ALBEDO Ether.Sync is a field tester that supports absolutely all Ethernet standards and functionalities you need to install, commission and troubleshoot telecom services based on GbE, SyncE, PTP, Jitter and Wander.

Datasheet

ALBEDO Ether.Sync

Ether.Sync is a dual port tester, multistream and compatible with the new ITU-T standards. The equipment includes traffic generation and analysis features up to 1 Gbit/s, equivalent to 1.5 millions of frames, if frame size is set to 64 bytes. If the equipment is connected in through mode, it accepts and forwards frames at wirespeed.

1. CONNECTORS

- Operation over two Gigabit Ethernet physical interfaces (Port A, Port B) based either on SFPs or RJ45 connectors
- Port C: Unbalanced (BNC) 75 Ω / balanced (RJ-45) 120 Ω
- Smart Serial universal datacom connector for the DTE and DCE (all datacom interfaces)
- Analogue voice frequency audio port

2. OPERATION MODES

- *Ethernet Endpoint operation*: The equipment generates and receives Ethernet PCS codes and Ethernet frames
- *IP Endpoint operation*: The equipment generates and receives IPv4 datagrams
- *IP / Ethernet Through operation*: Traffic is forwarded between port A and B

3. ETHERNET PHY

3.1 Interfaces
- *SFP*: *10BASE-T, 100BASE-TX, 100BASE-FX, 1000BASE-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX*
- *RJ-45*: *10BASE-T, 100BASE-TX, 1000BASE-T*
- On/off laser control for optical interfaces

3.2 Auto-Negotiation
- Rate negotiation, allow 10 / 100 / 1000 Mb/s
- Ability to disable auto-negotiation and force line settings

4. POWER OVER ETHERNET (PoE)

4.1 Types
- PoE (IEEE 802.3af-2003) and PoE+ (IEEE 802.3at-2009) detection
- PoE (IEEE 802.3af), PoE+ (IEEE 802.3at), non-standard, none

4.2 Interfaces
- 10BASE-T, 100BASE-T and 1000BASE-TX through attached RJ-45 ports A and B

4.3 Modes
- Endpoint. Voltage between pairs 1-2 / 3-6 and 4-5 / 7-8.
- Through. Voltage and current in pairs 1-2/ 3-6 and 4-5 / 7-8

5. SYNCHRONOUS ETHERNET (ITU-T O.174)

5.1 Interfaces
- 100BASE-TX and 1000BASE-T through the attached RJ-45 ports. 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX and 1000BASE-BX through external SFP

5.2 Operation
- Analysis of synchronous Ethernet signal in Ethernet endpoint, IP Endpoint and Through modes, generation of synchronous Ethernet signal in Ethernet endpoint and IP Endpoint modes. Transparent synchronous Ethernet pass-through in Through mode
- Configuration of internal, external or recovered clock in Ethernet interfaces
- Fixed freq. offset generation on transmitted signals with maximum value of ±150 ppm as per ITU-T O.174 (11/2009) 8.2.1
- Sinusoidal wander generation on Ethernet interfaces.
- Generation, decoding and transparent forwarding (Through mode) of the ESMC and the SSM code carried in. Transmission and reception of "hear-beat" and event SSM messages is subject to ITU-T G.8264 clauses 11.3.2.1 and 11.3.2.2.
- QL to be transported by the SSM is encoded as specified in ITU-T G.781 clauses 5.5.2.1 (Option I), 5.5.2.2 (Option II) and 5.5.2.3 (Option III)

5.3 Analysis
- Measurement of the line frequency (MHz), frequency offset (ppm) and frequency drift (ppm/s) as specified in ITU-T O.174 (11/2009) clause 10
- TIE / MTIE / TDEV measurement on Ethernet interfaces following ITU-T O.172 clause 10
- Decoding of the QL transported in SSM as per ITU-T G.781 clauses 5.5.3.1 (Option I), 5.5.3.2 (Option II) and 5.5.3.3 (Option III)

6. CLOCK REFERENCES

6.1 Internal
- Internal time reference better than ±3.0 ppm. Optional internal reference better than ±0.1 ppm

6.2 Through
- Ethernet through Port B (over any valid electrical / optical synchronous Ethernet interface, not available for Port B or when through mode is configured)

6.3 External
- 2048 Mb/s, 2048 MHz, 1544 Mb/s, 1544 MHz through Port C (balanced or unbalanced), 10 MHz
- 2048 Mb/s, 2048 MHz, 1544 Mb/s, 1544 MHz through through DCE datacom port (unbalanced interface, BNC connector adapter)
- Optional one-pulse-per-second (PPS) synchronization through a RJ45 interface

