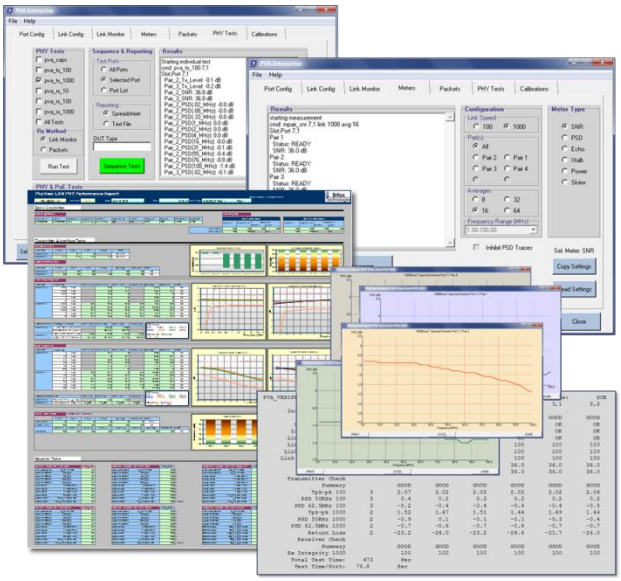
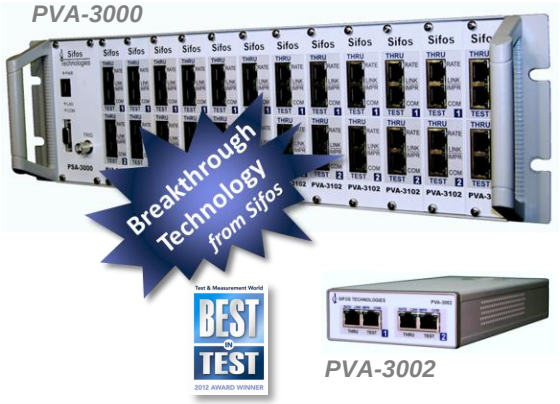
# PVA-3000
## PhyView® Analyzer
***Gigabit & Fast Ethernet Transceiver Analysis***



Product Overview




## Key Features

- **10/100/1000 Physical Layer Testing Simplified**
  - **Just** *Plug…..Run…..Evaluate*
- **No Scopes, Fixtures, Probes, Generators, Test Modes, or Cable Spools!**
  - **Test** *Any LAN Interface, Anywhere*
- **Faster and More Informative Alternative to Packet Testing**
  - **Answer** *"What's Wrong, How Wrong, and Where?"*
- **Fully Automated Multi-Port PHY Qualification**
  - *Transmitter Performance Evaluation*
  - *Receiver Performance Qualification*
- **Supports the PHY Performance Test Suite for LAN PHY Analysis**
  - *Fully Automated 10/100/1000Base-T Interface Analysis*
  - *Fully Automated PSE DC Unbalance Analysis*
- **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 and PSA-1200 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**
**PLUS PVA-VeriPhy Automated Rapid Multi-Port Screener**

## *Expose Hidden Defects*

**Uncover Problems Invisible to Link & Packet Flow 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 both 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 favor transmitter testing over receiver testing despite the equal role both elements play in enabling successful link-ups.

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.*

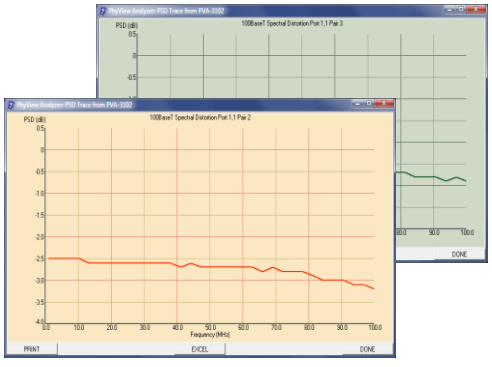
## LAN PHY Transmission and Interface Metering with the PhyView Analyzer

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<br><br>Wideband Power reports aggregate transmitted power at the DUT interface. This factory calibrated meter reports power-per-transmitting-pair. | **dB(nominal)**<br><br>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**<br><br>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**<br><br>(Ideal Signal Power / Distortion Components) The measurement ceiling for SNR is 36 dB. |
| **Power Spectral Distortion (PSD)** | Single or Multi-Pair **Power Spectral Distortion**<br><br>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**<br><br>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**<br><br>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**<br><br>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**<br><br>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**<br><br>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<br><br>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**<br><br>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 +21.5 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 +24 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 |

