



# MetroScope™

## Service Provider Assistant

### With MetroScope you can

Use a single, integrated tool to cover the Carrier Ethernet deployment lifecycle covering both Optical and Copper Ethernet services

Define quick, efficient tests, or comprehensive characterization of the Service Level.

Execute complete RFC2544 suites to validate networks for throughput, loss, latency and burst-ability.

Turn up, validate and document new services for SLA conformance including QoS tagging and classification.

Measure jitter to qualify for VoIP and IPTV.

Discover VLANs and monitor talkers, protocols, and trend traffic by VLAN.

Resolve disputes with powerful enterprise features. Discover VLANs, LANs, and devices. Trend local and remote interfaces using SNMP.

Provision equipment using serial terminal, SSH Telnet or web browser.

Test physical media - Verify copper cabling or qualify dark fiber using FrameBERT™. Measure Optical Power Levels.

Generate layer two or layer three background Traffic to load and stress links.

Test IP connectivity using Ping, Trace Route and TCP application connectivity and responsiveness using the Server Response Tool.

Use remote control for escalation, training, and 24x7 access, from any web browser.

Ready for the field technician, or engineer—easy to use and carry, small, lightweight ruggedized platform, a bright color touch-screen, intuitive user interface, and context sensitive help.

### Deploy Metropolitan and Carrier Ethernet services

The pressure is on to quickly provision and roll out Carrier and Metropolitan Ethernet services. Increased broadband deployment to homes, businesses, cellular base stations and DSLAMs, along with faster core technologies, has led to the metro bottleneck.

MetroScope is the next generation of Metro and Carrier Ethernet field test equipment for Ethernet Networks carrying Voice, Data and Video. MetroScope allows turn-up and testing of Ethernet and IP services independent of the core transport—SONET/SDH, ATM, MPLS, WDM, TDM, Ethernet or other means. Whether interfacing to optical 100/1000 Ethernet via SFP, or copper 10/100/1000BASE-T via RJ-45, MetroScope delivers all the tools you need to commission and troubleshoot Ethernet and IP services in an integrated package.



### Key Applications

- Ethernet installation and commissioning testing
- Point to point, and point to multipoint performance testing
- Rapid in-service diagnostics and troubleshooting
- Assurance of Service Level Agreements including Jitter
- Contract ready SLA report generation
- Bit Error Rate Testing
- Test Layer 2 802.1Q or Layer 3 DSCP QoS tagging/classification
- Remote monitoring, troubleshooting, escalation and training
- Network element provisioning, management and troubleshooting
- Fast resolution of customer disputes
- Segmenting metro and core networks with cost effective instrumentation



## RFC 2544

Perform the RFC2544 automated test suite at full line rate at the recommended frame sizes. Complete support for Throughput, Latency, Loss, and Back-to-back frames including baby jumbo frames. The test suite can be performed using a variety of peer, reflector, and loopback schemes. The test results can be viewed locally, remotely or stored on the CompactFlash™ card. All performance tests may be run with RFC sizes or user sizes including jumbo frames sizes.

## Jitter Measurement

RFC 2544 testing is not sufficient for delay sensitive applications. Maintaining low packet jitter is critical to video and voice quality. With jitter accuracy in the microseconds, MetroScope certifies the service readiness for VoIP and IP-TV futures.

## SLA Conformance Automation

Easy to configure Performance Test Scripting allows one button control of what gets tested and how long it takes. Numerous time to test controls allows tradeoff of test time to certify an SLA. Test to a single or numerous endpoints for testing multipoint services. Configurable pass/fail thresholds deskill and create consistent and repeatable environment. Specify a specific bandwidth or hunt for loss-less performance using the fastest convergence algorithms in the industry.

## Robust Reports

Flexible XML reports can be saved and viewed locally, or remotely via built-in web server. Reports can be transferred to a host system where extensive XML reporting tools or Excel may be used to create customer reports. Saved report includes a technician job comment entered on the spot.

## Flexible Double Ended Testing

Support for a variety of double ended testing methods includes using a peer MetroScope, a low cost Fluke Networks IP layer reflector, or infrastructure layer 1, 2 or 3 loopback schemes provided by the network elements. This versatility allows fast segregation of the network when diagnosing performance issues.

## Element Provisioning

Configure and monitor local elements using the built-in DB-9 and terminal emulator to connect to a craft port. Using Ethernet, provisioning can be performed using the built-in SSH Telnet or web browser.

