



400G Ethernet Analyzer

Network Master Pro
MT1040A



MT1040A Product Concept

World's smallest class portable 400G analyzer that contributes to the expansion of Ethernet networks, supporting the evolution of 5G and Data Centers' communication traffic

Features

- 200G/400G 2 port simultaneous measurement, independent control possible
- Providing quantitative evaluation in 200G/400G FEC essential technology change
- Easy to analyze the correlation on the different parameters and on different layers with unique history function
- High Power supply and sufficient cooling mechanism for pluggable coherent (100ZR /400ZR /OpenZR+ /OpenROADM)
- Support 4x100G and 2x200G breakout test with Ethernet test
- Improve customer testing efficiency through automated testing (SEEK)
- Efficient expandability by stackable structure
Transport + Transport, Transport + OTDR



Network Master Pro Mainframe

- ✓ Battery operation at 400G (ability to move tester between measurement locations maintaining a powered on status)
- ✓ Ability to reuse all current HW modules
 - Mount 400G module and current modules simultaneously
 - i.e. 400G + OTDR

400G Multirate module

- ✓ One 400G port (can mount up to 2*400G modules for dual port 400G testing)
- ✓ Two ports for 100G and lower bit rates (2 mounted modules support up to 4 simultaneous ports)
- ✓ 400ZR/OpenZR+/OpenROADM operation without any restriction as well as 400G DR4/FR4/LR4
- ✓ Direct module support for QSFP-DD, OSFP, QSFP56, QSFP28, SFP/SFP+/SFP28
- ✓ Supports 10M to 400G Ethernet and 2.6G-100G OTN

1 Module with Mainframe

262(W) x 167(H) x 134(D) mm, 4.7 kg max.
>1 hour of battery operation (for 400G)

2 Modules with Mainframe

262(W) x 167(H) x 187(D) mm, 6.5 kg max.
No battery operation

MT1040A Dedicated Measurement Modules

MU104014B 400G (QSFP-DD) Multirate Module



**QSFP-DD
/QSFP28
/QSFP**

QSFP28/QSFP

SFP28/SFP+/SFP

10/100/1000BASE-T

Test Interface

200G/400G 1port (QSFP-DD)

100G/40G/25G/10G/1G/100M/10M 2port

MU104015A 400G (OSFP) Multirate Module



OSFP

QSFP28/QSFP

SFP28/SFP+/SFP

10/100/1000BASE-T

Test interface

400G 1port (OSFP)

100G 1port (QSFP28)

