

CMA4000i

Optical Test System

The CMA4000i Optical Test System is an all-in-one test and measurement solution for network commissioning, fault location/restoration, maintenance, and DWDM spectral analysis. Combining best in class OTDR and OSA performance, modular flexibility and ease-of-use, the CMA4000i is the ultimate time saving system for increasing network performance while reducing the cost of measurement.

TABLE OF CONTENTS:

OTDR Module Specifications	02-05
Mainframe and OTDR Ordering Information	06
OSA Module Specifications	07
Single-mode Light Source Specifications	07
Power Meter Specifications	07
Visual Fault Locator Specifications	07
Optional Accessories	08

Mainframe Specifications

Display	VGA LCD Display (21.3 cm (8.4 inch) color or 20.8 cm (8.2 inch) monochrome)
Floppy Drive	3.5 inch/1.44 MB floppy disk (up to 180 OTDR traces for a standard disk)
Keyboard	Integral alpha-numeric, external keyboard (optional)
I/O Ports	Standard: (2) RS-232 Serial, (1) Parallel, VGA, Mouse, and (1) PS/2 External Keyboard Port
Internal Storage	Up to 125 OTDR traces internal 2 Gigabytes minimum (Over 65,000 traces with hard drive option)
Dimensions (H x W x D)	24.1 x 34.3 x 9.5 cm (9.5 x 13.5 x 3.75 inches)
Weight	4.9 kg (11.0 lbs.) Includes mainframe, battery and module
Power Supply	Autoswitching 100-132 VAC, 47-63 Hz, 184-250 VAC, 47-63 Hz, 10-15 VDC
Battery	(2) Sealed lead acid battery pack
Battery Life	6 hours typical, depending on operating mode Recharge Time 1.5 - 2 hours
AC Power Temperature	0° C to 45° C (32° F to 122° F)
AC Power Humidity	95% RH max., non-condensing
AC Power Maximum Altitude	15,240 meters (50,000 feet)
Battery Temperature	0° C to 40° C (32° F to 104° F)
Battery Humidity	95% RH max., non-condensing
Battery Maximum Altitude	15,240 meters (50,000 feet)
Storage Temperature	-25° C to 60° C (-13° F to 140° F)
Storage Humidity	95% RH max., non-condensing
Storage Maximum Altitude	15,240 meters (50,000 feet)

OTDR Specifications			
Module	4415	4425	4436
Emitter Type ¹	Laser Diode	Laser Diode	Laser Diode
Center Wavelength	1310 nm ±20 nm 1550 nm ±20 nm	1310 nm ±20 nm 1550 nm ±20 nm	1310 nm ±20 nm 1550 nm ±20 nm
Fiber Type	Single-mode	Single-mode	Single-mode
Spectral Width (RMS)	1310 nm: ≤10 nm 1550 nm: ≤10 nm	1310 nm: ≤10 nm 1550 nm: ≤10 nm	1310 nm: ≤10 nm 1550 nm: ≤10 nm
Dynamic Range ²	1310 nm: 30 dB 1550 nm: 28 dB	1310 nm: 36 dB 1550 nm: 34 dB	1310 nm: 40 dB 1550 nm: 40 dB
Initial Reflective Deadzone ³	1310 nm: 3.0 meters 1550 nm: 3.0 meters	1310 nm: 3.0 meters 1550 nm: 3.0 meters	1310 nm: 3.5 meters 1550 nm: 3.5 meters
Initial Non-Reflective Deadzone ⁴	1310 nm: 10 meters 1550 nm: 12 meters	1310 nm: 10 meters 1550 nm: 12 meters	1310 nm: 6.0 meters 1550 nm: 6.0 meters
Linearity	.04 dB/dB	.04 dB/dB	.04 dB/dB
Pulsewidth	10 ns to 20 μs	10 ns to 20 μs	10 ns to 20 μs
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Loss Resolution	0.001 dB	0.001 dB	0.001 dB
Distance Sampling (range dependent) ⁵	0.25, 0.5, 1, 2, 4, 8, 16 meters	0.25, 0.5, 1, 2, 4, 8, 16 meters	0.25, 0.5, 1, 2, 4, 8, 16 meters
Distance Range Setting	2/4/8/16/32/ 64/128/256 km	2/4/8/16/32/ 64/128/256 km	2/4/8/16/32/ 64/128/256 km
Distance Accuracy	0.0025% of distance measurement + distance resolution + index uncertainty		
Loss Modes	ORL, 2-point, 2-point LSA, dB/KM, dB/KM LSA, splice, dual splice loss, reflectance		
Trace Compare Modes	4 Trace Overlay, Delta Trace Compare, Align, Stack		
Data Acquisition	Real Time, Fast Scan, Medium Scan, Slow Scan, Timed Average (user selectable)		
Vertical Scale Settings	0.125/0.25/0.5/1/2/4/8 dB (module dependent)		
Horizontal Scale Settings	0.001 km/div. to 0.448 km/div. @ 2 km; 0.001 km/div. to 57.304 km/div. @ 256 km (IOR = 1.5)		
Language Capability	Dial-a-language (English, Chinese, Spanish, Portuguese, French, Russian, German, Italian, Swedish, Korean, Hungarian)		

