FLUKE networks

EtherScope™ Industrial Ethernet Kits

Network Assistant

Features and Benefits

With EtherScope Industrial Ethernet Kits you can:

- Use a single, integrated tool to cover the Industrial Ethernet deployment lifecycle.
- Solve Ethernet problems fast on copper, fiber optic and wireless networks.
- Validate security measures by testing access control and authentication, communicate securely, or event audit your network by generating malicious traffic.
- Generate comprehensive reports that provide a comprehensive baseline of network performance.
- Identify unintended traffic by traffic type, top talkers and protocol using mirror ports.
- Trend utilization by unicast, multicast and broadcast for up to 18 hours.
- Monitor VLAN utilization by VLAN ID and priority.
- Characterize redundancy fail-over performance of ring structures or trunk redundancy between switches.
- Monitor the building, plant, or remote locations for performance testing and problem segmentation.
- Analyze 802.11 a/b/g wireless networks with full suite of tests including detailed information about RF signal strength, access point and client configurations, and network utilization.

The EtherScope Industrial Ethernet Kits contains everything needed to prequalify, deploy, qualify and troubleshoot Industrial Ethernet. The EtherScope Series II Network Assistant is the next generation of Industrial Ethernet test equipment for networks carrying control, data, voice and video. Kits include either a LinkRunner Duo LinkReflector tester which lets you perform complete Ethernet transport qualification from physical layer to higher TCP/IP layers or a CableIQ Qualification Tester which lets you determine if your existing cabling has the bandwidth to support voice, 10/100, VoIP or Gigabit Ethernet.

Key applications allow you to:

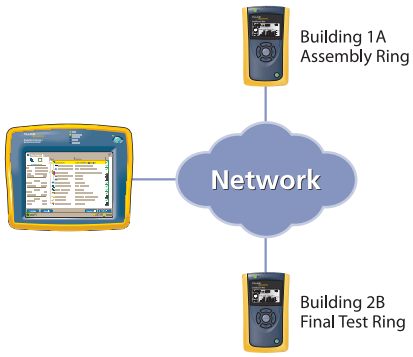
- Remotely monitor and troubleshoot for rapid in-service diagnostics to ensure critical network links don't bring your network down
- Characterize your network for deterministic performance instrumentation, including latency and jitter
- Detect network bottlenecks and areas for optimizing network and applications discrete process
- Switch element provisioning, management, and troubleshooting
- Evaluate vendor equipment prior to installation
- Test port-level security and Quality of Service (QoS)
- Create, distribute, and archive reports for preventative maintenance records
- Simulate multicast traffic generation and client signaling prior to new equipment installations (stress testing and worst-case loading)
- Test LAN provisioning and prioritization
- Perform wireless service turn-up and troubleshooting

Helping engineers solve network problems fast.

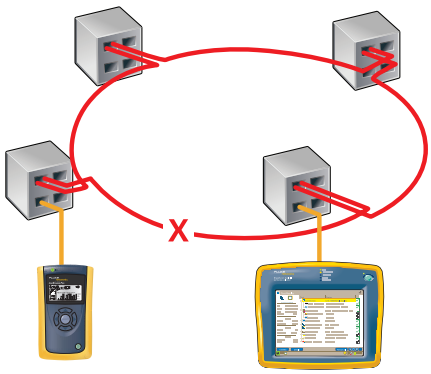
Technical Data

Determinism

As the move to Industrial Ethernet continues on the manufacturing floor, a key issue of concern is end-to-end performance. Determinism, the ability to ensure that a packet is sent and received in a specific period of time, is an important design goal for industrial networks. Performance tests for switched and routed networks have shown that it is possible to provide real-time communication on the network domain making use of Quality of Service. Determinism for the critical control data is achieved through the use of layer 2 VLANs per IEEE802.1p/1Q and TOS/DiffServ for layer 3.