40G/25G/10G/1G/100M/10M 2port

➤ Test Interfaces

	QSFP-DD /QSFP56	OSFP	QSFP28 /QSFP+	SFP28/ SFP+/SFP	RJ45
MU104014B	x1		x2	x2	x2
MU104015A		x1	x1	x2	x2

Key Features

Stackable structure

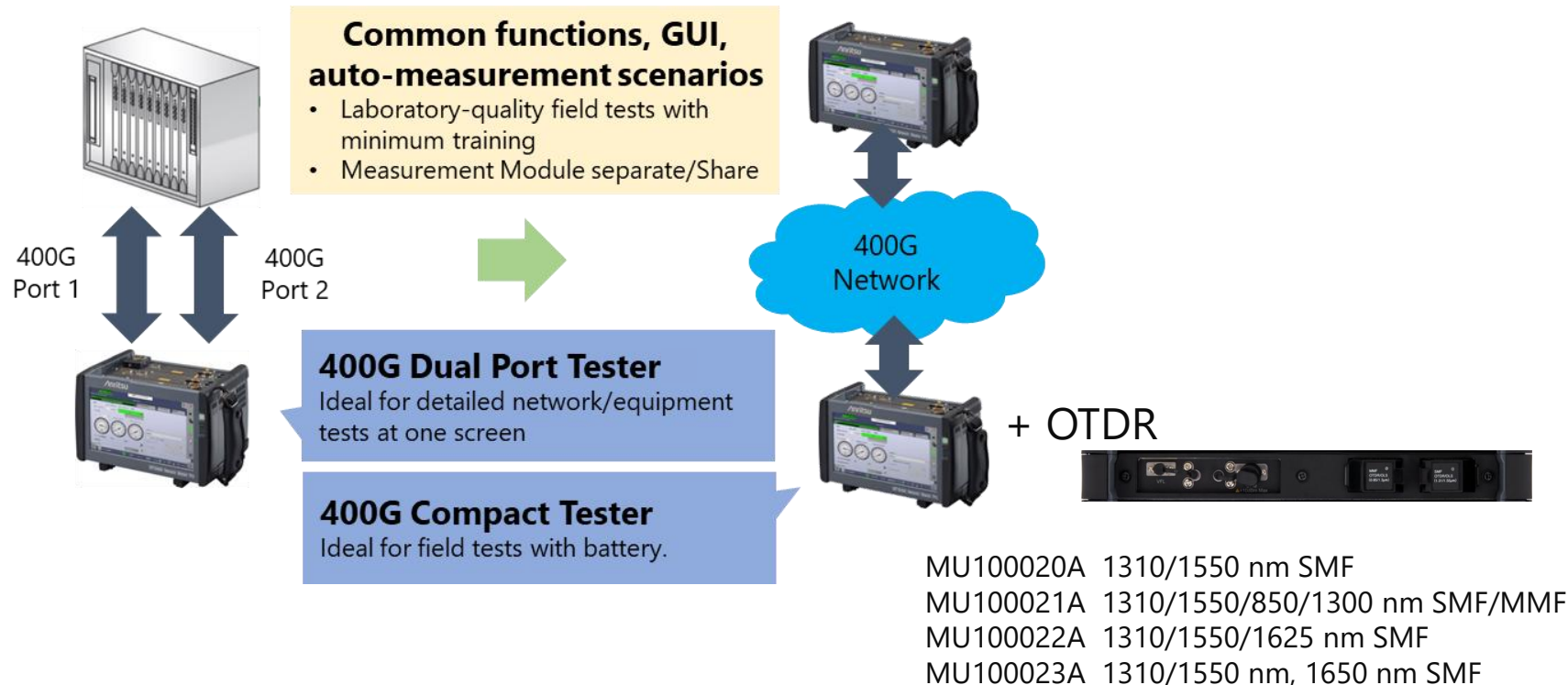
ANRITSU UNIQUE : Optimize the hardware as to the usage!!

One tester supports both Lab use and I&M use via stackable architecture.
Get Lab-quality test in I&M with minimum training and with minimized configuration.

Split 2 port in Lab to 2x 1 port in I&M, and maximize the field testers with saving the cost.

Equipment Tests in laboratories

I&M



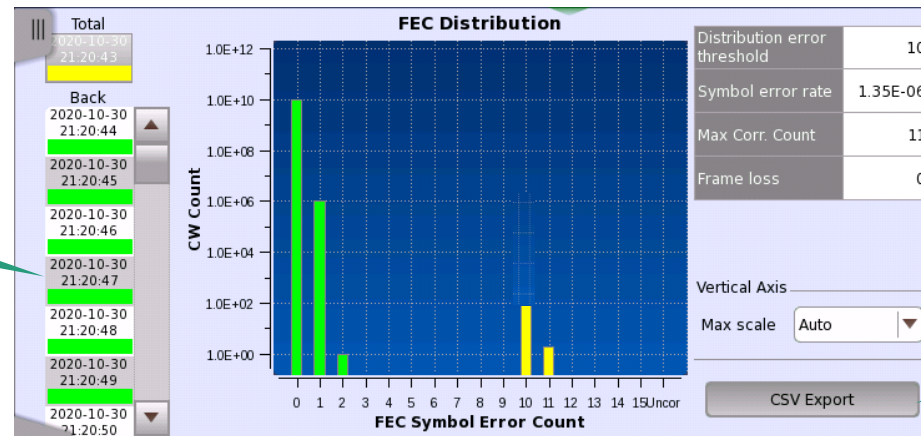
Key Features

FEC performance test

ANRITSU UNIQUE : Easy margin test with threshold and yellow-highlight!!

FEC collection margin is important for stable 200GbE/400GbE communication.
FEC margin test provides the hidden risk not observed by FEC failure test and Ethernet frame test.

