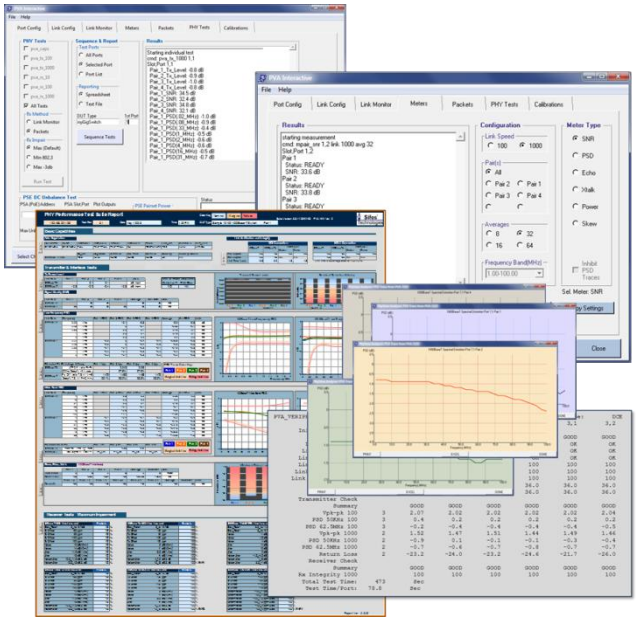
PVA-3000
PhyView® Analyzer
Gigabit & Fast Ethernet Transceiver Analysis

Product Overview



Key Features

- **10/100/1000 Physical Layer Testing Simplified**
  - **Just** *Plug…..Run…..Evaluate*
- **No Scopes, No Fixtures, No Probes, No Test Modes, No Cable Spools!**
  - **Test** *Any LAN Interface, Anywhere*
  - **Uncover** *Behaviors that Test Modes Won't Reveal*
- **Faster and More Informative Alternative to Packet Testing**
  - **Answer** *"What's Wrong, How Wrong, and Where?"*
- **Fully Automated PHY Performance Test Suite for LAN PHY Analysis**
  - *Fully Automated 10/100/1000Base-T Interface Analysis*
  - *Fully Automated PSE DC Unbalance Analysis*
- **Fully Automated Multi-Port PHY Qualification**
  - *Transmitter Performance Evaluation*
  - *Receiver Performance Qualification*
- **Innovative New Measurements on 10/100/1000 Transmitted Signals**
- **Accelerated Receiver Testing with Versatile Physical Impairments**
- **Externally Accessible Impairments – Combine with Packet Analyzers**
- **Sifos PSA-3000 Chassis Compatible**
- **Compact, Portable 2-Port PVA-3002 – Same Testing Features**

Verification, *Simplified.*

Anything 10/100/1000

Switches/Hubs
Routers/Gateways
NIC's/Ports
PSE's
Repeaters
Link Components
Service Outlets

True Physical Layer Integrity

WITHOUT

Scopes & Probes
Fixtures & Test Modes
Packet Analyzers
Generators & Network Analyzers

Full Automation

PHY Performance Test Suite Option for Automated and Comprehensive Multi-Port PHY Analysis
PVA-VeriPhy Automated Rapid Multi-Port Screener

Expose Hidden Defects

Uncover Problems Invisible to Packet Flow and Traditional 802.3 PHY Tests

Overview

The PVA-3000 PhyView Analyzer is designed to bridge the wide coverage gap between comprehensive Ethernet twisted pair PHY compliance testing and rudimentary link verification testing. The PVA-3000 introduces an innovative multi-port capability *dedicated* to 10/100/1000BaseT physical layer characterization under controlled impairments including cable insertion loss, ingress noise, jittered or offset timing, and Power-over-Ethernet. The PVA-3000 tests Ethernet switches and routers, discrete LAN interfaces, link transmission components, and network service integrity at any LAN interface.

Why Test Ethernet PHY's ?

Conformance to all IEEE 802.3 specifications at the physical layer assures that a LAN port will successfully interoperate with other specification compliant equipment under all possible link configurations and conditions of connection impairment. Exhaustive physical layer testing also exposes and identifies any flaws that can secretly degrade link performance. Physical layer testing is essential for qualifying new components including PHY silicon, magnetics, connectors, and physical layouts.

PHY Testing versus Ethernet Packet Testing

Ethernet PHY testing, as typically defined by IEEE 802.3 specifications, is expensive and time consuming. It requires expensive test equipment and a high degree of expertise to perform. Most measurements are done one wire pair at a time with considerable manual intervention. The types of measurements specified often defy automation and available commercial solutions typically offer just transmitter testing, ignoring auto-neg and receiver testing despite the equal role those elements play in enabling interoperability.

Packet transmission testing is widely available and has evolved as the convenient substitute to physical layer evaluation. In fact, many consider packet flow testing to be "equivalent" to physical layer evaluation. As a substitute however, ordinary packet testing is highly challenged to capture and resolve defect types, defect locations, and defect magnitudes. Packet flow testing is therefore a poor predictor of the interoperability of an Ethernet port under all possible link configurations and impairments.

