Sifos Technologies Application Brief: **PhyView Anlayzer**

PHY Performance Test Suite: IEEE 802.3 Correlations

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Ethernet PHY Tests for 1000BASE-T

IEEE Specifications		PhyView Analyzer / PHY Performance Test Suite: 1000Base-T		
Standard reference	**Description**	**PHY Performance Test Report**	**Correlation**	**Comment**
IEEE802.3.2005 Sub clause 40.6.1.2.1	Difference A, B peak output voltage*	Pk.Diff.Volts T.S.#1 A-B	Direct*	Estimated parameter has been correlated to actual IEEE 802.3 measurements. PVA does not require test signal.
IEEE802.3.2005 Sub clause 40.6.1.2.1	Point A peak output voltage*	Pk.Diff.Volts T.S.#1 A-B, SNR, and Low Frequency PSD	Partial	If "Differential A,B Peak Output Voltage" tests nominal but Point A or Point B Peak Voltage is not, then the resultant amplitude asymmetry will impact **SNR** and in severe cases, impact **Low Frequency PSD** owing to magnetic DC biasing.
IEEE802.3.2005 Sub clause 40.6.1.2.3	Point A template test*	Test Signal #1 Mask Fit	Direct*	Estimated parameter has been correlated to actual IEEE 802.3 measurements. PVA does not require test signal.
IEEE802.3.2005 Sub clause 40.6.1.2.1	Point B peak output voltage*	Pk.Diff.Volts T.S.#1 A-B, SNR, and Low Frequency PSD	Partial	*See Point A Peak Output Voltage above*
IEEE802.3.2005 Sub clause 40.6.1.2.3	Point B template test*	Test Signal #1 Mask Fit	Direct*	Estimated parameter has been correlated to actual IEEE 802.3 measurements. PVA does not require test signal.
IEEE802.3.2005 Sub clause 40.6.1.2.1	Point C peak output voltage*	Pk.Diff.Volts T.S.#1 A-B, SNR	Partial	If "Differential A,B Peak Output Voltage" tests nominal but Point C and/or Point D Peak Voltage is not, then either the transmit gain is non-linear and/or there is amplitude asymmetry, either one of which represents non-correctable distortion that will affect **SNR**.
IEEE802.3.2005 Sub clause 40.6.1.2.3	Point C template test*	Test Signal #1 Mask Fit, SNR	Partial	Point C will typically replicate Point A mask performance unless there is excessive residual noise that would affect **SNR**.
IEEE802.3.2005 Sub clause 40.6.1.2.1	Point D peak output voltage*	Pk.Diff.Volts T.S.#1 A-B	Partial	*See Point C Peak Output Voltage above*
IEEE802.3.2005 Sub clause 40.6.1.2.3	Point D template test*	Test Signal #1 Mask Fit	Partial	Point D will typically replicate Point B mask performance unless there is excessive residual noise that would affect **SNR**.
IEEE802.3.2005 Sub clause 40.6.1.2.3	Point F template test*	Test Signal #1 Mask Fit	Partial	Point A and B are the more stringent mask fits while Points F & H are more determined by external test circuit.
IEEE802.3.2005 Sub clause 40.6.1.2.2	Point G droop test*	Droop% T.S. #1 F-G,H-J	Direct*	Estimated parameter has been correlated to actual IEEE 802.3 measurements. PVA does not require test signal.
IEEE802.3.2005 Sub clause 40.6.1.2.3	Point H template test*	Test Signal #1 Mask Fit	Partial	*Partial Indicator - See Port F Template Test above.*
IEEE802.3.2005 Sub clause 40.6.1.2.2	Point J droop test*	Droop% T.S. #1 F-G,H-J	Direct*	Estimated parameter has been correlated to actual IEEE 802.3 measurements. PVA does not require test signal.
IEEE802.3-2005 Sub clause 40.8.3.3	MDI common mode output voltage			
IEEE802.3-2005 Sub clause 40.6.1.2.5	Jitter master filtered	SNR	Gross	Severe (failing) jitter will impact **SNR** measurements.
IEEE802.3-2005 Sub clause 40.6.1.2.5	Jitter master unfiltered	SNR	Gross	Severe (failing) jitter will impact **SNR** measurements.
IEEE802.3-2005 Sub clause 40.6.1.2.5	Jitter slave filtered	SNR	Gross	Severe (failing) jitter will impact **SNR** measurements.
IEEE802.3-2005 Sub clause 40.6.1.2.5	Jitter slave unfiltered	SNR	Gross	Severe (failing) jitter will impact **SNR** measurements.
IEEE802.3-2005 Sub clause 40.8.3.1	MDI return loss	(Wideband) Return Loss	Partial	**Wideband Return Loss** readings will point to likely success (< -21dB) or likely failure (>-18dB) in MDI Return Loss measurements. *See PVA-3000 Reference Manual, Section 1.3.8.*
IEEE802.3-2005 Sub clause 40.6.1.2.4	Transmitter distortion	SNR	Partial*	**SNR** reports on aggregate uncorrectable characteristics of incoming transmitted signal. PVA does not require Test Signal 4 or prescribed postprocssing of capture waveform. This may be ultimately a more useful metric because correctable distortions don't impair performance.
IEEE802.3-2005 Sub clause 40.6.1.2.6	Transmit Clock Frequency			
Not Specifed by 802.3 Clause 40	Transmit Crosstalk	(Wideband) Crosstalk	Direct	Report Pair-Pair Power Leakage from DUT transmitter.
IEEE802.3-2005 Sub clause 40.6.1.3.1	Receiver Differential Input Signals	1000Base-T Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case Insertion Loss & External Coupled Noise.
IEEE802.3-2005 Sub clause 40.6.1.3.2	Receiver Frequency Tolerance	1000Base-T Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case Frequency Offset.
IEEE802.3-2005 Sub clause 40.6.1.3.3	Common Mode Noise Rejection			
IEEE802.3-2005 Sub clause 40.6.1.3.4	Alien Crosstalk Noise Rejection	1000Base-T Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case Insertion Loss & External Coupled Noise.
Not Specifed by 802.3 Clause 40	Receiver Jitter Tolerance	1000Base-T Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case timing jitter (Master & Slave Modes).