Automatically saves
results continuously
at any interval



Outputs csv file for
detailed analysis

Supports detection of both Symbol Error maximum and occurrence of burst-type errors with two types of threshold setting

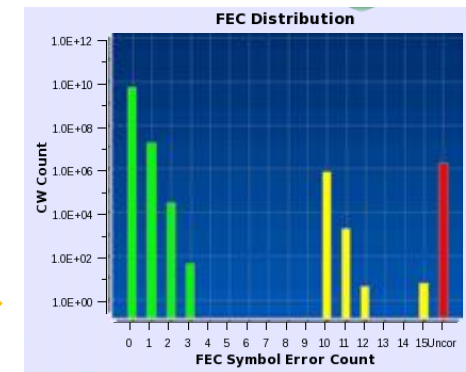
FEC Thresholds

Symbol error rate:

CW Distribution:

Symbol Error rate
threshold

Symbol Error rate
count threshold
per codeword



Displays color-coded alarms
when threshold values exceeded

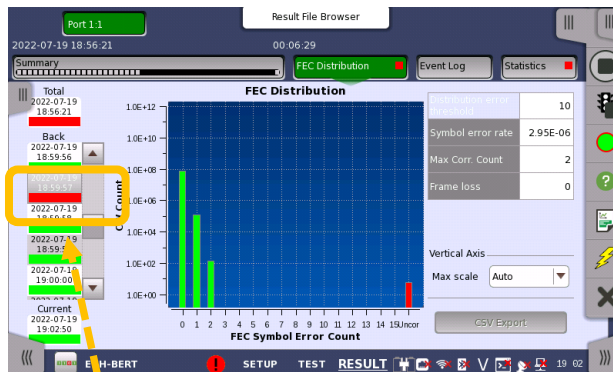
Key Features

History function for correlation analysis

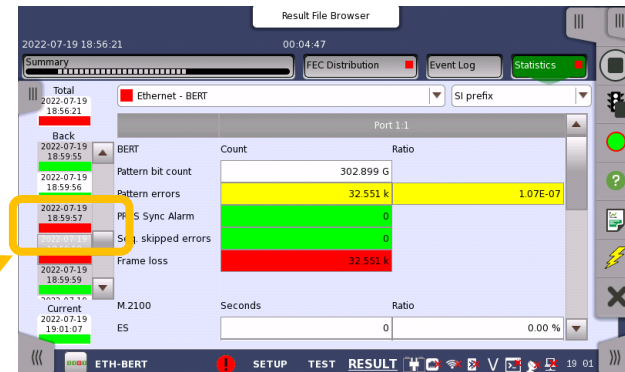
ANRITSU UNIQUE : Easy analysis of the failure event correlation !!

To analyze the network failure event and the extent the impact is important to investigate the root cause and to recovery the network quickly.

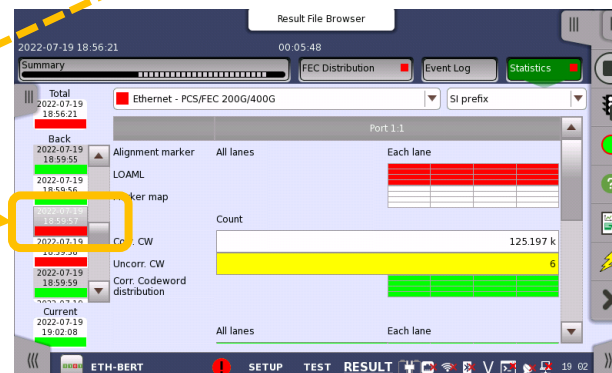
History function can store the all of result with any interval (1 sec to 12 hours) and user can compare the failure parameter each other.



FEC failure event



Ethernet frame loss event



PCS layer alarm event

Same time stamp
history result

Output csv file for more
detail investigation on
the PC.