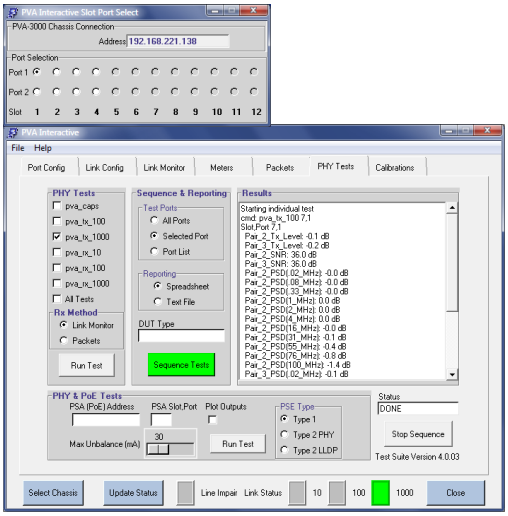
PVA-3000 metering associated with PHY receiver testing includes a configurable Link Stability meter and an MAC frame generator / counter. Link Stability measurements require just a single port connection to the DUT.

| Measurement | Description | Reported Units |
|---|---|---|
| **Link Stability** | Link Statistics and Sampled Link Stability<br>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**<br>Count: **Count of Link "Up"** or **Remote Rx "OK"** Indications |
| **Packet Count** | Count of Received MAC frames<br>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**<br>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.

## PhyView Analyzer Software

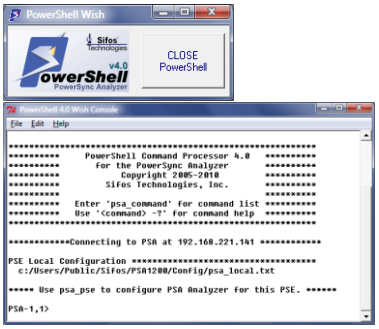
PhyView Analyzer software is hosted on a Microsoft Windows (or Linux) PC and consists of two primary components that manage the instrument over a LAN interface.



**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**)<br>Link Status (OK \| FAIL)<br>Link Stability (0 – 100%)<br>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**)<br>Vpk-pk (pair N \| M, volts)<br>PSD (pair N \| M, 50KHz, dB)<br>PSD (pair N \| M, 62MHz, dB)<br>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**)<br>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

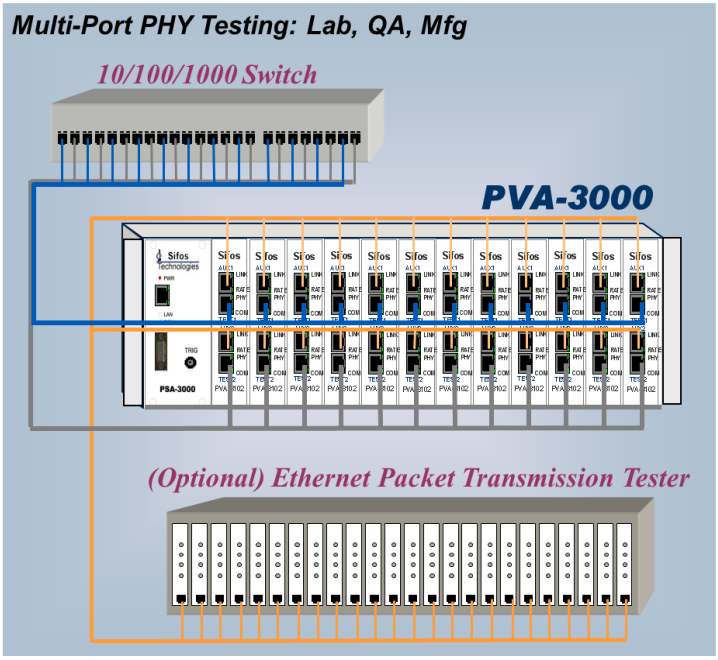
| Parameter | Pair | 1,1 | 1,2 | 2,1 | 2,2 | 3,1 | 3,2 |
|---|---|---|---|---|---|---|---|
| Initial Check-Out Summary | | GOOD | GOOD | GOOD | GOOD | GOOD | GOOD |
| Link Success 10 | | OK | OK | OK | OK | OK | OK |
| Link Success 100 | | OK | OK | OK | OK | OK | OK |
| Link Success 1000 | | OK | OK | 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: | 3 | Sec | | | | | |
| Test Time/Port: | | Sec | | | | | |