## VLANs

Active and passive VLAN features allow monitoring and troubleshooting of this critical service delivery mechanism. Support for VLAN discovery, statistics, active participation, QinQ detection, and filtering by VLAN to investigate top talkers, protocols, health and trends.

## Optical and Copper Physical Media Tests

Optical measurements using digital optical monitoring functions according to the industry-standard SFF-8724 Multi Source Agreement (MSA) allows monitoring of optical output power, optical input power, temperature, laser bias current, and transceiver supply voltage. UTP Cable Diagnostics includes built in TDR fault location, wire mapping and digital or analog toning.

## BERT Testing

Dark fiber may be qualified for deployment using the built in FrameBERT™ feature to assure an error free physical layer.

## Traffic Generator

MAC and IP layer traffic generation up to line rate including all traffic types and duration controls.

## IP Tools

Traditional Ping and Trace Route is included as well as Switch TraceRoute which displays the switch/port and provisioning of the route.

## TCP Tools

Server Response Tool measures key application server connectivity and responsiveness using port specific analysis. Use the built-in ftp and web browser to validate the end user experience.

## Enterprise Network Troubleshooting

An unmatched set of features support customer dispute resolution. Discovery of VLANs, Switch and Devices provide the SuperVision to troubleshoot and shift blame from the service to the enterprise.

## Remote Operation

Complete remote operation makes it as easy as being there, supporting escalation and eliminating truck rolls, while training front line technicians on the job. MetroScope provides web browser access for 24x7 maintenance, monitoring, and troubleshooting from a distance.

## Connectivity

With built in 10/100/1000BASE-T, 100/1000 Fiber SFP, CompactFlash™, USB keyboard port, and DB-9 RS232, MetroScope supports the connectivity needs of carrier methods and procedures.

## Shell Scripting

Embedded Linux shell programming allows provider defined processing to automate standard work, gather and transfer data, and support OAM&P. Built in binaries include bash, grep, sed, ftp, ping, and other popular tools.



## Verify Service Level Agreements

Irrespective of the Ethernet service being installed, it is always necessary to verify that the network can deliver the performance characteristics specified in the customer Service Level Agreement (SLA). This requires Service Providers to measure network performance such as throughput, loss, latency, burst-ability and jitter to ensure conformance to what the customer expects. These measurements become the contractual reference and enable service providers to validate the quality of the service delivered as well as create value-added services that can be measured and demonstrated. By having different classes of services, a service provider can create new revenue sources based on better, measurable performance. MetroScope supports robust performance test scripting resulting in ease of use for technicians in the field by enabling accurate, efficient and repeatable measurements, and providing reports they can give to customers for future reference.

### Define

A range of test scenarios and test methods must be developed to allow the operator and the end user to prove the service matches the traffic and customer demands as specified in the SLA. Performance Tests can be defined for installation, acceptance and troubleshooting. MetroScope's flexible performance test scripting supports anything from comprehensive hunt for the exact loss-less performance level, or a quick one minute test for a specified bandwidth and loss with only short and long frames. MetroScope allows the method and procedures engineer freedom in trading off test coverage versus test time. Controls impacting the test time include the test duration, accuracy, starting bandwidth, specific frame sizes or sweep, and number of endpoints to test to. Setting of user defined bandwidth to an exact expected value allows a single test to confirm an SLA commitment. Additionally, each test allows specification of a pass/fail limit that assure SLA conformance is tested and deskills the decision process. A test may confirm point-to-point, or point-to-multipoint as multiple target devices may be added. Once a test script is defined it may be saved under a descriptive task name on the built-in Compact Flash card.

### Deploy

In the field, the technician simply plugs in, selects the named test, and presses start. Test progress may be monitored via the at-a-glance LED indicator, or by watching the results graph or table fill in. The test results are compared to the pass/fail limits. Local element management can be accomplished through Serial EIA RS232-E and Terminal, or via Ethernet using Telnet, SSH Telnet, or Web Browser.

### Document

Once the test is completed a complete report of the job is created including everything needed to document the environment and performance. The precise configuration of the test instrument including serial number, SFP used, and addresses as well as time/date and port numbers. The on screen keyboard allows the technician to add any job comments or notes to the report. The performance of the link including throughput, latency, loss, back to back, and jitter is displayed in both a tabular format for precision and a graphical format for quick interpretation. These reports may be viewed locally, or viewed and saved off remotely using the built in web server.

