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Tal Technologies, LLC
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MetroNet 5000

Ethernet and IP Test Set

- Dual 10GbE Ports for In-line Monitoring and Testing
- Rugged, Lightweight Design Ideal for Field Use
- Powerful Packet and Frame Filtering
- Port Traffic Flooding
- Sophisticated Reporting and Graphing
- Line-Rate Packet Capture and Analysis

Introducing a true handheld test set with dual-10GbE capability

The Complete 10GbE Test Set for Carrier Ethernet and LAN

As Metro Ethernet Networks play an increasingly critical role in linking core fiber transport networks with access infrastructures, they continue to integrate new technologies, such as 10GbE. As a result, cable, telecom and wireless service providers need flexible testing solutions that deliver both sophisticated test capabilities and true field portability.

Trilithic's new MetroNet 5000™ series offers comprehensive test and monitoring functions to isolate and solve problems in the network core, edge, NOC and data center. Designed for construction, customer turn-up and maintenance applications, each model offers numerous built-in tests for complete Ethernet, IP and LAN testing in one small, lightweight handheld:

- Ethernet
- IPTV
- VoIP
- Wireless LAN

The MetroNet 5000 also offers dual 10GbE interfaces, allowing you to do in-line monitoring and testing for faster problem resolution. The series includes four models with different port configurations but the same robust complement of software functions for cable, telecom and wireless service provider testing applications.

- 5020 - Two GbE Interfaces
- 5100 - One 10GbE Interface
- 5120 - One 10GbE Interface and Two GbE Interfaces
- 5200 - Two 10GbE Interfaces

COMPLETE ETHERNET, IP AND LAN TESTING IN A LIGHTWEIGHT, FIELD-READY PACKAGE.

Dual 10 GbE Ports for In-line Testing

The MetroNet 5000 allows technicians to perform in-line and wrap-around testing at 10GbE, opening up a whole new suite of testing scenarios that provide faster problem resolution and better customer experiences.

Rugged, Lightweight Design Ideal for Field Use

Lightweight (under 3 lbs.) and durable, the compact handheld test set provides an economical solution for sophisticated testing in demanding field environments. It has the functionality of much more expensive test systems but the ease of use that is a hallmark of Trilithic systems.

Powerful Packet and Frame Filtering

Based on field content, the user can select which types of packets or frames are transmitted, looped back, received and measured. This allows the user to focus measurement on a particular type of traffic (e.g., IPTV) or filter several types of traffic into a custom stream that emulates a particular carrier service.

Port Traffic Flooding

The user has the flexibility to flood port traffic for stress testing of network equipment like routers and switches, simulate distributed denial of service attacks and other intrusions, and design or mark packet content to emulate viruses and other security breaches.

Sophisticated Reporting and Graphing

The MetroNet 5000 provides report generation and graphing capabilities typically found only in larger and higher-priced systems. The ability to generate reports in histogram, bar, pie and line graph formats and easily convert them to PDF files enables service providers to deliver detailed reporting to customers and management.

Line-Rate Packet Capture and Analysis

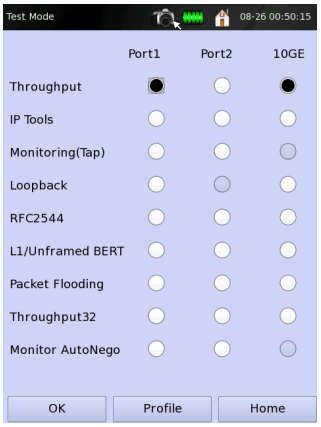
With optional packet and frame capture based on uniquely settable filters, the MetroNet 5000 enables the user to capture specifically the traffic to be measured, making it easier to troubleshoot network problems.

THE SOPHISTICATED TEST SET THAT'S SIMPLE TO USE.

A clean, easy-to-read touch screen with simple, recognizable icons makes the MetroNet 5000 easy to learn, navigate and use.

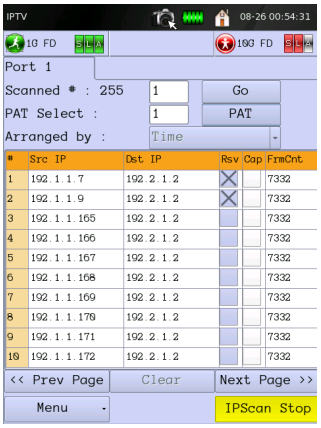
Ethernet and IP

- Launches access to Ethernet and IP service test set-up, testing and reporting for nine different test modes. Operator can also control unit's interfaces and can set up test profiles that define a set of parameters for a particular type of repeatable test.