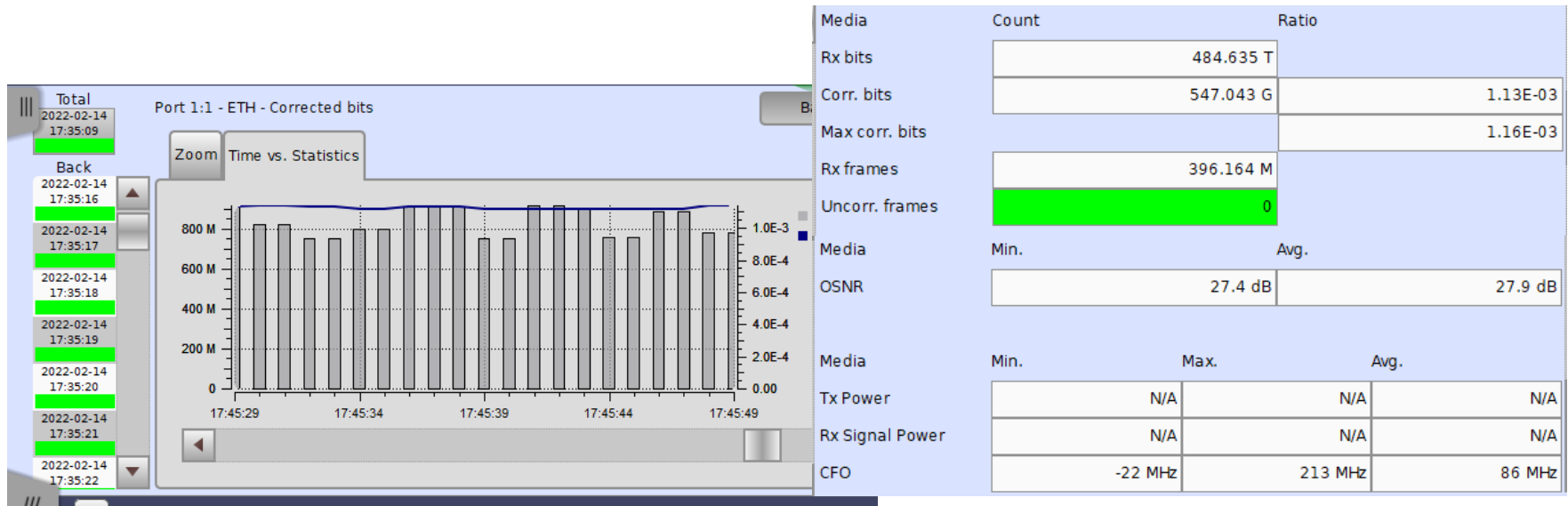
Key Features

100ZR /400ZR /OpenZR+ /OpenROADM test : Contiguous Monitoring function

ANRITSU UNIQUE : Easy analysis Media side performance by history function!!

Support native Pluggable Coherent transceiver test. Both client Ethernet test and Media monitor via transceiver are supported.