** Measurement performed with incoming 4-pair "nominal" 1000BaseT signal. This is more realistic than the "disturbing signal" utilized in 802.3 test setups.*

PhyView Analyzer / PHY Performance Test Suite: Test Time & Coverage Chart			
PHY Performance Test	**Typical Test Time**	**Total Time Per 24 Ports**	**Parameters Included**
1000Base-T Transmit & Interface Test	338 Sec. (84 Seconds / Pair)	2.25 Hours	Wideband Power, SNR, Low Band & Wideband PSD, Pair Skew, Return Loss, Crosstalk, Pk.Diff.Volts T.S.#1 A-B, Droop% T.S. #1 F-G,H-J, Test Signal #1 Mask Fit
100Base-Tx Transmit Test (MDI & MDI-X)	120 Sec. (60 Seconds / Pair)	0.8 Hours	Wideband Power, SNR, Low Band & Wideband PSD, UTP Diff. Volts Pk-Pk, 500ns Droop%, >2.4msec τ
1000Base-T Receiver Test (Master & Slave)	6.4 Min. (3.2 Minutes / Mode)	2.5 Hours	Max Insertion Loss Response, ±100 & ±115 ppm Timing Offset Response, -2, +1, & +4 dB(40mV) Alien Crosstalk Response, 0, +3, & +6 dB(1.4nsec) Jitter Response, Combo Insertion Loss + Alien Crosstalk + Jitter or Offset Response
100Base-T Receiver Test (MDI & MDI-X)	4.2 Min. (2.1 Minutes / Pair)	1.7 Hours	Max Insertion Loss Response, ±50 & ±100 ppm Timing Offset Response, +5 & +10 dB(40mV) Alien Crosstalk Response, +6 & +12 dB(1.4nsec) Jitter Response, Combo Insertion Loss + Alien Crosstalk + Jitter Response
10Base-T Receiver Test (MDI & MDI-X)	4.2 Min. (2.1 Minutes / Pair)	1.7 Hours	Max Insertion Loss Response, ±50 & ±100 ppm Timing Offset Response, +8 & +13 dB(40mV) Alien Crosstalk Response, +9 & +15 dB(1.4nsec) Jitter Response, Combo Insertion Loss + Alien Crosstalk + Jitter Response

