EX1 FTTH and Business Services tester

THE SMALLEST GIGABIT, GPON AND WiFi TESTING SOLUTION AVAILABLE

WiFi testing

SPEC SHEET

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 WiF 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 via EXFO-qualified 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 and PPPoE

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

Active Verifier

Scalable platform capable of hosting EXFO's Active Verifier VNF for service and application performance assurance

Complete visibility of L3 to L7 performance through a suite of 140 performance tests

Centralized management and control via EXFO Worx, with support for template-driven testing and automation from extensive API support

* Requires EXFO-qualified SFP GPON ONT transceiver

EXFO

The EX1, paired with an Android or iOS smart device is a one-of-a-kind Ethernet, GPON* 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.

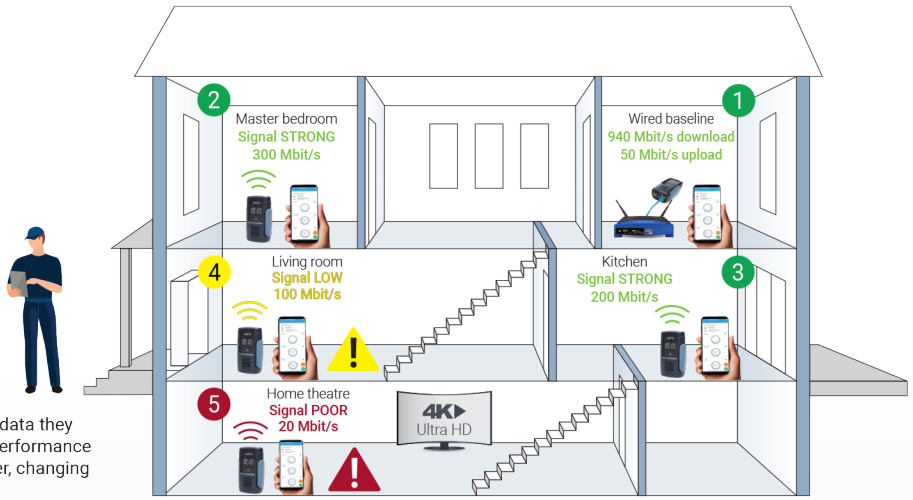
The Ethernet speed test can be performed on electrical (RJ45), optical (SFP), wireless (WiFi 802.11ac/a/b/g/n) and now GPON* interfaces, making the EX1 the ideal tool to generate birth certificates for multiple services during its provisioning phase. Moreover, the field technician can easily execute 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.

1. Get the wired baseline values
2. Verify master bedroom WiFi
3. Verify kitchen WiFi
4. Verify living room WiFi
5. Verify home theater WiFi



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.

* Requires EXFO-qualified 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.