Fully Automated Multi-Port LAN PHY Testing

The PVA-3000 is designed to facilitate fully automated testing of 10/100/1000Base-T interfaces and associated transceivers. Measurements including **wideband power**, **power spectral distortion**, **residual distortion**, **wideband return loss**, and **wideband crosstalk** are performed on multiple transmit pairs across one or more Ethernet ports, often with a single button press or command. Physical layer impairments including **worst case link insertion loss**, programmable **alien crosstalk**, **frequency offset**, and timing **jitter** are easily inserted and controlled when evaluating receiver performance. The **PHY Performance Test Suite*** option offers a robust, fully automated suite of transmission and receiver tests that automatically sequence one or more ports and automatically produce colorful, graphical spreadsheet test reports. The **PVA-VeriPhy** physical layer screening test included with the PVA-3000 offers fully automated, multi-port screening for physical layer defects in as little as 75 seconds per tested port.

Breaking the Mold

The PVA-3000 presents an innovative, time-efficient, and highly cost-effective alternative for qualifying and characterizing 10/100/1000BaseT interfaces, providing wide-scale visibilities into performance that simply have not been available historically.

Verification, Simplified.

* *For further information, see the PHY Performance Test Suite datasheet.*

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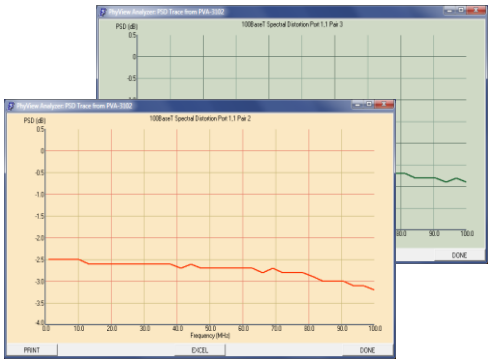
LAN PHY Transmission and Interface Metering with the PhyView Analyzer

The PVA-3000 introduces new techniques for assessing LAN PHY Transmitter & Interface performance. These techniques require just a simple RJ-45 interface to the device-under-test and are performed on a **live link** – that is, the test instrument acts as the link partner while performing physical layer assessments. **Transmitters** and **physical interfaces** are characterized by methods that are completely independent of their receiver characteristics.

Measurement	Description	Reported Units
Wideband Power	Single Pair (100BaseTx) or 4-Pair (1000BaseT) **RF Power** at DUT Interface Wideband Power reports aggregate transmitted power at the DUT interface. This factory calibrated meter reports power-per-transmitting-pair.	**dB(nominal)** Where "nominal" is the mid-level transmit amplitude specified for a 100BaseTx or 1000BaseT transmitter.
Residual Distortion (SNR)	Single or Multi-Pair **Signal-to-Noise Ratio** SNR characterizes all forms of non-correctable signal distortion including noise or crosstalk ingress, signal compression, and severe ISI (inter-symbol interference). Meter configures desired link speed (100BaseTx or 1000BaseT) and measures specified pair.	**dB** (Ideal Signal Power / Distortion Components) The measurement ceiling for SNR is 36 dB.
Power Spectral Distortion (PSD)	Single or Multi-Pair **Power Spectral Distortion** PSD characterizes the spectral frequency response of a LAN transmitter. PSD returns 33 evenly spaced frequency-amplitude points over a user-specified frequency range between 20KHz and 100MHz. Meter configures desired link speed (100 or 1000BaseT) and measures specified pair(s).	**dB(nominal) vs. Frequency** Each frequency-power point is referenced to a nominal, mid-specification level 100BaseTx or 1000BaseT transmitter spectrum. The measurement floor is below –30 dB.
Wideband Return Loss (Echo)	Single or Multi-Pair **Wideband Return Loss** Wideband Return Loss characterizes total reflected energy across the frequency spectrum and therefore assesses the degree of deviation from a nominal 100Ω transmission line. The Meter measures any or all of the 4 pairs in a 1000BaseT link.	**dB** Ratio of total reflected to total transmitted power. Measurements are normalized to test port calibrations. The measurement floor is –26 dB.
Wideband Crosstalk	Single or Multi-Pair Group **Wideband Crosstalk** Wideband Crosstalk is equivalent to Isolation in a typical RF transmission system. It characterizes total power transmitted between any two specified pairs with the assumption that these transmissions are bi-directional on average. Meter measures any or all of the 6 pair groupings in a 1000BaseT link.	**dB** Ratio of total ingress (crosstalk) power to total transmitted power. Measurements are normalized to test port calibrations. The measurement floor is –39 dB.
Pair Skew	Relative Pair **Timing Offset** in 1000BaseT Pair Skew reports any symbol period timing differences between pairs in a 1000BaseT link. Each measurement reports 4 pairs, of which 3 pairs are each compared to a reference pair.	**nsec** Measurement granularity is one symbol period, or 8 nsec per pair.

PVA-3000 metering, while very different from the traditional time-domain measurements associated with LAN PHY compliance testing, is actually analogous to the types of testing typically seen in wired or wireless RF communications channels. In this regard, both measurements and calibrations are readily automated and are based upon similar conceptual constructs as seen with ordinary spectral analysis and vector network analysis. Calibrations required for PSD, Return Loss, and Crosstalk are fully automated and require no external fixtures or calibration standards.