Verification, Simplified.

PHY Performance Test Suite: IEEE 802.3 Correlations

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Ethernet PHYTests for 100BASE-TX

IEEE Specifications		PhyView Analyzer / PHY Performance Test Suite: 100Base-Tx		
Standard reference	**Description**	**PHY Performance Test Report**	**Correlation**	**Comment**
ANSI X3.263-1995, Section 9.1.3	+Vout overshoot	Wideband PSD, Rise/Fall Time:4+1 nsec	Partial	Large overshoots will increase PSD at very high frequencies (75 - 100 MHz) and would likely correlate to fast Rise/Fall times. *See PVA-3000 Reference Manual, Section 1.3.3.*
ANSI X3.263-1995, Section 9.1.3	+Vout overshoot decay	UTP Diff. Volts Pk-Pk, SNR	Partial	Slow overshoot decay in the presence of a large overshoot will typically increase reported Peak-Peak voltage and, if severe enough, will degrade SNR.
ANSI X3.263-1995, Section 9.1.3	–Vout overshoot	Wideband PSD, Rise/Fall Time:4+1 nsec	Partial	*See +Vout Overshoot above.*
ANSI X3.263-1995, Section 9.1.3	–Vout overshoot decay		Partial	*See +Vout Overshoot Decay above.*
ANSI X3.263-1995, Section 9.1.6	AOI +Vout rise time	Rise/Fall Time:4+1 nsec	Direct	Estimated Rise/Fall Time parameter has been correlated to actual IEEE 802.3 measurements. It will reflect the average of positive and negative going Rise and Fall times.
ANSI X3.263-1995, Section 9.1.6	AOI +Vout fall time	Rise/Fall Time:4+1 nsec		
ANSI X3.263-1995, Section 9.1.6	AOI +Vout rise/fall time symmetry			
ANSI X3.263-1995, Section 9.1.6	AOI –Vout rise time	Rise/Fall Time:4+1 nsec	Direct	Estimated Rise/Fall Time parameter has been correlated to actual IEEE 802.3 measurements. It will reflect the average of positive and negative going Rise and Fall times.
ANSI X3.263-1995, Section 9.1.6	AOI –Vout fall time	Rise/Fall Time:4+1 nsec		
ANSI X3.263-1995, Section 9.1.6	AOI –Vout rise/fall time symmetry			
IEEE 802.3-2008 Sub clause 25.4.4a	Worst Case Droop of Transformer	500ns Droop%, >2.4msec τ	Direct	Droop without baseline wander packet. *See PVA DC Unbalance Application for more robust analysis of low frequency response and SNR to effects of magnetic biasing.*
ANSI X3.263-1995, Section 9.1.8	Duty cycle distortion	SNR	Partial	SNR reports on aggregate uncorrectable characteristics of incoming transmitted signal. Duty-Cycle would represent one form of uncorrectable distortion. *See PVA-3000 Reference Manual, Section 1.3.4.*
ANSI X3.263-1995, Section 9.1.4	Signal amplitude symmetry	500ns Droop%, >2.4msec t, SNR	Partial	Signal amplitude asymmetry will DC bias magnetics and if severe enough, will degrade both Estimated Droop and **SNR**.
ANSI X3.263-1995, Section 9.1.9, IEEE802.3-2005 Sub clause 25.4.5	Transmit jitter	SNR	Gross	Severe (failing) jitter will impact **SNR** measurements.
ANSI X3.263-1995, Annex J UTP	AOI template	UTP Diff. Volts Pk-Pk, SNR, and Rise/Fall Time:4+1 nsec	Partial	The AOI template fit requires nominal Peak-Peak Amplitude and nominal Rise/Fall Time, parameters that are tested separately. Severe jitter could affect AOI template fit and would, if severe enough, degrade **SNR**.
ANSI X3.263-1995, Section 9.1.2.2	UTP +Vout differential output voltage	UTP Diff. Volts Pk-Pk	Direct	Estimated UTP Differential Voltage Pk-Pk parameter has been correlated to actual IEEE 802.3 measurements.
ANSI X3.263-1995, Section 9.1.2.2	UTP –Vout differential output voltage	UTP Diff. Volts Pk-Pk		
ANSI X3.263-1995, Section 9.1.5	Transmitter return loss	(Wideband) Return Loss	Partial	**Wideband Return Loss** readings will point to likely success (< -21dB) or likely failure (>-18dB) in MDI Return Loss measurements. *See PVA-3000 Reference Manual, Section 1.3.8.*
ANSI X3.263-1995, Section 9.2.2	Differential Input Impedance			
ANSI X3.263-1995, Section 9.2.3	Common Mode Rejection			
Not Specifed by 802.3 Clause 25	Receiver Differential Input Signals	100Base-Tx Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case Insertion Loss & External Coupled Noise.
Not Specifed by 802.3 Clause 25	Receiver Frequency Tolerance	100Base-Tx Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case Frequency Offset.
Not Specifed by 802.3 Clause 25	Alien Crosstalk Noise Rejection	100Base-Tx Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case Insertion Loss & External Coupled Noise.
Not Specifed by 802.3 Clause 25	Receiver Jitter Tolerance	100Base-Tx Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case timing jitter (Master & Slave Modes).

