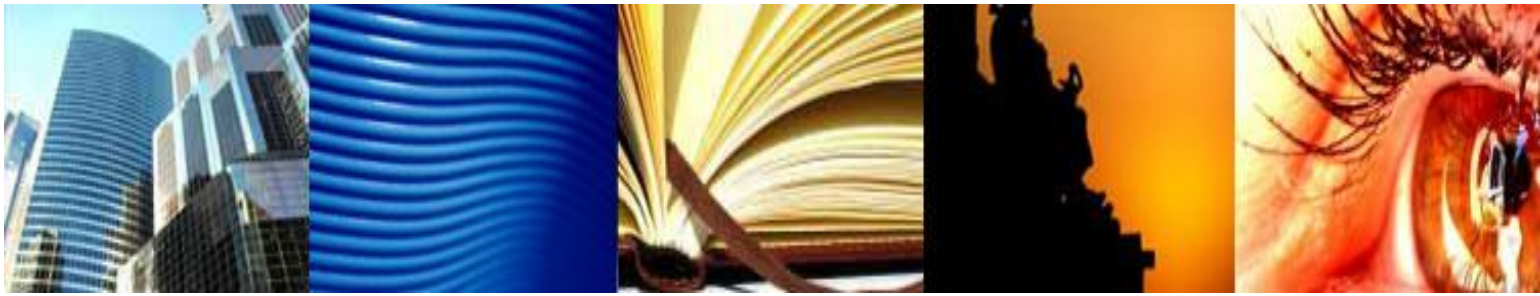
Net.Storm WAN emulator



High Performance Generator of IP packet impairments

ALBEDO Telecom

World FIRST

Net.Storm - Handheld WAN simulator

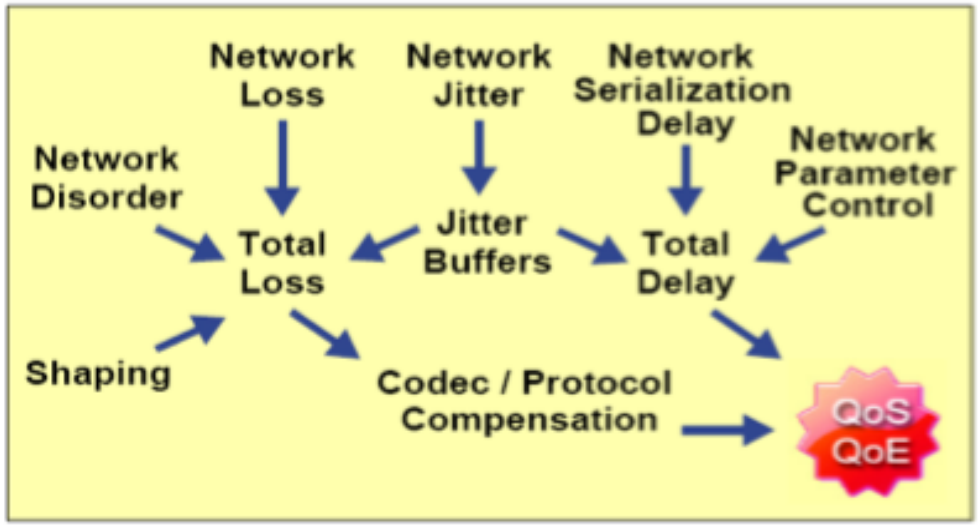
Introduction - QoS Requirements

- Convergence is moving all applications to IP
- However routers, and IP networks were designed to transport Data
- Video, Voice, TV, Internet, Data, etc.: all have specific QoS needs
- Can any network support next gen services?
- Are applications tolerant enough to real networks?
- Are routers, devices appropriate?

