

# VIAMI

## 400G Transport Modules

Portable Test Unit up for 400G on OneAdvisor 800 Transport and OneAdvisor 1000

### OneAdvisor 800 Platform

Attributes	
<p>The Transport OneAdvisor 800 (ONA-800A-MF2-T with ONA-800A-DISP-T) is a mainframe which supports modules providing test functionality</p> <hr/> <p>Operating system is Linux to ensure optimum stability and offer high security</p>	
<b>Mainframe components</b>	<p>Display enclosure which includes the following components:</p> <ul style="list-style-type: none"> <li>• 8-inch display</li> <li>• Recessed power button to avoid accidental contact</li> <li>• Operational battery support; for all configs</li> <li>• Storage of 6.2 GBytes; additional via USB</li> <li>• Expandability for up to 2 expansion modules and 1 or 2 full-size modules</li> </ul>
<b>Modules available</b>	<ul style="list-style-type: none"> <li>• 400G Module TM400GB-QO</li> </ul> <p>Can be combined with:</p> <ul style="list-style-type: none"> <li>• SPA06MA (without -O)</li> <li>• E81FMC1 (Fiber Module Carrier)</li> </ul> <p>And expansion modules:</p> <ul style="list-style-type: none"> <li>• OTDR modules of type E4100</li> <li>• OSA/OCV-4100 and Channel Checkers</li> <li>• PEM: Power Expansion Module</li> <li>• TEM2</li> </ul> <p>Optical USB pluggables such as fiber inspection scopes and power meters</p>

Mainframe Interfaces
<p>The OneAdvisor 800 supports the following interfaces:</p> <ul style="list-style-type: none"> <li>• 2 USB ports (including USB3.0)</li> <li>• 1 RJ-45 management port up to 1000Base-T</li> <li>• WiFi and Bluetooth (optional, unit can be provided without radios)</li> <li>• MicroSD port</li> </ul>
Instrument Control and Management
<ul style="list-style-type: none"> <li>• Local User Interface, same UI as all T-BERD/MTS</li> <li>• SmartAccess Anywhere <ul style="list-style-type: none"> <li>- Cloud access (Android, IOS, Windows) via SSH with encryption or locally</li> </ul> </li> <li>• VNC</li> <li>• MobileTech <ul style="list-style-type: none"> <li>- Supports file transfer, instrument management, StrataSync</li> </ul> </li> <li>• StrataSync <ul style="list-style-type: none"> <li>- Cloud fleet management tool with automatic updates</li> </ul> </li> <li>• Job Manager <ul style="list-style-type: none"> <li>- Workflow and Test plan management</li> </ul> </li> <li>• Report Generation <ul style="list-style-type: none"> <li>- HTML, PDF, TXT, CSV, XML</li> </ul> </li> <li>• NTP server support</li> <li>• Built-in web browser and video player</li> <li>• Onscreen Lock</li> </ul>



## Power and Battery

Supports battery operation with seamless swapping between AC and DC

Built-in battery charger as unit operates

Battery is high current 96Whours, Lithium Ion

Can perform a 400GE test for 1 hour on battery power

Battery is field replaceable

Additional supplemental battery available via Power Expansion Module

Power supply	330 Watts
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## Industry Standards and Compliance

EMC	IEC/EN 61326-1, FCC part 15B, ICES-003
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Safety	IEC/EN/UL/CSA 61010-1
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## Environmental

Operating Temperature Range	0°C to +40°C (32°F to +104°F)
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Storage Temperature Range	- 20°C to +60°C (-4°F to +140°F)
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Storage Temperature Range	10-95% without condensing
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## Drop Test and Vibration

Shock and vibration	MIL-PRF-28800F
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Drop	MIL-PRF-28800F, ETSI EN 300 019-2-7
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## Warranty

Standard 3 years

## Calibration

Interval of 3 years

## Size and Weight

### Size

OneAdvisor 800 with battery	17.0 x 27.0 x 6.0 cm	6.7 x 10.6 x 2.3 in
400G Module	17.0 x 27.0 x 5.5 cm	6.7 x 10.6 x 2.2 in

### Weight

OneAdvisor 800 with battery	2.0 kg	4.4 lbs
400G Module	2.0 kg	4.4 lbs

## Hardware Option

### ONA-PMVFL

Power Meter	<ul style="list-style-type: none"><li>• Power range: +10 to -60 dBm</li><li>• Calibrated Wavelength: 850, 1310, 1550 nm</li><li>• Connector Type: Universal push/pull (UPP)</li></ul>
Visual Fault Locator	<ul style="list-style-type: none"><li>• Wavelength: 650 nm +/-15 nm</li><li>• Output power level: &lt;1 mW</li><li>• Laser Safety: Class 2</li></ul>