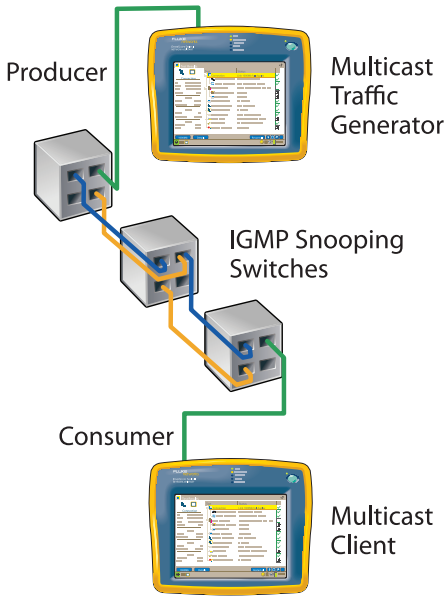
Measuring Determinism means the capability to accurately characterize the worst case time to exchange information end to end, no matter what other network traffic is occurring, such as web exchanges (HTTP, FTP) or non real-time exchanges (configuration, management). In evaluating this determinism it is important to consider not only network throughput and latency, but also delay variability or jitter. These measurements must also be made in the presence of a prescribed traffic load with precise hardware timing for transmission and reception, insuring accuracy in the presence of congestion. EtherScope Industrial Kit performance tests characterize determinism by directly measuring point-to-point network throughput, loss, latency and jitter. The characterization can take place across an individual switch during vendor evaluation, or across a wide area global network.



Redundancy

Industrial Ethernet networks must be highly reliable and continue to operate during harsh environmental conditions, accidental network disruptions, and equipment failures. Network downtime can be dangerous and expensive. Network reliability is largely achieved by the use of redundancy for all critical links. There are four popular redundancy schemes for Ethernet: Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), Link Aggregation (Trunking), and proprietary ring topology.

Independent of the redundancy scheme, EtherScope coupled with a LinkReflector provides precise measurement of failover recover time with sub-millisecond accuracy. The characterization is performed at the prescribed load to ensure a worst cast measurement, up to full gigabit line rate.



Multicasting

Many Industrial Ethernet applications depend on IP multicast technology. IP multicast allows a host, or source, to send packets to another group of hosts called receivers anywhere within the IP network using a special form of IP address called the IP multicast group address. While traditional multicast services, such as video or multimedia, tend to scale with the number of streams, Industrial Ethernet multicast applications do not.

Industrial Ethernet environments use a producer-consumer model, where devices generate data for consumption by other devices. The devices that generate the data are producers and the devices receiving the information are consumers. Multicast is more efficient than unicast, because consumers will often want the same information

from a particular producer. Each device on the network can be both a producer and a consumer of traffic. While most devices generate very little data, networks with a large number of nodes can generate a large amount of multicast traffic, which can overrun end devices in the network. Using mechanisms like QoS and IGMP snooping, organizations can control and manage multicast traffic in industrial environments.

EtherScope can operate as either a producer or consumer of multicast traffic.

Security

While the increasing integration of IT and Industrial Ethernets has the potential to deliver new levels of benefit in industrial operations, it also raises potential vulnerabilities. The act of monitoring and analyzing data from control systems at plant-device level means that the network extends in the other direction too. This greatly increases exposure of the expanded network to intrusions and threats. Internal factors offer different risks. For example when the network is overloaded due to faulty devices or operating errors, switches and routers may offer little relief. Industrial Ethernet can use many methods to help ensure network confidentiality and integrity.

These network security measures can be grouped into several categories, including access control and authentication, and secure connectivity and management.

