SPEC SHEET

EX1 FTTH and Business Services Tester

THE SMALLEST GIGABIT, GPON AND WiFi TESTING SOLUTION AVAILABLE

- The EX1 is an industry first: a pocket-sized tester that validates bandwidth speed up to full line rate Gigabit Ethernet, emulates GPON ONT, fully tests residential WiFi and monitors both residential and business quality of experience.

KEY FEATURES AND BENEFITS

Gigabit, GPON and WiFi tester

Full line rate capable gigabit tester powered by the industry-leading Speedtest® by Ookla® algorithm

Wireless interface (WiFi) for both Speedtest by Ookla and WiFi channel map capabilities

Support of 2.4 GHz and 5.0 GHz WiFi frequency bands

Latency, download and upload throughput performance metrics with adjustable pass/fail thresholds based on subscribers' purchased plans

GPON ONT emulation[a] via EXFO-managed SFP GPON ONT transceiver

GPON ONT emulation allows the ability to detect PON ID, ONU ID, optical RX power, OLT optical TX power, ODN loss, ONT operational status

Supports VLAN, Static IP, DHCP (with or without option 60) and PPPoE

URL validation tool

Controlled entirely through Android™ or iOS® smart devices offering a completely "untethered experience" for setup, testing, birth certificate generation and cloud-enabled firmware upgrades

Efficient job closeout with best-in-class birth certificate generation—reports generated in PDF or CSV formats can be sent by email, text, cloud, Skype, etc. directly to the subscriber or stored in the cloud for the provider's future reference

Carrier-grade quality hardware including onboard FPGA muscle—delivering repeatable and reliable metrics each time

Rechargeable Li-ion battery operated

a. Requires EXFO-managed SFP GPON ONT transceiver.

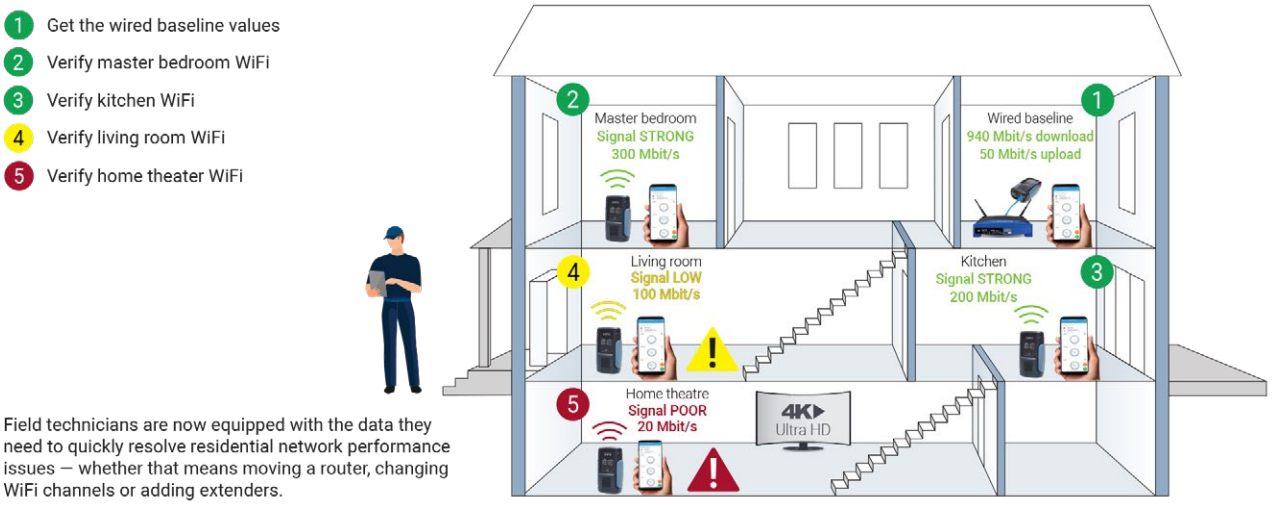
The EX1, paired with an Android or iOS smart device is a one-of-a-kind Ethernet, GPON[a] and Wi-Fi tester designed to qualify fiber to the home (FTTH) and business customers' quality of experience (QoE). The pocket-sized solution enables communication service providers and MSOs to validate full line rate Gigabit Ethernet as well as WiFi services to their subscribers. The advantage of the EX1 is three-fold: it includes a built-in dedicated WiFi chipset as well as utilizes the world-leading Speedtest by Ookla algorithm, giving repeatable and reliable metrics, every time.