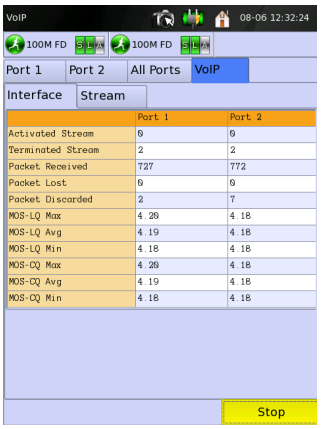
IPTV

- Launches mode for monitoring Video over IP sessions and IGMP signaling, as well as control and monitoring of the stream based on PAT (Program Address Table).



VoIP

- Launches program for monitoring Voice over IP sessions, with MOS and R-factor measurements. Includes monitoring of both terminated and pass-through calls.



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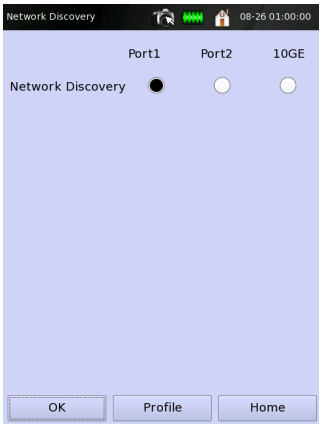
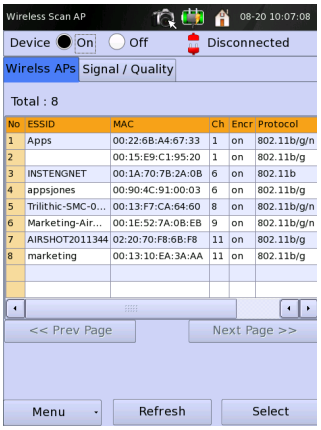
Network Discovery

- Launches session for discovery and analysis of the devices attached to the Intranet which the MetroNet 5000 is connected to. Uses ARP (Address Resolution Protocol), SNMP and NetBIOS as tools to discover and display the subnet topology.



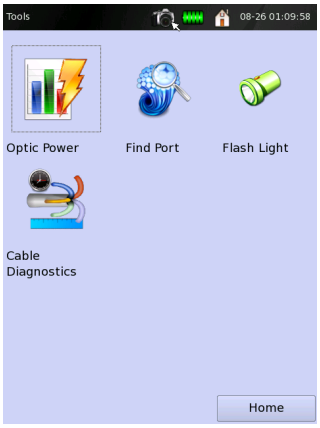
Wireless LAN

- Launches application for scanning of 802.11 a/b/g access points, channels and signal strength (with Cisco/ Linksys Wireless-G USB network adapter).



Tools

- Launches a menu of utility functions to prepare for Ethernet or IP testing, such as measurement of optical port power or identification of individual Ethernet cables out to the user or server location.

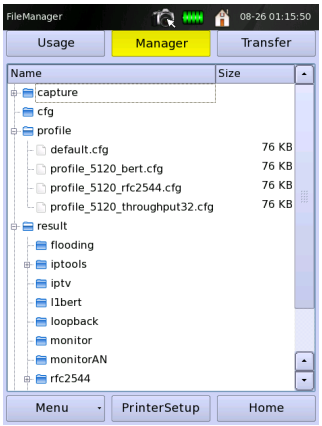


System

- Launches access to various system utilities that are used to configure the operation and performance of the test unit, including software upgrades, license key management, display preferences and power management.

File Manager

- Launches access to menu for handling file management between internal and external file systems (using USB interface or USB memory stick), including screen captures, software downloads, technician profiles and measurement results.



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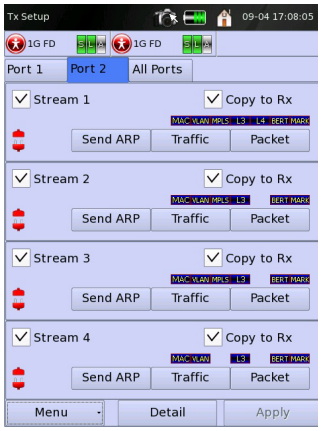
ADVANCED ETHERNET, IP, VOIP AND IPTV MEASUREMENT AND MONITORING

