**ALBEDO Ether.Sync**

Ether.Sync is a field instrument for testing the new LTE architectures, synchronization planes, and Gigabit Ethernet networks the need of modules because everything is embedded in this modern hand-held units.

1. **GENERAL**
   
1.1. **INTERFACES**

- Port A - B: 2 x SFP, 2 x RJ45 connectors
- Port C - D: balanced, RJ45 120 Ω, unbalanced BNC 75 Ω
- Analogue voice frequency Port

1.2. **OPERATION MODES**

<table>
<thead>
<tr>
<th>TCP/IP</th>
<th>Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-point</td>
<td>YES</td>
</tr>
<tr>
<td>Monitor</td>
<td>YES</td>
</tr>
<tr>
<td>Pass-through</td>
<td>YES</td>
</tr>
<tr>
<td>Loop-back</td>
<td>YES</td>
</tr>
</tbody>
</table>

2. **ETHERNET PHY**

2.1. **INTERFACES**

- SFP ports: 1000BASE-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX, 1000BASE-BX, 100BASE-TX, 100BASE-T
- RJ-45 ports: 10BASE-T, 100BASE-TX, 1000BASE-T
- On / Off laser control
- Insertion of code errors

2.1.1 Auto-Negotiation

- Bit rate: 10 Mbit/s, 100 Mbit/s, 1 Gbit/s
- Master and Slave roles in the 1000BASE-T
- Disable auto-negotiation, force line settings

2.1.2 Power over Ethernet (PoE)

- Interfaces: 10BASE-T, 100BASE-T, 1000BASE-TX
- PoE pass-through in transparent mode

2.2. **TIME REFERENCES**

- Internal time ref < ±3.0 ppm (Optionally < ±0.1 ppm)
- Ethernet through Port A & B
- 2048 Mbit/s, 2048 MHz, 1544 Mbit/s, 1544 MHz Port C
- 10 MHz, 2 Mbit/s, 2 MHz, 1.5 Mbit/s, 1.5 MHz Datacom Port
- 1 PPS / TOD synchronization
- GNSS: GPS/GLONASS

2.3. **SYNCHRONOUS ETHERNET**

2.3.1 Interfaces

- SFP ports: 1000BASE-T, 1000BASE-SX, 1000BASE-LX, 1000BASE-ZX, 1000BASE-BX, 100BASE-TX, 100BASE-T
- RJ-45 ports: 100BASE-TX, 100BASE-T

2.3.2 Timing

- Internal, external or recovered clock in Ethernet interfaces
- Freq offset generation up to ±125 ppm (res. 0.001 ppm)
- Line freq (MHz), offset (ppm), drift (ppm/s)

2.3.3 Synchronization

- Frequency offset generation of ±120 ppm
- Sinusoidal wander generation
- ESMC, SSML, QL: generation, decoding, forwarding

3. **ETHERNET MAC**

- Formats: DIX, IEEE 802.3, IEEE 802.1Q, IEEE 802.1ad
- Jumbo frames up to 10 kB
- Sour / Dest MAC address setting
- Type / Length Setting
- Enable / Disable VLAN and Q-in-Q modes
- VLAN VID / User Priority setting
- S-VLAN VID, DEI, PCP, C-VLAN VID, User Priority
- FCS errors insertion

4. **IP**

4.1. **IPv4**

- Sour / Dest IPv4 address setting
- Dest. MAC address by hand or ARP
- DSCP CoS labels, TTL and transport protocol
- IP checksum errors insertion

4.2. **PROTOCOLS**

- ARP
- DHCP
- DNS
- Ping
- Trace route

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

4.3. MPLS
- MPLS generation / analysis
- Double label stack support
- TTL exp, label fields

5. TRAFFIC GENERATOR
Generation over 8 independent streams

5.1. BANDWIDTH PROFILE
5.1.1 Operation Modes
- Continuous:
- Periodic:
- Ramp:
- Random

5.2. TEST PATTERNS AND PAYLOADS
- Layer 1 BER: HF, LF, MF, Long/Short continuous random
- Layer 2-4: PRBS 2^11-1, PRBS 2^15-1, PRBS 2^20-1, PRBS 2^25-1, PRBS 2^31-1 along with their inverted versions, user (32 bits). These patterns apply to stream 1 only
- SLA payload
- All zeros
- Insertion of TSE: single, rate, random

6. FILTERS
Up to 8 simultaneous filters to be applied to the traffic
Selection by Ethernet, IP, TCP/UDP fields
Generic filter by using 16 bit mask and arbitrary offset

6.1. ETHERNET SELECTION
- MAC Address: Source and Destination
- Type / Length value with selection mask
- C-VID and S-VID with selection mask
- Service and Customer priority codepoint