The Ethernet speed test can be performed on electrical (RJ45), optical (SFP), wireless (WiFi 802.11 ac/a/b/g/n), GPON and XGS-PON interfaces, making the EX1 the ideal tool to generate birth certificates for multiple services during its provisioning phase. Moreover, the field technician can easily execute a WiFi channel map analysis (2.4 GHz and 5 GHz) and, as a result, determine the best placement for the access point at the customer premises. Service providers can also qualify 1GE optical connections based on SFP transceivers that are typically deployed in installations for business customers. The EX1 is therefore a must-have tool for troubleshooting activities that are expedited with the use of its unique graphical views and features enabled by the WiFi channel map analysis function.

The EX1 does not require a screen. Instead, its ultra-intuitive application runs directly on a field technician's smart device, displaying all tasks performed, including connection, setup, result gathering, report generation and cloud-enabled firmware upgrades.

GIGABIT ETHERNET AND WiFi TESTING

Internet service providers (ISPs) and multiple system operators (MSOs) often receive calls and complaints related to the speed and the latency measured by their customers. These complaints are often unresolved and result in substantial customer churn. Customer expectations are not always met, and service providers are not necessarily equipped with the right tools to define expectations with customers when deploying new services. The EX1 was designed with this in mind and allows installers to provide a complete birth certificate for newly deployed services.



Field technicians are now equipped with the data they need to quickly resolve residential network performance issues — whether that means moving a router, changing WiFi channels or adding extenders.

The figure above outlines the typical steps for installing a residential gigabit broadband service using the EX1.

- **Step 1:** The technician validates the wired download/upload speeds and latency at the entry point of the house. This step will confirm that the ISP or MSO has delivered the expected metrics according to the customer's chosen package. This first step can be used as the benchmark for the rest of the residential analysis.
- **Step 2 and 3:** The technician can now start the analysis of WiFi performance. Family members regularly make use of an assortment of internet services from different locations: over-the-top video, music streaming, email, etc. It's up to the technician to confirm that these services are operating optimally in all locations of the residence. In this scenario, services in the master bedroom and kitchen are performing well, with a strong signal level and high throughput.
- **Step 4:** The technician sees a drop in the WiFi signal and notices that the Speedtest throughput has reached a point where certain internet services could be affected, especially if multiple users are using the WiFi.
- **Step 5:** The technician moves to the home theater where there is a brand-new TV using WiFi to stream 4K ultra high definition (UHD) broadcasts. The signal is very low and the throughput level is not sufficient for a typical 4K UHD stream.

In summary, by using the EX1 for both wired and wireless installations, the field techs can gain complete insight on how to remedy any given situation. They can move the router, change the WiFi channels or add extenders. The EX1 guarantees the job is done right the first time, drastically reducing any future WiFi-related complaints.

a. Requires EXFO-managed SFP GPON ONT transceiver.