# OneAdvisor 1000 Platform

Attributes	
The OneAdvisor 1000 (ONA-1000A-MF) is a mainframe which supports modules providing test functionality	
Always delivered with a soft case	
Operating system is Linux to ensure optimum stability and offer high security	
Mainframe components	<p>Display enclosure which includes the following components:</p> <ul style="list-style-type: none"> <li>• 10-inch display</li> <li>• Lit power button</li> <li>• 2 batteries</li> <li>• Storage for operation</li> <li>• GNSS</li> <li>• Back termination which is either: <ul style="list-style-type: none"> <li>• Blank termination (ONA10-BACK)</li> <li>• Dual Module Carrier (ONA10-DMC)</li> </ul> </li> <li>• Power Supply</li> </ul>
Modules available	<ul style="list-style-type: none"> <li>• 400G Module</li> <li>• 100G Module</li> <li>• Concurrent support of 1 400G module and 1 100G Module</li> <li>• Concurrent support of 2 400G modules including battery operation</li> <li>• When equipped with Dual Module Carrier: <ul style="list-style-type: none"> <li>- OTDR modules of type E4100</li> <li>- Channel Checkers</li> </ul> </li> <li>• OCV-4100 and OSA-4100</li> <li>• Optical USB pluggables such as fiber inspection scopes and power meters</li> </ul>

## Mainframe Interfaces

The OneAdvisor 1000 supports the following interfaces:

- 2 USB ports
- 1 RJ-45 management port
- SMA antenna connector for GNSS
- WiFi and Bluetooth (optional, version available without radios)
- MicroSD port

## Instrument Control and Management

- Local User Interface, same as all T-BERD/MTS
- SmartAccess Anywhere
  - Cloud access (Android, IOS, Windows) via SSH with encryption or locally
- Mobile Tech
  - Supports file transfer, instrument management, StrataSync
- StrataSync
  - Cloud fleet management tool with automatic updates
- Job Manager
  - Workflow and Test plan management
- Report Generation
  - HTML, PDF, TXT, CSV, XML
- NTP server support
- Built-in web browser and video player
- Onscreen Lock



## Power and Battery

Supports battery operation with seamless swapping between AC and DC

Built-in battery charger as unit operates

Each of the 2 batteries is 96W hours, Lithium Ion

Batteries are field replaceable

Power supply | 330 Watts

Can perform a 400GE test for at least 1:30 hours on battery power including with ZR optics

Can perform a 100GE test for at least 2:20 hours on battery power

## Industry Standards and Compliance

EMC | IEC/EN 61326-1, FCC part 15B, ICES-003

Safety | IEC/EN/UL/CSA 61010-1

## Environmental

Operating Temperature Range | 0°C to +45°C (32°F to +113°F)

Storage Temperature Range | -20°C to +60°C (-4°F to +140°F)

Operating Humidity | 10-95% without condensing

## Drop Test and Vibration

Shock and vibration | MIL-PRF-28800F

Drop | MIL-PRF-28800F, ETSI EN 300 019-2-7

## Warranty

Standard 3 years

## Calibration

Interval of 3 years

## Size and Weight

### Size

OneAdvisor 1000 with dual batteries	24.1x30.9x8.3 cm	9.5x12.2x3.3 in
400G Module	24.1x30.9x5.5 cm	9.5x12.2x2.2 in
100G Module	24.1x30.9x5.5 cm	9.5x12.2x2.2 in
Dual Module Carrier	23.7x30.5x2.0 cm	9.3x12.0x0.8 in
Blank Termination	23.7x30.5x1.5 cm	9.3x12.0x0.6 in
OneAdvisor 1000 400G Mod Blk Term	24.1x30.9x15.3 cm	9.5x12.2x6.0 in

### Weight

OneAdvisor 1000 with dual batteries	3.9 kg	8.5 lbs
400G Module	2.3 kg	5.1 lbs
100G Module	1.9 kg	4.1 lbs
Dual Module Carrier	0.9 kg	1.9 lbs
Blank Termination	0.4 kg	1.0 lbs
OneAdvisor 1000 400G Mod Blk Term	6.6 kg	14.6 lbs

## 400G Module on OneAdvisor 800 : TM400GB-QO



## Physical Interfaces

The TM400GB-QO on ONA 800 provides the following physical ports:

- 1 x OSFP
- 1 x QSFP56-DD (QSFPx capable)
- 2 x SFP56-DD (SFPx capable)
- 1 x EXT CLK REF
- 1 x CLK OUT (future)
- 1 x 1PPS IN REF (future)
- GNSS antenna (a dual-band GNSS is in the module)

## 400G Module on OneAdvisor 1000: TM400GA



## Physical Interfaces

The TM400GA on ONA 1000 provides the following physical ports:

- 2 x QSFP56-DD
- 2 x QSFP56 (QSFP28 capable)
- 2 x SFP56-DD (SFP capable)
- 1 x EXT CLK REF
- 1 x CLK OUT (future)
- 1 x 1PPS IN REF (future)

## 400G Functionality (for both modules)

### Application Control

Test Time Control | Not Timed, Timed Test, Delayed Start

Auto Create Report upon Completion

Automatic Timed Report Creation

Auto-start traffic with laser on

Split Screen Reporting | Results in 1 to 4 areas

Full customization of result presentation information on screen

On screen help via 'What's This?'