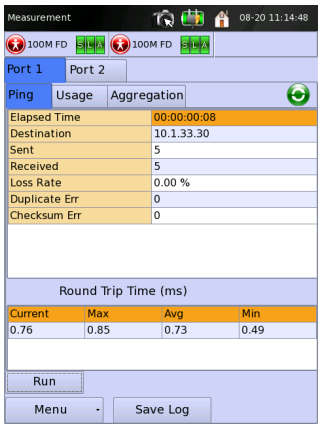
Ethernet Testing Matrix

- Out-band throughput and BER test
- RFC2544 benchmarking methodology for network interconnect devices
- Packet flooding
- In-band monitoring



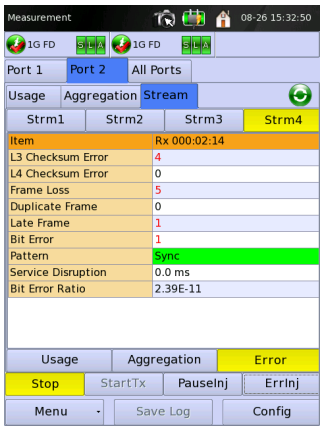
IP Testing Matrix

- Dynamic Host Configuration Protocol (DHCP)
- Ping
- Trace route
- Network discovery
- ARP



Ethernet Anomalies and Defects

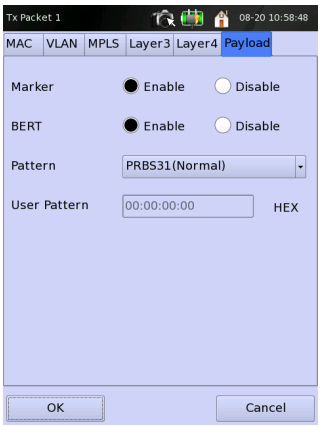
- 10G WAN
- Physical layer
- Frame errors
- QoS parameters
- Lost frame effects
  - FCS/CRC error
  - Bandwidth drop



VERSATILE ETHERNET SERVICE TESTING APPLICATIONS

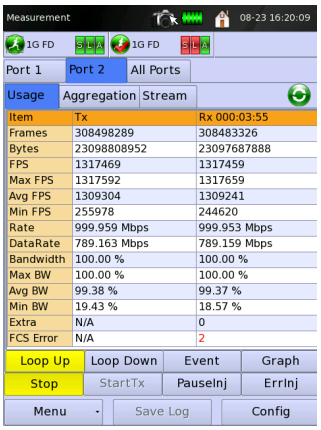
Device Under Test (DUT) Application

- Use multiple interfaces to accelerate throughput and BER tests, error injection and detection for layers 2,3,4.



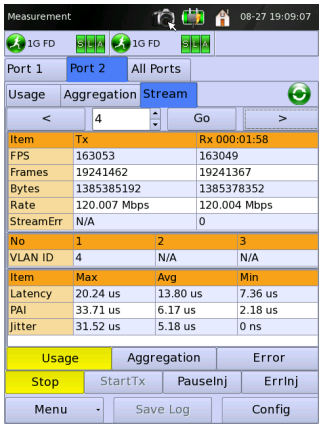
Using Bi-directional or Remote Loopback Testing

- Confirm performance for service level agreement parameters – including UNI, EVC and CoS bandwidth profiles – using MEF service definitions.
- Measure asymmetrical and symmetrical uplink and downlink speed throughput using swapped source and destination MAC/IP addresses for return path.



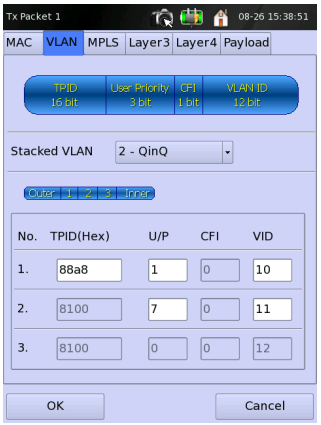
SLA Validation with Multiple Streams in Different Priorities

- Test multiple configurations, such as measuring an EVPL (Ethernet Virtual Private Line) with three VLANs to validate its conformity to the customer's SLA.



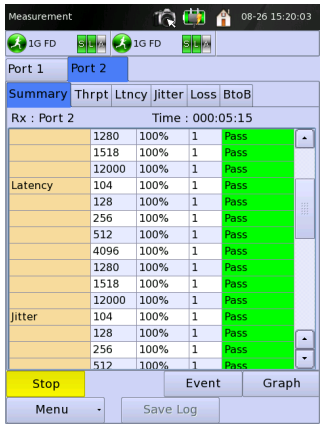
VLAN and QinQ

- Run multiple streams on multiple VLANs – with both service and customer VLAN tags – to verify network virtualization.



