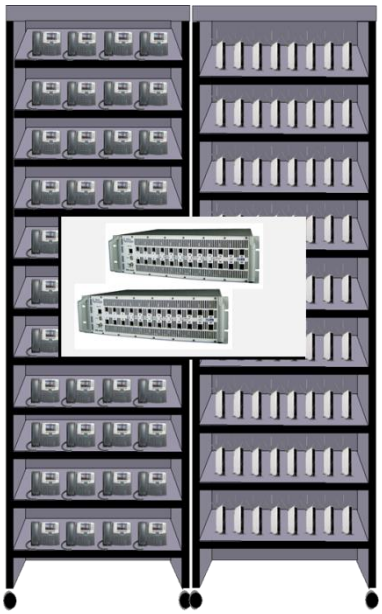
PD emulation status across all emulating test ports is readily captured and displayed with a single mouse click to PSA Interactive software. This status information can be compared to PSE status information to assess that PSE status reports are accurate and up-to-date.

Verification, Simplified.

Multi-Port Test Configuration (48 Port Example)



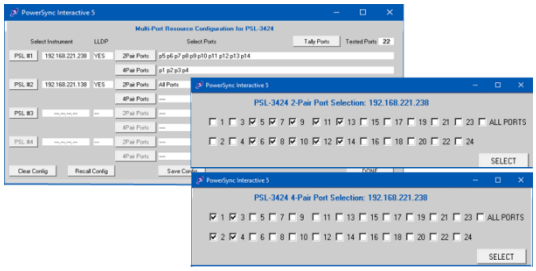
Traditional Rack of PD's vs
2x PSL-3424



Flexible IEEE 802.3 PD Modeling on Every PSE Port

With the ongoing expansion of PD Types and Classes, PSE system developers and system testers are ever more challenged by testing administrative and power management functions in multi-port PSE's. The traditional "racks of PD's" are prohibitively expensive and space consuming given the range of Powered Devices that are now possible under 802.3 standards. Furthermore, many available PD's offer compromised interoperability and/or slow activation times rendering them of marginal value for testing PSE system management behaviors.

Using **Multi-Port Live PD Emulation**, each PSL-3424 test port can flexibly model any specification-compliant Powered Device from Class 0 to Class 8 with static power loading from 0.5 watts to 76 watts. Maximum Cable Loss emulation can then increase power draw to the PSE in accordance with power pair count (2 or 4) and PSE output voltage to over 90W per port.



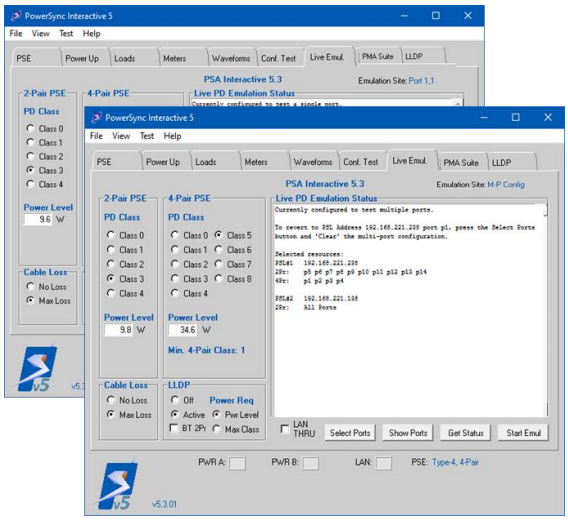
PSA Interactive Resource Configurations

Under control of **PSA Interactive** software, **Multi-Port Resource Configurations** of up to 96 test ports spanning up to four PSL-3424 instruments may be configured. Multi-Port Resource Configurations also designate which test ports will receive 2-pair power and which ones will receive 4-pair power. Distinct PD emulations are then defined for the 2-pair powered ports and separately for the 4-pair powered ports. When Live PD Emulation starts, all test ports in the Multi-Port Resource Configuration connect simultaneously to the PSE.

PD emulations may be uniquely defined to individual PSE ports by activating each emulation one-by-one. Multi-Port Resource Configurations are not utilized in this case.

Using PSL-3424L instruments, Live PD Emulation will automatically emulate Powered Device **802.3 LLDP** messaging and power management actions. Each time a PD is disconnected and re-connected, or each time PSE PoE service is restored, the PD will carry-out a start-up power negotiation with the PSE. By default, 2-pair powered PD's will utilize 802.3at protocol and 4-pair powered PD's will utilized 802.3bt protocol.

Live PD Emulation runs indefinitely on each test port until terminated by the user. While running, current power status, negotiation status, and actual power loading may be sampled for all utilized test ports with a single mouse click.



PSA Interactive Live PD Emulation Configuration

Technical Specifications

Live PD Emulation: General Configuration Requirements	
Supported Instruments	PSL-3424A, PSL-3424L
Required Instrument Feature	PSE Multi-Port Live PD Emulation

Live PD Emulation: Class 0-8 PD's PSL-3424A, PSL-3424L									
Maximum PD's Emulated		96							
Maximum PSA Instruments / Resource Configuration		4							
Emulated Detection Signature Resistance / PD		24 KΩ							
Emulated Detection Signature Capacitance / PD		0.1 μF							
Emulated PD Class		0, 1, 2, 3, 4, 5, 6, 7, 8							
Startup Load Per Powered Pairset		20 mA to 220 mA, Default 50 mA							
Cable Loss Emulation		OFF: Maximum power is **Pclass_pd** (assigned class*) ON: Maximum power is **Pclass**, function of powered pairsets, output voltage, and **Pclass_pd** (assigned class*)							
Emulated Power / PD	PD Assigned* Class	**0, 3**	**1**	**2**	**4**	**5**	**6**	**7**	**8**
	Watts	0.5-13.0	0.5-3.9	0.5-6.5	0.5-25.5	0.5-40.0	0.5-51.0	0.5-62.0	0.5-76.0
Maximum PSE Load Power / PD (*with Cable Loss activated*)	Watts	15.4	4.0	7.0	30.0	45.0	60.0	75.0	100.0
LAN Data Connections		Terminated or Loop-Back (Snake Path)							
Emulation Status Data (per port)		Emulation Status, Power State, Grant Type (L1, L2), Port Power, Port Current, Port Voltages (by Pairset) OPTIONAL: PSE Power Cycle Count, Time-to-Power (sec), Time to LLDP Grant (sec)							

***** Assigned class is the power class allocated by the PSE at power-up and may be lower than the emulated PD class.

Live PD Emulation Class 0 - 8 PD's with LLDP PSL-3424L	
LLDP Protocol	802.3at (12 octet, default for 2-Pair PSE ports) or 802.3bt (29 octet, default for 4-Pair PSE ports)
Pre-LLDP Grant Load	Assigned Class power load (default) or Startup Power Load ("idle")
LLDP Power Request	(Same as Emulated Power / PD above)
LAN Data Connections	LLDP (continuous) or Loop-Back (Snake Path) after Power Grant

Ordering Information

PSL-3424-EMUL PSE Multi-Port Live PD Emulation for 2-pair, 4-pair, and hybrid-pair powering PSE's for one **PSL-3424A** or **PSL-3424L** Address (24 ports)

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