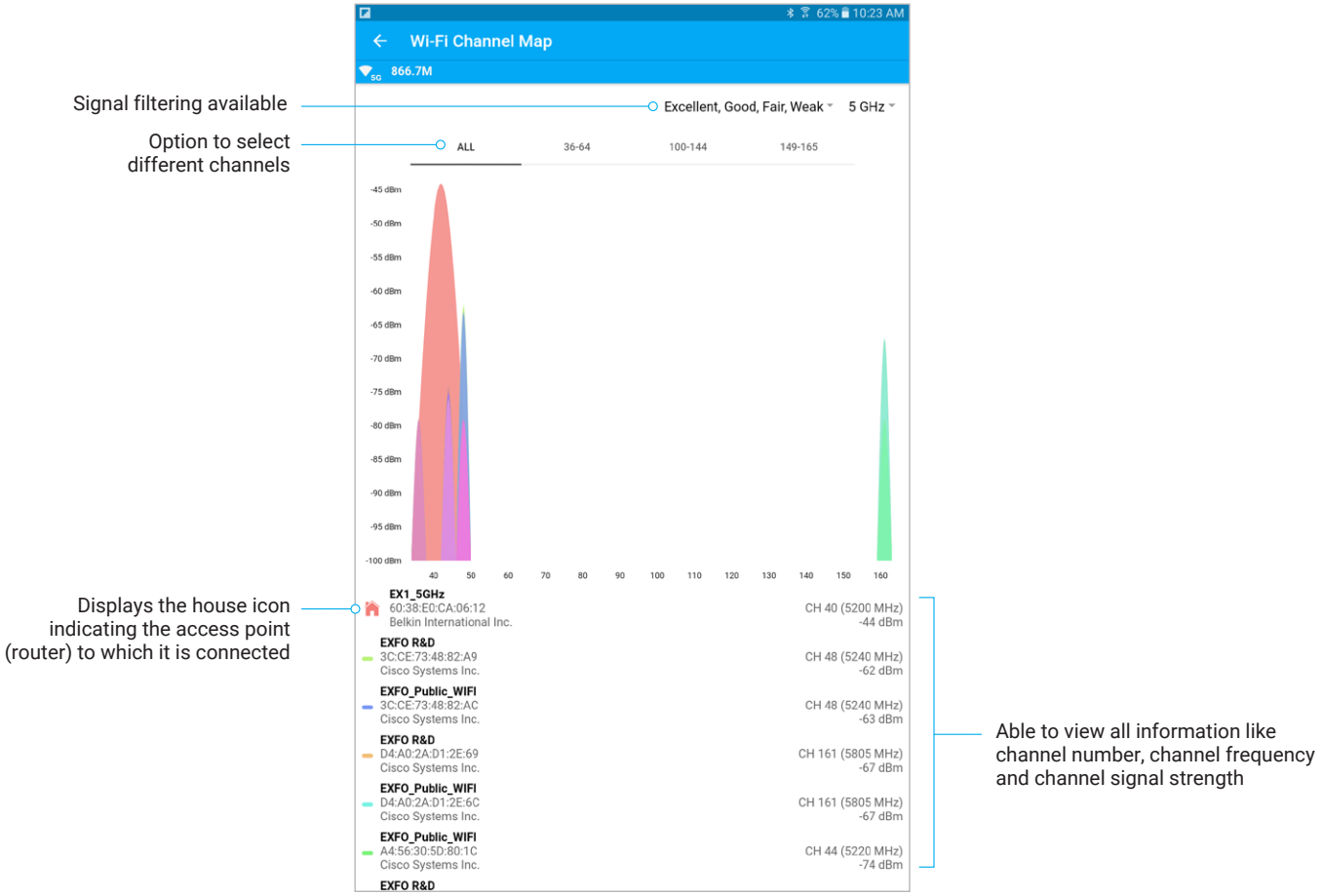
WiFi CHANNEL MAP

The EX1's WiFi channel map will report all access points found within the vicinity of the location under test. The access point connected to the EX1 will always show up at the top of the list, accompanied by a house icon. Field techs can filter results for 2.4 GHz and 5 GHz frequency bands by signal strength and channel. The channel map will return the access point name, BSSID, channel, channel frequency, signal strength and manufacturer.

The EX1's channel map and the Speedtest over WiFi are key troubleshooting features. Subscribers can see the tests performed by the service provider's technicians and receive reports showing the exact status of their purchased service.