Notes

¹ Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR

² SNR=1 with up to 256k averages (Typical, subtract approximately 1.7 dB of range for 98% peak noise. Bellcore TR-TSY-000196 Issue 2)

³ Using Bellcore TR-TSY-000196 Issue (typical)

⁴ Deadzones measured on -45 dB reflections (typical)

⁵ Stored Data Points 16,000

OTDR Specifications			
Module	4439	4442	4453
Emitter Type ¹	Laser Diode	Laser Diode	Laser Diode
Center Wavelength	1310 nm ±20 nm 1550 nm ±20 nm	850 nm ±20 nm 1300 nm ±20 nm	1310 nm ±20 nm 1550 nm ±20 nm 1625 nm ±10 nm
Fiber Type	Single-mode	Multimode	Single-mode
Spectral Width (RMS)	1310 nm: ≤10 nm 1550 nm: ≤10 nm	850 nm: ≤10 nm 1550 nm: ≤15 nm	1310 nm: ≤12 nm 1550 nm: ≤12 nm 1625 nm: ≤12 nm
Dynamic Range ²	1310 nm: 43 dB 1550 nm: 46 dB	850 nm: 23 dB 1300 nm: 26 dB	1310 nm: 40 dB 1550 nm: 40 dB 1625 nm: 40 dB
Initial Reflective Deadzone ³	1310 nm: 3.0 meters 1550 nm: 3.5 meters	850 nm: 3.5 meters 1300 nm: 3.0 meters	1310 nm: 3.5 meters 1550 nm: 3.5 meters 1625 nm: 3.5 meters
Initial Non-Reflective Deadzone ⁴	1310 nm: 10 meters 1550 nm: 10 meters	850 nm: 6.5 meters 1300 nm: 7.0 meters	1310 nm: 7.0 meters 1550 nm: 7.0 meters 1625 nm: 7.0 meters
Linearity	.04 dB/dB	.04 dB/dB	.04 dB/dB
Pulsewidth	10 ns to 30 µs	4 ns to 1 µs	10 ns to 20 µs
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Loss Resolution	0.001 dB	0.001 dB	0.001 dB
Distance Sampling (range dependent) ⁵	0.25, 0.5, 1, 2, 4, 8, 16 meters	0.25, 0.5, 1, 2, 4, 8 meters	0.25, 0.5, 1, 2, 4, 8, 16 meters
Distance Range Setting	2/4/8/16/32/ 64/128/256 km	2/4/8/16/32/64 km	2/4/8/16/32/ 64/128/256 km
Distance Accuracy	0.0025% of distance measurement + distance resolution + index uncertainty		
Loss Modes	ORL, 2-point, 2-point LSA, dB/KM, dB/KM LSA, splice, dual splice loss, reflectance		
Trace Compare Modes	4 Trace Overlay, Delta Trace Compare, Align, Stack		
Data Acquisition	Real Time, Fast Scan, Medium Scan, Slow Scan, Timed Average (user selectable)		
Vertical Scale Settings	0.125/0.25/0.5/1/2/4/8 dB (module dependent)		
Horizontal Scale Settings	0.001 km/div. to 0.448 km/div. @ 2 km; 0.001 km/div. to 57.304 km/div. @ 256 km (IOR = 1.5)		
Language Capability	Dial-a-language (English, Chinese, Spanish, Portuguese, French, Russian, German, Italian, Swedish, Korean, Hungarian)		