QoS	ITU-T Y.1541 - Applications	Delay	Jitter	Loss	Error	Order
Class 0	Real-Time, Jitter Sensitive, High Interaction (VoIP, VConf)	100 ms	50 ms	$1x10^{-3}$	$1x10^{-4}$	U
Class 1	Jitter Sensitive, Interactive (VoIP, Audio Streaming)	400 ms	50 ms	$1x10^{-3}$	$1x10^{-4}$	U
Class 2	Transaction Data, Interactive (Signalling)	100 ms	U	$1x10^{-3}$	$1x10^{-4}$	U
Class 3	Transaction Data, Interactive (Enterprise critical data)	400 ms	U	$1x10^{-3}$	$1x10^{-4}$	U
Class 4	Low Loss (Bulk Data, Video Streaming, VoD on local disk)	1 s	U	$1x10^{-3}$	$1x10^{-4}$	U
Class 5	Best Effort IP Networks (Traditional IP applications, www)	U	U	U	U	U
Class 6	Real-Time, Jitter Sensitive, High Interaction (IPTV, VConf)	100 ms	50 ms	$1x10^{-5}$	$1x10^{-6}$	$1x10^{-4}$
Class 7	Jitter Sensitive, Interactive, Low error (HDTV, IPTV, VTC, VoD)	400 ms	50 ms	$1x10^{-5}$	$1x10^{-6}$	$1x10^{-4}$

Introduction - Testing requirements

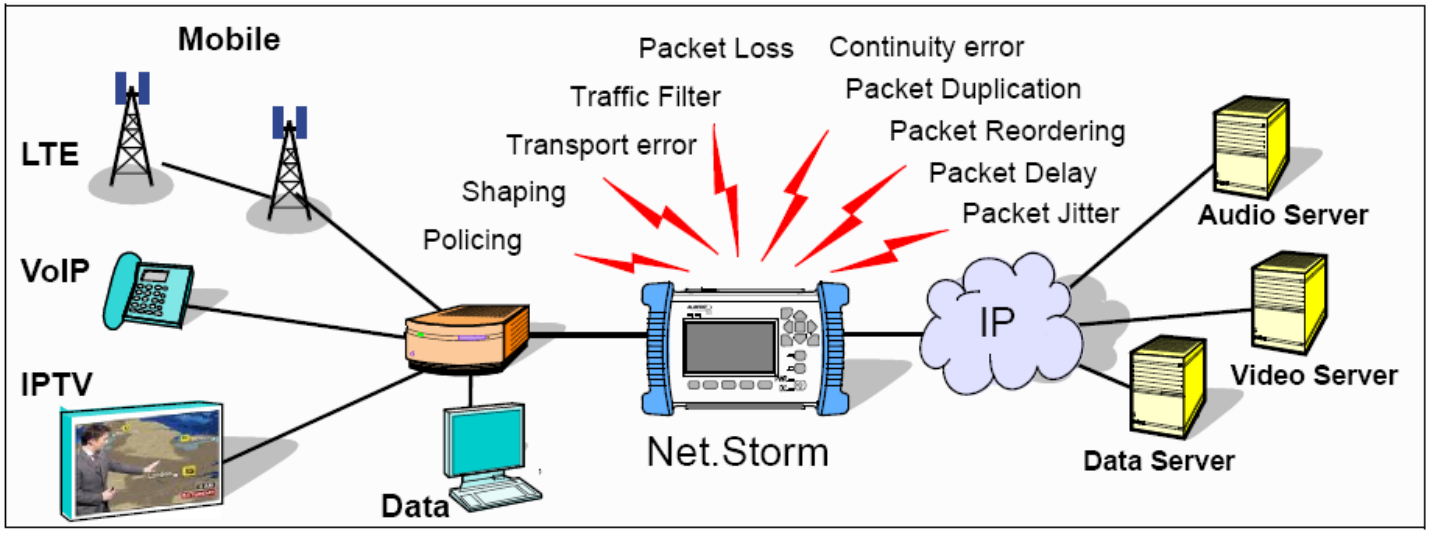
- Quality of Service (min bandwidth, max latency) are harder to test, compare than simple best-effort delivery
- Nodes, Terminals, Protocols, and Applications are harder to "pin down" and test thoroughly
- Some features such as multicast delivery require larger, more complex test environments
- Access technologies (HFC, xDSL, FTTH, WiMax, PLC, WiFi) can be highly asymmetric and expensive to test



End-to-end Real Traffic Conditions

ALBEDO NetStorm emulates real IP actual network conditions

- Managed, Partially Managed, Unmanaged
- Real traffic pass-through then
  - Packet Loss, Error, Duplication, Reordering,
  - Packet Delay, Jitter, Bandwidth shaping, and Throttling
- Control per traffic flow and filters



