LinkRunner® 10G

Advanced Multi-Gig/10Gig Cable & Network Tester

Overview

The LinkRunner 10G is a high-performance solution for Multi-Gig and 10 Gig network testing. LinkRunner 10G simplifies testing and configuration of copper and fiber Ethernet networks, streamlining workflows by combining essential functions of installation and triage in a single, ruggedized unit.

This next-generation tester delivers complete network validation and troubleshooting at line-rate from the media (copper/fiber) to the application (layers 1 – 7), accelerating deployments, speeding problem identification, and improving the efficiency and effectiveness of network installers and operations teams.

- Install, test, verify, and troubleshoot technology upgrades, Multi-Gig (NBASE-T) and 10G networks with advanced troubleshooting apps and purpose-built test hardware at line-rate.
- Physical layer testing includes cable (TDR) testing, toning, wiremapping, and LANBERT™ Media Qualification testing with cable SNR (Signal-to-Noise Ratio) measurements for Multi-Gig links
- Compatibility with standards compliant SFPs enables test and validation of any wired media (copper or fiber) for a variety of use models
- Validate up to 90W 802.3bt PSE with TruePower™ loaded Power over Ethernet (PoE) test
- Two LinkRunner 10G units can be used for line-rate performance testing to verify network capacity, performance and QoS, as well as service provider SLAs between sites

HIGH-PERFORMANCE, LINE-RATE 10GIG ETHERNET TESTING

Key Features

Flexible Platform for a Variety of Testing Needs

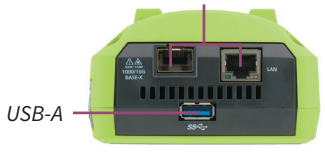
The LinkRunner 10G has two Ethernet ports. The main test RJ-45 port supports Multi-Gig networks from 10/100/1000Mbps to 2.5/5/10G to verify link speed, SNR, and duplex advertised and connected. It can request and verify PoE power under load from up to 90W PSE's. Alternatively, it can interface to fiber networks via single/multi-mode SFP+ to test 1/10Gbps fiber-based Ethernet. The second RJ-45 management port connects to 10/100/1000Mbps Ethernet for remote control, and conducts network scanning and tests where needed. It is also the port for cable testing.

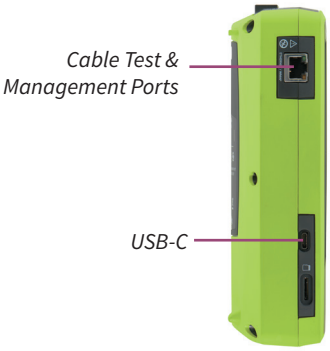
In addition to fiber optic transceivers (SX, LX, SR, LR, ZX, singlemode, multimode, etc.) the SFP+ slot can be utilized with a variety of standards-based interfaces, such as TwinAx or other Direct Attach Copper (DAC) cables, and vendor-specific transceivers.

LinkRunner 10G can use a variety of third-party apps from the Link-Live app store for a variety of uses. The USB-A port provides connectivity for added USB adapters and 3rd party accessories such as printers, barcode scanners, fiber optic inspection cameras, and more. The use of a USB-based Wi-Fi adapter (such as the Edimax n150 for 802.11ac/b/g/n/) provides for connectivity and wireless testing using a third-party app.

The USB-C port is compatible with higher-power USB-C chargers, as well as external power-packs for all-day portable use.

Main Ethernet Test Ports (RJ-45 & SFP)





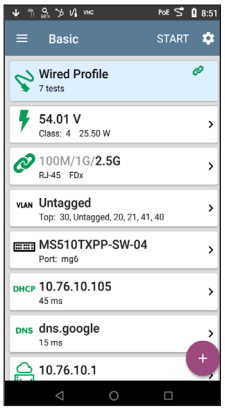
Simplifies tasks and empowers technicians to verify complex networks with next generation AutoTest

The LinkRunner 10G has out-of-the-box AutoTest profiles with best practice pass/fail thresholds for quick assessment of network configurations and services providing over 45 discreet test results/measurements in seconds.