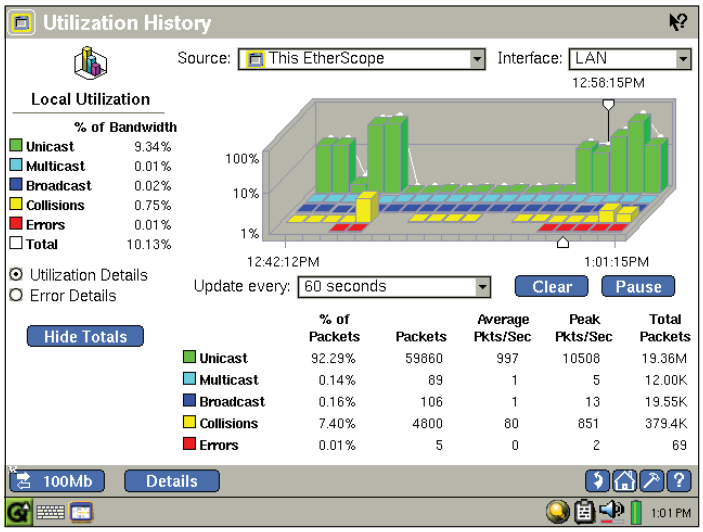
When designing an access-control solution, network administrators can set up filtering decisions based on a variety of criteria, such as an MAC or IP address or TCP/UDP port number. Intelligent switches can provide support for this advanced filtering to limit network access to authorized users. At the same time, they can enable organizations to enforce policy decisions based on the IP or MAC address of a laptop or PLC. Even simple steps such as turning off unused ports reduce the opportunity for intrusion. EtherScope allows the user to manually configure MAC and IP addresses to validate access or denial provisioning. The included Server Response Tool allows the user to test access based on TCP/UDP port numbers by testing port response times to any IP address.

Virtual LANs (VLANs) are another access-control solution, providing the ability to create multiple IP subnets within an Ethernet switch. VLANs provide network security and isolation by virtually segmenting factory-floor data from other data and users. VLANs can also be used to enhance network performance, separating low-priority end devices from high-priority devices. Ether-Scope's extensive VLAN discover-and-monitoring features allows complete VLAN SuperVision.

Monitoring

Other mirror ports provide engineers and technicians with real-time monitoring tools for system behavior. Monitoring allows vision into live network operation for expected traffic types and amounts. Equally important is the identification of unexpected network usage to identify leakage from enterprise to factory networks. EtherScope provides the ability to monitor links for utilization, traffic types, top talkers and protocols, and VLAN usage for minutes, or days.

Using port mirroring on industrial Ethernet switches, statistics and history can be used to identify capacity trends, allowing users the ability to pinpoint problems quickly and see who the top bandwidth users are at a glance. Utilization by unicast, multicast, broadcast and errors can be trended up to 18 hours for long-term analysis.



Utilization history

Fluke Networks' Industrial Ethernet Kits offers additional capabilities not found in other handhelds – capabilities that can eliminate the need to bring a laptop along. For example, EtherScope's built-in web browser, terminal emulator, or telnet can configure devices or access-shared documents, while built-in FTP capability provides the ability to easily download files. All these capabilities are controlled through a touch-sensitive keyboard on the display or an optional USB keyboard. Embedded Linux® shell programming allows the automation of standard work, data collection, and reporting.

EtherScope LAN and WLAN Analyzer

Ethernet Transport Qualification

EtherScope can be teamed with LinkRunner Duo Reflector to offer a low-cost solution for end-to-end testing. A Reflector is an intelligent IP loopback solution supporting gigabit speeds based on Fluke Networks' LinkRunner Duo Network Multimeter. This unique device can be placed anywhere, on the factory floor, a remote facility, or on the enterprise networks.