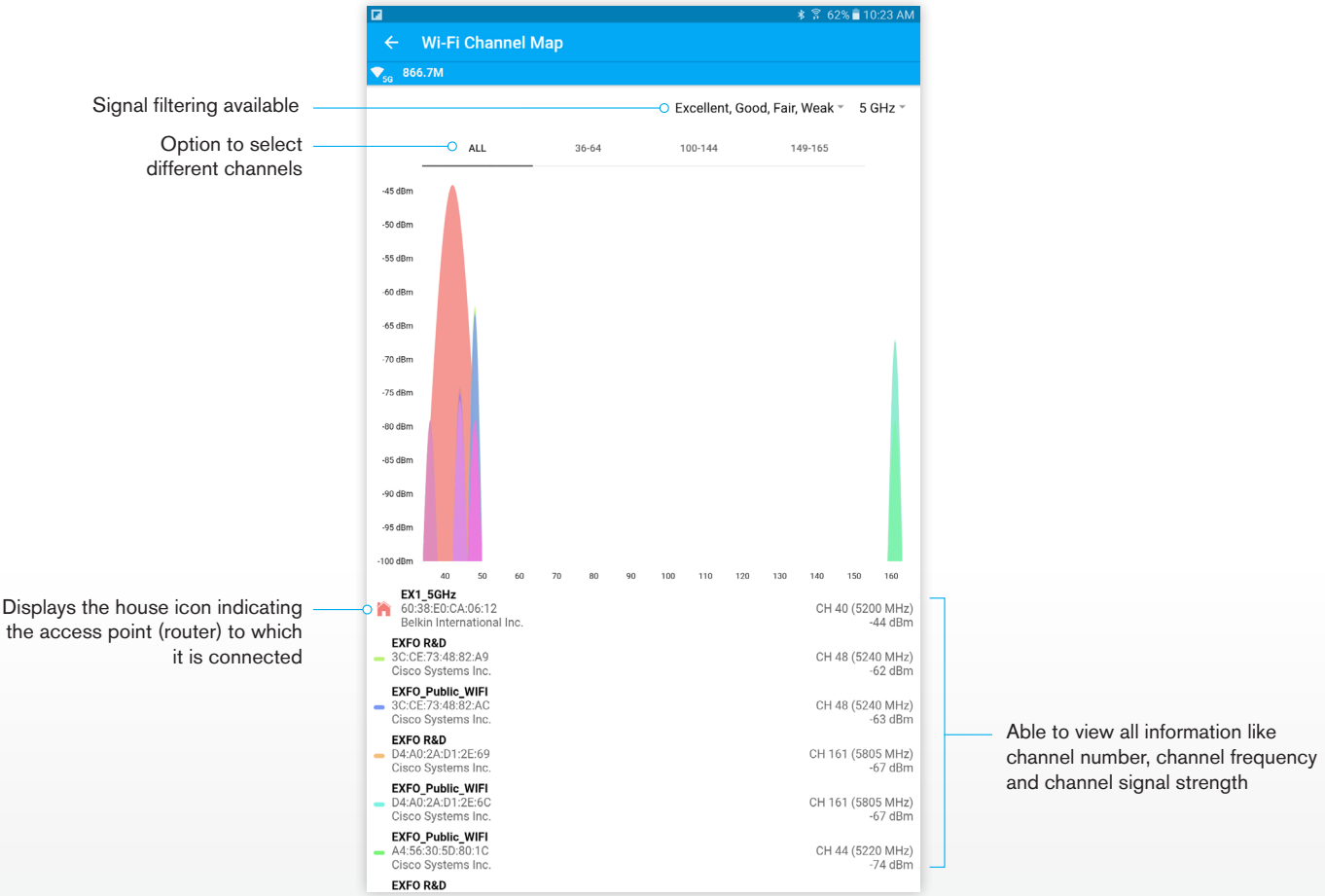
The EX1 is ideal not only for residential use but also a wide range of other settings:

› 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

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 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.

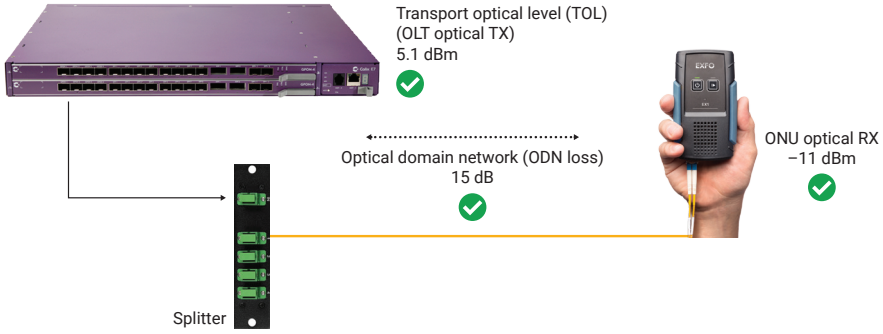


Figure 1. Optical power readings

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.