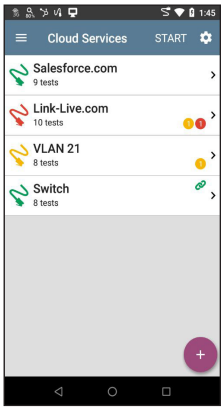
AutoTest Element Configurations include:

- Switch port PoE validation up to 90W from PSE and TruePower™ load testing
- 802.1x authentication
- Link speed/duplex advertised vs. actual, Multi-Gig link SNR measurement
- VLAN Tagged traffic detection & monitoring
- Switch port identification with interface stats, connected devices and drill-down
- DHCP availability, response time, automatic detection of 2nd DHCP offer, and connect log
- DNS lookup (forward/reverse) availability and response time
- Gateway availability and response time
- Active connection test targets (Ping or TCP Connect)
- End-user response time measurement via HTTP

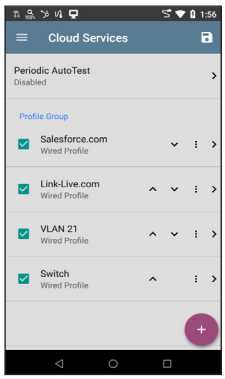
Multiple profiles can be created for complex networks with multiple VLANs supported per switch port, each with its own set of IP targets. These can then be organized into profile groups that execute each test against each profile in sequence. The result is that multiple VLANs can be verified and documented in one go. Since the pre-defined profiles can be executed individually, the profiles group serves as a resource for technicians to verify each specific VLAN during troubleshooting. With profile groups, engineers can transfer their network configuration and test knowledge to technicians, saving training time and effort.



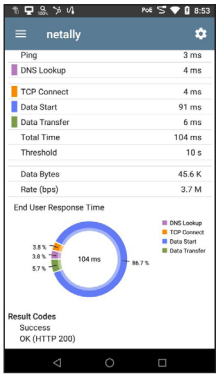
NBASE-T switch network with VLAN and 802.1x authentication



Add & customize profiles for standardized testing



Test profiles enable comprehensive, consistent infrastructure testing

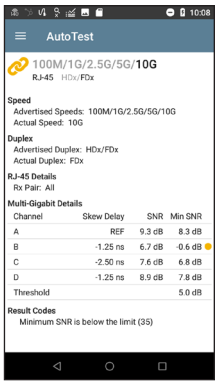


HTTP test reveals cloud/ web-based services response times

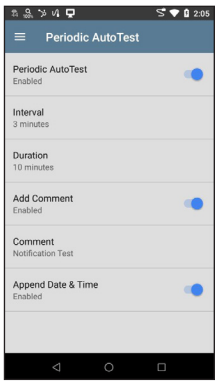
Multi-Gig Link Validation

With the expanding deployment of Multi-Gig switching (typically to feed greater bandwidth to Wi-Fi 6 access points), users are finding that their cable plant may not support the desired speed. Cable quality, length, installation workmanship, and noise in the environment all can contribute to "downshifting" to lower-than-expected speeds.

- **Cabling SNR Measurement** – LinkRunner 10G can verify copper media for Multi-Gig capability (1 / 2.5 / 5 / 10Gig), and provide root cause diagnosis when link speed downshifting occurs.



Cabling SNR measurement validates Multi-Gig links



Periodic AutoTest enables monitoring infrastructure for intermittent issues

24-Hour Monitoring for Intermittent Issues

Periodic AutoTest: In this mode, AutoTest runs at specified intervals (from 1 minute to 24 hours) and sends the results to Link-Live to view the results over time. This is an effective way to "monitor" aspects of your network for an extended period, or to help diagnose intermittent issues without having to manually execute multiple tests. Results are automatically timestamped and can be prefixed with a user-entered comment for grouping or organization. Test results can be quickly analyzed in Link-Live using the filtering and sorting functions. Email notifications can warn you when errors are found.

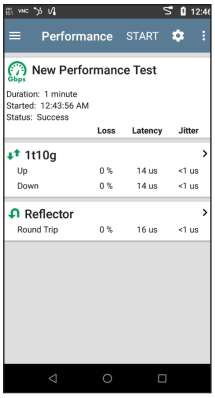
10G copper/fiber wired performance tests for critical links and key devices

Two LinkRunner 10G units (or one unit paired with an EtherScope nXG or CyberScope®) and the Network Performance Test (NPT) app can be used to stress critical network links, such as switch ports to servers/storage/Wi-Fi access points, uplinks or WAN links, with up to eight simultaneous data streams at up to 10G line-rate. It verifies the link's compliance to service level agreements (SLA) based on throughput, packet loss, QoS, delay and jitter.