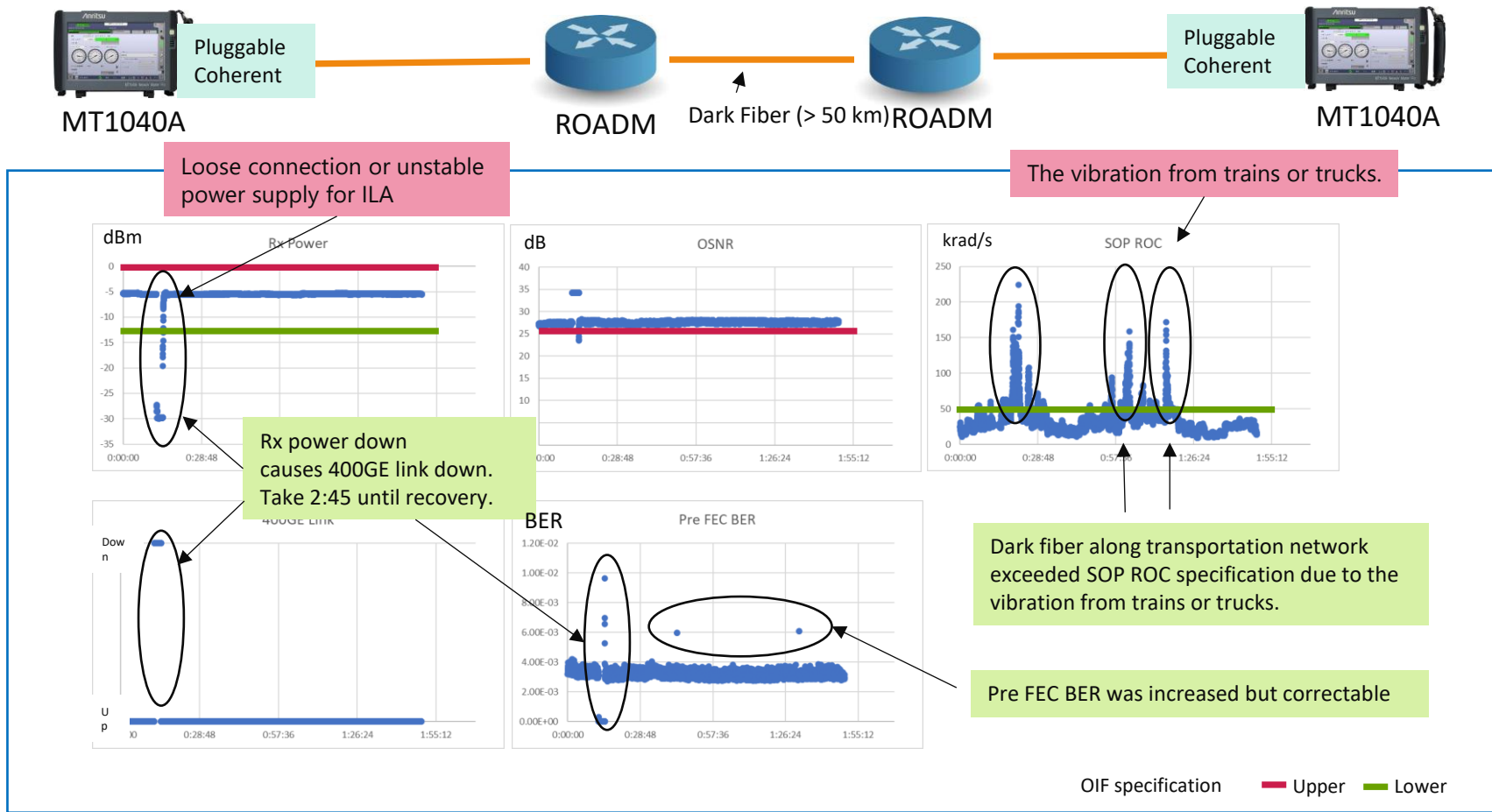
- Ethernet test result : BER, FL, Delay, Packet Jitter, SDT,,,
- OTN test result (only for 100ZR) : BERT, RTD and APS
- Monitored result by transceiver
Rx bits, Rx corr bits, Rx frames, Rx uncorr frames, CD, SOPROC, OSNR, Tx/Rx power, CFO
(note) the validity is guaranteed by each transceiver.



Key Features

100ZR /400ZR /OpenZR+ /OpenROADM test : Media monitoring example

MT1040A reads every register in minimum 1 sec interval and can be stored for a long time.



The accuracy of each parameter depends on the transceiver specification

Key Features

400ZR/ZR+/OpenROADM test : Multi-client option

Support following multiple client defined in OpenZR+/OpenROADM test with Graphical user interface.

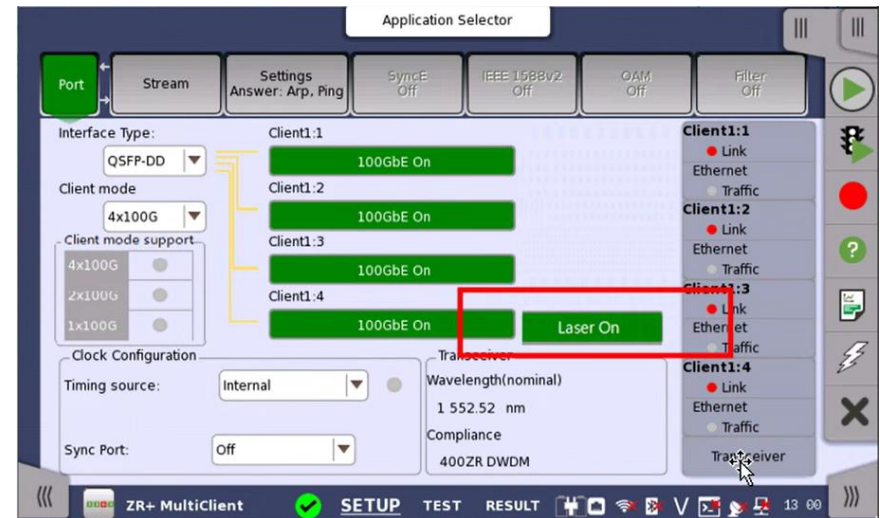
- 1x 400GBASE-R (Electrical PAM4 50 Gbps x8) (*1)
- 4x 100GBASE-R (Electrical PAM4 50 Gbps x8) (*2)
- 2x 100GBASE-R (Electrical PAM4 50 Gbps x4) (*2)
- 1x 100GBASE-R (Electrical PAM4 50 Gbps x2) (*2)