PVA-3000 transmission measurements can also readily be used to assess passive link components including cabling and patch panels or to assess LAN signal integrity at any point in a LAN link.



PSD on Pairs 2 & 3 at 100BaseT

LAN PHY Receiver Testing with the PhyView Analyzer

PhyView Analyzer test ports provide configurable line impairments and metering resources to enable rapid assessment of LAN PHY receivers under **controlled stresses** either at or beyond the margins specified in the respective IEEE 802.3 standards for 10/100/1000BaseT. Some of these impairments are also accessible to external Ethernet packet testers so that accelerated receiver assessment can be performed using external packet analyzers. Device-Under-Test (DUT) receiver performance is tested **fully independent** of DUT transmitter performance.

Impairment	Description	External Access
Line Loss	Emulate IEEE 802.3 worst case insertion loss (attenuation over frequency). May be applied to 2 or 4 pairs such that 10/100BaseT transmit can be separated from 10/100BaseT receive pair. This impairment models worst case ISO/IEC 11801 Class D channels. Maintains 100Ω line impedance and approximately linear phase characteristics.	YES
Noise (Alien Crosstalk)	Apply random noise per pair that is spectrally similar to 100BaseTx. Noise source is isolated by 2.7dB from Test PHY so that DUT experiences greater noise levels. Amplitude is programmable from –6 dB to +20 dB in 0.5 dB steps where 0 dB corresponds to 100BaseTx limit of 40mVpp amplitude.	YES
Line Mismatch	Insert –12 dB (Return Loss) Mismatch on either 2 or 4 pairs such that 100BaseTx transmit can be separated from 100BaseTx receive pair.	YES
Transmitter Offset	Applies a fixed frequency offset to transmitted 100BaseTx and 1000BaseT signals. Frequency offset may be programmed to –115ppm, –100ppm, -50ppm, +50ppm, +100ppm, and +115ppm.	NO
Transmitter Jitter	Applies random jitter to transmitted 100BaseTx and 1000BaseT signals. Jitter level may be programmed to –6 dB to +18 dB in 0.5 dB steps where 0 dB corresponds to IEEE 802.3 specified 1.4 nsec peak-peak jitter. Transmit jitter is structured to meet 1000BaseT phase noise versus frequency profile such that jitter power above 5KHz is attenuated by > 13.5 dB relative to total jitter power.	NO
Transmitter Power	Transmitter power may be controlled on 100BaseT and 1000BaseT signals over a range of ~2.1 dB (or ~25%). This range is then summed with a nominal 2.7dB fixed loss on all Test Ports. Ten power level steps are provided.	NO
Transmitter Slew	Transmitter slew rate may be controlled on 100BaseT and 1000BaseT signals over a range of 0.17V/nsec (or ~75%). Eight slew rate steps are provided.	NO

PVA-3000 metering associated with PHY receiver testing includes a configurable Link Stability meter and an MAC frame generator / counter. Link Stability measurements require just a single port connection to the DUT.

Measurement	Description	Reported Units
Link Stability	Link Statistics and Sampled Link Stability Samples live link status (10/100BaseT) and/or gigabit remote receiver status (1000BaseT) to assess link stability. Counts from 1 to 100 samples with sampling interval configurable as 20, 50, or 100msec.	Type: **Link Status** or **Gigabit Remote Rx Status** Count: **Count of Link "Up"** or **Remote Rx "OK"** Indications
Packet Count	Count of Received MAC frames Each PVA-3000 port can transmit user-configured MAC frames with programmable duration, packet gap, and repeating 4-byte payload pattern. Each PVA-3000 port will count incoming MAC frames either independent of or coincident with MAC frame transmission.	**Packet Count** Burst transmissions of 32K, 128K, 512K, and 1024K packets are supported. Continuous transmission is also supported with counts into billions of packets.

Each PVA-3000 Test Port includes a THRU interface to enable LAN PHY receiver testing with external packet analyzers. This feature enables testing in situations where IP layer or higher protocols are required and/or where packet filtering must be performed as part of the packet counting process.

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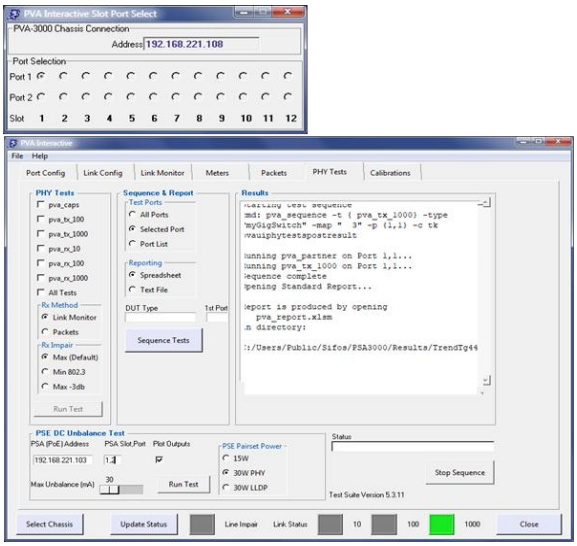
PhyView Analyzer Software

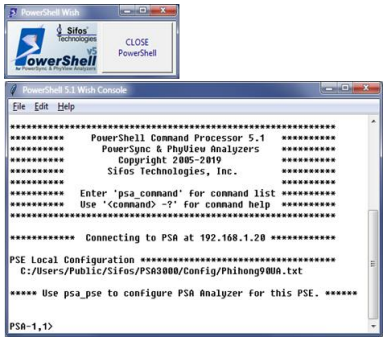
PhyView Analyzer software is hosted on a Microsoft Windows (or Linux) PC and consists of two primary components that manage the instrument over a LAN interface.