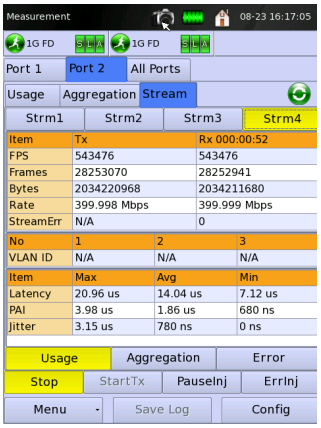
RFC2544

- Run this popular test suite faster than other test sets by running several tests simultaneously. Generate comprehensive reports and graphs in various formats.

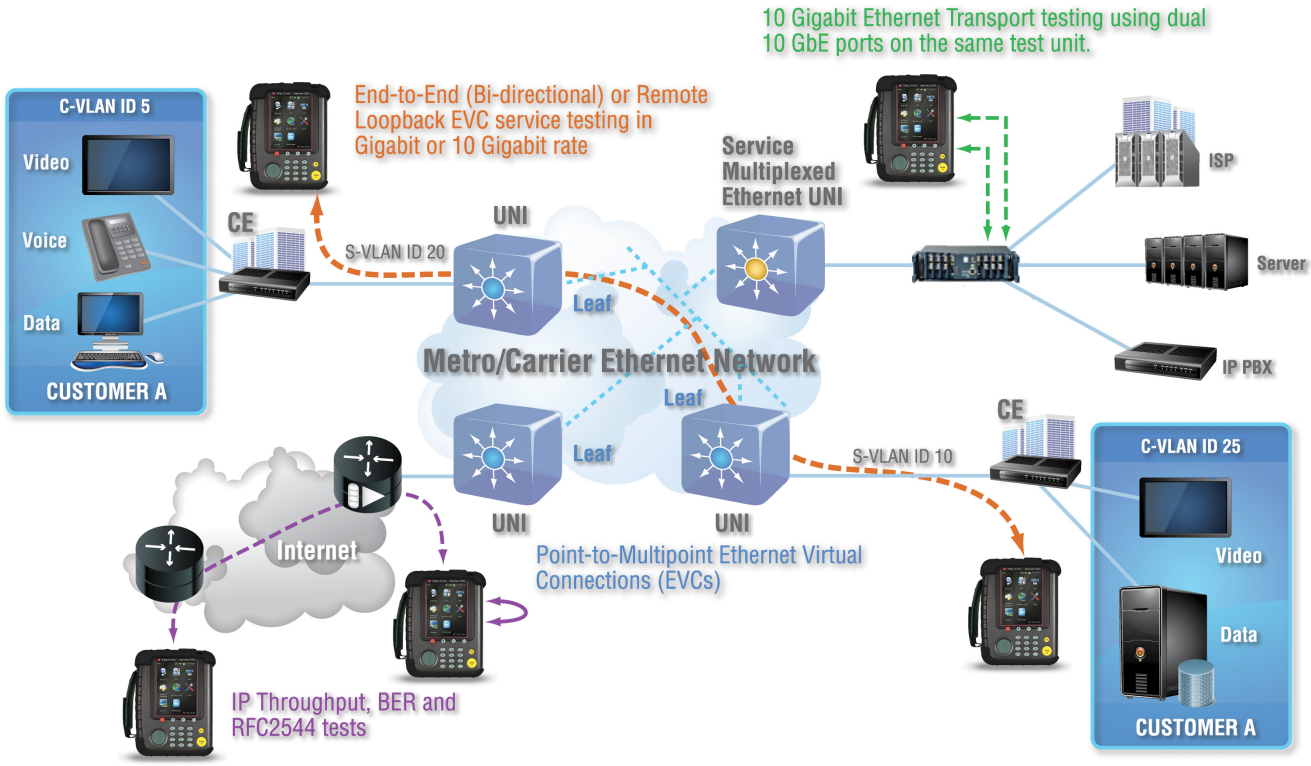


Ethernet Service Parameters and QoS Attributes

- Verify QoS and bandwidth profile attributes of EVC services. Examples include:
  - Latency (frame delay)
  - Jitter (frame delay variation)
  - Frame loss ratio
  - QoS assignment
  - Tagging options
  - CIR / EIR
  - CBS / EBS