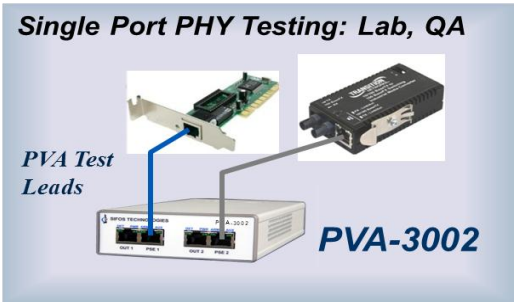
PVA_VERIPHY Test Report Date:April 25, 2013 Time: 11:25 AM DUT Type: DCE

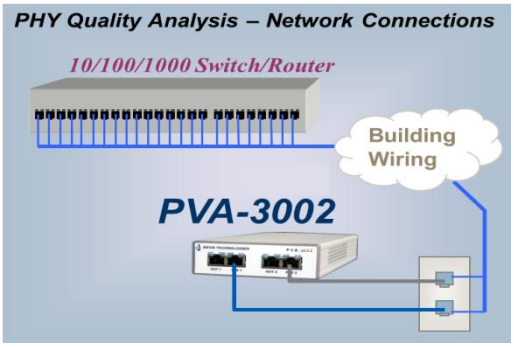
| Parameter | Pair | 1,1 | 1,2 | 2,1 | 2,2 |
|---|---|---|---|---|---|
| Initial Check-Out Summary | | GOOD | MARGINAL | GOOD | GOOD |
| Link Success 10 | | OK | OK | OK | OK |
| Link Success 100 | | OK | OK | OK | OK |
| Link Success 1000 | | OK | OK | OK | OK |
| Link Stability 10 | | 100 | 100 | 100 | 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 Advertisement | 10/100/1000BaseT | NO |
| | | Link Partner Static Responses | | |
| | | Link Partner Fallback Response | | |

## 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)<br>≤-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 ± .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) |

## 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<br>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<br>*normalized to calibration* | ± .5 dB (.02 – 75 MHz)<br>± 1.5 dB (75 – 100 MHz) |
| Signal-To-Noise | 100Base-Tx: Pair 2 or 3<br>1000Base-Tx: Pairs 1 to 4 | Measurement Range | 18.5 dB – 36 dB |
| | | Measurement Accuracy* | ± 1.5 dB (SNR > 30 dB)<br>± 0.75 dB (SNR ≤ 30 dB) |
| Power Level | 100Base-Tx: Pair 2 or 3<br>1000Base-Tx: Pairs 1 – 4 | Measurement Range | ≤ -15 dB to ≥ +3 dB |
| | | Accuracy / Repeatability | ± 0.25 dB |
| Bulk Echo Response (~ 4 – 75 MHz) | 1000Base-T: Pairs 1 to 4 | Measurement Floor | -26 dB |
| | | Accuracy / Repeatability<br>*normalized to calibration* | ± 1.0 dB @ > -20 dB<br>± 1.5 dB @ ≤ -20 dB |
| Bulk Crosstalk Response (~ 4 – 75 MHz) | 1000Base-T: Pair Combo's<br>1-2, 1-3, 1-4, 2-3, 2-4, 3-4 | Measurement Floor | -39 dB |
| | | Accuracy / Repeatability<br>*normalized to calibration* | ± 1.0 dB @ < 32 dB<br>± 1.5 dB @ ≥ 32 dB |
| Pair Timing Skew | 1000Base-T: Pairs 1 to 4 | Range & Resolution | 0 – 80 nsec, 8 nsec |

* *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<br>32K, 128K, 5120K, or 1024K |
| | | Received Packet Count | 0 to > 1e9 |
| | | Receive Packet Filtering | NONE |
| 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) |