Ethernet PHY Tests for 10BASE-T

IEEE Specifications		PhyView Analyzer / PHY Performance Test Suite: 10Base-T		
Standard reference	**Description**	**PHY Performance Test Report**	**Correlation**	**Comment**
IEEE802.3.2005 Sub clause 14.3.1.2.1	Template MAU			*The PhyView Analyzer does not make direct transmitter measurements on 10Base-T transmitters. Generally, the expectation is that nominal performance at 1000Base-T and 100Base-Tx will infer nominal performance at 10Base-T since requirements for 1000Base-T and 100Base-Tx are much more demanding than 10Base-T.*
	Template TP_IDL with TPM			
	Template TP_IDL without TPM			
	Template Link Pulse with TPM			
	Harmonic content			
IEEE802.3.2005 Sub clause 14.3.1.2.1, Annex B.4.1 &B.4.3.3	Jitter with TPM			
IEEE802.3.2005 Sub clause 14.3.1.2.1, Annex B.4.1 & B.4.3.3	Jitter without TPM			
IEEE802.3-2005 Sub clause 14.3.1.2.5	Common mode output voltage			
IEEE802.3.2005 Sub clause 14.3.1.2.2, Annex B.4.3.2	Transmitter return loss	(Wideband) Return Loss	Partial	**Wideband Return Loss** readings will point to likely success (< -21dB) or likely failure (>-18dB) in MDI Return Loss measurements. *See PVA-3000 Reference Manual, Section 1.3.8.*
IEEE802.3.2005 Sub clause 14.3.1.3.4, Annex B.4.3.5	Receiver return loss			
IEEE802.3.2008 Sub clause 14.3.1.3.1	Differential Input Signals	10Base-T Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case Jitter.
IEEE802.3.2008 Sub clause 14.3.1.3.2	Receiver Differential Noise Immunity	10Base-T Rx Test	Direct	Link Monitor and/or Packet Flow with IEEE worst case ingress noise.

Note: 100Base-Tx and 10Base-T Transmit and Receive Tests performed automatically on both pair combinations, that is, MDI and MDI-X.

Verification, Simplified.