A WIDE VARIETY OF TESTING AND MONITORING APPLICATIONS FOR THE METRONET 5000



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SPECIFICATIONS

Models	**5020 (P/N 2011434000)** 2 ports electrical Ethernet: 10/100/1000Base-T 2 ports optical Ethernet SFP: 100/1000Base-X **5100 (P/N 2011435000)** 1 port optical Ethernet XFP: 10GBase-R/W (LAN/WAN PHY) **5120 (P/N 2011431000)** 1 port optical Ethernet XFP: 10GBase-R/W (LAN/WAN PHY) 2 ports electrical Ethernet: 10/100/1000Base-T 2 ports optical Ethernet SFP: 100/1000Base-X **5200 (P/N 2011432000)** 2 ports optical Ethernet XFP: 10GBase-R/W (LAN/WAN PHY)
Management Ports	RJ-45 USB
Test Modes	Packet capture/analyzer Throughput analysis (traffic generation/filter/packet capture) IP tools (ping, trace route, DHCP, ARP) Monitoring (tapping); in-service test mode (5020, 5120, 5200) Loopback (Layer 1, 2, 3, 4) / auto loopback (smart loopback) RFC2544 BERT framed (Layer 1, 2, 3, 4) / unframed(Layer 1) Cable test (TDR, cable finder, optical power measurement) Packet flooding (MAC, VLAN, IP, payload) Network discovery IP scan VoIP/IPTV
Traffic Testing	Link configuration Duplex modes (full/half) Flow control Auto negotiation (link partner status display) Ethernet traffic generation (multiple streams) Generate Layer 1, 2, 3, 4 frames Continuous, burst-once, random length generation Configurable MAC/VLAN/MPLS/IP/TCP/UDP header Configurable payload (PRBS, increment, decrement, user pattern) Frame length (48 ~ 12,000bytes) Frame payload, utilization (%, BPS, FPS) Configurable VLAN tags (QinQ: TPID, priority, CFI, VLAN ID) 3 MPLS stacked labels (label, Exp., EoS, TTL) Pause injection (editable delay) Error injection (FCS, duplicated, lost, late frame, Layer 3, 4 checksum, bit error) Ping, ARP, trace route, DHCP

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Ethernet Traffic Filtering	Source/destination MAC address VLAN ID (3 tags: TPID, priority, CFI, VID) MPLS (3 stacks: label, Exp., EoS, TTL) Source/destination IP address TOS/DSCP Protocol TCP/UDP port User-defined pattern filter
Packet Capture and Analyzer	Packet capture/analyzer Filtered capture (filter criteria;refer to filtering) Event triggered (event criteria-VLAN, pause frame, Multicast packet, broadcast packet, FCS error, length, Layer 3, 4 checksum error) Result: protocol decoding/raw data Export to USB/FTP (TCPdump/Wireshark/Ethereal compatible format) Exported data can be used in Wireshark or Ethereal
In Service Traffic Monitoring (Dual Port)	Frame/packet performance and statistics In-line packet filter/capture Error injection Media converter (copper ↔ optic)
Loopback	Layer 1, 2, 3, 4 loopback (address and Layer 4 port swapping) Frame/packet performance and statistics Remote loopback Auto (smart) loopback
RFC2544 Testing	Throughput test Latency test Frame loss test Back-to-back test Report: printable report, configuration, tabular and graphical results, convert to PDF or CSV format
BERT Testing	Unframed (Layer 1) test pattern: PRBS (15, 20, 23, 31 and inverted selections), CJPAT, CRPAT Framed (Layer 2, 3, 4) test pattern: PRBS 31 and inverted selections Lost/duplicate/late frame measurement Error injection: burst once or rate
Physical Testing	Link speed, link status, cable status Optical power measurement Rx power Wavelength Vendor name, serial number, part number/and revision number