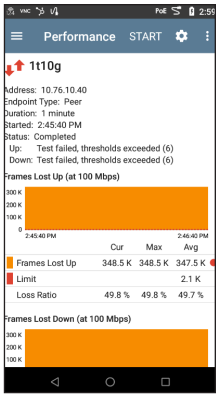
This performance test can be run at up to full line-rate in order to measure the top-end bandwidth and quality of your network from end-to-end, or for particular network segments. It can also be utilized to bench-test switches for optimal configuration prior to rollout into production. For troubleshooting on a production network (where excessive test traffic could be detrimental), many users will configure the NPT feature with a low stream of traffic (even just 64Kbps) in order to characterize network quality, identify possible packet loss, delay and jitter, and validate QoS.

Settings for data streams and thresholds for VoIP or video service can be stored and recalled where needed, saving configuration time.

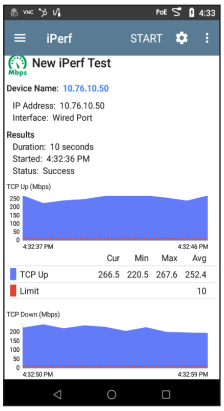
For key servers/services in the cloud or Internet, engineers can pre-define tests and thresholds to verify their connectivity and performance using ping, TCP connect, HTTP, or FTP. Continuous testing with response time measurements is available to verify consistency and identify intermittent issues. These tests can be easily recalled by field technicians to reduce configuration time or mistakes, to get more done faster.



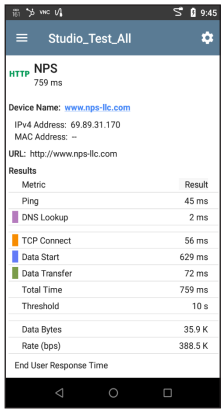
Performance test with up to 8 streams and 8 end points



Frame loss, jitter, and latency charted

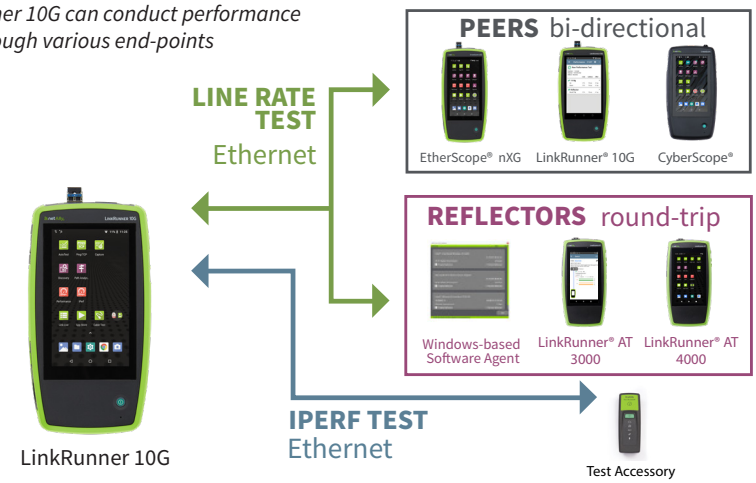


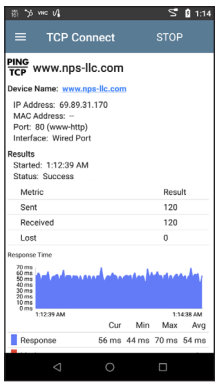
iPerf throughput test with TCP or UDP frames



HTTP test against a webserver with end-user-response-time analysis

Performance Test Relationships
LinkRunner 10G can conduct performance tests through various end-points



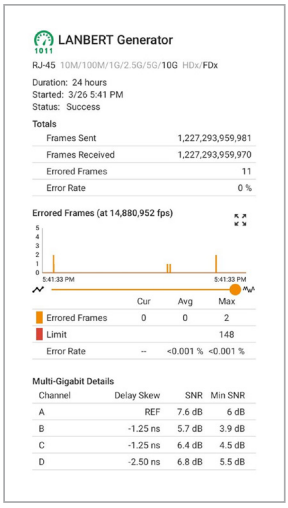


TCP Connect Test -TCP Connect Test showing response time over time (up to last 24-hours)

List of Problems Automatically Detected by LinkRunner 10G Discovery		
Bad Subnet Mask	High Interface Utilization*	High Disk Utilization*
Duplicate IP Address	High Interface Errors*	High Memory Utilization*
DHCP Server Not Responding	High FCS Errors*	Recent Device Reboot*
LinkRunner 10G Received Used IP from DHCP	High Packet Discards*	Spanning Tree Topology Change
LinkRunner 10G Lost DHCP Lease	Detected Half-Duplex Interfaces	SNMPv3 Agent Responded to SNMPv1/v2 Query
Max Clients on SSID	High CPU Utilization*	