On UI Screen capture into PNG

On Unit User Manuals

Remote automation via SCPI

<b>Timing</b>	
Internal Reference	+/-1.5 ppm. Designed for Stratum 3. Yearly degradation 1 ppm/year
Clocking	Internal, recovered, external
PPM offset	Report incoming in PPM and Hz, injection +/-150 ppm range
<b>Interface Type and Applications</b>	
OSFP (CMIS)	On TM400GB-QO Application: 400GigE, Unframed BERT. Via adapter to QSFP: 100GigE, OTU4, 40GigE, 4x100GigE KP4
QSFP56-DD (CMIS)	Application: 400GigE, Unframed BERT, 4x100GigE KP4
QSFP56 (CMIS)	Application: 200GigE
QSFP28	Application: 100GigE, OTU4
QSFP+	Application: 40GigE
SFP56	Application: 50GigE, 64GFC
SFP28	Application: 25GigE
SFP+	Application: 10GigE LAN, OTU2e, OTU1e, OTU2
<b>QSFP and OSFP Optics Support</b>	
<b>QSFP and OSFP Optics Support</b>	Nominal Wavelength, Vendor, Part Number, Serial Number, Vendor Rev, Date Code, Lot Code, Connector Type, Max Link Length, Transceiver Info, Rx Power level Type, Rx Max Lambda Power, Tx max Lambda power, Power Class, Module ID, Rev Compliance, Cable Length if applicable
<b>QSFP and OSFP Expert Mode</b>	Advanced host transmit settings with Pre-emphasis settings with Pre-Cursor, Post-Cursor and Swing Advanced Module Rx Output Pre-emphasis Settings with Pre-Cursor, Post-Cursor and Swing Indication for 100GE single lambda QSFP28 on Media bypass support
<b>QSFP and OSFP I2C Peek/Poke</b>	Full read and write device register access, Full register dump to .txt file upon module insertion and app loading (in bert/reports)
<b>Per Lambda</b>	Signal present, Rx optical power, Tx optical power, Laser Bias current CMIS Host-Media Apps Support As per CMIS4.0/5.0 up to 16 applications

<b>Pluggable Power Reporting</b>	Module voltage, current, power Current, minimum, maximum values
<b>Temperature</b>	
<b>400GE ZR/ZR+ Tunable Support</b>	
<b>Grid Spacing Reporting and Setting</b>	12.5GHz to 100GHz
<b>Tuning Mode</b>	Channel number, Frequency (THz), Wavelength (nm)
Fine Tuning support (GHz)	
Output Power setting support (dBm)	
Report Current Frequency, Tuning in Progress, Wavelength lock/unlock	
Display First and Last Tunable Frequency, Fine tuning Low and High offset, Min and Max Output Power	
<b>Coherent Statistics</b>	
<b>BER</b>	Media Pre-FEC BER
<b>Statistics</b>	Chromatic Dispersion (ps/nm), Differential Group Delay (ps), Second Order Polarization Mode Dispersion (ps <sup>2</sup> ), Polarization Dependent Loss (dB), Optical Signal to Noise Ratio (dB)
<b>Q Factor</b>	For some devices
<b>CMIS Application Codes</b>	
<b>Programmable application code</b>	Such codes are displayed under Interface   CMIS Host-Media Apps
<b>Datapath ID</b>	Displayed in expert mode
<b>SFP Optics Support</b>	
<b>SFP Optics Support</b>	Wavelength, Recommended Rates, Vendor, Vendor PN, Vendor SN, Vendor Rev, Min Rx Level, Min Tx Level, Diagnostic Monitoring, Module ID, Transceiver, Nominal Rate, Min Rate, Max Rate, Power Level Type, Max Rx Level, Max Tx Level, Diagnostic Byte
<b>SFP Expert Mode</b>	Ignore LOS, Rate Select
<b>SFP I2C Peek/Poke</b>	Full read and write device register access, Full register dump to .txt file upon module insertion and app loading (in bert/reports)
<b>Pluggable Power Reporting</b>	Module voltage, current, power, current, minimum, maximum values

## Temperature

### Optics Self-Test

Built-in PRBS theory test duration calculator
User controlled test duration or auto calculated
BER pass/fail threshold with choice of pre or post FEC (except 10GE)
PPM max offset settings
Reporting of QSFP Info or SFP Info
Monitoring of temperature, optical power, and total power consumed by the pluggable
Pre-FEC and Post-FEC results as applicable
Report generation with full information
Integration into job manager

### Dual Applications

Provides dual application, dual port testing simultaneously on port 1 and port 2
Any of the two applications can be reloaded at any time without affecting the other application/test. This is the end goal; as an interim measure dual applications may work on a subset of rates such as 200GE, 100GE, 10GE.
This function is to apply to application rates up to 200GE
Applies to different protocols which can be loaded concurrently; this is the end objective.

