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*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

# 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. FIELD OPERATION

### 1.1 Ports and Interfaces

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

### 1.2 Formats and Protocols

- Ethernet frame: IEEE 802.3, IEEE 802.1Q
- IP packet: IPv4 (IETF RFC 791)
- Jumbo frames: up to 17 kB MTU (Maximum Transmission Unit)
- Throughput between measurement ports: 1 Gb/s or 1,500,000 frames/s in each direction

## 2. CONFIGURATION

- Autonegotiation parameters including bit rate (10, 100, and 1000 Mb/s) and duplex mode
- Configurable MTU size

## 3. RESULTS

- Autonegotiation results including current bit rate, duplex mode, Ethernet 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
- Frame counts: unicast, multicast and broadcast
- Basic error analysis: FCS errors, undersized frames, oversized frames, fragments, jabbers, collisions
- Frame size counts: 64, 65-127, 128-255, 256-511, 512-1023, and 1024-1518 bytes
- Four byte counts: Port A (Tx / Rx) and Port B (Tx / Rx)
- All traffic counters follow RFC 2819

## 4. FILTERS

- One filter for background traffic processing
- Up to 15 fully configurable and independent filters
- Customizable filters defined by field contents on Ethernet, IP, UDP and TCP headers
- Agnostics filters defined by 16 bits masks and user defined offset

### 4.1 Ethernet filters

- MAC address: source, destination, and source-and-destination
- MAC address group: subset of addresses filtered by a masks
- Ethertype field with selection mask
- VLANs field
- CoS field

### 4.2 IP filters

- IPv4 address: source, destination, and source-and-destination
- IPv4 address group: subset of addresses filtered by masks
- Protocol encapsulated in the IP packet (TCP, UDP, Telnet, FTP, etc.)
- DSCP field
- TCP/UDP port

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### 4.3 Statistics

- Accepted and dropped frame counters for each configured filter.

## 5. EVENT INSERTION

- Events are implemented at Ethernet layer
- Independent event insertion in every single flows identified in the main stream
- Sequential application of every active filter
- Events: Packet loss, error, duplication, delay

### 5.1 Packet Delay and Packet Jitter

- Deterministic delays: defined as a single Latency (ms)
- Random delays over a uniform distribution: defined with a Minimum and a Maximum delay (ms).
- Random delays over an exponential distribution: defined with a Mean (ms) and a Minimum delay (ms).
- Shaping filter for bandwidth control. Based on a token bucket algorithm is defined with two parameters (a) *sustainable rate* (bits/s or frames/s ), and (b) *depth* (bytes or frames) that determines the traffic allowed to pass-through when the rate is above sustainable. Non conformance bytes or frames are delayed.
- Delay filters are configurable.

### 5.2 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), and 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.
- Policing filter for bandwidth control. Based on a token bucket which is defined with two parameters a) *sustainable rate* (bit/s or frames/s), and b) *depth* (bytes or frames) or how much traffic is allowed to pass through when the rate is above sustainable. Non conformance frames are dropped.

### 5.3 Packet Errors

- Error Insertion without recalculation of the Ethernet FCS field
- Single error insertion
- Statistical error: random, defined by a probability
- Statistical error: constant, defined by a probability

### 5.4 Packet Duplication

- Single duplication insertion
- Random duplication defined by a probability
- Constant duplication defined by a probability

## 6. 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.

## 7. GENERAL

- *Instant On* (the equipment measures immediately after power on)
- Operation time with batteries: 3.5 hours (minimum, two battery packs)
- Configuration and report storage and export through attached USB port
- TFT color screen (480 x 272 pixels)
- Dimensions: 223 mm x 144 mm x 65 mm
- Weight: 1.0 kg (with rubber boot, one battery pack)

## THE GILBERT-ELLIOTT MODEL

- The model of packet loss describes a CHANNEL made of two states of two different qualities and therefore with two different packet loss probabilities. The transition between the two states is random.