PVA Interactive Graphical User Interface

PVA Interactive is an intuitive graphical user interface that provides access to most of the features of each PhyView Analyzer test port. Using PVA Interactive, test port switching and impairments are readily configured to one or more test ports. Metering including Link Monitor, Rx Power, SNR, PSD, Echo, Crosstalk, and Skew are all configured and queried interactively. MAC frames are configured and activated as is the MAC frame receive counter. The PhyView Test Suite is fully accessible for running individual tests or sequencing groups of tests to reports. Automated meter calibration (PSD, Echo, Crosstalk) is also readily performed from PVA Interactive.

PowerShell PSA is the Tcl/Tk-based scripting environment that has historically been available for the PowerSync Analyzer from Sifos Technologies. All testing resources and applications associated with the PhyView Analyzer are accessible via high level commands to PowerShell PSA. Customized test scripts are readily created and debugged in this interactive "live" programming environment.



PowerShell PSA

PVA_VeriPhy Automated Testing

The PhyView Analyzer is provided with a fully automated screening program for 10/100/1000Base-T ports designed to provide rapid physical layer qualification with moderate* defect coverage. The **pva_veriphy** test can test between one and six DUT ports at a time and produce a standard report with measured parameters and summary assessments rating performance into one of three categories:

- **GOOD**: All parameters are indicative of a properly functioning and interoperable port
- **MARGINAL**: One or more parameters is on the edge of the IEEE 802.3 interoperability specifications
- **FAIL**: One or more parameters is likely outside the allowable margins for interoperability

pva_veriphy consists of three distinct tests described as follows:

Test	Description	Output
Link Function, Stability, and Transmit SNR	Determines elemental link functionality for each specified link rate, assesses link stability for each specified link rate given IEEE 802.3 worst case insertion loss connection to a link partner, and assess residual distortion on one of the transmitting pairs at 100Base-Tx and 1000Base-T.	SUMMARY (**GOOD** | **MARGINAL** | **FAIL**) Link Status (OK | FAIL) Link Stability (0 – 100%) SNR (pair N, dB)
Transmission Assessment	Assess low (50KHz) and high (62 MHz) frequency Power Spectral Distortion at 100Base-Tx and/or 1000Base-T on one transmission pair each, provide Peak-Peak Voltage for 100Base-Tx and/or 1000Base-T on one transmission pair each, and measure Wideband Return Loss on alternative transmission pair at 1000Base-T only.	SUMMARY (**GOOD** | **MARGINAL** | **FAIL**) Vpk-pk (pair N | M, volts) PSD (pair N | M, 50KHz, dB) PSD (pair N | M, 62MHz, dB) Return Loss (pair M | N, dB)
Receiver Assessment	Assess Link Stability in the presence of the highest tested link rate, for example, at 1000Base-T if 1000 was specified as a test rate or at 100Base-Tx if specified link rates were 10 and 100. Link stability is measured with a combination of Worst Case 802.3 insertion loss on either one (10/100Base-T) or all (1000Base-T) pairs as well as ingress noise and jitter levels that are just above the levels allowed for the link rate tested.	SUMMARY (**GOOD** | **MARGINAL** | **FAIL**) Rx Integrity (0 – 100%)

* For more comprehensive automated testing and analysis, see the **PHY Performance Test Suite** datasheet.

The **pva_veriphy** test is accessed from PowerShell PSA and is easily sequenced when more than six ports are to be tested. The time per test port will range as low as 75 seconds when testing 10, 100, and 1000Base-T on six ports at a time. 10/100Base-T testing will cost less than 30 seconds per port tested when testing six at a time.

The **pva_veriphy** test produces a standard, text formatted report that adapts to the link rates (10, 100, and/or 1000) and produces summary results by test as well as parameters if requested. The report is passed into PowerShell PSA and may optionally be written to a user defined file. PowerShell scripts can readily collect and aggregate pva_veriphy reports across many DUT ports.