### Tests - Phoenix Premium10+ SLA

Include Test/Target	Status
<input checked="" type="checkbox"/> Performance Tests	Results Available
<input checked="" type="checkbox"/> RFC 2544 Throughput	Results Available
<input checked="" type="checkbox"/> MetroScope rem South Ring 3	Results Available
<input checked="" type="checkbox"/> MetroScope remote 2 (CORE)	Results Available
<input checked="" type="checkbox"/> RFC 2544 Latency	Results Available
<input checked="" type="checkbox"/> MetroScope rem South Ring 3	Results Available
<input checked="" type="checkbox"/> RFC 2544 Loss	Results Available
<input type="checkbox"/> RFC 2544 Back To Back	Will not run/report
<input checked="" type="checkbox"/> Jitter	Results Available
<input type="checkbox"/> Bit Error Rate	Will not run/report

Override Frame Defaults

Content: PRBS      802.1Q/IP TOS Overrides

Timeout: 10      Priority: 4

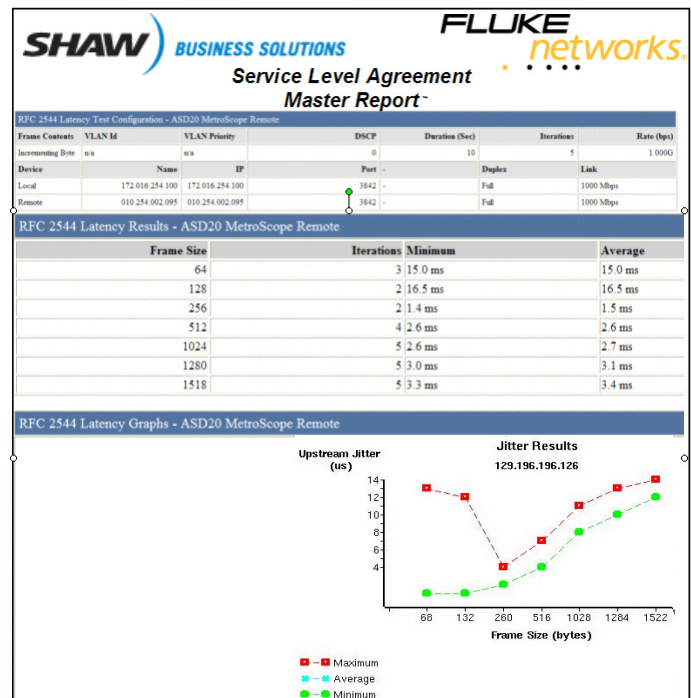
Size: Sweep      DSCP: 0

Port: 3842

Override RFC 2544 Throughput Defaults

Duration: 2 seconds      Measurement Accuracy: 99.5%

Maximum Rate (bps): 100M      Pass/Fail Rate (bps): 90000000



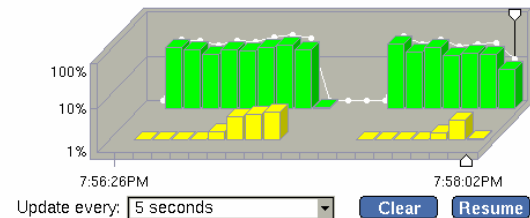
## The customer is always right...

Turning up and certifying the service is only half the battle. When the customer blames the service provider for a slow-down or poor quality of service, troubleshooting with the enterprise bred capabilities of MetroScope shine. Fluke Networks pioneered the handheld enterprise network market over a decade ago, and is unprecedented in its ability to quickly diagnose, and resolve the dispute.

### Pinpoint Customer Problems

Carrier Ethernet is segregated by VLANs, which separate voice, video, and data traffic and prioritize the delivery of delay-sensitive packets such as voice and video. Monitoring the boundary between the customer's network and the carrier/service provider network of live traffic is a key component of the troubleshooting process as it detects problems in how the service is being used or misused. MetroScope allows monitoring of VLANs

VLAN ID	Octets	Packets	% of Pkts
196	1705873	6954	53.09%
504	486027	2769	21.14%
500	32686	436	3.33%
502	16254	227	1.73%
Native	16998	223	1.70%
196 (Native)			53.1%



	% of Packets	Packets	Average Pkts/Sec	Peak Pkts/Sec	Total Packets
Unicast	87.26%	4227	845	3472	17.85M
Multicast	0.00%	0	0	0	2
Broadcast	0.00%	0	0	0	618
Collisions	12.74%	617	123	503	138.5K
Errors	0.00%	0	0	0	0

utilization percentages and frame counts to understand the VLAN traffic. Utilization history provides trending and statistics to show steady and bursty traffic broken down by traffic or error type.