**Problems detected with user-definable threshold*

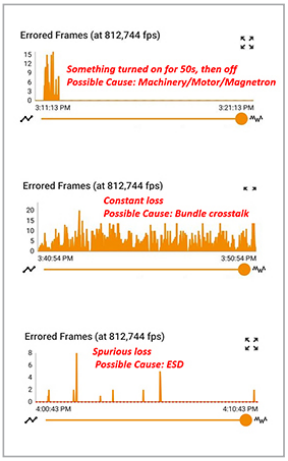
LANBERT™ Media Qualification App



Your copper and fiber cable plant serves as the foundation of your network. But do you know whether it is of sufficient quality to provide the bandwidth required? With the insatiable growth in bandwidth, increasing speeds of Wi-Fi APs (with Multi-Gig 2.5/5Gbps backhauls), 1Gbps to 10Gbps upgrades, and deploying new fiber links, network professionals must have confidence that their network will transport that data error-free at the maximum speed possible. Downtime or intermittent loss and errors is simply not an option.

The quality of components and workmanship of installation is critical, but typical cable certification testers can be very expensive, single-purpose tools – making them cost-prohibitive for many installers and end-users. The new LANBERT media qualification app for NetAlly's multi-function professional instruments provides a simple and fast method of assessing the quality of transmission and available bandwidth.

LANBERT generates and measures the transmission of line rate Ethernet frames over your network cabling infrastructure, qualifying its ability to support 1G/10G on fiber and 100M/1G/2.5G/5G/10G on copper links.



Key Features

- Maximize utilization of your existing cable plant
- Qualify copper cable bandwidth for 2.5 / 5 / 10Gbps
- Validate 1Gbps/10Gbps fiber optic cabling and components
- Identify maximum error-free throughput

Running the LANBERT test using the EtherScope® nXG and/or LinkRunner® 10G as endpoints over a long duration (up to 24 hours) serves as a "soak test" to identify the presence of intermittent issues and noise events that can corrupt network traffic. With easy-to-read trend graphs and the ability to drill down to 1-second granularity, LANBERT helps you identify exactly when errors occur.

Poor quality components and/or installation workmanship can result in links that are susceptible to noise, whether induced from within cable bundles or from outside events such as electrostatic discharges (ESD), crosstalk, or electromagnetic (EMF) pulses caused by motors or other machinery. This can cause not only bit errors and frame loss but may prevent certain technologies (Multi-Gig) from linking at the designated speed causing a downshift to the next lower rate.

But beware of other testers offering similar capabilities! Standard Layer 2-only Ethernet access link testing will not validate layer-3 enterprise switches and routers. Because it does not test the IP (Internet Protocol) layer, this methodology cannot pass through Layer 3 devices. Thankfully, NetAlly's multifunction tools also feature the Layer 3 line-rate Network Performance Test app, that can transmit and test across your entire network infrastructure end-to-end – not just one access link and switch. It also includes up to 8 streams with individual L2 and L3 QoS and VLAN controls, essential capabilities for truly understanding the capacity and quality of packet transmission.

The LANBERT app generates a stream of Ethernet frames onto a copper or fiber link which are redirected back to the LinkRunner 10G using one of three methods:

1) Single tester with physical loopback (for fiber, using a jumper between Tx and Rx; for twisted-pair cabling using an RJ-45 loopback connector – limited to 100Mbps)
2) Single tester with active remote loopback (switch port configured in loopback mode), or reflector test instrument (such as LinkRunner AT 3000 or 4000, for up to 1Gbps)
3) Dual tester, one in Generator mode, the other in Loopback mode, using two EtherScope nXG units, two LinkRunner 10G units, two CyberScope units or one of each (up to 10Gbps copper or fiber testing.)

Discovery – Know who and what is on your network

The LinkRunner 10G discovery app automatically discovers your network immediately upon power-up. The discovery provides quick security and health audits of the network devices across multiple VLANs and subnets.

Devices are classified and correlated to provide complete visibility of their name, network addresses, VLAN, SSID, device type, and where available, traffic statistics. Engineers can name and set authorization status for devices discovered. Discovery results can be directly uploaded to the Link-Live Cloud Service for storage, conduct detailed analysis of devices discovered with filter and sort tools, or export to CSV/PDF files as documentation.