PVA_VERIPHY Test Report Date:April 17, 2013 Time: 10:36 AM DUT Type: DCE

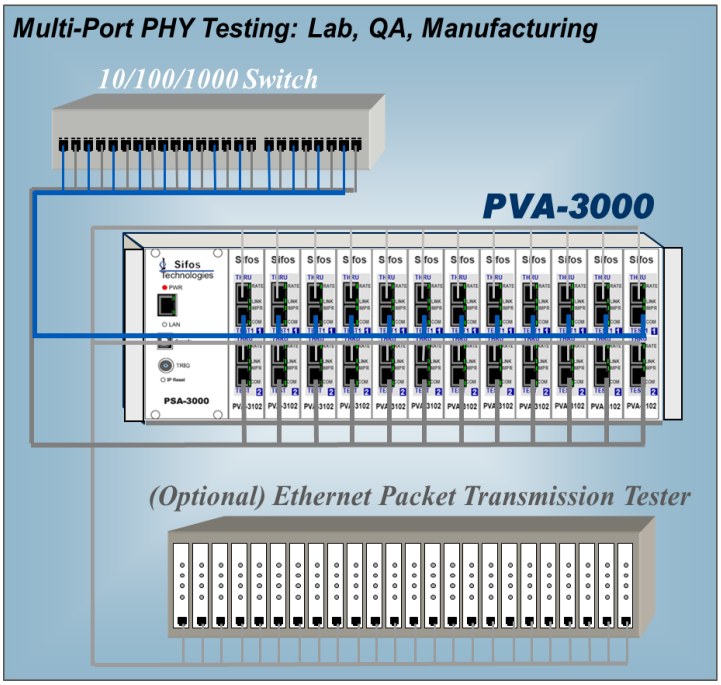
Parameter	Pair	1,1	1,2	2,1	2,2	3,1	3,2
Initial Check-Out							
Summary		GOOD	GOOD	GOOD	GOOD	GOOD	GOOD
Link Success 10		OK	OK	OK	OK	OK	OK
Link Success 100		OK	OK	OK	OK	OK	OK
Link Success 1000		OK	OK	OK	OK	OK	OK
Link Stability 10		100	100	100	100	100	100
Link Stability 100		100	100	100	100	100	100
Link Stability 1000		100	100	100	100	100	100
SNR 100	3	36.0	36.0	36.0	36.0	36.0	36.0
SNR 1000	3	36.0	36.0	36.0	36.0	36.0	36.0
Transmitter Check							
Summary		GOOD	GOOD	GOOD	GOOD	GOOD	GOOD
Vpk-pk 100	3	2.07	2.02	2.02	2.02	2.02	2.04
PSD 50KHz 100	3	0.4	0.2	0.2	0.2	0.2	0.2
PSD 62.5MHz 100	3	-0.2	-0.4	-0.4	-0.4	-0.4	-0.5
Vpk-pk 1000	2	1.52	1.47	1.51	1.44	1.49	1.46
PSD 50KHz 1000	2	-0.9	0.1	-0.1	-0.1	-0.3	-0.4
PSD 62.5MHz 1000	2	-0.7	-0.6	-0.7	-0.8	-0.7	-0.7
Return Loss	2	-23.2	-24.0	-23.2	-24.6	-21.7	-26.0
Receiver Check							
Summary		GOOD	GOOD	GOOD	GOOD	GOOD	GOOD
Rx Integrity 1000		100	100	100	100	100	100
Total Test Time:	473	Sec					
Test Time/Port:	78.8	Sec					

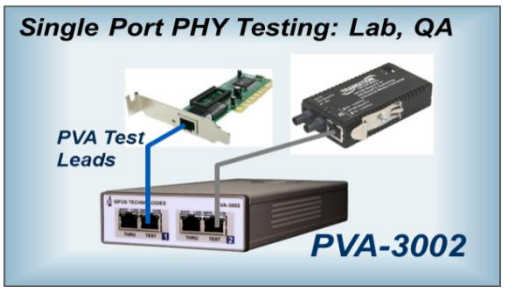
PVA_VERIPHY Test Report Date:April 25, 2013

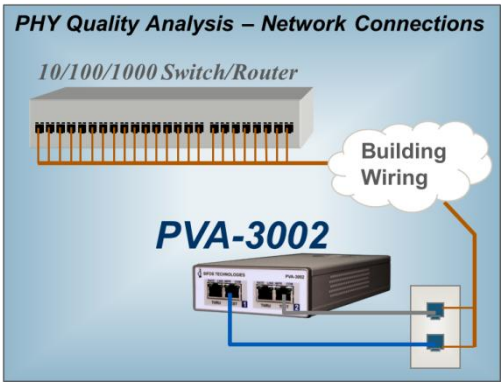
Parameter	Pair	1,1			
Initial Check-Out					
Summary		GOOD			
Link Success 10		OK	OK	OK	OK
Link Success 100		OK	OK	OK	OK
Link Success 1000		OK	OK	OK	OK
Link Stability 10		100	100	100	100
Link Stability 100		100	100	100	100
Link Stability 1000		100	100	100	100
SNR 100	3	35.1	34.2	36.0	36.0
SNR 1000	3	36.0	30.8	34.2	36.0
Transmitter Check					
Summary		GOOD	FAIL	MARGINAL	GOOD
Vpk-pk 100	3	2.09	2.07	2.07	2.07
PSD 50KHz 100	3	0.6	0.5	0.4	0.5
PSD 62.5MHz 100	3	-0.1	-0.1	-0.1	-0.1
Vpk-pk 1000	2	1.49	1.32	1.35	1.51
PSD 50KHz 1000	2	0.4	-0.5	-0.6	0.1
PSD 62.5MHz 1000	2	-0.3	-2.6	-2.2	-0.5
Return Loss	2	-26.0	-17.2	-19.5	-26.0
Receiver Check					
Summary		GOOD	GOOD	GOOD	GOOD
Rx Integrity 1000		100	100	100	100
Total Test Time:	378	Sec			
Test Time/Port:	94.5	Sec			

Users of **pva_veriphy** specify from one to six test ports for testing and then configure the link rate(s) to test as well as some control modes affecting reporting and the handling of unlinked ports. User may also modify criteria by which numeric parameters are converted into summary results (GOOD vs MARGINAL vs FAIL).