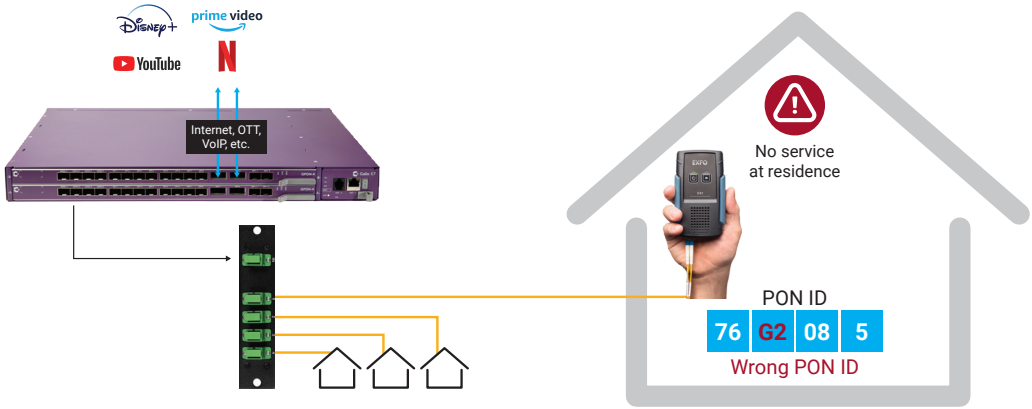


Figure 2. PON ID validation

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

ACTIVE VERIFIER (EX1-V)

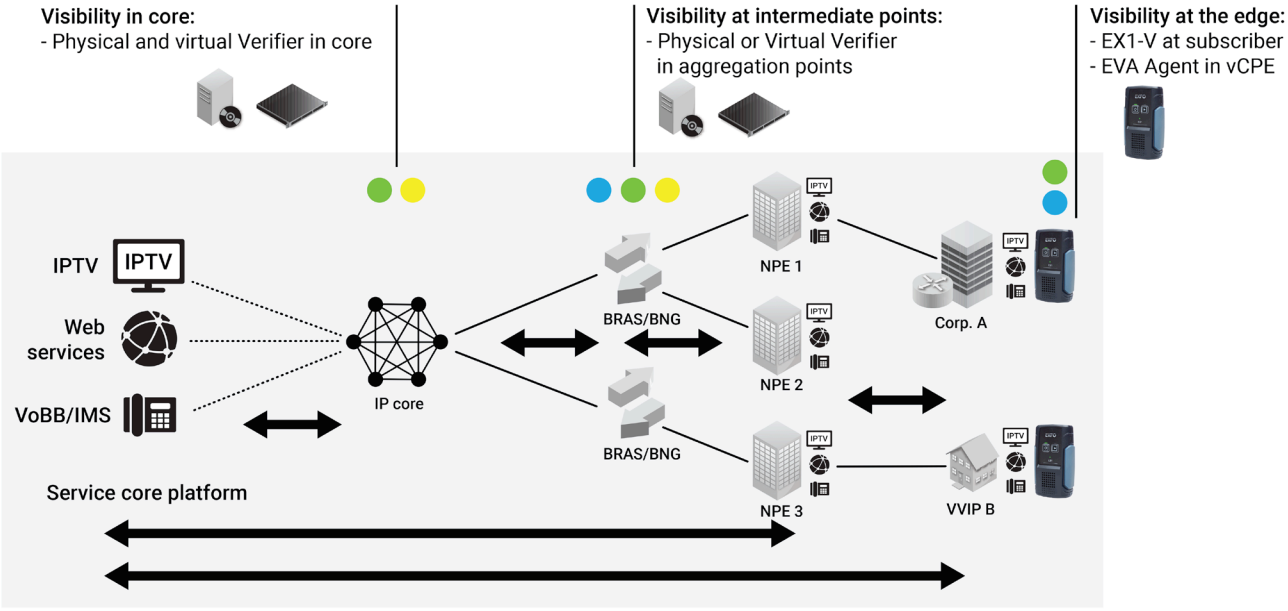
A flexible platform that evolves with your network, the EX1 can also host EXFO's Active Verifier agent (EVA). When equipped with the EVA, the EX1 is referred to as an EX1-V, delivering a complete level 3 to level 7 service assurance solution.

The EX1-V leverages a full suite of more than 140 performance tests to commission, assure and troubleshoot service performance and service delivery across multiple layers. The current test catalog delivers complete visibility of L2 to L7 performance and includes tests such as: Y.1564 SAM; IP connectivity tests; VoIP qualification; internet experience; infrastructure assurance–all designed to help users assure the configuration and delivery of highly differentiated services.

The EX1-V can be left onsite for temporary troubleshooting or permanently deployed as a fixed performance endpoint that continuously reports on network and service performance. It can also leverage the full capabilities of the EXFO Worx management system to facilitate test creation, aggregate performance results, and integrate into any existing OSS/BSS as a data source.

