

Setting a new standard in Broadband Connectivity

* Wireline * Coax * Wi-Fi * Fiber *



Are you searching for non-interrupted and guaranteed speed of Internet ?

Worlds' unique Programmable Physical Layer Broadband Platform that defines, emulates, and test end-to-end latency & traffic performance

Broadband connectivity technologies like G.fast ITU-T G.9700, G.9701 TDD require accurate simulation of **delay/phase/impedance** in frequency bands of 106 MHz, 212 MHz & 424 MHz (MG.fast) enabling speed of >1GBPS into the home, just like Docsis, MoCA, and other data access technology do with coax cable, or optical technology with fiber networks.

Wireless data-modems complement network access & distribution technology.

Home gateways combine modems, Wifi, PLC, codecs, routers, switches to enable fast data-links for user applications and thus depend very much on the well functioning of the network.

Configure, test, simulate end-to-end Broadband Performance with Sparnex Instruments **programmable Latency Test System**

This new NextGen reference and verification platform simulates the problems that occur in real live networks for the purpose to define the speed and quality of Broadband with the ultimate goal of guaranteeing non-interrupted speed of data-networks for any kind of application.

- It is about Speed ! Ethernet interfaces of 1 – 4 – 10 – 40 and 100 Gbps traffic are programmable allowing to emulate and test data access speed and data loss in different configurable formats
- It is about latency ! Programmable Repetitive and Single electrical Impulse noise from 1 to 1000 ms in continuous or periodic test sequences, as well as signal delay as of used transmission technology, known as SHINE, REIN, PEIN, EMI .. as captured in your network or acc. Standards
- It is about local or remote/distance powered broadband devices ! Programmable power in terms of voltage and current with associated peaks and raise time when powering modems, gateways, servers in order to simulate the disturbances caused by unstable and/or poor wired power sources.
- It is about high speed carried data signal integrity and stability ! Programmable attenuation of signals depending on the different carriers before it arrives to the user.
- It is about quality of connectors and local wiring/internconnections ! Programmable impedance and insertion loss according realistic installation of cabling and connectors.
- It is about implementing the 'Standard' for each type of technology testing campaigns... SparneX Broadband Reference Center is testing and certifying interoperability and performance according standards of different bodies and organisation such as

**RFC 2544/TR-100/TR-105 / TR-114/TR-115/TR-208/TR-249/ ATP-337
TR-380/101.388/TR-398/101.524/802.3 L2-3/Docsis 3.0-3.1 / ...**

SparneX Instruments Broadband Reference Center

Concept & Main features

Load

Run

Stop

Close

Scenario Programmer

Pre-defined Scenario

Micro Interruptions

Noise Events

PhyTrx type

ASM

Performance Table

Internet speed and quality according realistic Use Cases ... this platform is programming all **latency affecting variables of 'your' network with programmable real case parameters, answering connectivity questions such as ..**

- where is Broadband destination point located? Is it wireline, optical, coax or a combination of it. How far away? .. With or without wireless?
- Broadband quality depends on the overall latency, insertion/signal loss, and impedance variation as the result of all intermediate network elements: the speed & quality of Broadband is as good as its weakest part of the network.. where is yours?
- Is the application under test (AUT) a real-time, an update or an off-line APP?
- Are disturbers electrical, chip or data-computing related? Or do you want to know the effects in any of those cases ?
- Is the Use Case upstream or downstream dominant, or is it symmetric? Or is it permanently changing? Is it hot-swappable, permanent or event originated
- Is deployed equipment acc. applicable International Reference Standards?
- Which access network technology and distributed broadband technology is Use Case among them cable based MoCA, DOCSIS or Wireline (x)DSL, Vectoring, G.fast or optical or in-home G.Hn, PLC, PON, POF, Ethernet, WiFi, Bluetooth, ...