### Unframed BERT

Support of independent BERT engines on 4 or 8 lanes on QSFP56-DD pluggable

<b>LED Indicators</b>	Per Lane Signal Present Overall Pattern Sync Per Lane Pattern Sync
<b>Per lane Statistics</b>	Bit Count Bit Error Count Bit Error Rate Pattern Sync Losses Sync Loss Seconds

### Settings

PAM4 patterns for Tx and Rx BER	PRBS31Q regular and invert, PRBS13Q regular and invert, SSPRQ
Rx threshold settings for pass fail	$10^{-3}$ to $10^{-11}$
Pattern Bit Error Injections	Single, Rate: $10^{-4}$ to $10^{-9}$

## Ethernet

### Ethernet Rates

#### Rates

400GigE (425 Gbps) with RS (544,514) FEC	Supports 400GBASE-ZR pluggables
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4x100GigE with KP4 RS(544,514)	User can select the number of active ports to be all 4 or down to a single port
200GigE (212.5 Gbps) with RS (544,514) FEC	
100GigE (103.125 Gbps) with no FEC or RS (528,514) FEC or native RS (544,514) FEC with QSFP28 media FEC bypass selectable. Also supports 106.25 Gbps via single lambda QSFP28	
50GigE (53.125Gbps) with RS (544,514) FEC	
40GigE (41.25Gbps)	
25GigE (25.78125Gbps) with no FEC or RS (528,514) FEC selectable	
10GigE (10.3125 Gbps) LAN	

### FEC

#### FEC Types

RS (544,514) FEC	Application: 400GigE, 4x100GE KP4, 200GE, 100GigE, 50GigE, 64GFC
RS (528,514) FEC	Application: 100GigE or 25GigE used with or without FEC. OTU4 also uses this FEC

#### Alarms and LEDs

LOAMPS	Loss of Alignment Marker Payload Sequence
LOA	Loss of Alignment
HI SER	

#### Errors and Stats

RS-FEC Error Stats	Correctable counts and rates per codeword symbol and bits, uncorrectable counts and rates per codewords, A and B per engine and aggregate for 400GE, 200GE
RS-FEC Per Lane	Physical to virtual mappings, Corr. Symbol Errors, Corr. Bit Errors, Corr. BER, A and B per engine and aggregate for 400GE, 200GE
RS-FEC Error Distribution	Correctable per symbol bin, error count, and error%, Uncorrectable codeword count

#### Injections

LOAMPS, LOAML, LOCWMS	
HI SER	
FEC Error Injections	Correctable, uncorrectable, single, burst, rates $10^{-2}$ to $10^{-9}$
FEC Per Engine (400GE, 200GE)	Aggregate, A FEC, B FEC
Local Degraded SER (400GE, 200GE)	
Remote Degraded SER (400GE, 200GE)	

<b>Setups</b>	
Incoming FEC settings	Find and fix errors, Find but don't fix errors, Ignore FEC
FEC Type (100GE, 25GE)	No FEC, RS (528,514) FEC
Disable Hi SER Alarm	
Enable Degrade SER (400GE, 200GE)	
Enable Local/Remote Degrade SER (400GE, 200GE)	
Correctable RS-FEC BER Threshold Alarm support (400GE, 200GE), defaults to $2.4 \times 10^{-4}$	
<b>PCS</b>	
<b>Alarms and LEDs</b>	
Signal Present	
Sync Acquired and link active	
Marker Lock	LOAML (Loss of Alignment Marker Lock)
HI BER	
Excessive skew	User settable threshold defaults to 180ns
Local Fault	
Remote Fault	
<b>Errors and Stats</b>	
Invalid alignment markers	Counts and rates
Alignment marker lock	
BIP-8 Alignment Marker	Errors, rate
PCS Invalid Blocks	
Skew reporting	Per lane, max, min, current
Results per lane	Sync acquired, marker locked, code violations, invalid alignment markers, BIP-8 bit and block errors
<b>Injections</b>	
LOAML	Loss of Alignment Marker Lock, Per lane
LOAMPS	Loss of Alignment Marker Payload Sequence
LOCWMS	Loss of Codeword Marker Sequence
LOBL	Loss of Block Lock. Per lane
HI BER	
Local Fault	
Remote Fault	
Invalid Alignment Marker	Per lane, single, burst, rate $10^{-3}$ to $10^{-10}$