Notes

¹ Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR

² SNR=1 with up to 256k averages (Typical, subtract approximately 1.7 dB of range for 98% peak noise. Bellcore TR-TSY-000196 Issue 2)

³ Using Bellcore TR-TSY-000196 Issue (typical)

⁴ Deadzones measured on -45 dB reflections (typical)

⁵ Stored Data Points 16,000

OTDR Specifications			
Module	4454	4456	4457
Emitter Type ¹	Laser Diode	Laser Diode	Laser Diode
Center Wavelength	1310 nm ±20 nm 1410 nm ±10 nm 1550 nm ±20 nm 1625 nm ±10 nm	850 nm ±20 nm 1300 nm ±20 nm 1310 nm ±20 nm 1550 nm ±20 nm	850 nm ±20 nm 1300 nm ±20 nm 1310 nm ±20 nm 1550 nm ±20 nm
Fiber Type	Single-mode	Multimode and Single-mode	Multimode and Single-mode
Spectral Width (RMS)	1310 nm: ≤12 nm 1410 nm: ≤12 nm 1550 nm: ≤12 nm 1625 nm: ≤12 nm	850 nm: ≤10 nm 1300 nm: ≤10 nm 1310 nm: ≤10 nm 1550 nm: ≤10 nm	850 nm: ≤10 nm 1300 nm: ≤10 nm 1310 nm: ≤10 nm 1550 nm: ≤10 nm
Dynamic Range ²	1310 nm: 36 dB 1410 nm: 36 dB 1550 nm: 36 dB 1625 nm: 36 dB	850 nm: 23 dB 1300 nm: 25 dB 1310 nm: 22 dB 1550 nm: 21 dB	850 nm: 22 dB 1300 nm: 24 dB 1310 nm: 33 dB 1550 nm: 31 dB
Initial Reflective Deadzone ³	1310 nm: 3.5 meters 1410 nm: 3.5 meters 1550 nm: 3.5 meters 1625 nm: 3.5 meters	850 nm: 3.5 meters 1300 nm: 3.0 meters 1310 nm: 3.0 meters 1550 nm: 3.0 meters	850 nm: 4.5 meters 1300 nm: 4.5 meters 1310 nm: 4.0 meters 1550 nm: 3.5 meters
Initial Non-Reflective Deadzone ⁴	1310 nm: 7.0 meters 1410 nm: 7.0 meters 1550 nm: 7.0 meters 1625 nm: 7.0 meters	850 nm: 6.5 meters 1300 nm: 7.0 meters 1310 nm: 10 meters 1550 nm: 12 meters	850 nm: 8.0 meters 1300 nm: 9.0 meters 1310 nm: 11 meters 1550 nm: 12 meters
Linearity	.04 dB/dB	.04 dB/dB	.04 dB/dB
Pulsewidth	10 ns to 20 μs	4 ns to 10 μs ⁵	4 ns to 20 μs ⁵
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Loss Resolution	0.001 dB	0.001 dB	0.001 dB
Distance Sampling (range dependent) ⁶	0.25, 0.5, 1, 2, 4, 8, 16 meters	0.25, 0.5, 1, 2, 4, 8, 16 meters ⁵	0.25, 0.5, 1, 2, 4, 8, 16 meters ⁵
Distance Range Setting	2/4/8/16/32/ 64/128/256 km	2/4/8/16/32/ 64/128/256 km ⁵	2/4/8/16/32/ 64/128/256 km ⁵
Distance Accuracy	0.0025% of distance measurement + distance resolution + index uncertainty		
Loss Modes	ORL, 2-point, 2-point LSA, dB/KM, dB/KM LSA, splice, dual splice loss, reflectance		
Trace Compare Modes	4 Trace Overlay, Delta Trace Compare, Align, Stack		
Data Acquisition	Real Time, Fast Scan, Medium Scan, Slow Scan, Timed Average (user selectable)		
Vertical Scale Settings	0.125/0.25/0.5/1/2/4/8 dB (module dependent)		
Horizontal Scale Settings	0.001 km/div. to 0.448 km/div. @ 2 km; 0.001 km/div. to 57.304 km/div. @ 256 km (IOR = 1.5)		
Language Capability	Dial-a-language (English, Chinese, Spanish, Portuguese, French, Russian, German, Italian, Swedish, Korean, Hungarian)		