Simple way to make your own test scenario

Change test criteria & Use Case parameters and switch DUT/SUT/AUT

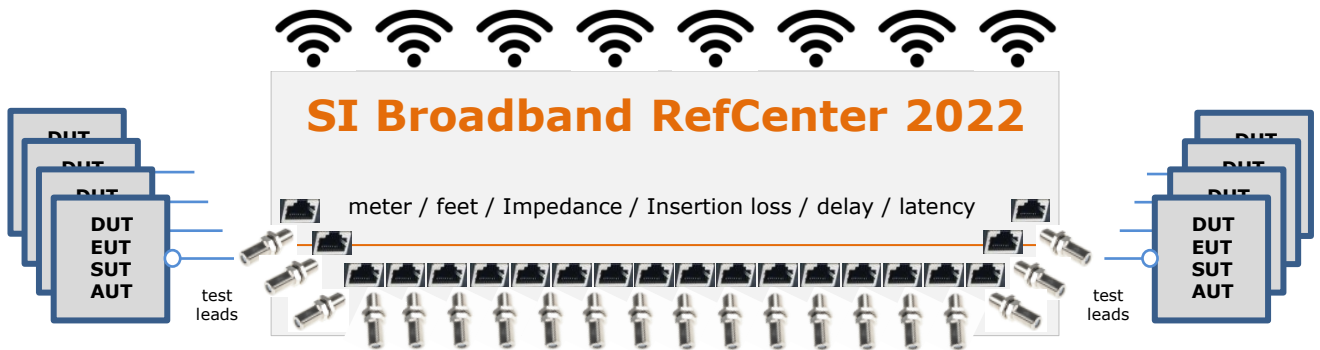
Install pre-defined test scenario's acc. Standards or Use Test cases

Generate test reports

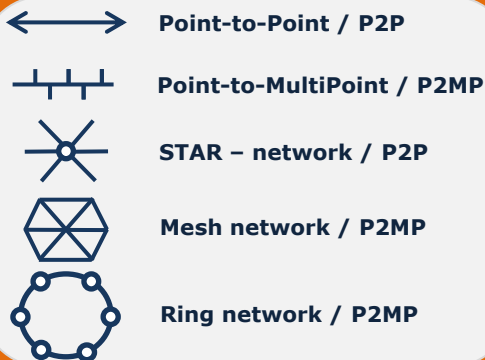


SparneX Broadband Connectivity Reference Center 2022

Modular * Configurable * Upgradeable



Reference for Standard Certification



RG-6 / RG-11 / RG-59

TP-100 / Cat 3-5-6e / 0.4 ~ 1.5 mm

Wireless

Programmable Line & cable types acc
American, Asian, Japanese, European
network topologies and characteristics

Accurate network simulation
DC ~ 1.5 ~ 2.4 ~ 5 GHz
In steps of 5 m up to 1000 m

Select BroadbandTechnology under test

xDSL - G.fast - PLC - WiFi
G.Hn - Docsis - MoCA

Select Standard Test Recommendation

- Coax type library RG-6, RG-59, RG-11 ..
- UTP libraries for EUR, US, ASPAC ...
- Electricity network simulation library
- Noise impairment libraries / network
- ICL – CLI Cloud and Lab remote control
- PDS / Pre-Defined Test Scenario
- TSP / Test Scenario Programmer
Adjusted and appropriate Use Cases
- RPG / Report Generators
- Integrated Arbitrary Noise Generation
- Integrated Automation Matrix Switch
- Combined with use case duplexers,
triplexers, splitters, baluns, connectors
- Integrated Traffic Generation platform

RFC2544 Performance - TR-398 WiFi
BBF398/337/100/105/114/115/208/..
ETSI270/388/524/548/..
ITU9700/9701/992/993/..