BIP-8	Per lane, single, burst, rate $10^{-3}$ to $10^{-10}$
Coding error	Per lane, single, burst, rate $10^{-3}$ to $10^{-10}$
Skew injection per lane (100GE no FEC)	
<b>MAC</b>	
<b>LED Indicators</b>	
Frame Detect	
ATP (Acterna Type Packet) Detect	
VLAN and SVLAN Detect, up to 4-VLAN tags deep	
<b>Statistics</b>	
Link Stats	Util % stats, Frame Rate, Frame Size, Tx/Rx Mbps at L1/L2, ATP Util %, Round Trip Delay, Packet Jitter, VLAN info
Link Counts	Tx/Rx Frame Counts, Tx/Rx ATP Frame Counts, Rx VLAN Frames, Unicast, Multicast, Broadcast, Tx/Rx Byte Counts, Frame size bin counts
Filter Stats	Util % stats, Frame Rate, Frame Size, Tx/Rx Mbps at L1/L2, Round Trip Delay, Packet Jitter, VLAN info
Filter Counts	Rx Frame Counts, Rx ATP Frame Counts, Rx VLAN Frames, Unicast, Multicast, Broadcast, Rx Byte Counts, Frame size bin counts
Peak Interframe Gap (service disruption)	
BERT	Pattern Losses, BER, Bit Errors, Bit Error Second
Errors	Undersized Frames, Runts, Jabbers, FCS errors, Errored Frames, Errored Seconds, Acterna Payload Errors, Packet Error Rate, Lost Frames, Frame Loss Ratio, Out of Sequence Frames
Graphs	Throughput, Frame Loss, Packet Jitter, Latency, Errors
<b>Injections</b>	
Undersize	Single, burst
Runts	Single, burst
FCS	Single, burst
<b>Setups</b>	
MAC Address types	Unicast, Multicast, Broadcast
Encapsulation	None, VLAN, Q-in-Q, up to 4 levels of VLAN tags

VLAN/CVLAN edits	ID, User priority
SVLAN edits	ID, User priority, DEI bit, TPID
Ethertype value	
Frame Type	DIX, 802.3
Payload type	ATPv3 (Acterna Test Payload) with fill byte, BERT
BERT payload	PRBS2 <sup>31</sup> , PRBS2 <sup>31</sup> Inv, User defined byte (10GE, 100GE), and for 10GE
Frame Size	64 to 16,000 bytes
Frame Variations	Fixed including Jumbo, Random, EMIX
Filters	Destination Address, Source Address, VLAN/CVLAN/SVLAN ID, DEI Bit, User priority, TPID, Payload Analysis

### IPv4

#### LED Indicators

IP Packet Detect

#### Statistics

Link Stats	Util % stats, Packet Rate, Packet Size, Tx/Rx Mbps at L3, TOS
Link Counts	Tx/Rx Packet Counts, Unicast, Multicast, Broadcast
Config Status	Source IP, Gateway, Subnet Mask, Dest IP, Dest MAC
Errors	IP Checksum Errors, IP Packet Length Errors, Acterna Payload Errors, Packet Error Rate, Lost Frames, Frame Loss Ratio, Out of Sequence Frames
Graphs	Throughput, Frame Loss, Packet Jitter, Latency, Errors

#### Injections

Errors	IP Checksum
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#### Setups

Ping Support	
ARP Support	
IP Source Address	Address, Default Gateway, Subnet Mask
IP Destination Address	
TOS Type	TOS, DSCP
TTL Value	
Protocol Value	
Payload type	ATPv3 (Acterna Test Payload), Fill Byte

### IPv6

#### LED Indicators

IP Packet Detect

#### Statistics

Link Stats	Util % stats, Packet Rate, Packet Size, Tx/Rx Mbps at L3
Link Counts	Tx/Rx Packet Counts, Tx Router Solicitations, Rx Router Advertisements, Unicast Packets, Multicast Packets, Binned sized packets in categories
Config Status	Src Global IP Address, Src Link-Local IP Address, IP Gateway, Subnet Prefix Length, Dest IP Address, Dest MAC Address
Errors	IP Packet Length Errors, Acterna Payload Errors, Packet Error Rate, Lost Frames, Frame Loss Ratio, Out of Sequence Frames
Graphs	Throughput, Frame Loss, Packet Jitter, Latency, Errors

#### Setups

Ping Support	
NDP Support	
IP Source Address	Manual, Stateful, Stateless
IP Destination Address	
Traffic Class	
Flow Label	
Hop Limit	
Payload Type	ATPv3 (Acterna Test Payload), Fill Byte