Net.Storm - Description

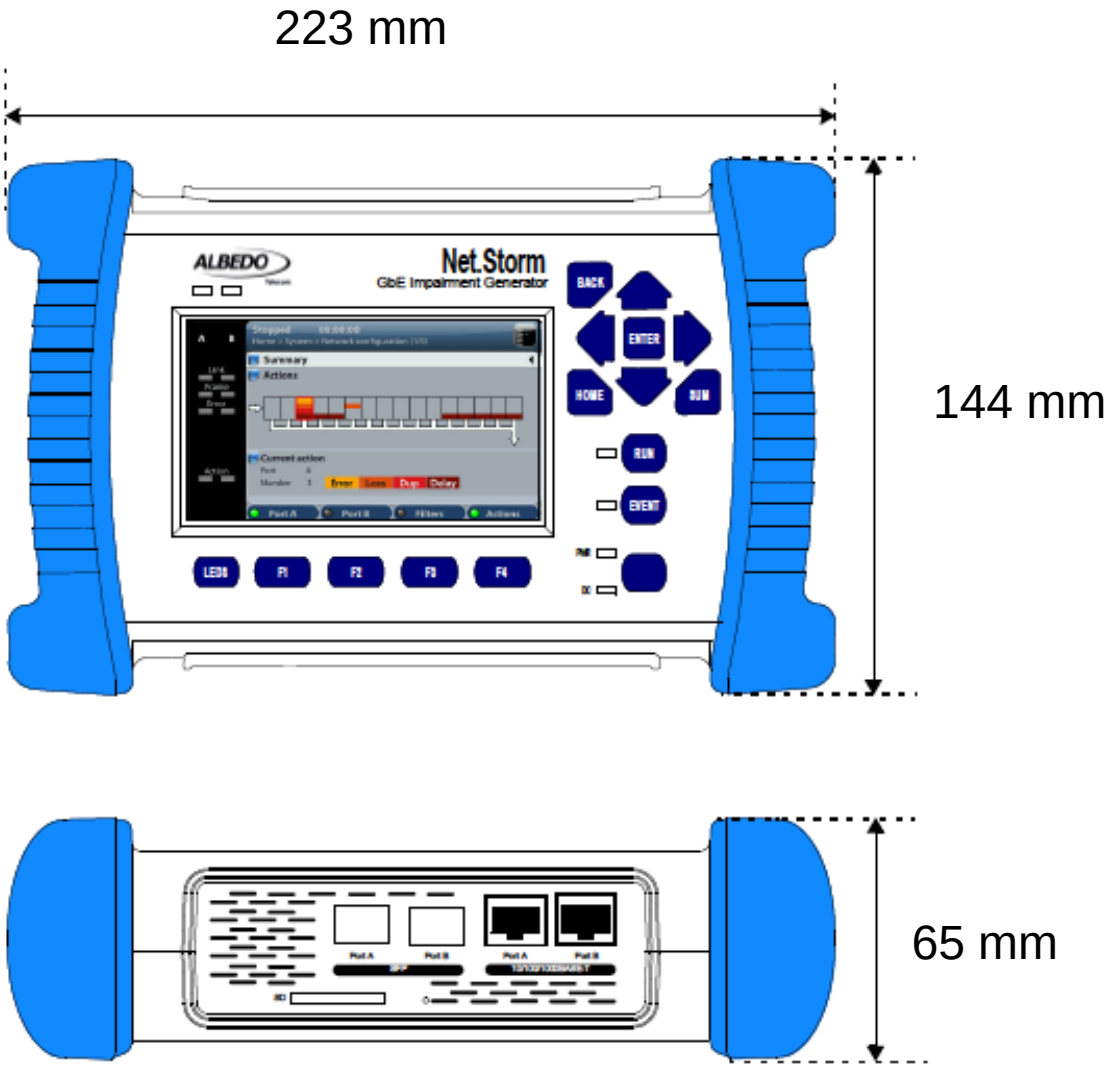
Firmware-based WAN emulator in a battery operated hand-held.