6.4 Output
- Clock Output 2048 kHz

7. ETHERNET MAC
- Traffic generation and analysis features up to 1 Gb/s (1.5 millions of frames, if frame size is set to 64 bytes)
- Frame formats: *DIX, IEEE 802.1Q, IEEE 802.1ad*
- Support for Jumbo frames with MTU up to 10 kB
- Setting of *source* and *destination MAC addresses* as a single value or as a range
- Setting of the *Type / Length* value
- Configuration of *VID* and *priority codepoint* in VLAN modes
- In Q-in-Q / IEEE 802.1ad modes, configuration of the S-VLAN *VID, DEI* and *priority codepoint*. Configuration of the C-VLAN *VID* and priority *codepoint*
- Configuration of the *frame size*

8. IPv4
- Configuration of *source* and *destination IPv4 addresses* as a single value or as a range
- Configuration of *DSCP* CoS labels, *TTL, transport protocol*
- If transport protocol is UDP, support of UDP frame with *source* and *destination port* configuration

9. TRAFFIC GENERATOR
- Generation over 8 independent streams. Each stream has its own specific bandwidth profile,pattern configuration

9.1 Bandwidth Profiles
- Generation modes: *Continuous, Periodic burst, Ramp* and *Poisson*

9.2 Test Patterns and Payloads
- Layer 2-4 BER test patterns: *PRBS 2^{11}-1, PRBS 2^{15}-1, PRBS 2^{20}-1, PRBS 2^{23}-1, PRBS 2^{31}-1* along with their inverted versions and user (32 bits). These patters apply to stream 1 only
- Test payload for SLA tests
- *All zeros* test pattern

10. FILTER
- Up to 8 simultaneous filters can be applied to the traffic
- The equipment supports a generic filter which can select frames by using a *16 bit mask* and an arbitrary *offset* defined by the user

10.1 Ethernet Selection
- By *source* and *destination MAC addresses*. Selection of MAC address sets with masks
- By *Type / Length* value with selection mask
- By *C-VID* and *S-VID* with selection mask
- By *service* and *customer priority codepoint* value with selection mask

10.2 IPv4 Selection
- Selection by *IPv4 source* or *destination* address. It is possible to select address sets by using masks

- Selection by *protocol*
- Selection by *DSCP value*

10.3 UDP Selection
- Selection by *UDP port*. Either as a single value or a ranges

11. PHY RESULTS

11.1 Cable Tests
- Optical power measurement (transmitted and received power) over compatible SFP transceivers
- For inactive links: Open/short fault indication and distance to fault in metres (accuracy: 1 m)
- For 10/100 Mb/s active links, the following results are reported: current local port MDI/MDI-X status
- For 1 Gb/s active links the following results are reported: current local port MDI/MDI-X status, pair polarities (normal/inverted), pair skew (ns)

11.2 Auto-Negotiation
- *Bit rate* and *duplex mode*

11.3 SFP
- *SFP presence*, current *interface, vendor*, and *part number*

12. FRAME ANALYSIS
- Support of *local one-way* (port A-port B) and *two-way* (port A-port A) test modes
- Separate traffic statistics for Port A and B

12.1 Ethernet Statistics
- Frame counts: *Ethernet, VLAN, IEEE 802.1ad frames, Q-in-Q frames, control frames, pause frames*
- Frame counts: *unicast, multicast* and *broadcast*
- Basic error analysis: *FCS errors, undersized frames, oversized frames, jabbers*
- Frame size counts: *64 or less, 65-127, 128-255, 256-511, 512-1023, 1024-1518, 1519-1522, 1523-1526* and *1527-MTU* bytes

12.2 IP Statistics
- Packet counts: *IPv4 packets*
- Packet counts: *unicast, multicast* and *broadcast*
- *UDP packets, ICMP packets*
- *IPv4 errors, UDP* errors

12.3 Bandwidth Statistics
- *Current, maximum, minimum* and *average* (transmitted and received) traffic figures for port A and B
- Ethernet traffic statistics expressed in bits per second, frames per second and a percentage of the nominal channel capacity
- *Unicast, multicast* and *broadcast* traffic figures expressed as a percentage of the nominal channel capacity
- IP statistics (bits per second)
- UDP traffic (bits per second)

13. SLA STATISTICS
- Multistream SLA analysis
- Delay statistics: ITU-T Y.1563 *FTD* (current, minimum, maximum, and mean values)
- Delay variation statistics: ITU-T Y.1563 *FTD* (standard deviation), ITU-T Y.1563 *FDV* (peak), RFC1889 / RFC 3393 *jitter* (current, maximum and mean values)
- Duplicated packets, out -of -order packets
- Frame loss: ITU-T Y.1563 *FLR*
- Availability statistics: *SES* and ITU-T Y.1563 *PEU*