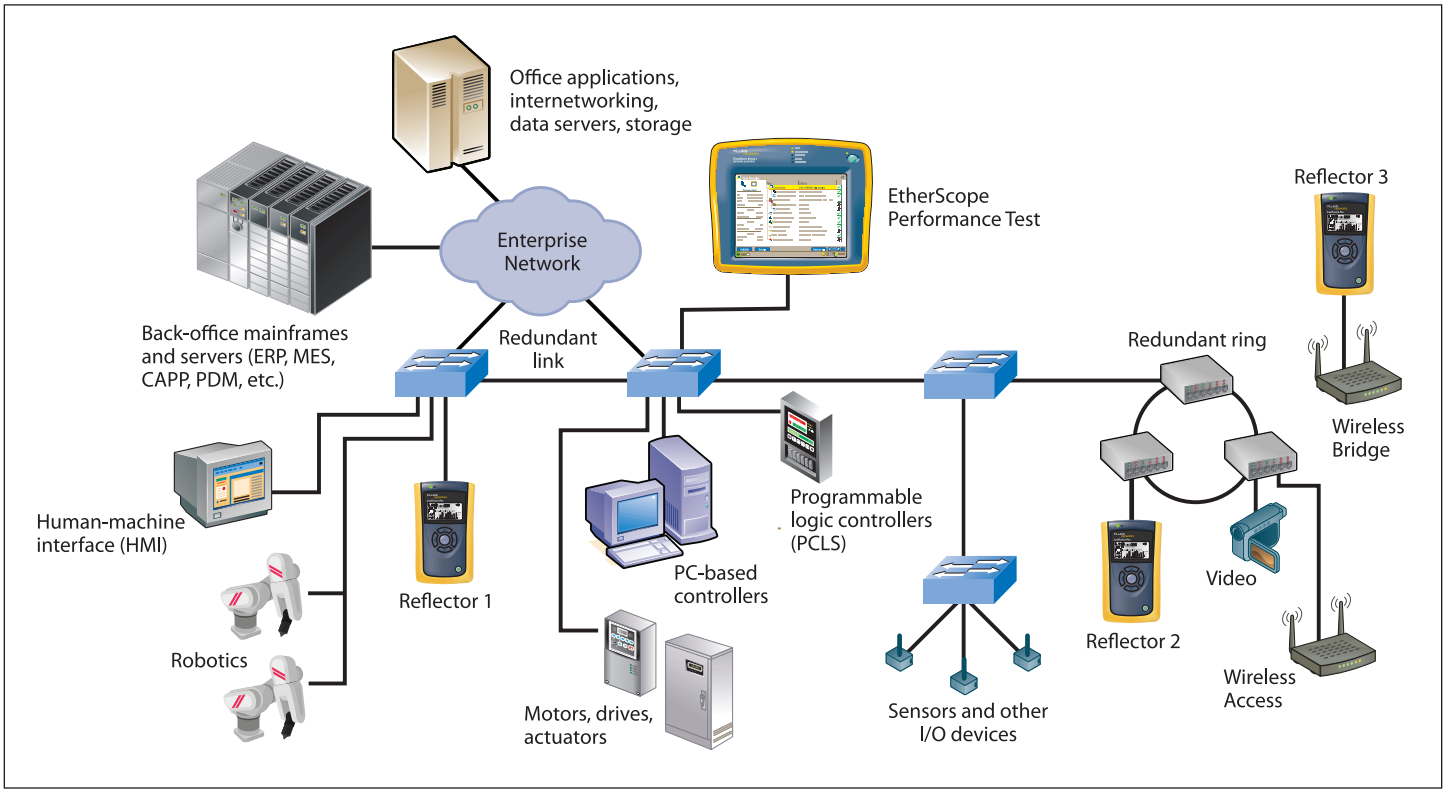
In addition to providing the end-to-end testing capability, LinkRunner Duo is a powerful troubleshooting tool on its own, with the ability to ping key devices, verify link and port status, provide basic monitoring, and test copper cabling. With the EtherScope Industrial Kit, you can qualify and document your Ethernet transport for throughput, determinism, latency, packet loss under congestion, broadcast, and multicast behavior independent of the physical media or distance.

Wireless

EtherScope has a wide variety of WLAN troubleshooting tools. Use RF measurements to determine if co-channel interference causing a problem? Is signal strength too low to support all users? EtherScope continuously scans 2.4 GHz and 5 GHz frequencies, providing visibility into wireless LAN coverage and performance. Drop-down menus including signal strength, signal-to-noise ratio, utilization, and several other useful measurements allow users to choose the measurement they wish. Users can quickly determine if access points are configured for the appropriate channels and that the RF transmit power is appropriate for the environment.