- Hardware accuracy (< 1 nsecs) at top bit rate
- Process capacity of 1,5 millions frames/second
- 16 x Filters based on layer 1, or layer 2, or 3 or higher…
- All impairments: delay, loss, jitter, error, duplication, etc.
- Traffic Shaping & Policing

Net.Storm - Description

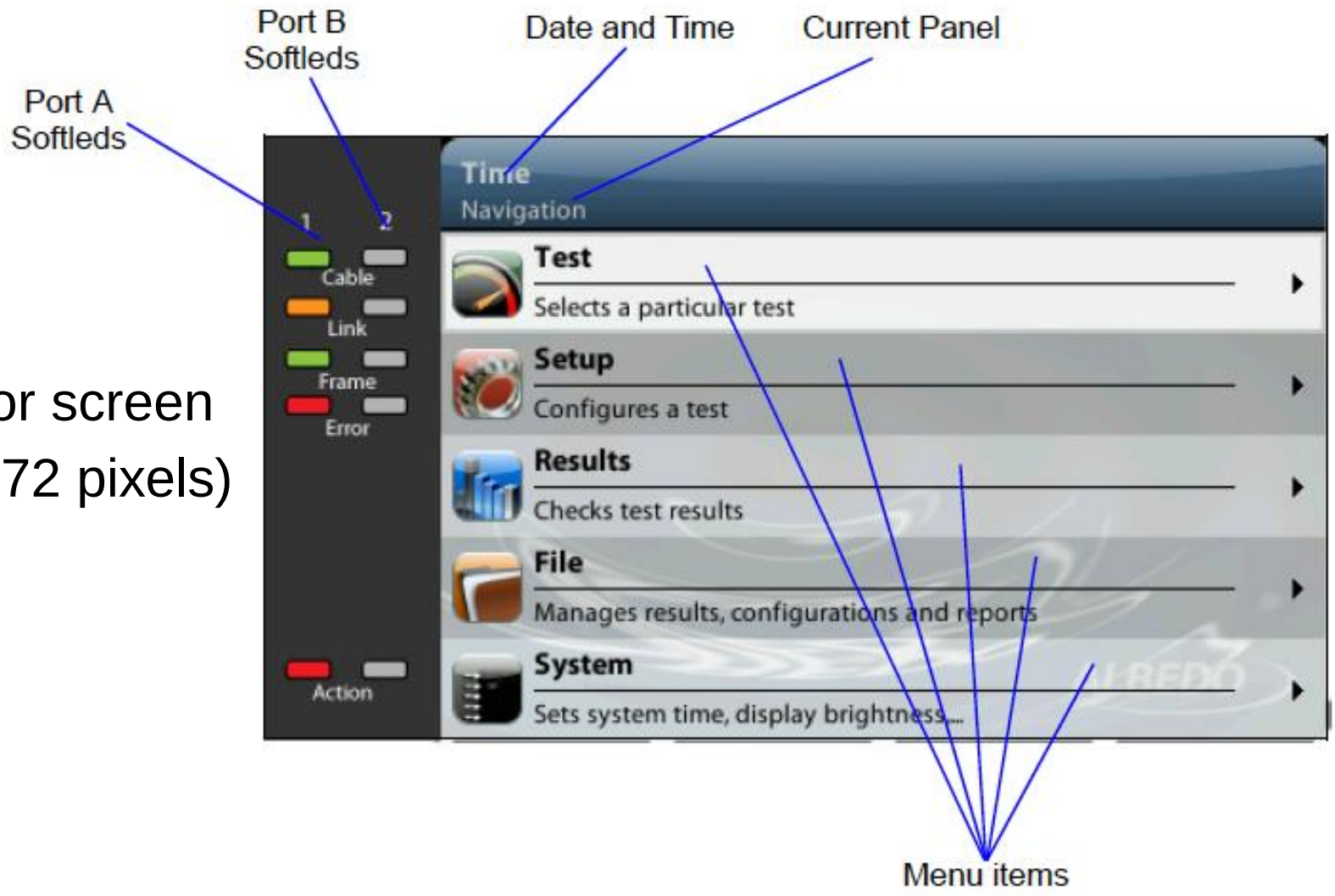
Net.Storm
Dimensions

Small size
1 Kg weight

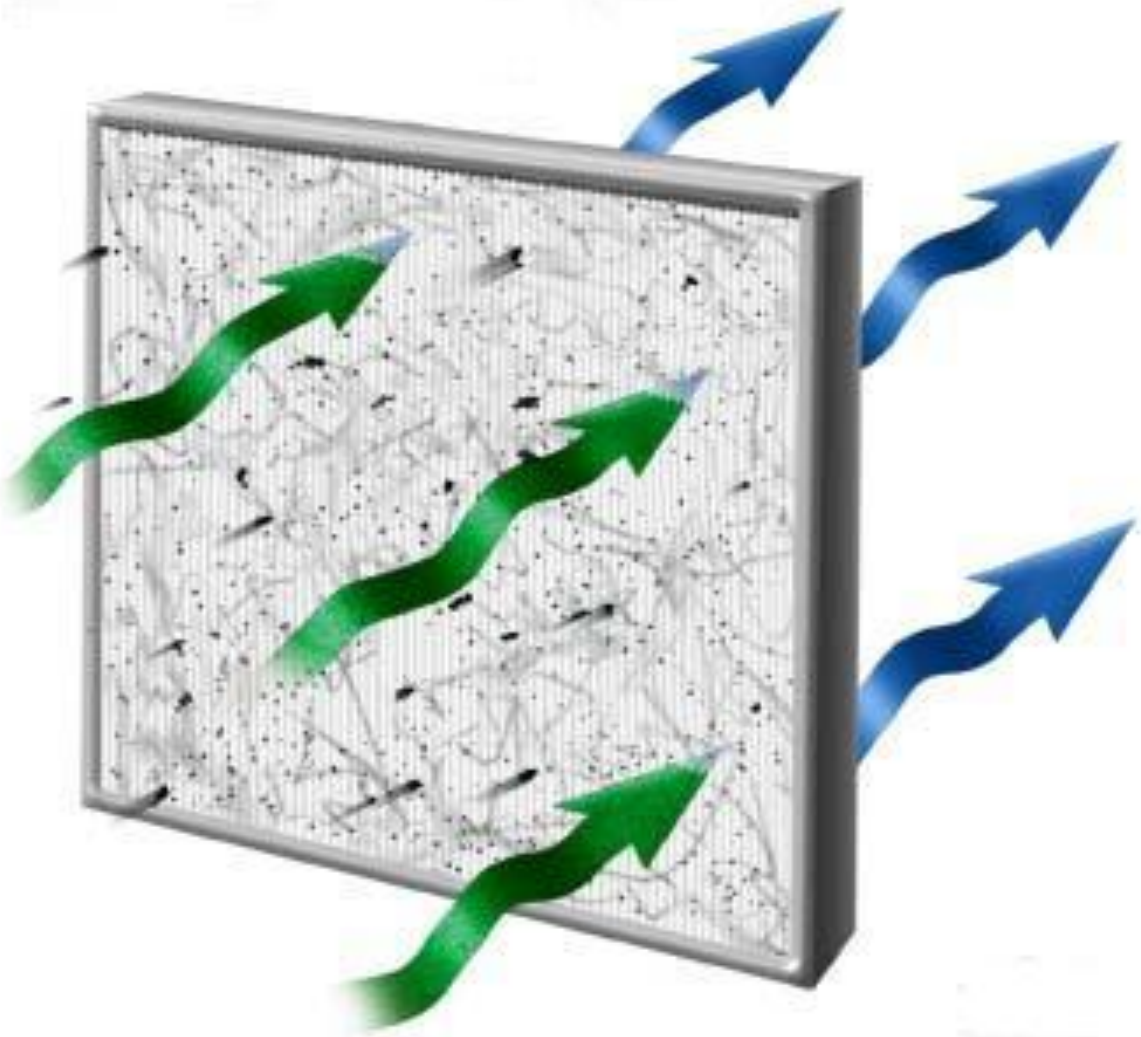


Net.Storm - Description