#### Traffic Load

Load Type	Constant, Burst, Ramp
Constant Load Unit	Bit rate, Percent, Frames per second
Burst Load Unit	Bytes and Information Rate, Burst Time and Information Rate, Bytes and Gap Time, Burst Time and Gap Time, Frames and Duty Cycle
Ramp	Time step and load step

#### Capture/Decode

Line rate Capture	All Ethernet rates
Integrated Wireshark	Viewing capture files can be performed directly on the test set and not require a separate laptop/PC.
Triggers and filters	Tx control plane and full Rx Capture Frame Slicing

## Enhanced RFC 2544

VLAN Q-IN-Q Support, up to 4 levels

Throughput

Latency

Frame Loss

Back-to-back

Packet Jitter

Burst Test (advanced)

Extended Load

Throughput, latency, packet jitter run concurrently for speed

Up to 10 frame sizes

Built-in QuickCheck

Graphical results

Integration into job manager

Available for Ethernet into OTN

For 4x100GigE KP4, user selects the applicable port

## Y.1564 SAMComplete

Service Configuration Test

Service Performance Test

VLAN Q-IN-Q Support, up to 4 levels

Committed Information Rate (CIR)

Extended IR (EIR)

Maximum IR (MIR)

Frame Loss Rate (FLR)

Frame Delay (FD)

Frame Delay Variation (FDV)

Committed Burst Size (CBS)

Policer Test

Additional throughput test like RFC 2544

Built-in QuickCheck

Graphical results

Integration into job manager

## QuickCheck

VLAN Discovery

Frame length setting

Measures maximum throughput

Integration into job manager

## VLAN Scan

Workflow to scan VLANs that are present

## OTN

### OTN Rates

#### Rates

OTU4 (111.8Gbps) with RS (528,514) FEC

OTU2e (11.1Gbps) with RS(528,514) FEC

OTU1e (11.05Gbps) with RS(528,514) FEC

OTU2 (10.709Gbps) with RS(528,514) FEC

#### FEC

See FEC under Ethernet, OTN uses RS (528,514) FEC

### Traffic Mappings

Bulk BERT for all supported OTN rates

PRBS Patterns	2 <sup>9-1</sup> , 2 <sup>9-1</sup> Inv, 2 <sup>23-1</sup> , 2 <sup>23-1</sup> Inv, 2 <sup>31-1</sup> , 2 <sup>31-1</sup> Inverse, Delay
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OTU4 with 100GigE client GFP-F

OTU1e/OTU2e with 10GigE client transparent

### OTL/OTN Injection/Detection

Set Tx Scramble on/off

Set Rx Descramble on/off

Skew injection per Virtual Lane:

Skew alarm (Rx) threshold settings	Defaults to 180nsec
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Skew reporting per virtual lane

Transcoding HI BER Detection on/off

#### Errors

OTL FAS	Per lane/all lanes; Single/Burst (up to 128)/Rate (10-3 to 10-10)
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OTL MFAS	Per lane/all lanes; Single/Burst (up to 128)/Rate (10-3 to 10-10)
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OTL LLM	Per lane/all lanes; Single/Burst (up to 128)/Rate (10-3 to 10-10)
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FEC Uncorrectable	Single/Rate (10-2 to 10-5)
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FEC Correctable	Single/Rate (10-2 to 10-5)
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OOM

SM-BIP	Single/Rate (10-5 to 10-7)
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SM-BEI	Single/Rate (10-5 to 10-7)
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PM-BIP	Single/Rate (10-5 to 10-7)
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PM-BEI	Single/Rate (10-5 to 10-7)
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TCM1-6 BIP	Single/Rate (10-5 to 10-7)
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TCM1-6 BEI	Single/Rate (10-5 to 10-7)
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Bit Error/TSE	Single/Rate (10-3 to 10-10)
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#### Alarms

OTL OOF

OTL LOF

LOM

SM-IAE

SM-TIM	
SM-BDI	
SM-BIAE	
ODU AIS	
ODU LCK	
ODU OCI	
PM-BDI	
PM-TIM	
Fwd Sig Fail	
Fwd Sig Degrade	
Bwd Sig Fail	
Bwd Sig Degrade	
TCM1-6 IAE	
TCM1-6 BDI	
TCM1-6 BIAE	
TCM1-6 TIM	
PT Mismatch	
Client Loss	
<b>OTN Overhead</b>	
Support of AMP, GMP, BMP as per client mapping	
GCC Transparency Test	Selection of GCC0, GCC1, GCC2, GCC1+2. PRBS verification on Rx interface with bits, errors, and BER.
Round-Trip Delay (RTD) as per G.709 section 15.8 (100 nsec accuracy)	Selection of PM or TCM1-6
Overhead Manipulation Analysis	
Setting of Tx and Rx Tributary Ports	
SM/PM and TCM1-6 Trace (TTI) messages	
Fault Signaling (FTFL) processing	
Payload Type (PT) Label generation/display	
<b>FEC Settings</b>	
Outgoing FEC: GFEC (G.709 FEC) or all-zeroes	
Incoming FEC: ignore, correct errors, do not correct errors	
<b>Service Disruption Measurement</b>	
<b>Measurement Parameters</b>	
SD Separation/Debounce Time Setting	
SD Threshold Time Settings	
<b>Triggers</b>	
Signal Loss / LOS	
Bit/ TSE Error	
LOF	