Frequently, an error is made in the VLAN configuration of the switches or devices in the enterprise network. Filtering on a VLAN allows tracking down and resolving any suspicious traffic. Trending can be used to understand the traffic type on the VLAN over minutes, or hours, broken down by Unicast, Multicast, Broadcasts and Errors to catch sporadic misuse such as a broadcast storm. This historical view, coupled with top talkers and protocol statistics filtered by VLAN makes problem identification straightforward. For example, the presence of HTTP web traffic on the Voice VLAN would point to a mis-configured device or switch. Protocol Statistics hierarchically displays the presence and percentage of traffic by protocol type. By expanding TCP, then selecting HTTP, a list of all devices using HTTP on the VLAN is displayed. Any device identified exhibiting unexpected behavior can be viewed in detail including MAC and IP address, domain, and advertised services, as well as located logically using active troubleshooting tools such as Switch TraceRoute.

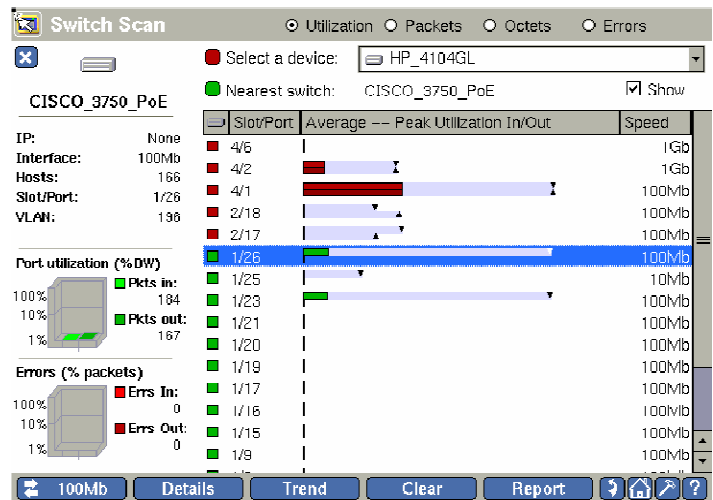
Name	Packets	Octets
DTMCOS-JKAHKOSK	4574	361879
192.168.000.001	2449	208485
Cisco-4e4140	454	98972
IBM-3b2ec5	105	9304
010.032.160.001	74	10072
Cisco-abfe08	29	4045
PP0101622OFFA	28	3590
192.168.000.118	25	2518
CS-JKAHKOSKA	24	3335
152.085.046.001	13	995

Protocol	% of Pkts	Packets
All by protocol	100.0	7398
IP-V4	71.2	5221
TCP	50.8	3727
Other TCP	48.0	3519
HTTP	2.7	201
Microsoft DS	0.1	5
socks	0.0	2
UDP	14.0	1026
Other UDP	6.4	469
DNS	3.6	264

### Active Troubleshooting

To complement powerful passive monitoring, MetroScope has extensive active troubleshooting features. SNMP is used to query switches, routers and other elements pulling out information about what's connected, ongoing traffic levels, instances of errors and discard. Switch Scan allows active monitoring of two switches allowing direct comparison of the border router port and demarcation port. VLAN discovery makes understanding VLAN topology easy as switch interfaces that comprise each VLAN are mapped, while network discovery organizes devices by IP subnet and domain. Enterprise bottlenecks, congestion points and connections are uncovered using Switch TraceRoute to any element.

Device	Slot/Port In	Slot/Port Out
This MetroScope	---	---
CISCO_3750_PoE	1/7	1/26
129.196.197.142	VLAN 1	VLAN 196
	100Mb	100Mb
whimsey	3/5	1/38
129.196.196.001	VLAN 196	VLAN 196
	100Mb	100Mb
MONARCH	---	---





## A Deployment Solution that address both Capex and Opex

Carrier Ethernet is compelling due to its consolidation of networks and reduction in both Capital Expenditure and Operating Expenditure. Your test equipment should deliver the same.

### Integrated Analyzer

MetroScope is an integrated tool that supports for the entire deployment life cycle from physical verification of fiber cables, to SLA validation and report generation, and dispute resolution, eliminating the need for multiple pieces of test equipment. Built in gigabit fiber SFP and 10/100/1000BASE-T support working on both sides of the demarcation point. Provisioning of network equipment can be performed using the built in web browser or script capable terminal via built in DB-9. Additional integration of SSH Telnet, report server, and file transfer may eliminate the need for a laptop.