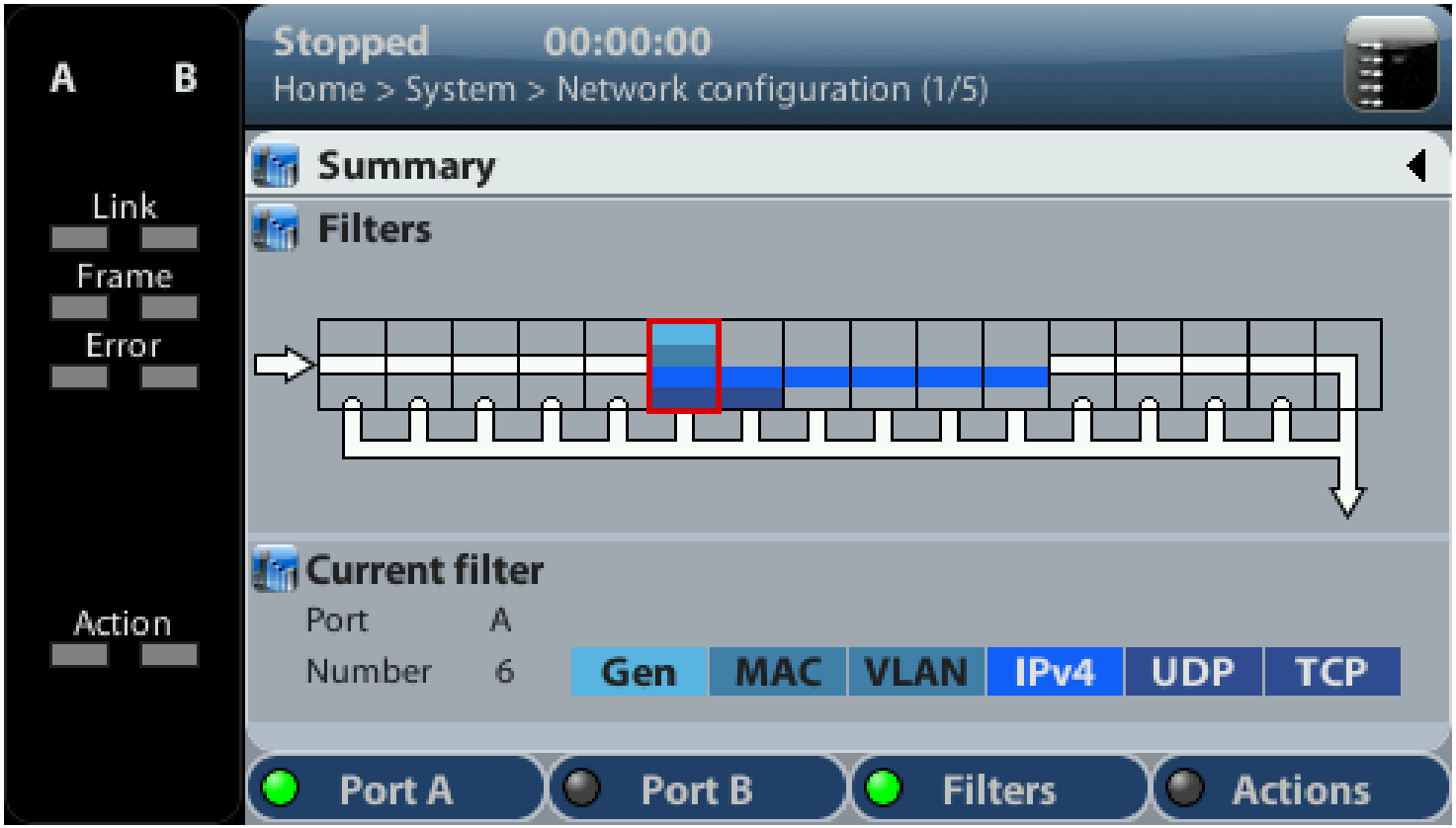
TFT color screen
(480 x 272 pixels)



Net.Storm - Filtering



Net.Storm - Filtering



Net.Storm is equipped with 15 filters plus one special filter for background traffic (BG filter).