6.2. MPLS SELECTION
- Top and Bottom MPLS headers
- Label value
- Exp field

6.3. IPV4 SELECTION
- IPv4 Source and Destination address
- IPv4 Protocol
- DSCP fields

6.4. IPV6 SELECTION
- IPv6 Source and Destination address
- IPv6 flow label
- DSCP
- Next Header

6.5. UDP SELECTION
- Port: single value or ranges of values

7. PHY RESULTS
7.1. CABLE TESTS
- Optical power (over compatible SFP/SFP+)
- Inactive links: Open/short, distance to fault
- 10/100 Mbit/s links: current local port MDI/MDI-X status
- 1000 Mbit/s links: current, polarities, skew

7.2. AUTO-Negotiation
- Bit rate and duplex mode
- Master / Slave role indication (1000BASE-T)

7.3. SYNCHRONOUS ETHERNET
- Frequency (MHz), offset (ppm), drift (ppm/s)
- TIE / MTIE / TDEV
- Decoding of the QL transported in SSM

8. FRAME ANALYSIS
- Modes: One-way (port A - A), two-way (port A - B)
- Separate statistics for Port A / B, Tx / Rx, Filter

8.1. ETHERNET STATISTICS
- Counts: Ethernet, VLAN, IEEE 802.1ad frames, Q-in-Q, Control, Pause, IEEE 1588-2008
- Frames: unicast, multicast, broadcast
- FCS errors, Undersized, Oversized, Fragments, Jabbers

8.2. MPLS STATISTICS
- MPLS stack size: max, min

8.3. IP STATISTICS
- Packet counts: IPv4 packets, IPv6 packets
- Packet counts: unicast, multicast and broadcast
- UDP packets, ICMP packets
- IPv4 checksum errors, IPv6 checksum errors
- IEEE 1588-2008 packets

8.4. BANDWIDTH STATISTICS
- Current, max, min, avg (Tx / Rx, Port A / B)
- Unicast, multicast and broadcast counts
- IP and UDP statistics

8.5. SLA STATISTICS
- Delay (FTD): current, min, max, mean
- Delay variation (FDV or jitter): current, min, max, mean
- Reordering: Out-of-order, Duplicated count and ratio
- Loss (FLR): count, ratio
- Availability: SES count, PEU, PEA

8.6. BER
- Count, seconds, ratio and pattern loss secs at layer 1-4

8.7. NETWORK EXPLORATION
- Top talkers: 25 most popular MAC / IPv4 / IPv6 addr
- Top C-VID and S-VID: 25+25 most popular tags
- Automatic setup of 8 filtering blocks

9. PTP (IEEE 1588)
9.1. OPERATION
- Generation / Decoding of PTP - IEEE 1588-2008
- Operation as Ordinary Clock
- Master / Slave operations, ability to force Slave role
- Transparent operation in pass-through mode with Packet delay equalization
- Encapsulations: PTP over UDP / IPv4, PTP over Ethernet

9.2. PROTOCOL STATE
- Port state, best master clock, master identity
- Grandmaster: identity, BMC priorities, clock class, accuracy, clock variance, time source
9.3. **Counts & Statistics**
- Sync, Delay request, Delay response, Peer delay request, Peer delay response, Follow up, Peer delay response follow up, Announce, Signaling, Management
- Sync delay: current, max, min, avg, st-dev, range
- Sync delay variation: current, max, avg
- Sync inter arrival time: min, max, avg, current
- Delay request: current, max, min, avg, st-dev, range
- Round trip delay: current, mean
- Correction field: current, max, avg
- Sync floor delay population: Count (FPC), Rate (FPR), Percent (FPP), Configurable Pass / Fail threshold
- Wander: TIE, MTIE, TDEV

10. **Automatic Tests**
Automatic RFC 2544 / Y.1564 tests in one/two ways mode

10.1. **Port Loopback**
- Layer 1-4 loopback with Filtering conditions
- MPLS loop control
- Loop controls for broadcast and ICMP

10.2. **RFC 2544**
- Throughput, Frame-loss, Latency, Back-to-back, Recovery
- Asymmetric RFC based on Ethernet and IP RMP

10.3. **Y.1564**
- Ethernet service activation
- Eight / four services (colour / not) CIR, EIR, max, throughput
- FTD, FDV, FLR, availability objectives

10.3.1 Test Phases
- Phase 1: steps, step duration
- Phase 2: duration, bandwidth profile (deterministic, random)

11. **Platform**

11.1. **GUI**
- Touch-screen, keyboard and mouse
- Full remote control with VNC
- SNMP and MIB support

11.2. **Batteries**
- Operation time with batteries (LiPO): 8 - 24 hours
- Battery recharge time (LiPO): 4 hours

11.3. **Operation**
- Operational range: -10°C to +50°C
- Operation humidity: 10% - 90%
- IP rating: 54
- Configuration, report storage and export through USB

11.4. **Ergonomics**
- TFT colour touch screen (480 x 272 pixels)
- Dimensions: 223 x 144 x 65 mm (8.8 x 5.6 x 2.5 inches)
- Weight: 1 kg