Notes

- ¹ Meets CDRH Class 1 Requirements (Eye Safe) 21 CFR
- ² SNR=1 with up to 256k averages (Typical, subtract approximately 1.7 dB of range for 98% peak noise. Bellcore TR-TSY-000196 Issue 2)
- ³ Using Bellcore TR-TSY-000196 Issue (typical)
- ⁴ Deadzones measured on -45 dB reflections (typical)
- ⁵ Wavelength dependent
- ⁶ Stored Data Points 16,000

OTDR Specifications			
Module	4473	4476	4498
Emitter Type ¹	Laser Diode	Laser Diode	Laser Diode
Center Wavelength	1550 nm ±20 nm 1625 nm ±10 nm	1550 nm ±20 nm 1625 nm ±10 nm	1550 nm ±20 nm
Fiber Type	Single-mode	Single-mode	Single-mode
Spectral Width (RMS)	1550 nm: ≤10 nm 1625 nm: ≤10 nm	1550 nm: ≤10 nm 1625 nm: ≤10 nm	1550 nm: ≤15 nm
Dynamic Range ²	1550 nm: 34 dB 1625 nm: 36 dB	1550 nm: 40 dB 1625 nm: 40 dB	1550 nm: 50 dB
Initial Reflective Deadzone ³	1550 nm: 4.0 meters 1625 nm: 4.0 meters	1550 nm: 4.0 meters 1625 nm: 4.0 meters	1550 nm: 4.5 meters
Initial Non-Reflective Deadzone ⁴	1550 nm: 11 meters 1625 nm: 7.0 meters	1550 nm: 11 meters 1625 nm: 7.0 meters	1550 nm: 12 meters
Linearity	.04 dB/dB	.04 dB/dB	.04 dB/dB
Pulsewidth	10 ns to 20 µs	10 ns to 20 µs	10 ns to 30 µs
Distance Resolution	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi	0.0001 km; 0.1 meters; 0.001 kft, 1 ft, 0.0001 mi
Loss Resolution	0.001 dB	0.001 dB	0.001 dB
Distance Sampling (range dependent) ⁵	0.25, 0.5, 1, 2, 4, 8, 16 meters	0.25, 0.5, 1, 2, 4, 8, 16 meters	0.25, 0.5, 1, 2, 4, 8, 16 meters
Distance Range Setting	2/4/8/16/32/ 64/128/256 km	2/4/8/16/32/ 64/128/256 km	2/4/8/16/32/ 64/128/256 km
Distance Accuracy	0.0025% of distance measurement + distance resolution + index uncertainty		
Loss Modes	ORL, 2-point, 2-point LSA, dB/KM, dB/KM LSA, splice, dual splice loss, reflectance		
Trace Compare Modes	4 Trace Overlay, Delta Trace Compare, Align, Stack		
Data Acquisition	Real Time, Fast Scan, Medium Scan, Slow Scan, Timed Average (user selectable)		
Vertical Scale Settings	0.125/0.25/0.5/1/2/4/8 dB (module dependent)		
Horizontal Scale Settings	0.001 km/div. to 0.448 km/div. @ 2 km; 0.001 km/div. to 57.304 km/div. @ 256 km (IOR = 1.5)		
Language Capability	Dial-a-language (English, Chinese, Spanish, Portuguese, French, Russian, German, Italian, Swedish, Korean, Hungarian)		