LinkRunner's discovery can be enriched by accessing SNMP MIBs of infrastructure devices. It shows details such as device configuration summary, interface configuration and traffic detail, SSIDs supported by WLAN Controllers, and devices directly connected to switches. Community strings entered are concealed from view.

The LinkRunner 10G's discovery automatically detects problems. It shows possible cause(s) for each problem detected, and it has integrated troubleshooting tools to investigate further to get to root cause.

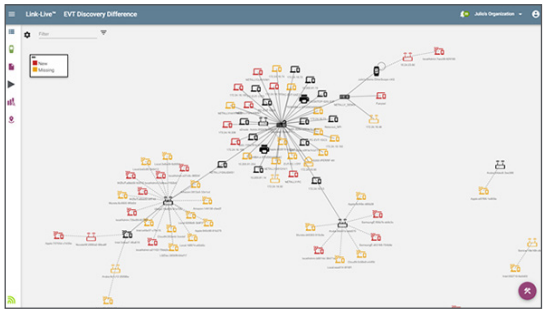
Device detail showing VLAN, interfaces, uptime, & more with drill-down

Discovery Difference Analysis in Link-Live

Keeping track of network changes while at the same time detecting unauthorized devices connected to your network is essential for speeding troubleshooting and securing your infrastructure, but is very hard to do on a regular basis.

NetAlly's Link-Live cloud service makes it fast and easy. The Discovery Difference analysis simplifies the process of documenting network changes or identifying unauthorized devices by comparing two network discovery snapshots and automatically highlighting new or missing devices on your network. This analysis can be viewed as a network topology diagram or data table.

The first discovery test will provide a baseline of the original state of your network, and the second discovery test will provide a snapshot of the current state of your network. Link-Live will compare the two snapshots and then highlight what has changed over time. That includes new devices that were not originally part of your network, and devices that were removed.



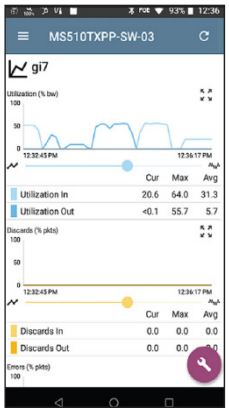
Discovery Difference analysis in Link-Live

Switch Management

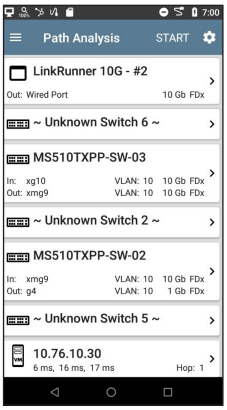
Drill into switch interfaces via SNMP for additional diagnostics, including trend graphs on utilization, errors, discards, half-duplex (HDX), RSTP, and recent reboots.

Path Analysis

Shows the switch/router path connecting the LinkRunner 10G to an IP device on across wired and Wi-Fi networks, and even beyond the local network, e.g., from the LinkRunner 10G's test port to a server in the cloud or data center. The LinkRunner 10G offers built-in tools to conduct further analysis of the devices along the path: view configuration, interface traffic statistics, launch Telnet or browser, conduct port scan, ping and more.



Interface traffic statistics - correlated for 24 hours to detect intermittent events



Path Analysis shows the device & interfaces that UDP/TCP traffic traverses

Network Topology Mapping – Integrated Wired and Wi-Fi Network Diagrams

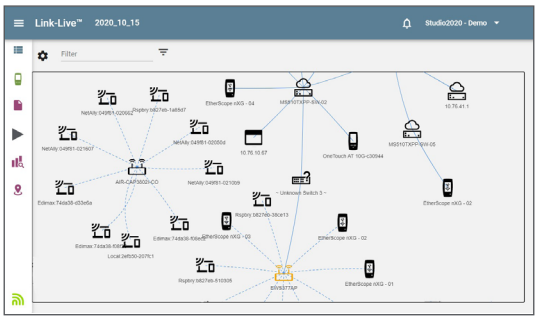
No more struggling to keep manually drawn maps up to date! LinkRunner 10G automatically discovers both your wired and Wi-Fi networks for instant mapping in NetAlly's Link-Live Cloud Service.

These comprehensive, up-to-the-minute-accurate network diagrams show your network as it is NOW, integrating Layer 2 and Layer 3 topology information, including these connections: switch to host, switch to Access Point, AP to Wi-Fi client, switch to switch, switch to router, and router to router hops.