### Versatile Double Ended Testing

Using distributed remotes and reflectors located at aggregation switches or boundary routers at the edge provides in depth testing and analysis by sectionalizing the service to resolve the trouble. Fluke Networks low cost remote reflector capability provides a Capex reduction of over 80% compared to a second full tester at these locations. The reflector supports gigabit line rate reflection by swapping the source and destination MAC and IP addresses of test frames from MetroScope. The deployment choice of a peer MetroScope, a low cost IP reflector, or network element loopback as the remote target manages the scalability cost of adding additional network instrumentation, or field technicians.



*Line Rate Reflector*

### Mean time to Deploy

MetroScope supports automation in two ways. Performance Test scripting optimizes test times to create a consistent and repeatable process for turning up new services in the field. The underlying Linux operating system supports shell scripting for automation of various carrier specific functions such as transferring reports to a host or retrieving the newest test scripts. The extensive problem solving toolkit facilitates problem detection which expedites fault isolation for the maintenance of service integrity, and greatly reducing MTTR and operation costs. Ease of use lessens the skill level needed by the technicians and cuts the number of technicians needed to close out a job ticket .

### Remote Interface

Remote operation cuts the core of operating expense by eliminating truck rolls. The mean time to repair is enhanced as escalation can be performed by tier two technician in the operations center. The built in web server includes real-time view of the instrument's display and allows for remote control of all functions allowing troubleshooting, monitoring, and reporting from central office, eliminating costly dispatches. During remote operation, display of cursor movement and selection is displayed on the local unit which serves to train the field technician. Any of the MetroScope applications can be operated remotely. For example, a remote user can program an element using the craft serial port via terminal application and use the command line interface just like a terminal server.

### Quickly Resolve Disputes

Customer complaints may result from unknown WAN-vicious applications, that may behave differently across a WAN than LAN. The Server Response Tool quickly demonstrate application layer connectivity. Ping and TraceRoute are no longer adequate to test connectivity response. Gross inaccuracies exist as network devices handle ICMP Ping packets differently than application packets in routing, queuing, fire-walling, discarding and servicing, diminishing the value of Ping as a diagnostic tool. Exoneration requires verifying the server response time as the application would, using the same port and connection protocol. The MetroScope Server Response Tool allows a list of servers (file, email, web, application, DNS, ...) to be tested just as the application would, quickly acquitting the service.

IP Address	Service	Port		Avg RTT (ms)
129.196.197.142	https	443		unreachable
129.196.197.142	http	179		unreachable
129.196.197.142	ssh	22		19.71
129.196.197.142	domain	53		16.29
129.196.197.142	smtp	25		18.33
129.196.197.142	telnet	23		20.29
129.196.197.142	www	80		14.49

### Flexible charging schemes

Long battery life coupled with four flexible charging schemes means no down time. Charging sources include AC and auto lighter adapter. The battery may be charged in the unit, or separately using the optional external battery charger and replacement battery.

### Reliability

The armor clad messenger bag is designed for holding, hanging, and the back of the truck. Back and forth trips are eliminated as the carrier class bag holds everything needed for service turn-up and troubleshooting.





### Ordering Information

Model	Contents
<b>MS-LAN-FX</b>	<b>MetroScope</b> Mainframe including 10/100/1000BASE-T and 1000BASE-X SFP Port, rechargeable Li-Ion battery pack, AC adapter/battery charger, remote wiremap, 128MB Compact-Flash card, CD, carrying case
<b>LR1000-CSP</b>	<b>Reflector</b> Mainframe including 10/100/1000BASE-T Port, rechargeable Li-Ion battery pack, AC adapter/battery charger

### Accessories

Model	Contents
<b>ES2-SX</b>	1000BASE-SX Gig Fiber SFP Transceiver (850nm VCSEL)
<b>ES2-LX</b>	1000BASE-LX Gig Fiber SFP Transceiver (1310nm FP laser)
<b>ES2-ZX</b>	1000BASE-ZX Gig Fiber SFP Transceiver (1550nm DFP laser)
<b>MS-FX</b>	100BASE-FX 100mb Fiber SFP Transceiver (850nm VCSEL)
<b>ES-BATT-CHG</b>	External Battery Charger
<b>MS-AUTO-CHG</b>	Auto lighter charger
<b>ES-BATTERY</b>	Replacement Battery
<b>OPVS-KB</b>	Mini USB keyboard
<b>DTX-ACUN</b>	Ac Charger, universal
<b>944806</b>	Null modem cable (DB9)

### NETWORK SUPERVISION

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**Fluke Networks** operates in more than 50 countries worldwide. To find your local office contact details, go to [www.flukenetworks.com/contact](http://www.flukenetworks.com/contact).

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