



Net.Storm is hardware based impairments generator, equipped with double GbE ports, battery operated, fast and full-featured, can emulate the dynamics of real Ethernet / IP networks in terms of packet impairments.

Datasheet

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ALBEDO Net.Storm

ALBEDO Net.Storm generates degradations typical packet network to emulate -in a 100% controlled environment- the impairments of actual Ethernet / IP systems. Ideal to verify the tolerance and the quality of Video, AUdio or Data applications either working in development laboratories or directly connected to commercial networks.

1. Ports and Interfaces

- Dual RJ-45 port for electrical connection 10/100/1000BASE-T
- Dual optical and electrical SFPs ports operating up to 1 Gb/s
- SFP interfaces including: 10BASE-T, 100BASE-TX, 100BASE-FX, 1000BASE-T, 1000BASE-SX, 1000BASE-LX

1.1 Formats and Protocols

- Ethernet frame: IEEE 802.3, IEEE 802.1Q
- IP packet: IPv4 (IETF RFC 791)
- Jumbo frames: up to 10 kB MTU (Maximum Transmission Unit)
- Throughput between measurement ports: 1 Gb/s or 1,500,000 frames/s in each direction

1.2 Configuration

- Configurable MTU size

2. Filters

- One filter for background traffic processing and up to 15 fully configurable and independent filters
- User-configurable filters defined by field contents on Ethernet, IP, UDP and TCP headers
- Agnostic filters defined by 16-bit masks and user defined offset

Ethernet Selection

- By *source and destination MAC addresses*. Selection of MAC address sets with masks
- By *Type / Length* value with selection mask
- By *VID* with selection mask
- By *VLAN priority codepoint* value with selection mask

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

TCP / UDP Selection

- Selection by *TCP or UDP port*. Either as a single value or a range

Statistics

- Accepted and dropped frame counters for each configured filter

3. Switch Simulation

3.1 Bandwidth Policing

- Sustainable rate set up from 0 to 100%, defined in frames/s and burst size in number of frames

- Sustainable rate 0-100% (bits/s) and burst size (bytes)
- Policing filter for bandwidth control. Based on a token bucket which is defined with two parameters (a) *sustainable rate* (frames/s), (b) *depth* (frames) or how much traffic is allowed to pass through when the rate is above sustainable
- Not conforming frames are dropped

3.2 Bandwidth Shaping

- Sustainable rate set up from 0 to 100%, defined in frames/s and burst size in number of frames
- Sustainable rate 0-100% (bits/s) and burst size (bytes)
- Shaping filter for bandwidth control. Based on a token bucket algorithm is defined with two parameters (a) *sustainable rate* (frames/s), (b) *depth* (frames) that determines the traffic allowed to pass-through when the rate is above sustainable
- Not conforming frames are delayed

4. Event Insertion

- Events are implemented at Ethernet layer
- Independent event insertion in every single flow identified in the main stream
- Events: Frame loss, delay, frame duplication, errored frames
- Maximum process time caused by event insertion: 10 μs

4.1 Frame Delay and Jitter

- Fixed Delay From 10μs to 60s
- Deterministic delays: defined as a single Delay (ms)
- Random delays with uniform distribution: defined with a Minimum and a Maximum delay (ms)
- Random delays with exponential distribution: defined with a Mean (ms) and a Minimum delay (ms)
- Worst case max. delay (1 Gb/s traffic load and 64 byte frame): 20 ms

Metric	Minimum	Maximum
Delay	0 ms	60 s
Minimum Delay	0 ms	60 ms
Maximum Delay	0 ms	60 ms
Average Delay	0 ms	60 ms
Rate	0 frames/s	1,500,000 frames/s
Maximum burst size	0 frames	32767 frames

4.2 Packet Loss

- Single loss insertion
- Constant loss defined by a probability
- Random loss defined by a probability
- Random loss defined by the two-state model of Gilbert-Elliot which is configured by

- (a) the probability of packet loss during a period of high losses
- (b) probability of packet loss during a period of low losses
- (c) average length of high losses (in frames)
- (d) the average separation between high-loss events in frames
- Burst loss: defined as event duration, and number of packets affected.
- Periodic burst loss: defined with a burst duration, and the separation between two consecutive bursts. Both parameters can be defined using as units either the number of frames or time duration

Metric	Minimum	Maximum
Burst length	0 minutes	30 minutes
Burst length	0 frames	32737 frames
Burst separation	0 minutes	30 minutes
Burst separation	0 minutes	30 minutes
Rate	0 frames/s	1,500,000 frames/s
Maximum burst size	0 frames	32767 frames
Loss probability	0%	99.99%
Alternative loss prob.	0%	99.99%
Mean length	1 frame	16383 frames
Mean alt. length	1 frame	16383 frames

4.3 Frame Duplication

- Single duplication event insertion
- Random duplication defined by a probability.

Metric	Minimum	Maximum
Duplication prob.	0 %	99.99 %

4.4 Errored Frames

- Single errored frame event insertion
- Random errored frames defined by a probability.

Metric	Minimum	Maximum
Frame error prob.	0 %	99.99 %

5. Results

- Auto-negotiation results: current bit rate, duplex mode, interface
- SFP presence, vendor, and part number
- Separate traffic statistics for each port
- Separate statistics for transmit and receive directions
- Frame counts: Ethernet, and IEEE 802.1Q (VLAN), control frames
- Frame counts: unicast, multicast and broadcast
- Basic error analysis: FCS errors, undersized frames, oversized frames, fragments, jabbers
- Size counts: 64, 65-127, 128-255, 256-511, 512-1023, 1024-1518 bytes
- Byte counts: Port A (Tx / Rx) and Port B (Tx / Rx)
- Traffic counters follow RFC 2819

6. Platform

6.1 Ergonomics

- Size 223 x 144 x 65 mm
- Weight: 1.0 kg (with rubber boot, one battery pack)
- 4.3 inch TFT colour screen (480 x 272 pixels)

6.2 Graphical User Interface

- GUI controlled by Touch-screen, Keyboard or Mouse
- Direct configuration and management in graphical mode
- User interface by touch-screen, keyboard and mouse
- Full remote control with VNC
- Configuration up/down through Internet, USB and SNMP
- Local management with CLI
- Full remote control: SNMP, SSH, VNC

6.3 Results

- Local storage in txt and pdf files
- File transfer to SD card and USB port
- File management through web interface and SNMP

6.4 Board

- 2 x USB ports

- 1 x RJ45 port
- 2 x LEDs
- Software upgrade through USB port

6.5 Batteries

- Li Ion Polymer
- Up to 22 hours of operation in E1 (with two packs)
- Up to 10 hours of operation in Ethernet (with two packs)

6.6 Operational Ranges

- IP rating: 54
- Operational range: -10°C to +50°C
- Storage range: -20°C to +70°C
- Operation humidity: 5% - 95%