FAS	
MFAS	
OTL LLM	
OTU LOM	
OTU OOM	
OTU SM-IAE	
OTU SM-BIAE	
ODU PM-BIP	
ODU PM-BEI	
ODU AIS	
ODU LCK	
ODU OCI	
ODU PM-BDI	
<b>Results</b>	
<b>LEDs</b>	
Signal Present	
Frame Sync	
OTL Lanes Aligned (OTU4)	
OTL Marker Lock (OTU4)	
OTU OH Pattern Sync	
Pattern Sync	
Summary Status	
Event Log	
Histogram	
Service Disruption	Summary Table, Disruption Details, Disruption Statistics Time
<b>Interface</b>	
Invalid Rx Signal Seconds	
Signal Losses / LOS	
Signal Losses Seconds / LOS Seconds	
QSFP/SFP State	
Optical Rx Level (dBm)	
Rx Frequency (Hz)	
Rx Frequency Deviation (ppm)	
Rx Frequency Max Deviation (ppm)	
Tx Clock Source	
Tx Frequency (Hz)	
Tx Frequency Deviation (ppm)	
Tx Freq Max Deviation (ppm)	
Round-Trip Delay Current, Avg, Min, Max (100 nsec res.)	
<b>OTL</b>	
Frame Sync Loss Seconds / LOF Seconds	
OOF Seconds	
OOMFAS Seconds	

Marker Lock Loss Seconds / LOR Seconds
OOE Errors (out of recovery)
Lane Aligned Loss Seconds / LOL Seconds
OOL Seconds
OOLLM Seconds
FAS Errors, Rate, Seconds
MFAS Errors, Rate, Seconds
Logical Lane Marker Errors, Rate, Seconds
Max Skew (Bits)
Current Max Skew (Bits)
Max Skew (ns)
Current Max Skew (ns)
Max Logical Lane Skew (LL ID)
Min Logical Lane Skew (LL ID)
Multiple per lane statistics
<b>FEC</b>
Uncorrected Word Errors, Rate, Seconds
Corrected Word Errors, Rate, Seconds
Corrected Bit Errors, Rate, Seconds
<b>Framing</b>
OOM Seconds
<b>OTU</b>
OOM Seconds
AIS Seconds
SM-IAE Seconds
SM-BIP Errors, Rate
SM-BDI Seconds
SM-BIAE Seconds
SM-BEI Errors, Rate
SM-BEI Error Rate
SM-SAPI
SM-DAPI
SM-Operator Specific
GCC BERT Bits
GCC BERT Bit Errors
GCC BERT Bit Error Rate
<b>ODU</b>
ODU-AIS Seconds
ODU-LCK Seconds
ODU-OCI Seconds
PM-BIP Errors
PM BIP Error Rate
PM-BDI Seconds
PM-BEI Errors

PM-BEI Error Rate
PM-SAPI
PM-DAPI
PM-Operator Specific
GCC BERT Bits
GCC BERT Bit Errors
GCC BERT Bit Error Rate
PM Round Trip Delay Recent
PM Round Trip Delay Last
<b>OPU</b>
Payload Type
PT Mismatch Seconds
<b>FTFL</b>
Forward-Fault Type
Forward-SF Seconds
Forward-SD Seconds
Forward-Operator Identifier
Forward-Operator Specific
Backward-Fault Type
Backward-SF Seconds
Backward-SD Seconds
Backward-Operator Identifier
Backward-Operator Specific
<b>TCM1-6</b>
IAE Seconds
BIP Errors
BIP Error Rate
BDI Seconds
BIAE Seconds
BEI Errors
BEI Error Rate
SAPI
DAPI
Operator Specific
PM Round Trip Delay Recent
PM Round Trip Delay Previous
<b>Payload</b>
Pattern Sync Losses \ LSSs
Pattern Sync Loss Seconds \ LLS Seconds
TSE/Bit Errors
TSE/Bit Error Rate
TSE/Bit Error Seconds
Bit Error-Free Seconds
Bit Error-Free Seconds, %