Notes

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² SNR=1 with up to 256k averages (Typical, subtract approximately 1.7 dB of range for 98% peak noise. Bellcore TR-TSY-000196 Issue 2)

³ Using Bellcore TR-TSY-000196 Issue (typical)

⁴ Deadzones measured on -45 dB reflections (typical)

⁵ Stored Data Points 16,000

Power Meter

Connector Options

Select one when ordering a power meter

- AM-430-15 D4
- AM-430-20 SMA 906
- AM-430-25 Diamond GFS-3
- AM-430-45 FC
- AM-430-50 ST
- AM-430-75 VFO/PFO
- AM-430-85 DIN
- AM-430-90A SC
- AM-430-95 E2000
- AM-430-100 FDDI

VFL Connector Options

FC, SC, ST - fixed connector

OTDR Connector Options

Adapters for Ultra Polish

- UC-130-15 DIN 47256
- UC-130-20 D4
- UC-130-25T FC
- UC-130-30T ST
- UC-130-55A SC
- UC-130-35 SMA 905/906
- UC-130-40 Diamond HP
HMS-10
- UC-130-45 Diamond
HMS-0
- UC-130-50 Diamond
HMS-10/A

Adapters for Angle Polish

- UC-130-60 FC NTT
- UC-130-60A FC Seiko Giken
- UC-130-65 SC
- UC-130-70 DIN/HRL-10
- UC-130-75 ST
- UC-130-80 Diamond
E-2000

Ordering Information

CMA4000i Includes:

Floppy drive, operator's manual, "Understanding OTDR" training manual, AC charger/adapter, two batteries, carry strap, protective display cover, serial data transfer kit and choice of AC power cord (select one from below)

Mainframe Selection (required)

TD-14XXE

Select Display Option
1 = Monochrome Display
(Available for use with OTDR modules)

2 = Color Display
(Color display required for use with OSA modules)

Select Hard Drive Option
1 = No hard drive (OTDR only)
3 = Hard drive option
4 = Hard drive & DOS 6.22 option
5 = Hard drive & Windows 95 option

AC Power Cord Options

TD-11685	US/Japan AC power cord	TD-30360	Swiss AC power cord
TD-30358	European AC power cord	TD-30362	Australian AC power cord
TD-30359	UK AC power cord	TD-30361	Italian AC power cord

OTDR Module Ordering Information

Part Number TD-14MXX XX-X

Enter Last Two Digits Of Module Number

Select Power Meter
(For OTDR modules 4415, 4425, 4436, 4439, 4442, and 4456)
0 = No power meter
1 = 10 dBm power meter
2 = 20 dBm power meter

Select Power Meter
(for OTDR modules 4453, 4454, 4473, and 4476)
0 = No Power Meter
3 = 10 dBm InGaAs power meter
4 = 20 dBm InGaAs power meter

Note: No power meter options for module 4498

Select Light Source Option
0 = No light source
1 = Dual wavelength with only dual optical module
2 = Single wavelength with only single optical module

Note: No light source option for 4498 or multimode wavelength modules

Select Connector Polish For Modules
2 = Ultra PC single-mode
3 = Angled PC single-mode
4 = 62.5 µm PC multimode (444X modules only)
6 = 62.5 µm PC MM / Ultra PC SM
(4456 and 4457 modules only)
7 = 62.5 µm PC MM/ angled PC SM
(4456 and 4457 modules only)

VFL Module Available

VFL-XX (FC, SC, ST - fixed connectors)