PVA-3000 Test Configurations







Technical Data: PVA-3000

Test Port Configurations and Measurements

Test Category	Port Configuration	Measurements	Link Types	Calibrations
Link Partner (DUT) Transmitter / Interface Measurements or Link Outlet Signal Quality Analyses	Test PHY	Power Spectral Distortion	1000 & 100BaseT	YES
		Signal-To-Noise Ratio (SNR)	1000 & 100BaseT	NO
		Bulk Echo Response	1000BaseT	YES
		Bulk Crosstalk Response	1000BaseT	YES
		Pair Timing Skew	1000BaseT	NO
		Tx Signal Power Level	1000 & 100BaseT	(Factory)
Link Partner (DUT) Receiver or Remote Receiver Analyses	Test PHY or Thru Port + Line Loss Emulator	Link Stability, 100M Cat5	10/100/1000BaseT	(Noise, Tx Offset, and Jitter are Factory Calibrated)
		Packet Loss, 100M Cat5		
	Test PHY or Thru Port + Alien Crosstalk	Link Stability, Ingress Noise		
		Packet Loss, Ingress Noise		
	Test PHY or Thru Port + Passive Mismatch	Link Stability, 12dB Mismatch		
		Packet Loss, 12dB Mismatch		
	Test PHY or Thru Port + Line Emulator + Alien Crosstalk OR Passive Mismatch	Link Stability (Multi-Impairment)		
		Packet Loss (Multi-Impairment)		
	Test PHY + Jitter/Offset Synthesis	Link Stability, Jittered or Offset Xmit Signal		
		Packet Loss, Jittered or Offset Xmit Signal		
	Test PHY + Jitter/Offset Synthesis + Line Emulator &/or (Alien Crosstalk OR Passive Mismatch)	Link Stability (Multi-Impairment)		
		Packet Loss (Multi-Impairment)		
Transmit / Receive Tests with PoE Impairments	PVA-3102 Test Port to PSA-3102 OUT Port Connection(s)	(All Above Transmitter Tests)	1000 & 100BaseT	(see above)
		(All Above Receiver Tests and Impairments)	10/100/1000BaseT	NO
Link Partner Capabilities	Test PHY	Link Partner Advertisements	10/100/1000 Base-T	NO
		Auto-Neg Problem Indicators		
		Precision Auto-Neg/Linkup Timing (20msec Resolution)		

TEST Port Specifications

Port	Connection Mode	Parameter	Specification
Test Port	Terminated to Test PHY	Connection	RJ45
		Data Rate and Signaling	10/100/1000BaseT
		Impedance	100Ω, Balanced
		Insertion Loss to Test PHY (1 – 100 MHz)	2.7 +0.3, -0.2 dB (All Pairs)
		Maximum Return Loss (All Pairs)	≤ -15 dB (1 - 100MHz) ≤ -21 dB (1 - 62.5MHz)
		Pair-Pair Isolation (1 - 100MHz)	≤ -33 dB (All Pair Combo's)
	Terminated to Test PHY with Bulk 12dB Mismatch Connected	Return Loss (100 KHz – 100 MHz)	-11.7 dB ± 0.5 dB (All Pairs)
	Bypass Mode TEST Port to THRU Port (*terminated 100Ω / pair*)	Insertion Loss (1 – 100 MHz)	2.7 +0.3, -0.2 dB (All Pairs)
		Return Loss	≤ -15 dB, 1MHz to 100MHz (All Pairs)
		Pair-Pair Isolation	≤ -33 dB, 1 MHz to 100MHz (All Pair Combo's)

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THRU Port Specifications			
Specification	**Connection Mode**	**Parameter**	**Specification**
Auxiliary Port for Packet Analyzers	Bypass Mode THRU Port to TEST Port (*terminated 100Ω / pair*)	Connection	RJ45
		Data Rate and Signaling	10/100/1000BaseT
		Impedance	100Ω, Balanced
		Insertion Loss (1 – 100 MHz)	2.7 +0.3, -0.2 dB (All Pairs)
		Return Loss (All Pairs)	≤ -15 dB, 1MHz to 100MHz
		Pair-Pair Isolation (All Pair Combinations)	≤ -33 dB, 1 MHz to 100MHz