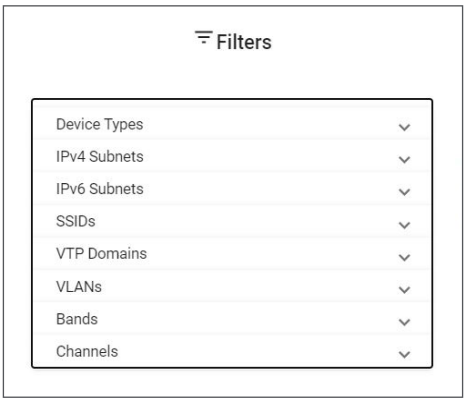
Now, users can now interact with the network in a flexible map-based user interface to quickly visually identify configuration and topology issues, speeding troubleshooting, and automatically create network documentation.

The LinkRunner 10G's patented discovery engine gathers data from its wired connection (via SNMP and other methods) to generate comprehensive network connectivity maps.

Easy to use filters and map controls allow you to see exactly what you want, and how you want it displayed. Quickly identify network and device configuration errors, and see 'unknown' switches and rogue devices. Element icons are color-coded to identify errors or warnings; double-clicking on any map element brings up its detailed discovery information, including status, problems, interface information, and more.



Link-Live makes it easy to collaborate and share maps to anyone who needs access, with no added licensing costs. One click exports your map to Microsoft Visio® where you can easily add notations and modify your map.



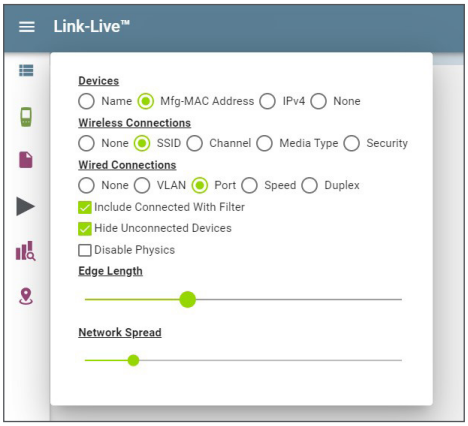
Filters allow you to choose the types of devices and network configurations to be shown.

The importance of visualizing your network

The faster engineers can "see" what is going on in their network, to know who is on the network and where they are connected, and what the path is from "here to there", the faster they can get to root cause when troubleshooting performance issues. This is especially true for maintenance organizations or system integrators who often troubleshoot an "unknown" network. The problem is that traditional methods (CLI or element managers) take too long and present complex data that's often hard to interpret and difficult to correlate.

Documentation is an essential step for any project, such as pre-deployment network assessments and new technology rollouts, but it can take too much time to complete. From the graphical map-based user interface, one click sends the map data through a Visio file generator, pre-populating the diagram with all discovered devices, links, and corresponding configuration information, saving hours of manual effort, allowing further customization.

Ideal for enterprises or service organizations, LinkRunner 10G's mapping function saves hours of manual labor, allowing documentation to keep up as the network changes, or provide instant maps for client projects.

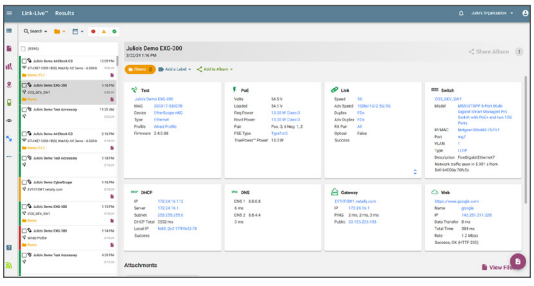


Simple controls allow for instant customization of the map's appearance and displayed data

Automated Test Results Management

Serving as a centralized test results and device management system, Link-Live transforms team workflows with the ability to quickly and easily log, document, and report test activity from all NetAlly handheld network testers.

Once the instrument is connected to the Link-Live (available as a complimentary cloud service or private cloud/on-premise version) your test results are automatically uploaded to the dashboard for project management and reporting. You have the option of uploading additional files, screenshots, images, profiles, packet captures, location information,



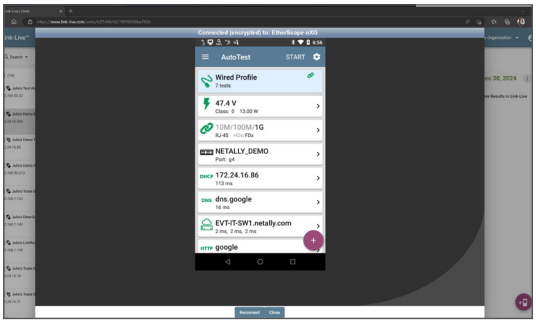
Simplify report generation across media types for network deployment documentation

and comments anytime. Also, NetAlly instruments with AllyCare Support can receive firmware updates “over the network” from Link-Live as they become available.