OTN Check	
Automated workflow is available at all OTN rates for OTN Bulk	<b>Comments:</b> · Key use case is OTN service activation
Set test duration based on Bit Error Rate Theory or actual time	
Bit Error Rate Theory parameters for test duration:	
Data Rate (e.g. OTU4)	
BER Threshold	
Confidence Level (% value)	<b>Comments:</b> · Statistical degree of certainty
Key automated tests	
Payload BERT	
PRBS pattern selection	
Pass/Fail BER Threshold	
Round Trip Delay	
Selection of applicable OH fields: PM, TCM1-6	
Measurement Frequency	
Pass/Fail Threshold (ms)	
GCC Transparency/encryption keys	
Selection of GCC0, GCC1, GCC2, GCC1+2	
Pass/Fail BER Threshold	
Far-end loopback auto-detect function	
Report generation and formats	

## Fibre Channel

### Fibre Channel Rates

64G FC (57.8 Gbps)    On SFP56 PAM4 electrical

### FEC

See FEC under Ethernet, 64GFC uses RS(544,514)

### Fibre Channel Generator

Frame Length	28 (no payload), 32, 76 (ATP), 128, 256, 512, 1024, 1536, 2076, 2140 settings
	User defined (28 to 2140)
Fibre Channel Fields	Unicast or Broadcast
	Destination ID
	Source ID
	Sequence ID
	Originator ID
	Responder ID
FC Frame Payload	BERT/PRBS Pattern (2 <sup>31</sup> -1, 2 <sup>23</sup> -1, User Byte)
	Acterna Test Protocol Version 3
Auto-traffic start on laser on	

### Traffic Load

Load Type	Constant, Burst, Ramp
Constant Load Unit	Bit rate, Percent
Burst Load Unit	Burst time and Gap time, Frames and Duty Cycle
Ramp	Time step and Load step

### Flow Control Login

Link Init	Enable/bypass
TTS Support	Enable/disable
Tx and Rx	Couple/Decouple (for Peak IFG/Service Disruption)
Flow Control	On/off
Login Type	Implicit, E-Port, Fabric/N-Port
MAC ID	Unit Identifier
	Port Name
Fabric/N-Port login	Topology
	Source N-Port Name
	Source Node Name/Source ID
	Dest N-Port Name
	Dest Node Name/Dest ID

### Traffic Filtering

Routing Control	
Destination ID	
Source ID	
Data Type	
Sequence Control	
Data Type	BERT Tx=Rx
	Payload Analysis
	Rx BERT Pattern

### Injection/Detection

HI SER	
Code	Single/Rate
CRC	Single/Burst
Bit Error (PRBS)	Single/Rate (10 <sup>-3</sup> to 10 <sup>-9</sup> )
FEC as in FEC section	

### Results

LEDs	Signal Present, RS-FEC, Sync Acquired, Link Active, ATP Detect, Pattern Sync
SLA/KPI	Frame Loss, Round Trip Delay
Event Log	
Histogram	
Time	
Interface	Signal Loss, Sync Loss, Link Loss, Optical Rx Overload, Tx Clock Source

Link Statistics	
Link Counts	Rx Frames, Tx Frames, Rx Acterna, Tx Acterna, 28-64 Byte Frames, 68-124 Byte Frames, 128-252 Byte Frames, 256-508 Byte Frames, 512-1020 Byte Frames, 1024-2140 Byte Frames Rx Frame Bytes, Tx Frame Bytes, Rx R_RDY's, Tx R_RDY's, Near-end B-B Credits, Tx Avail B-B Credits, Class F Frames, Class 1 Frames, Class 2 Frames, Class 3 Frames
Filtered Counts	
BERT Stats	Pattern Losses, Bit Error Rate, Bit Errors
Login Status	Login Status, Fabric Present, Fabric Login Status, F Port Name, Fabric Name, N Port Login Status, Dest N Port ID, Dest N Port Name, Dest Node Name, Source N Port ID, Source N Port Name, Source Node Name
RS-FEC Stats	
Error Stats	Symbol Errors, CRC Errored Frames, Fiber Runts, Fiber Jabbers, Undersized Frames, Errored Frames, Code Violations
Graphical Displays	
<b>FC RFC 2544</b>	
Throughput	
Latency	
Frame Loss	
Back-to-back	
Buffer Credit	
Buffer Credit Throughput	
Graphical Results	

## 100G Module on OneAdvisor 1000



### Physical Interfaces

The 100G Module (TM100GA) provides the following physical ports:

- 1 x CFP4
- 2 x QSFP28
- 2 x SFP28
- 1 x RJ-45 for 10/100/1000Base-T
- 1 x RJ-48c
- 2 x Mini-BNC
- 1 x SMA for GNSS Antenna
- 1 x CLK IN/OUT
- 1 x 1PPS IN REF
- 1 x EXT

### Functionality

The functionality on the 100G module is analogous to that of the MAP-2100. More information can be found in the 5800-100G/MAP-2100 datasheet (5800-100g-ds-tfs-nse-ae).

The 100G Module has its own onboard processor and storage just as with 5800-100G/MAP-2100.

The 100G Module runs the same software applications as 5800-100G/MAP-2100