Net.Storm - Impairment

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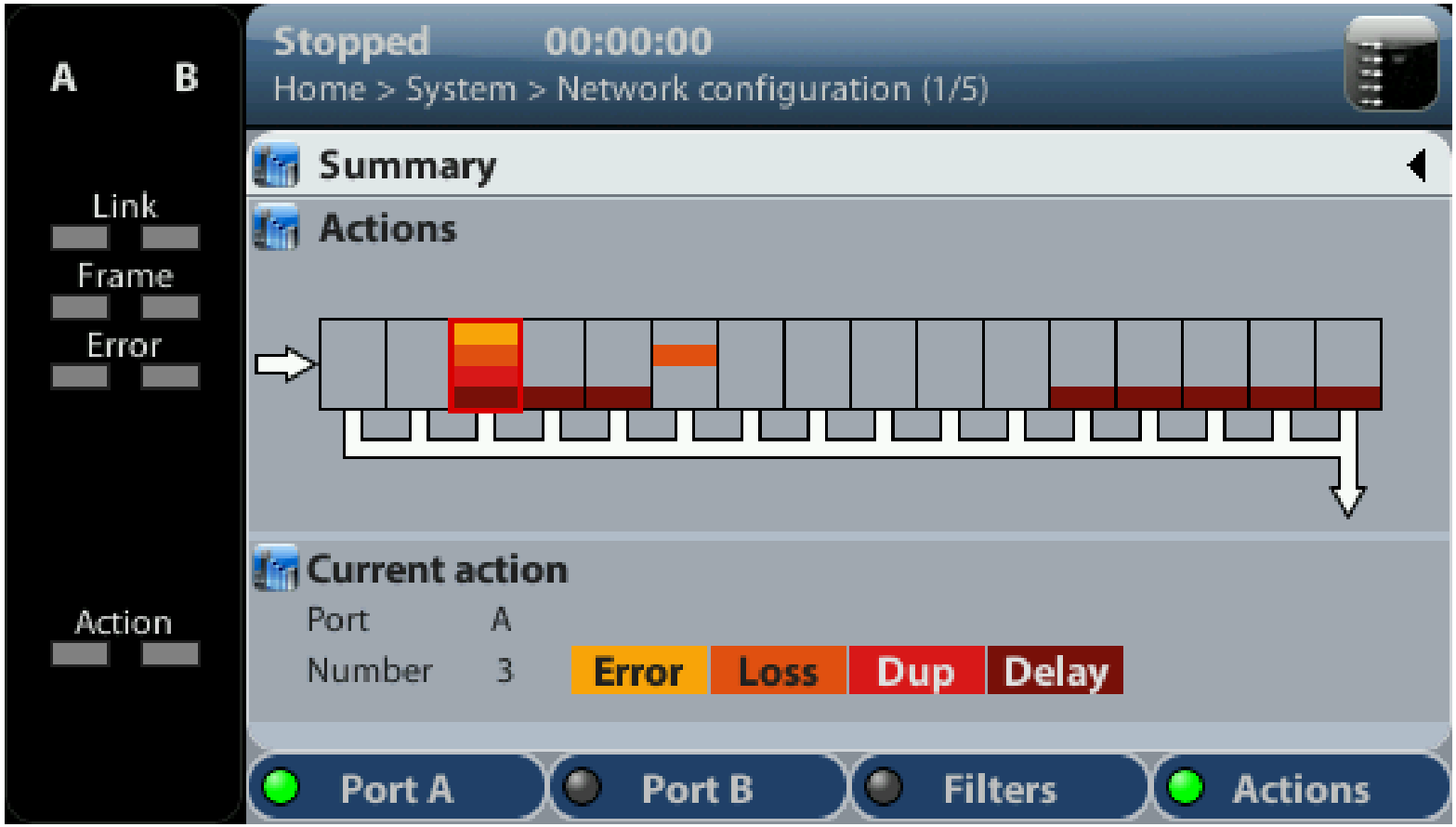
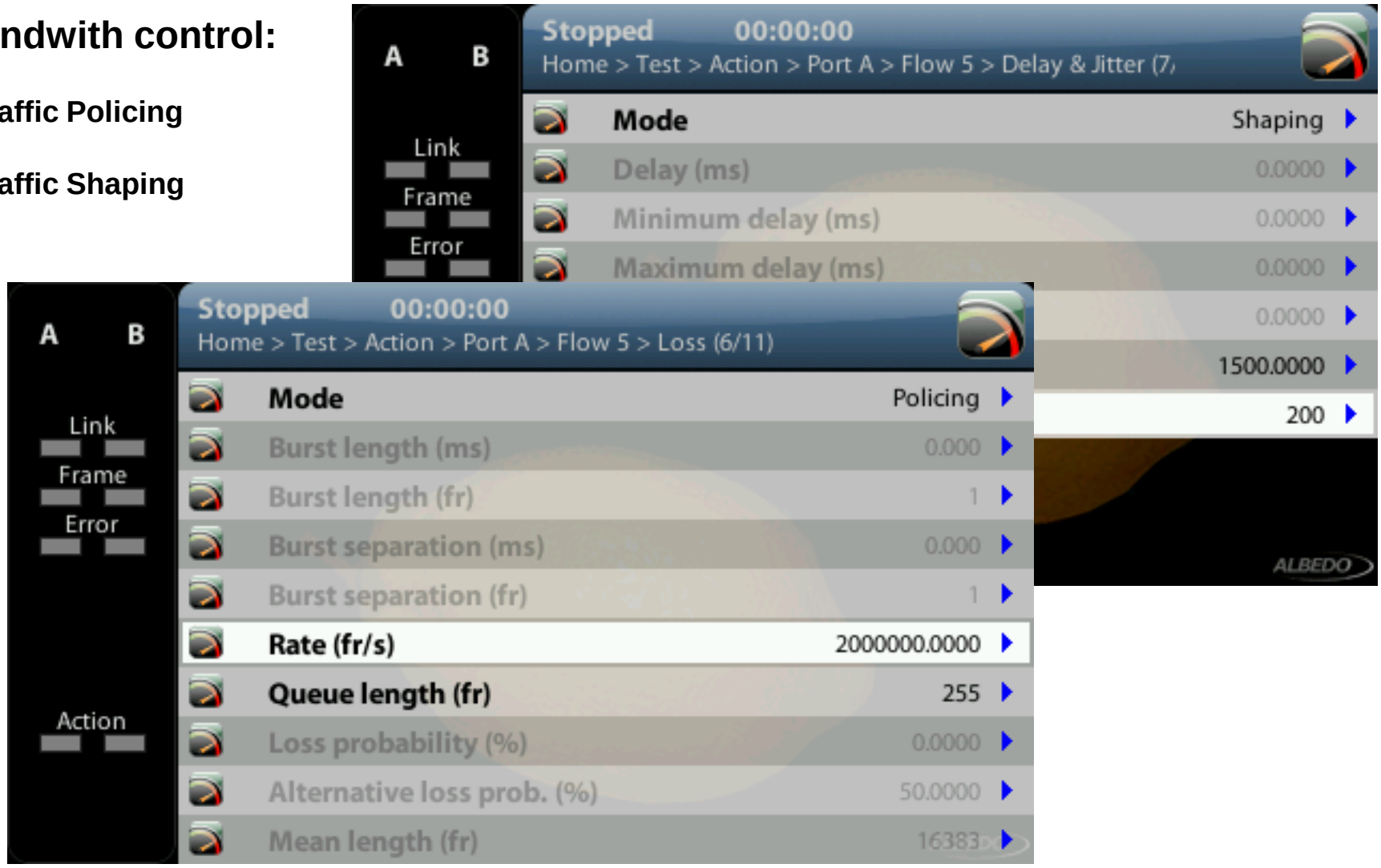