An API is available to retrieve and integrate data from Link-Live into other management platforms, such as your trouble-ticket application or network management system. This gives you the ability to easily provide proof-of- performance and better manage jobs and staff efficiency.

This unified dashboard of both wired and Wi-Fi network connectivity results enables you to:

- Reduce results management overhead for multiple testers and users
- Enables seamless collaboration between site personnel and remote experts
- Attach photos, user comments to each result, adding context for future changes and troubleshooting



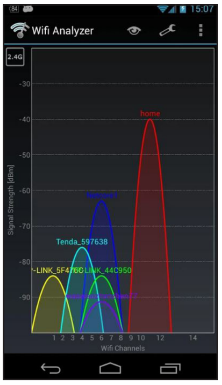
Remote Cloud Control and Collaboration

Web Remote Cloud Control*

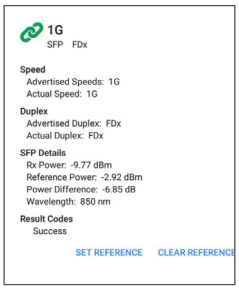
All LinkRunner 10G owners can remotely control their tester on the same network using VNC. With AllyCare support, you get simple and secure remote-control that allows you to connect from Link-Live™ directly to your network-connected LinkRunner 10G anywhere in the world for troubleshooting and collaboration without leaving your desk. (Requires internet access.) **Active AllyCare Premium Support required for web remote control*.

Wi-Fi Connectivity Support *(requires optional USB adapter)*

The LinkRunner 10G supports Wi-Fi connectivity through the use of an optional USB Wi-Fi adapter. This provides on-the-go connectivity for uploading test results to Link-Live, web remote control*, and for conducting basic Wi-Fi diagnostics using third-party apps.



Third-party apps, such as Wi-Fi Analyzer, can be used for WLAN visibility.



Optical power meter

Optical Power Meter

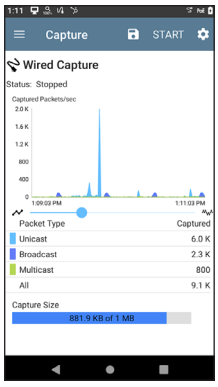
When connected with fiber, the AutoTest Link card has been augmented with the ability to set a reference and display the current power reading relative to that reference. This is useful for saving the power level at the source as a reference, then measuring the fiber power loss at the far end.

Additional Troubleshooting Tools

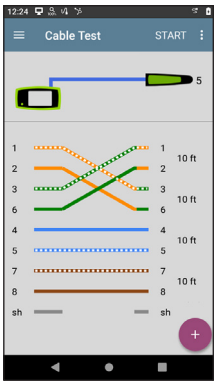
Packet Capture: You can capture up to 10G line-rate to create a PCAP file of up to 1Gigabyte. Packet slicing and filtering are supported, and PCAP files can be uploaded to the Link-Live Cloud Service for easy sharing.

Cable Test: Determine length, shorts, and split pairs and locate opens on UTP cable. Verify the wiremap of UTP and ScTP cable with a WireView adapter. It can generate either analog tone or the unique digital tone for the Fluke Networks® IntelliTone™ Probe for quick cable tracing.

Third-Party Apps: Users can download apps from the Link-Live app store to accomplish many tasks in addition to testing.



Packet capture up to 10G line-rate speeds



Cable test with Wiremap detecting distance to fault, including cable shield

Examples of third-party apps available to download onto the LinkRunner 10G.

Configuration	
Testing	
Documentation	
Collaboration	

Models & Accessories

Inclusion of AllyCare Support
All new LR10G-200 mainframes are sold with the first year (1 year) of AllyCare support included. Additional year(s) of support may be added. Product registration and activation is required within 30 days of first power-on.