Optical Spectrum Analyzer (OSA) Specifications		
Module	4791 NI	4792
Wavelength Range	1520 - 1570 nm	1520 - 1620 nm
Wavelength Accuracy	±20 pm (typical)	±20 pm (typical)
Resolution Bandwidth	<0.05 nm	<0.05 nm
Power Range	+10 to -70 dBm per channel +20 to -60 dBm per channel ¹	+10 to -70 dBm per channel
Polarization Dependence	<±0.25 dB	<±0.25 dB
Channel Table	Automatically generated, up to 400 channels	Automatically generated, up to 400 channels
Return Loss	<35 dB	<35 dB
Cyclic Time	4 seconds maximum	4 seconds maximum
Stability	±0.2 dB per hour	±0.2 dB per hour
Power Accuracy	±0.5 dB (23° C)	±0.5 dB (23° C)
Modes of Operation	Graph, table and drift modes	
Acquisitions	Real time, average, peak hold and channel drift	
Language Capability	English	
Single-mode Light Source Specifications		
Wavelengths	Same as OTDR	
Output	-8 dBm (minimum)	
Transmission Mode	CW, 2 KHz	
Output Fiber	9/125 µm SM fiber	
Optical Connector	Same as OTDR	
Stability	±0.2 dB (8 hours)	
Spectral Width	Same as OTDR	
Power Meter Specifications		
Detector Type	2 mm Ge PIN photodiode or InGaAs photodiode ²	
Range	+10 to -55 dBm or +20 to -45 dBm with AM460 filter	
Calibrated Wavelengths	850, 1310, 1410 ³ , 1550, 1625 nm ²	
Universal Connector	Yes (use AM-430-xx adapter caps)	
Resolution	0.01 dB, 0.01% Watts	
Store Reference Mode	Yes	
Accuracy ⁴	±4% (±0.18 dB) @ +5 dBm to -50 dBm, ±8% (±0.36 dB) @ +10 dBm to +5 dBm and @ -50 dBm to -55 dBm	
Linearity	±0.04 dB, +5 dBm to -50 dBm	
Visual Fault Locator Specifications		
Wavelength	650 ±10 nm	
Output	0 dBm	
Transmission Mode	CW or 2 Hz	
Output Fiber	9/125 µm, SM fiber	
Safety	IEC 825 Class 2, FDA (21 CFR 1040.10 Class 2)	

Notes

¹ Model 4791 only

² Available with 1625 nm light source only

³ Available with 1410 nm light source only

⁴ Specification applies to +10 dBm meter.

Optional Accessories (must be added as separate line item)

TD-400A	Hard case w/handle & wheels	TD-430	CMA serial transfer data kit
TD-401	Hard transit case	TD-435	Display cover
TD-410	Deluxe soft case	TD-30163	OTDR User's Manual
TD-415	Soft carry bag	TD-35992	OSA User's Manual
TD-405	Printer w/cable	TD-459US	US style keyboard
TD-420	Tripod	TD-459GE	German CE style keyboard
TD-309	Printer paper (5 rolls)	TD-459FR	French CE style keyboard
TD-409	Case of paper (25 rolls)	TD-459SP	Spanish CE style keyboard
TD-453	12V lead acid battery	TD-459IT	Italian CE style keyboard
TD-29621	12V DC power adapter		

Optional Accessories (must be added as separate line item)

FiberConnect

Bare Fiber Testing Adapters (Single-mode)

Ultra

- FiberConnect-1-UFC
- FiberConnect-1-USC
- FiberConnect-1-UST

Angled

- FiberConnect-1-AFC
- FiberConnect-1-ASC



Test Fiber Boxes (XXX-XXX = Connector Style)

- FB-XXX-XXX-SM-300M FB-XXX-XXX-M5-100M
- FB-XXX-XXX-SM-1K0M FB-XXX-XXX-M6-100M
- FB-XXX-XXX-SM-5K0M

Standard fiber lengths

Single-mode (SM) - 300 m, 1 km, and 5 km
Multimode (MM) - 100 m



Standard Connectors (SM and MM)

- UFC-UFC UST-UST USC-USC

Additional connector styles, combinations and lengths for the Test Fiber Boxes are available upon request.

FS Series Microscopes

- FS-200 Fiber Microscope with 200x optics
- FS-200C Fiber Microscope with 200x optics with coaxial illumination
- FS-400C Fiber Microscope with 400x optics with coaxial illumination



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NetTest is a leading worldwide provider of testing, monitoring and management systems across both the optical and network layers of communications networks. NetTest provides network operators, network equipment manufacturers, component manufacturers and enterprise service providers with the network testing solutions they need.