The EX1 is ideal not only for residential use but also a wide range of other settings:

- Public transportation networks can evaluate the WiFi services offered to their customers throughout bus, train or subway routes
- Smart cities
- Stadiums and conference centers
- Hotels



GPON ONT EMULATION[a]

The EX1's GPON ONT emulation is ideal for many different GPON testing scenarios. It can be used for FTTH deployments, troubleshooting, validation and performance metrics.

For deployment purposes, the EX1 can be used to get the OLT TX optical power and the ONT RX optical power. From there it can derive the optical domain network loss (ODN LOSS) which is the signal attenuation between OLT and the ONU.

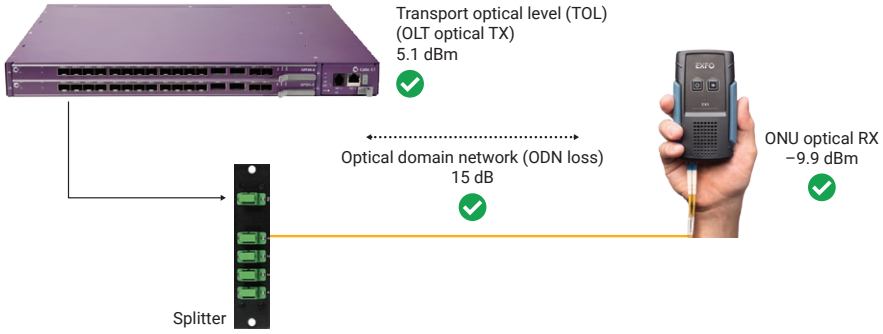


Figure 1. Optical power readings

For troubleshooting, the EX1 can derive the PON ID which helps the technician to understand why an ONT is not synching up with the OLT, typically when the PON ID is incorrect the fiber has been attached to an incorrect port.

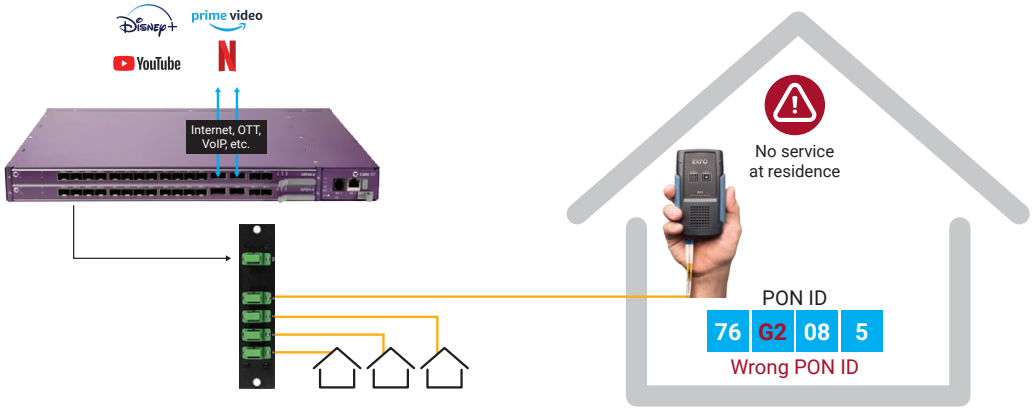


Figure 2. PON ID validation

For complete end-to-end performance metrics, the EX1 can be used to test the broadband speed being delivered by emulating the ONT and not requiring a router. All bandwidth measurements are powered by the industry-leading Speedtest by Ookla algorithm.

Figure 3. Speedtest over GPON or XGS-PON

a. Requires EXFO-managed SFP GPON ONT transceiver.