Net.Storm - Impairment

Bandwith control:

- **Traffic Policing**
- **Traffic Shaping**



Net.Storm - Markets

(1) LABs
- Verification of new architectures
- R+D centers
- Tuning VoIP codecs
- Tuning IPTV profiles

(2) FIELD tool
- Troubleshooting
- Instalation / configuration
- Network tolerance certification
- Verification of teleservices under stress

(3) Enterprise
- Developers of software
- Teleapplications are tested unders real conditions
- One-way delay sensitive applications

Field Applications

Fast Setup & Run, no PC needed

- VoIP, IPTV, troubleshooting
  - Real traffic conditions
  - Internetworking
  - Tolerance to impairments
- High Speed Data verification
  - At customer premises
- Critical Data Access
  - Gateways to Internet
  - User Terminals
  - One-way Delay

Lab Applications

- Planning Department
  - Simulation of the network
  - Testing new features
  - Definition of the Architecture
- Full Performance
  - Immediate changes implemented
  - The whole network in a rack
- Minimize Risks
  - Everything can be replicated
  - Full testing of new applications

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Net.Storm - Competitors

Net.Storm - Competitors

ALBEDO Net.Storm	Anue / Spirent GEM	IXIA ImpairNet EIM1G4S
		

Apposite Linktropy 5500	Apposite Netropy N60	Shunra vCat STN
		

Why Net.Storm

In Feb. 2010 we needed a tool:

- COMPLETE: any network condition can be emulated
- CARRIER-CLASS: battery operated, fault tolerant
- 4 x WHEEL-DRIVE: laboratory and field use
- INDEPENDENT: no host required to Setup & Run

We did not find it and we built it!

That's all