Link Partner Transmitter / Incoming Link Integrity Measurements			
Measurement	**Link Types & Pairs**	**Parameter**	**Value**
Power Spectral Distortion	100Base-Tx: Pair 2 or 3 1000Base-Tx: Pairs 1 to 4	Minimum Frequency	20 KHz
		Maximum Frequency	100 MHz
		Selectable Range	0.18 MHz – 99.98 MHz
		Frequency Resolution	Selected Range / 33 Points
		Amplitude Range	≤ -30 dB to ≥ +3 dB
		Amplitude Accuracy *normalized to calibration*	± 0.5 dB (.02 – 75 MHz) ± 1.5 dB (75 – 100 MHz)
		Ideal Gigabit Config. @ DUT	MDI, MASTER
Signal-To-Noise	100Base-Tx: Pair 2 or 3 1000Base-Tx: Pairs 1 to 4	Measurement Range	18.5 dB – 36 dB
		Measurement Accuracy*	± 1.5 dB (SNR > 30 dB) ± 0.75 dB (SNR ≤ 30 dB)
		Ideal Gigabit Config. @ DUT	NONE
Power Level	100Base-Tx: Pair 2 or 3 1000Base-Tx: Pairs 1 – 4	Measurement Range	≤ -15 dB to ≥ +3 dB
		Accuracy / Repeatability	± 0.25 dB
		Ideal Gigabit Config. @ DUT	NONE
Bulk Echo Response (~ 4 – 75 MHz)	1000Base-T: Pairs 1 to 4	Measurement Floor	-26 dB
		Accuracy / Repeatability *normalized to calibration*	± 1.0 dB @ > -20 dB ± 1.5 dB @ ≤ -20 dB
		Ideal Gigabit Config. @ DUT	MDI, MASTER
Bulk Crosstalk Response (~ 4 – 75 MHz)	1000Base-T: Pair Combo's 1-2, 1-3, 1-4, 2-3, 2-4, 3-4	Measurement Floor	-39 dB
		Accuracy / Repeatability *normalized to calibration*	± 1.0 dB @ < 32 dB ± 1.5 dB @ ≥ 32 dB
		Ideal Gigabit Config. @ DUT	MDI, MASTER
Pair Timing Skew	1000Base-T: Pairs 1 to 4	Range & Resolution	0 – 80 nsec, 8 nsec
		Ideal Gigabit Config. @ DUT	NONE

* *100BaseT and 1000BaseT SNR measurements are not referenced to any metric standards for SNR. SNR is a bulk measure of signal deviation from "ideal" following compensations for linear distortion and other correctable impairments.*

Link Partner Reciever / Link Integrity Measurements			
Measurement	**Link Types & Pairs**	**Parameter**	**Value**
Link State and Link Integrity	10/100/1000BaseT	Link Status	LINKED | DOWN
	1000BaseT	Remote Rx Status | Local Rx Status	Rx_OK | Rx_Error
	10/100/1000BaseT	Status Samples	1 to 100
		Status State Sampling Periodicity	20, 50, or 100 msec
Internal Test Port Packet Counting	10/100/1000BaseT	Packet Frame	Ethernet MAC
		Packet Size & Resolution (*excluding 4 FCS bytes*)	60 to 1512 Bytes, 4 Bytes
		Packet Payload	Repeating 4-Byte Patterns
		Packet Address	6-Byte Arbitrary Address
		Transmitted Inter-Packet Gap Time	96, 576, or 11006 bit periods
		Transmitted Packet Count	0 = Continuous 32K, 128K, 5120K, or 1024K
		Received Packet Count	0 to > 1e9
		Receive Packet Filtering	NONE

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Link Partner Reciever / Link Integrity Measurements			
Measurement	**Link Types & Pairs**	**Parameter**	**Value**
Link Partner Capabilities	10/100/1000BaseT	Link Partner Advertisement	Recovers 100/1000BaseT Auto-Neg Parameters
		Link Partner Advertisement Integrity	(Link State Measurements)
		Link Partner Fallback Responses	(Link State & Impairments)
		Auto-Negotiation and Linkup Timing Analysis	20msec timing resolution from physical connection

Impairment Synthesis Specifications			
Impairment	**Access**	**Parameter**	**Value**
IEEE 802.3 Line Loss Emulation	TEST Port & THRU Port	Frequency Response Target (5 MHz – 62.5 MHz)	$-(2.1 * F^{0.529} + 0.4/F)$ dB ± 0.5 dB (F in MHz)
		Frequency Response Target (62.5 MHz – 100 MHz)	$-(2.1 * F^{0.529} + 0.4/F)$ dB ± 1.5 dB (F in MHz)
		Return Loss (1 – 100 MHz)	≤ -14 dB
		Isolation (1 – 100 MHz)	(*not yet specified)*
		Phase Linearity (4 – 100 MHz)	± 12° from Linear (typical)
Passive Mismatch	TEST Port connected to Test PHY or THRU Port	Fixed Return Loss (TEST Port, 1 – 100MHz)	-11.7 dB ± 0.5 dB
		Impairment Application	Pairs 1+3, 2+4, or 1+2+3+4
Alien Crosstalk	TEST Port connected to Test PHY or THRU Port	Amplitude Range relative to **40mVpp** (= 0dB)	-6 dB to +20 dB
		Amplitude Steps (Resolution)	0.5 dB
		Amplitude Accuracy	± 0.9dB (typical)
		Frequency Shaping	100BaseTx Spectrum
		Impairment Application	Pairs 1+3, 2+4, or 1+2+3+4
Transmit Frequency Offset	Test Port with Test PHY Connected	Nominal Transmit Frequency	125 MHz ± 10 ppm
		Nominal Transmit Duty Cycle	50% ± 12.5 %
		Fixed Frequency Offsets	-115, -100, -50, 0, +50, +100, +115 ppm
Transmit Frequency Jitter	Test Port with Test PHY Connected	Jitter Magnitude Range relative to **1.4 nsec pk-pk** (=0dB)	-6 dB to +18 dB
		Jitter Level Steps (Resolution)	0.5 dB
		Jitter (pk-pk) Accuracy	± 1 dB (typical)
		Jitter Power @ greater than ± 5 KHz w.r.t. Total Jitter Power	-13.5 dB ± 1 dB (sharp filter) -8 dB ± 0.6 dB (1st order filter)
Transmit Power	Test Port with Test PHY Connected	Mid-Range Output Power 10/100/1000BaseT Peak Ampl.	-2.7dB (IEEE Spec.) at Tx Level = ~6 out of 10
		Transmit Power Range	-4 dB to -1.9 dB (IEEE Spec)
Transmit Slew	Test Port with Test PHY Connected	Mid-Range Slew Rate	~0.2V/nsec at setting = 5 out of 8
		Slew Rate Range	~0.1V/nsec to ~0.27 V/nsec