SPECIFICATIONS

GENERAL SPECIFICATIONS	
Size (H x W x D)	125 mm x 75 mm x 45 mm (5 in x 3 in x 1 ¾ in)
Weight	0.45 kg (1 lb)
Temperature Operating Storage With battery (short term < 1 month)	0 °C to 40 °C (32 °F to 104 °F) –10 °C to 40 °C (14 °F to 104 °F)
Relative humidity range	≤ 93 %, non-condensing

INTERFACES	
Electrical RJ45 test port	10/100/1000 Mbit/s [a]
Optical SFP test port	1 GE SFP, SFP GPON ONT (2.4 Gbit/s download and 1.2 Gbit/s upload) and SFP+ XGS-PON ONT (10 Gbit/s download and 10 Gbit/s upload)
USB port	USB 3.0 type-C port
Bluetooth and WiFi	Bluetooth v4.2 and WiFi 802.11 a/b/g/n/ac
Processor	ARM dual cortex-A53 ARMv8 1.0 GHz
Memory	1 GB
Storage	8 GB

GPON ONT EMULATION [b]	
ONU/ONT emulation	Removable EXFO-managed SFP GPON ONT transceiver and third-party SFP GPON ONT transceivers
Interface	SC/APC
Standard	G.984.1/2/3/4 GPON-compliant G.988 OMCI-compliant
Test metrics	OLT optical TX power, ONT optical RX power, ODN loss, ONU operational state, PON ID, ODN class, ONU ID, IP connectivity [c] and Speedtest [c]
GPON information	OLT vendor ID, OLT version
Modifiable transceiver information	ONU serial number, ONU password, ONT SW version, equipment ID

XGS-PON ONT EMULATION	
ONU/ONT emulation	Removable third-party SFP+ XGS-PON ONT transceivers
Interface	SC/APC
Standard	ITU G.9807.1 compliant
Test metrics	ONT optical Rx power, IP connectivity and speedtest [d]

BATTERY/POWER SUPPLY	
Type	Rechargeable Li-ion smart battery
Battery autonomy	One full day of customer visits (i.e., average of 10 residential broadband customer visits)
Charging time	3.5 h using supplied wall charger
AC/DC adapter/charger	Input: 100–240 VAC; 50/60 Hz; 1.0 A max, output: 5 V; 2.4 A

SMART DEVICE REQUIREMENTS	
Smart device supported	Android OS and iOS based devices
OS version	Android 7.0 Nougat and higher, iOS 13 and higher
Bluetooth support	Bluetooth low energy technology (version 4.0 and higher)

a. 10/100 Mbit/s available only on hardware revision B and C.
b. Requires EXFO-managed SFP GPON ONT transceiver.
c. IP connectivity and Speedtest may require custom development. Please contact your local representative for more information.
d. Speedtest up to 1 Gbit/s.

SPEED TEST CAPABILITIES

Speedtest by Ookla (electrical, WiFi and optical interfaces)	• Latency • Download speed • Upload speed • Server information • Client WAN IP	• Multi or Single TCP connection • Automatic/manual server selection with search engine • Pass/fail verdict based on thresholds • Configurable job information • PDF/CSV automatically generated reports

WiFi TESTING CAPABILITIES

Channel map	• Support of 802.11ac/a/b/g/n • Support of 2.4 GHz and 5 GHz frequency bands • Visualization of WiFi channel map analysis • Channel map filtering based on signal level: Excellent, Good, Fair, Weak • Channel map filtering: 5 GHz channels can be filtered by all, 36–64, 100–144, 149–165 channels • Information per access point: BSSID, manufacturer, channel number, frequency and RSSI • Graphical selection of access points for clarity and in-depth troubleshooting

MISCELLANEOUS

PPPoE [a,b]	Ability to enter in a user name and password, PPPoE connection status, and Always on or On-Demand connection mode, PAP and CHAP support.
VLAN [a]	Ability to enter a VLAN ID, priority and type.

a. Not available with the WiFi interface.

b. Maximum throughput rate of 450 Mbit/s.

ORDERING INFORMATION

EX1

Model

EX1 = Full line rate gigabit Ethernet testing capability Speedtest by Ookla over electrical/optical Ethernet and WiFi. Also includes GPON ONT emulation.[a]

a. Requires EXFO-managed SFP GPON ONT transceiver.

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