The EX1-V is fully interoperable with both physical and virtual active probes, delivering superior performance and visibility. EX1-V can partition network segments, isolate access and end-to-end service level agreements (SLAs) directly from subscriber environments. In addition, it can measure end-to-end service delivery, in conjunction with other verifiers or directly to an application.

* IPTV support is a roadmap feature for EX1.



EX1-V can be used in a variety of use cases:

- **Subscriber's on-premise verifier**: Operators are under increased pressure to deliver superior quality of service (QoS) and ultimately deliver a drastically improved quality of experience (QoE) to their users. Having clear visibility of end-to-end performance and quality, directly from the subscriber location can be a significant advantage for operators as they deliver that expected, high-quality subscriber experience. Strategically placed EX1-V verifiers in select subscriber locations, can deliver the in-depth visibility that is required while capturing connectivity issues, transport layer performance (delay, loss, delay variation), and service quality (internet performance, internet infrastructure assurance)—all leading to significantly improved subscriber QoE for their VoIP, Video MOS, and internet services.
- **WiFi performance**: WiFi is a popular access technology and used by operators for cell data offload, value-added services and even businesses grade connectivity services. However, WiFi is also a connectivity technology which can be plagued by interference, congestion, and infrastructure pressure which can ultimately lead to a diminished user experience. EX1-V can leverage its built-in WiFi interface as a test interface and provide a deep level visibility into the WiFi internet service quality.
- **On-demand troubleshooting**: Technician time is precious, and truck rolls can be a costly aspect of operating a network. EX1-V facilitates and accelerates the troubleshooting process by leveraging its on-demand capability to enable true remote control. Deployment of the EX1-V can be simplified to a simple ship-and-connect where customers simply plug the device into their network. Technicians can then remotely take control and execute a suite of tests to understand, isolate and troubleshoot issues through the EXFO Worx management platform. This greatly accelerates troubleshooting time, eliminates a truck roll, and delivers a more efficient resolution of tickets at a fraction of the cost. The rugged EX1-V can be shipped by standard methods, preprogrammed with connectivity parameters and automatically detected and managed when powered up and connected to the network. The entire process can be fully automated to produce true zero-touch troubleshooting through the EXFO Worx API suite.

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
Optical SFP test port	Optical 1GE SFP and SFP GPON ONT (2.4 Gbit/s download and 1.2 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[a]	
ONU/ONT emulation	Removable EXFO-qualified 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[b] and Speedtest[b]
GPON information	OLT vendor ID, OLT version
Modifiable transceiver information	ONU serial number, ONU password, ONT SW version, equipment ID

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 6.0 Marshmallow and higher, iOS 11 and higher
Bluetooth support	Bluetooth low energy technology (version 4.0 and higher)

a. Requires EXFO-qualified SFP GPON ONT transceiver.

b. IP connectivity and Speedtest may require custom development. Please contact your local representative for more information.

SPEED TEST CAPABILITIES

Speedtest by Ookla (electrical, WiFi and optical interfaces)	› Latency › Download speed › Upload speed › Server information › Client WAN IP	› 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]	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.

VERIFIER CAPABILITY

Turn-up tests	› Y.1564 SAM › iPerf	
Layer 3 to Layer 7 active tests	› Ping/traceroute › One-way IP performance › Two-way active measurement protocol (TWAMP) › TCP/UDP echo › TCP/UDP bandwidth measurements	› SIP VoIP signaling and media performance › IPTV assurance › Web quality and infrastructure › Full suite of more than 140 performance tests available

a. Not available with the WiFi interface.

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]

BV-EX1-V

Model

BV-EX1-V = EX1 platform preconfigured with EVA software[b]

a. Requires EXFO-qualified SFP GPON ONT transceiver.

b. Requires EXFO Worx and EXFO Verifier Agent (EVA) feature licenses to operate.

EXFO headquarters **T** +1 418 683-0211 **Toll-free** +1 800 663-3936 (USA and Canada)

EXFO serves over 2000 customers in more than 100 countries. To find your local office contact details, please go to www.EXFO.com/contact.

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