## Impairment Synthesis Specifications

| Impairment | Access | Parameter | Value |
|---|---|---|---|
| IEEE 802.3<br>Line Loss Emulation | TEST Port & THRU Port | Frequency Response Target<br>(5 MHz – 62.5 MHz) | -2.1 & $F^{0.529}$ + 0.4/F dB<br>± 0.5 dB (F in MHz) |
| | | Frequency Response Target<br>(62.5 MHz – 100 MHz) | -2.1 & $F^{0.529}$ + 0.4/F dB<br>± 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<br>Test PHY or THRU Port | Fixed Return Loss<br>(TEST Port, 1 – 100MHz) | - 11.7 dB ± .5 dB |
| | | Impairment Application | Pairs 1+3, 2+4, or 1+2+3+4 |
| Alien Crosstalk | TEST Port connected to<br>Test PHY or THRU Port | Amplitude Range<br>relative to 40mVpp (= 0dB) | -6 dB - +21.5 dB |
| | | Amplitude Steps (Resolution) | 0.5 dB |
| | | Frequency Shaping | 100BaseTx Spectrum |
| | | Impairment Application | Pairs 1+3, 2+4, or 1+2+3+4 |
| Transmit Frequency Offset | Test Port with<br>Test PHY Connected | Nominal Transmit Frequency | 125 MHz ± 10 ppm |
| | | Nominal Transmit Duty Cycle | 50% ± 12.5 % |
| | | Fixed Frequency Offsets | ±115, ±100, ±50, & 0 ppm |
| Transmit Frequency Jitter | Test Port with<br>Test PHY Connected | Jitter Magnitude Range<br>relative to 1.4 nsec pk-pk (=0dB) | -6 dB to +24 dB |
| | | Jitter Level Steps (Resolution) | 0.5 dB |
| | | Jitter Power @ greater than<br>± 5 KHz w.r.t. Total Jitter Power | -13.5 dB ± 1 dB |
| Transmit Power | Test Port with<br>Test PHY Connected | Mid-Range Output Power<br>10/100/1000BaseT Peak Ampl. | -2.7dB (IEEE Spec.)<br>at Tx Level = ~6 out of 10 |
| | | Transmit Power Range | -4 dB to –1.9 dB (IEEE Spec) |
| Transmit Slew | Test Port with<br>Test PHY Connected | Mid-Range Slew Rate | ~0.2V/nsec<br>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<br>**OFF**: Line Impairment Removed |
| Com | Communications | **ON** or **BLINKING**: Indicates Host Communications to PVA-3102 Test Port |

## Programming and Control

| Description | Specification |
|---|---|
| Interface | Ethernet 10/100BaseT |
| Host Requirements | PC running Microsoft Win7, Vista, Windows XP, Windows 2000, or Linux PC (Fedora, SUSE) |
| Control Environment | Sifos PowerShell or PSA-Interactive |
| Recommended Network Latency: | < 10 msec |

## Physical and Environmental

| Description | Specification |
|---|---|
| Dimensions | PSA-3000, PSA-1200 Chassis: 19"W x 5.25"H x 12"L (3U Rack Mount)<br>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<br>PVA-3002 Compact PVA: 2 PhyView Test Ports<br>PSA-1200 Chassis: 2 to 12 PhyView Test Ports |
| Ambient Operating Temperature | 0°C to 50°C (≤ 42.75 Watt loading per port) |
| Storage Temperature | -20°C to 85°C |
| Operating Humidity | 5% to 95% RH, Non-Condensing. |

## Certifications

| Description | Certifications |
|---|---|
| Emissions | FCC Part 15, Class A; EN55022; VCCI, AS/NZS 3548 |
| Safety | CSA Listed, EN61010-1, CB Scheme IEC 61010-1 |
| European Commission | 73/23/EEC, 89/336/EEC, CE Marking Directive 93/68/EEC |
| Patents | *PhyView Analyzer Patent Pending* |

## Ordering Information

| | |
|---|---|
| **PSA-3000** | PowerSync Analyzer 3000 Chassis & Controller, PowerShell PSA, and PSA Interactive Software |
| **PVA-3102** | Dual Port PhyView Analyzer Test Card for PSA-3000 (maximum 12 per PSA-3000 chassis, includes one pair of test leads) |
| **PVA-3000-PTS** | PhyView Performance Test Suite for a PSA-3000 / PSA-1200 Chassis |
| **PVA-3002** | Compact 2-Port PhyView Analyzer (includes one pair of test leads) |
| **PVA-3002-PTS** | PhyView Performance Test Suite for 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 Unit (ALT A/B, Forward and Reverse Channels) |
| **PVA-2CABLES** | Additional Test Lead Pair |

**Accessories Included**:

- Installation Guide & Configuration Chart
- PhyView Analyzer Reference Manual (Binder and CD)
- High Performance Test Cables (1 cable per Test Port)
- Power Cord
- Cross-Over Ethernet Cable
- RS-232 Cable

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

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