LED Indicators		
LED Label	**Parameter**	**Description**
Rate	Link Indication	**ON**: 1000BaseT, **BLINKING**: 100BaseT, **OFF**: 10BaseT
Link	Link Status	**ON**: Link Up, **OFF**: Link Down
Impr	Line Impairment Connection	**ON**: 100M Cat5e Line Impairment Connected **OFF**: Line Impairment Removed
Com	Communications	**ON** or **BLINKING**: Indicates Host Communications

Programming and Control	
Description	**Specification**
Interface	Ethernet 10/100BaseT (*Telnet Port 23 protocols*)
Host Requirements	PC running Microsoft Windows XP, Vista, 7, 8, 10, or Linux PC (Fedora, SUSE, Debian)

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Programming and Control	
Description	**Specification**
Control Environment	Sifos PowerShell PSA or PVA Interactive
Recommended Network Latency:	< 5 msec

Physical and Environmental	
Description	**Specification**
Dimensions	PSA-3000, PSA-1200 Chassis: 19”W x 5.25”H x 12”L (3U Rack Mount) PVA-3002: 4”W x 1. 5”H x 8.5”D
Weight	20 lbs. (Fully Populated with PVA-3102 Cards)
Power	100VAC-240VAC, 50-60 Hz, 1350mA Max.
Test Port Configurations	PSA-3000 Chassis: 2 to 24 PhyView Test Ports PVA-3002 Compact PVA: 2 PhyView Test Ports
Ambient Operating Temperature	0°C to 40°C
Storage Temperature	-20°C to 85°C
Operating Humidity	5% to 95% RH, Non-Condensing.

Certifications		
Description	**North America**	**Europe & International**
Emissions	FCC Part 15, Class A	Meets EN55011, VCCI, AS/NZS 3548, ICES-001
Safety	**CSA Listed** (CSA22.2 No. 61010)	Meets EN61010-1
European Commission		Low Voltage Directive (2014/35/EU) Electromagnetic Compatibility Directive (2014/30/EU) **CE Marking** Directive (93/68/EEC)
Patents	US Patent 9,203,730, Method and Apparatus for Testing Network Interfaces	

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Ordering Information

PSA-3000	PowerSync Analyzer Chassis & Controller, PowerShell PSA, and PVA Interactive Software
PVA-3102	Dual Port PhyView Analyzer Test Blade for PSA-3000 / PSL-3000 (maximum 12 per chassis)
PVA-3000-PTS	PhyView Performance Test Suite for one PSA-3000 / PSL-3000 Chassis
PVA-3002	Compact 2-Port PhyView Analyzer
PVA-3002-PTS	PhyView Performance Test Suite for one PVA-3002 Compact PhyView Analyzer
PVA-PL4	In-Line Quad Passive Loss Module (1, 2, 4, & 8 dB)
PVA-LI4	In-Line Quad Line Impairment Module (3 Mismatches, 1 Crosstalk)
PVA-DCU	In-Line DC Unbalance Generator Module (ALT A+B Bias Fwd. and ALT A+B Bias Rev. Channels) for PSE DC Unbalance Tolerance Analysis (*see PVA-PTS datasheet*)
PVA-2CABLES	Replacement High Performance Test Cable Pair (for 2 Test Ports)
CASE-PVA	Carrying & Storage Case for PVA-3002
HCopy-Manual	Hardcopy of PVA-3000 Technical Reference Manual

Accessories Included:

- PSA Software (CD, USB Stick)
- PSA Installation Guide (Hardcopy, CD, USB Stick) & Quick Start Guide for Phone
- PVA-3000 Technical Reference Manual (Softcopy, CD and USB Stick)
- High Performance Test Cables (1 test cable + 1 spare per Test Port)
- Power Cord
- Cross-Over Ethernet Patch Cable
- USB 2.0 (PSA-3000) or RS-232 (PVA-3002) Cable

Optional Carrying Case for PVA-3002

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*Learn more about the PhyView Analyzer. See the **PhyView Analyzer Overview** video presentation at www.sifos.com.*

Verification, Simplified.

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