Model Number/Name	Description
LR10G-200	**LinkRunner 10G Advanced Ethernet Tester** - includes: (1) LR10G mainframe with one year of AllyCare support (LR10G-200-1YS), G3-PWRADAPTER, SFP+MR-10G850, RJ-45 inline coupler, WIREVIEW wire mapper #1, *Quick Start Guide,* and shoulder sling bag.
LR10G-200-KIT	**LinkRunner 10G Professional Kit** - includes: (1) LR10G mainframe with one year of AllyCare support (LR10G-200-1YS), G3-PWRADAPTER, EXG-LR10G-HOLSTER, SFP+MR-10G850, SFP+MR-10G1310, RJ-45 inline coupler, WIREVIEW wire mapper #1-6, *Quick Start Guide*, and medium soft case.
EXG-300-LR10-KT-X2	**EtherScope nXG 10G Performance Test Kit** - includes: (1) EXG-300 mainframe, (1) LR10G-200 mainframe, (2) EXG-LR10G2-HOLSTER, (1) NXT-2000 Spectrum Analyzer, (2) G3-PWRADAPTER, (2)SFP+MR-10G850, (2) FP+MR-10G1310, (2) RJ-45 inline coupler, (1) EXT-ANT-TRIBAND, (1) TEST-ACC, (2) WIREVIEW 1-6, (2) Quick Start Guides, (1) medium softcase. Purchase EXG-300-1YS and LR10G-200-1YS for one-year AllyCare Support or EXG-300-3YS and LR10G-200-3YS for three-year AllyCare support.
LR10G-200-1YS	1 year AllyCare Support for LR10G (Use for either LR10G-200 or LR10G-200-KIT)
LR10G-200-3YS	3 year AllyCare Support for LR10G (Use for either LR10G-200 or LR10G-200-KIT)
G3-PWRADAPTER	AC Charger replacement/spare for LR-10G mainframe with country power cords
EXG-LR10G-HOLSTER	Holster for LinkRunner 10G, EtherScope nXG, and CyberScope
SFP+MR-10G850	SFP+ Optical Transceiver Module, SX/SR, 1G/10G, 850nm, Multimode
SFP+MR-10G1310	SFP+ Optical Transceiver Module, LX/LR, 1G/10G, 1310nm, Singlemode
US-WIFI-BT-USB	Edimax n150 Wi-Fi & Bluetooth USB Adapter for US and Canada
EU-WIFI-BT-USB	Edimax n150 Wi-Fi & Bluetooth USB Adapter for Europe

Specifications

General	
Dimensions	4.05 in x 7.67 in x 2.16 in (10.3 cm x 19.5 cm x 5.5 cm)
Weight	1.68 oz (0.77kg)
Battery	Rechargeable lithium-ion battery pack (7.2 V, 6.4 A, 46 Wh)
Battery Life	Typical operating life is 3-4 hours (Battery life from full charge varies depending on the feature being used); Typical charge time is 3 hours
Display	5.0 in color LCD with capacitive touch screen (720 x 1280 pixels)
Host Interfaces	RJ-45 and SFP Analysis ports RJ-45 Cable Test and Management Port USB Type-A Port and USB Type-C On-the-Go Port
SD card slot	Supports Micro SD card storage - up to 64GB supported
Memory	Approximately 8 GB available for storing test results and user applications, 1 GB packet capture buffer
Charging	USB Type-C 45W adapter: 100-240 Vac, 50-60 Hz; DC Output Power 15 V (3 A)
Media Access	Copper: 10M/100M/1G/2.5G/5G/10G Fiber SFP Adapters: 1G/10GBASE-X
Supported IEEE Standards	Wired: 802.3/ab/ae/an/bz/i/u/z PoE: 802.3af/at/bt, Class 0-8 and UPOE
Cable Test	Pair lengths, opens, shorts, split pairs, crossed, straight through, and WireView ID Multi-Gig link Signal-to-Noise (SNR) measurement (5 dB threshold)

Specifications

Environmental	
Operating Temperature	32°F to 113°F (0°C to +45°C)
	NOTE: The battery will not charge if the internal temperature of the device is above 122°F (50°C).
Operating relative humidity (% RH without condensation)	90% (50°F to 95°F; 10°C to 35°C)
	75% (95°F to 113°F; 35°C to 45°C)
Storage temperature	-4°F to 140°F (-20°C to +60°C)
Shock and vibration	Meets the requirements of MIL-PRF-28800F for Class 3 Equipment
Safety	IEC 61010-1:2010: Pollution degree 2
Altitude	Operating: 4,000 m; Storage: 12,000 m
EMC	IEC 61326-1: Basic Electromagnetic Environment; CISPR 11: Group 1, Class A

Certifications and Compliance	
CE	Conforms to relevant European Union directives
RCM	Conforms to relevant Australian Safety and EMC standards
FC	Complies with 47 CFR Part 15 requirements of the U.S. Federal Communications Commission
CSA	Listed by the Canadian Standards Association

netally.com/products/linkrunner10g

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