SparneX Broadband Connectivity Reference Center 2022

MODULAR Hardware and associated software

- OR -

STANDALONE systems with applicable software

Hardware test platforms

Line/Coax/Home Simulators

Noise Generator - Simulators

DSL Test Robot / automation

100 / 75 Ω Switches - Matrix

DSLAM & CPE Simulation

Traffic Generator / Analyzer

Software

CLI / ICL remote control

Use Test Case library

24/7 Auto test reporting

ITU-T / IEEE / ETSI / ANSI /

Real Time Test Events

Cable & Coax Line libraries

Test system/ DUT interfacing

Real world Noise libraries

Golden Reference Interfacing

Applications / Standards

CPE/DSLAM/DPU/GAM/GATEWAYS/WIFI

Certify & Benchmark / International Standards

Test Applications, Use Cases & Reporting



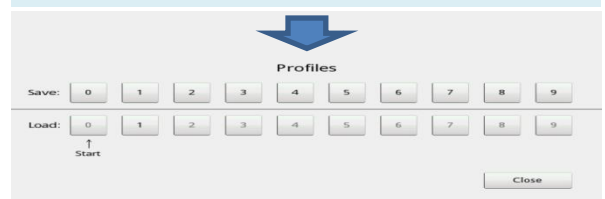
Operating Systems **WiFi** endpoints

Supported version - and above

Microsoft Windows 7
Apple MacOS
El Capitan 10.11.5
Apple iOS 9.2.1
Android 7.0
Linux Debian 8
Linux Ubuntu 14.04
Linux Fedora

AUTOMATION SOFTWARE INSIDE

Pre-programmed test cases



LATENCY Test Setup

LATENCY – JITTER – PROPAGATION DELAY – PHASE – GROUP DELAY

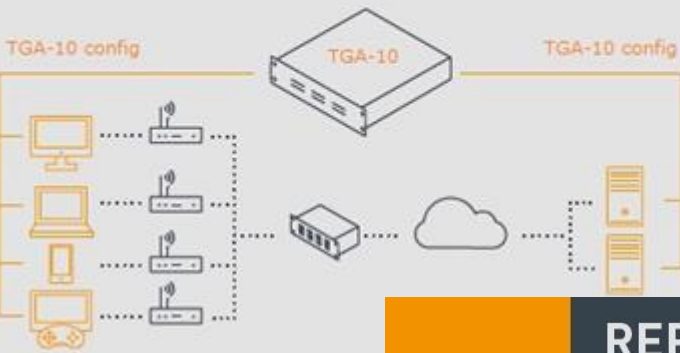
SI PR-2544 EXTENDED RFC2544 LATENCY TEST SUITE

Application Note LATENCY SI PR-2544i1

RFC 2544/SI PR-2544 * DTP337/SI PR-337 * TR-398/SI PR-398

CONNECT

CONFIGURE



PLAY WITH PARAMETERS SUCH AS:

- MAC, IPv4, IPv6,...addresses
- NAT, VLANs, protocols
- Unicast, broadcast, multicast
- Frame rate, frame size
- TCP receive window, congestion algorithm,

REPORT

CONFIGURATION

- Received IP addresses, DHCP, stateless auto-configuration NAT, VLAN, ...
- Auto-discovered IP/port translations
- Configured flow parameters

RESULTS

- Throughput and loss: both average and the result over time
- User experienced TCP performance
- Latency and jitter: average, distribution and result over time
- Packets received out of sequence
- Aggregate results per port