13.1 BER
- *Bit error count, seconds with errors, bit error ratio* (BER)
- *Pattern losses, pattern loss seconds*

C O N F I D E N C I A L

13.2 Network Exploration

- *Top talkers* statistics: Displays the 25 most common source MAC / IP addresses
- *Top VID* (IEEE 802.1Q) or *C-VID* (IEEE 802.1ad): Displays the 25 most common VID / C-VID tags

14. AUTOMATIC TESTS

- The equipment supports automatic normalized tests defined in IETF RFC 2544 and ITU-T Y.1564 (eSAM)
- Support of *local one-way* (port A - port B) and *two-way* (port A - port A) tests
- Support of Ethernet and IP test modes

14.1 IETF RFC 2544 Test

- Support of RFC-2544 *throughput*, *frame-loss*, *latency*, *back-to-back* and *recovery time* tests

14.2 eSAM Test

- Testing of up to eight services (non-color-aware mode) or up to four services (color-aware mode)
- Configuration of the *CIR* and *EIR* for each service
- Configuration tests (CIR, EIR and policing) with *FTD*, *FDV*, *FLR* results for each service
- Performance test with *FTD*, *FDV*, *FLR* and *availability* results for all services

15. PORT LOOPBACK

- Layer 1-4 loopback
- Loop frames matching current filtering conditions or loop all frames in layer 2-4 loopbacks
- Loop controls for broadcast and ICMP frames

16. PING AND TRACE-ROUTE

- Generation of on demand *ICMP echo request* (RFC 792) messages with custom destination IP address, packet length and packet generation interval
- Analysis of *ICMP echo reply* (RFC 792) messages with measurement of round trip time and lost packets
- Analysis of *ICMP Time-To-Live Exceeded* replies received in the trace-route test

17. PROTOCOLS

- *ARP* (IETF RFC 826)
- *DNS* (IETF RFC 1034, RFC 1035)
- *DHCP* (client side) (IETF RFC 2131)
- *Trace-route* application using UDP or ICMP

18. PTP - EEE 1588-2008 (V2)

18.1 General

- PTP protocol generation and analysis runs in Port A
- Operation: IEEE 1588-2008 endpoint emulation in Ethernet endpoint, IP Endpoint (Port A). Transparent, non-intrusive IEEE 1588 pass-through monitoring in Through mode
- Support of hardware-assisted generation and decoding of Precision Time Protocol (PTP) as defined in IEEE 1588-2008
- Operation and equipment connection to the network is as any IEEE 1588 Ordinary Clock (Ethernet endpoint operation modes or IP endpoint, TX/RX port mode)
- Both Master and Slave operations are supported in endpoint mode. Ability to force Slave role
- Encapsulations: PTP over UDP over IPv4 (IP Endpoint mode) as defined in IEEE 1588-2008 Annex D, PTP over IEEE 802.3 / Ethernet defined in IEEE 1588-2008 Annex F

18.2 Results

- Presentation of peer clock details: master identity, peer clock class, peer clock accuracy
- Master clock variance
- TX and RX PTP frame counts classified by frame type
- Sync Inter Packet Gap analysis: average and current
- *Sync delay*: current, min, max, average, st. deviation, range
- *Delay req.*: current, min, max, average, st. deviation, range
- Sync message Packet Delay Variation based on timestamps carried in Sync messages (or the Follow-up messages) and actual receiving times: Maximum, mean and current values.
- Round trip delay computed with the path delay mechanism: Histogram, current, minimum, maximum, mean values and standard deviation
- Path asymmetry: current, maximum and mean
- Wander metrics: TIE, MTIE and TDEV computed over the recovered clock
- Ethernet endpoint mode and IP endpoint mode with TX/RX port mode support full statistics presentation
-

19. USER INTERFACE

- Direct configuration and management in graphical mode using the keyboard and display of the instrument
- Remote access for configuration and management in graphical mode from remote IP site thought the Ethernet interface of the control panel
- Remote access with command line (CLI) using of either Telnet or SSH offering for configuration, management and task automation
- Remote access via SNMP for configuration, management and integration
- VNC based remote control for any client supporting standard versions such as PC, iPad, iPhone, etc
- Remote connection with Password using public / private Ethernet, IP network including Internet.

20. PLATFORM

- Configuration and report storage and export through attached USB port
- TFT display true Color 4.3" LCD, 480 x 272px
- Dimensions: 223 mm x 144 mm x 65 mm
- Weight: 1.2 kg (with rubber boot)
- AD/DC adapter (220 V AC / 50-60 Hz)
- Li-ion batteries (operation time 8 - 10 hours)