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VoIP (Optional)	Call summary, call degradation measurement Vocoder related information Call packet statistics
IPTV	IP Scan Statistics per IP address MPEG-TS analysis (PAT/PMT/PID) Enhanced IPTV test features
Key Results	**Interface Status:** Link up/down, speed, duplex, activity, optic power Auto negotiation acknowledgement/advertisement status **Stream Status:** Frame/packet format, selected stream status, ARP status **Measurement:** Timed measurement, Tx/Rx independent/synchronized mode, throughput summary Aggregation Status: Tx/Rx frame statistics Tx/Rx packet type statistics (uni/multi/broadcast/extra) FCS error Number of Tx/Rx pause, number of Runt/Jumbo Tx/Rx frame size distribution Frame rate Usage: Current bandwidth (%) - instantaneous Max/Avg/Min BW - cumulative Current frame per second - instantaneous Max/Avg/Min FPS - cumulative Stream Statistics: Tx/Rx frame statistics Number of stream error Number of Runt/Jumbo Tx/Rx frame size distribution Stream Error: Number of late frame (i.e., out-of-sequence) Number of duplicated frame Number of lost frame (i.e., frame loss) Number of Layer 3 checksum error Number of Layer 4 checksum error Number of bit error Service distruption Jitter: Latency (Max/Avg/Min in microseconds) PAI (packet arrival interval)(Max/Avg/Min in microseconds) Jitter (Max/Avg/Min in nanoseconds)

File Management	Interface: USB and RJ-45 Type: Measured log data (text/CSV) Measurement report (PDF) Screen captured file (.png file) Packet captured data (.cap file) File manager menu: View, rename, delete (all), print, export to CSV File transfer: USB / FTP
Remote Control	Remote control using VNC client Remote software download
Screen Capture	Capture snapshot of screen display output

Physical

Operating Temperature	0°C ~ +40°C
Storage Temperature	-20°C ~ +70°C
Humidity	10% ~ 90%
Weight	2.87 lbs (1.3 Kg) with battery
Dimensions	227 (H) x 172.5 (W) x 58.5 (D) mm
User Interface	5.7” color TFT-LCD touch screen Keypad

Power Source

AC/DC Adapter	Input 100 ~ 240 V, 50 ~ 60 Hz, 1.7 A Output 14 Vdc ~ 21 Vdc, 3A
Battery	Removable/rechargeable Li-Ion
Operating Time	4 hours typical
Internal Memory	2GB SD

MetroNet 5000

Ethernet and IP Test Set

SOFTWARE OPTIONS:

Packet Capture and Analysis **P/N 0930168000**	Captures all frames and packets at 10GbE and GbE wire speeds and allows for decode and analysis of frame and packet header and payload content
VoIP Testing **P/N 0930169000**	Includes MOS scoring and R-Factor measurements Operates only on GbE ports Not available on the 5100 or 5200 models
10GbE WAN PHY Mode **P/N 0930170000**	Supports SONET and SDH clocking of 0.995 Gbps Includes alarms and error injection functions For OC192C testing on 10GbE ports Not available on the 5020 model

OPTICAL TRANSCEIVER OPTIONS:

SFP 100 FX **P/N 2072185001**	1310nm, multi-mode, 2 Km reach
SFP 100 LX **P/N 2072185002**	1310nm, single mode, 30 Km reach
SFP1000 SX **P/N 2072185003**	850nm, multi-mode, 550 m reach
SFP1000 LX **P/N 2072185004**	1310nm, single mode, 10 Km reach
SFP1000 ZX **P/N 2072185005**	1550nm, single mode, 80 Km reach
XFP 10G LR/LW **P/N 2072186001**	1310nm, single mode, 10 Km reach
XFP 10G ER/EW **P/N 2072186002**	1550nm, single mode, 40 Km reach
XFP 10G ZR/ZW **P/N 2072186003**	1550nm, single mode, 80 Km reach

WARRANTY EXTENSION OPTIONS:

5020 **P/N 9970003001**	3 Year Warranty
5100 **P/N 9970003002**	3 Year Warranty
5120 **P/N 9970003003**	3 Year Warranty
5200 **P/N 9970003004**	3 Year Warranty

INCLUDES THE FOLLOWING:

One of the following MetroNet 5000 Ethernet and IP Test Sets:

- 5020 - Two GbE Interfaces
  P/N 2011434000
- 5100 - One 10GbE Interface
  P/N 2011435000
- 5120 - One 10GbE Interface and Two GbE Interfaces
  P/N 2011431000
- 5200 - Two 10GbE Interfaces
  P/N 2011432000

Battery

Carrying Bag

6’ RJ45 (CAT5e) Cable

User’s Manual on CD

ACCESSORIES AND REPLACEMENT PARTS:

Single-Mode Optical Patch Cable
P/N 2072191002

Multimode Optical Patch Cable
P/N 2072191001

Replacement Management Port Cable(6’ RJ-45)
P/N 2072192001

Replacement Battery
P/N 090059000

Replacement AC Power Adapter/ Charger
P/N 0610188000

Carrying Bag
P/N 2131479000