MODULAR

Package C25.1

CLOUD On-site testing

Price per month

Hardware test platforms

Software

Applications / Standards

Traffic Generator / Analyzer

TGA 10/2.01

RFC2544

Package C26.1

CLOUD On-site testing

Price per month

Hardware test platforms

Software

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RFC2544/SI PR-2544

Line/Coax/Home Simulator

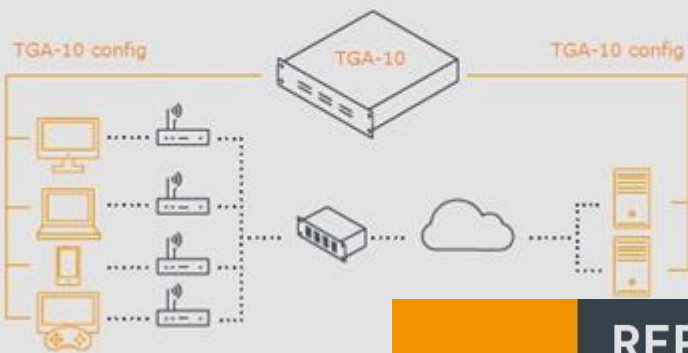
SHINE PEIN Noise Generator

SI PR-2544 EXTENDED RFC2544 LATENCY TEST SUITE

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RFC 2544/SI PR-2544 * DTP337/SI PR-337 * TR-398/SI PR-398

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MODULAR

Package C25.2

Laboratory testing

Install + per month

Hardware test platforms

Software

Applications / Standards

Traffic Generator / Analyzer

TGA 10/2.01

RFC2544

Package C26.2

Laboratory testing

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RFC2544/SI PR-2544

Line/Coax/Home Simulator

SHINE PEIN Noise Generator

Shortlist of specifications for traffic generation

RFC 2544 * DTP337 * TR-398

Ethernet copper interface:	10/100/1000 Mb copper (RJ-45)
Ethernet fiber interface:	1 Gb SFP / 10Gbit SFP+ / 100Gbit QSFP28
Port density:	in steps of 2*24 ports – up to 192 ports
NBASE-T ports:	in steps of 8 – up to 32 ports
daisy-chain capacity:	96 NBASE-T (12 x 8) + 192 Base-T (4 x 24 x 2)
Multiplex switches:	2 to 16
Physical layer switches:	192/4/48 - 384/4/48
WiFi AP measure capacity:	32 STA
MTU (max transmission):	1500 bytes – Jumbo 8192 bytes
Unidirectional 64 bytes:	1 M pps to 14,1 M pps
Bi-directional 64 bytes:	2 M pps to 28,2 M pps
Configurable parameters	
Source:	Interface, Mac address IPv4: IP address netmask / gateway or DHCP IPv6: IP address or Stateless Autoconfig or DHCPV6
Destination:	Interface, Mac address IPv4: IP address netmask / gateway or DHCP IPv6: IP address or Stateless Autoconfig or DHCPV6
Data organizer type:	NAT, VLANs, Protocols
Destination route:	Unicast / Broadcast / Multicast
Transmission type:	Upstream / downstream
Frame size:	60, 128, 1024, 1500 Frame/sec,
Frame sequence:	# frames /sec
Frame speed:	kbps
Acceptable packet loss:	programmable in steps of 1 %
Protocol:	TCP / UDP / TCP receiving window / congestion algorithm
Test sequence	
Initiation time:	n seconds
Test duration:	n seconds
Latency types:	Latency distribution / Latency over time
Latency accuracy:	100 us / 20 ns
Jitter accuracy:	ms
Calculated results	TCP throughput over time Frame blasting throughput over time
RFC 2544	SSID/BSSID & RSSI
Maximum throughput:	per 60 sec with zero packet drop or @ acceptable % packet drop
Latency:	latency @ maximum throughput
Frame Loss:	for any input rate and frame size
Back-to-Back:	Forwarding burst-size without packet drop @ line rate
System recovery:	speed/time for system recovery from overload condition
Reset Recovery	speed/time for system recovery after hard-software-power reset
TR-398:	
Receiver sensivity:	weak signal detection & demodulation
Coverage:	coverage and spatial consistency test
Throughput:	connection, throughput and airtime fairness
Capacity:	multi-user/multiple asso-disassociation stability/DL MU-MiMo
Stability:	long term (24 h) monitoring of stability and traffic reporting
Anti-interference:	AP coexisting multiple alien signal source anti-interference test
Service contracts:	Extended Warranty – Service support– Service 24/7 - Calibration – Software Upgrade Service