Network Discovery identifies who is using the network, and where they are. Are wireless clients congregating in one area of the building, dragging down wireless network performance? Wireless EtherScope quickly identifies all wireless network access points and discovers all associated clients. Visibility into wireless network utilization helps users make better decisions about access-point placement and expansion to support actual usage patterns.

Identify top talkers to see who the top bandwidth users are at a glance. Use Wireless EtherScope to identify the busiest access points and the most demanding wireless clients. Drill-in to view wireless LAN metrics such as FCS errors, crosstalk, and retries. Identify suspicious activity, then identify the source and solve the problem.



Specifications

Industrial Ethernet protocols identified in EtherScope local protocol stats page	
4 IE Ethertypes	Profinet, EtherCAT, Powerlink, SERCOS-III
13 UDP/TCP ports	Modbus (TCP only), Fieldbus Ann, Fieldbus Msg, Fieldbus Sys, Rockwell CSP2, Profinet RT, Profinet RTM, Profinet CM, EtherCAT Port, DeviceNet, BACnet, SNAP I/O, OptoControl
M12/ RJ45 Cable Specifications	
Cable type	Ethernet cable, Cat5e, shielded, 2 Pair AWG 26 stranded (7 wire), RAL 5021 (water blue), M12 4 pos. D- coded on RJ45 connector
Number of positions	4
Fixed cable length	2 m
Volume resistance	≤ 5 mΩ
Insulation resistance	≥ 100 MΩ
Ambient temperature	-20° to 50°C
Inflammability class acc to UL 94	V0
Surge voltage category	II
Pollution degree	3
Degree of protection	IP20/IP67
External cable diameter	6.7 mm
Transmission characteristics	Cat 5 (IEC 11801:2002), Cat 5e (TIA 568B:2001)

Ordering Information

Model Number	Name	Description
IE-NA-KIT	Industrial Ethernet Network Assistant Kit	**EtherScope LAN and WLAN analyzer with Fiber and ProVision/RFC2544 options, plus a CableIQ Qualification tester:** Series II mainframe, 1000BASE-SX transceiver, 802.11a/b/g CardBus adapter, directional antenna, protective boot, carrying strap, rechargeable Li-Ion battery pack, AC adapter/battery charger, CompactFlash® card, remote wiremap adapter (ID #1), RJ-45 patch cable, RJ-45 adapter, M12(M) to RJ45 patch cable, Getting Started Guide, resource CD, carrying case, additional ProVision/RFC2544-related features, plus a CIQ-100 CableIQ Qualification Tester
IE-NP-KIT	Industrial Ethernet Network Performance Kit	**EtherScope LAN and WLAN analyzer with Fiber and ProVision/ RFC2544 options, plus a LinkRunner Duo with Reflector:** Series II mainframe, 1000BASE-SX transceiver, 802.11a/b/g CardBus adapter, directional antenna, protective boot, carrying strap, rechargeable Li-Ion battery pack, AC adapter/battery charger, CompactFlash® card, remote wiremap adapter (ID #1), RJ-45 patch cable, RJ-45 adapter, M12(M) to RJ45 patch cable, Getting Started Guide, resource CD, carrying case, additional ProVision/RFC2544-related features, plus a LinkRunner Duo with Reflector option, rechargeable Li-Ion battery pack, 1000BASE-SX transceiver, and remote wiremap adapter (ID #1)
Accessories		
M12PCJ-IE	M12/ RJ45 Patch Cable Jack	M12-to-RJ45 jack patch cable - 2 m
M12PCP-IE	M12/RJ45 Patch Cable Plug	M12-to-RJ45 plug patch cable - 2 m

For more information about our solutions, call **800-283-5853** (US/Canada) or **425-446-4519** (Other locations) or email **info@flukenetworks.com**.

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