Independent and simultaneous test in each client

- BER, FL, Delay, Packet Jitter, SDT,,,

(*1) Require MU104014B-x33 400GE single channel option

(*2) Require MU104014B-x36 OpenZR+ Multi-Client BERT



400ZR/ZR+/OpenROADM : Heat control

Powerful hardware and flexible setting prevent the transceiver failure from the heat.

➤ **Temperature sensor**

According to the monitored room temperature by using the internal sensor, MU104014B automatically controls the FAN speed to avoid excessive noise generation. The user can choose Auto or Manual (H/M/L) adjustments

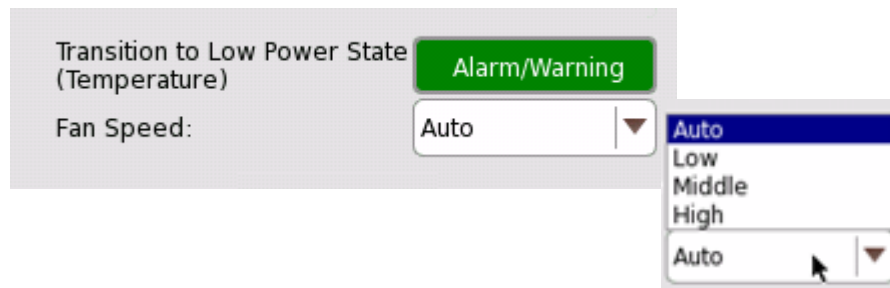
➤ **Transceiver temperature warning/alarm**

Upon detection of a warning or alarm status in the transceiver's registers, MU104014B can modify the transceiver mode from ready to low-power to prevent damages. The user can select whether a warning or an alarm will trigger this action.

The transceiver mode modification is reported in the Event log display during the measurement.

➤ **Maximum supported temperature**

MU104014B can support up to 28W power consumption, when the transceivers operation temperature is under the transceiver's limit for warning/alarm condition.



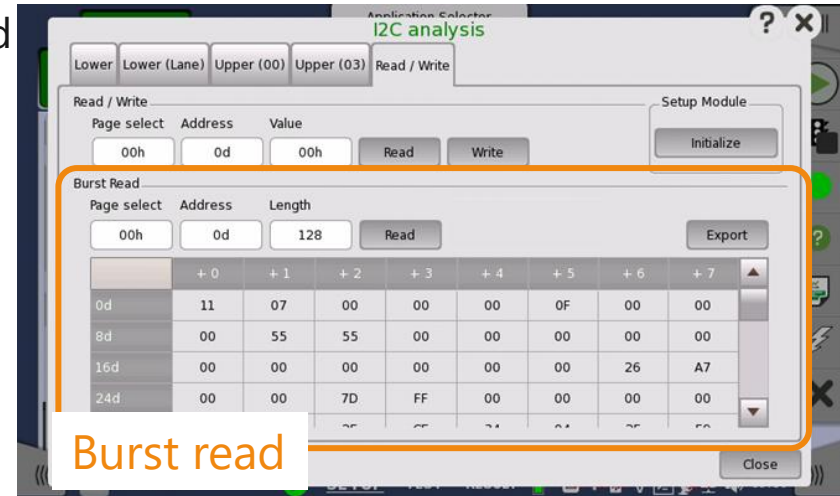
Key Features

Optical Transceiver MDIO / I2C Access

ANRITSU UNIQUE : Burst Read interface helps understanding the transceiver status.

MDIO and I2C interface support for monitoring and

- Per lane support for
 - Power level
 - Independently turn on/off
- Register access and status analysis
- Ability to automate with SEEK



Example of I2C analysis



Example of Power meter and Power On/Off



Example of SEEK result

Key Features

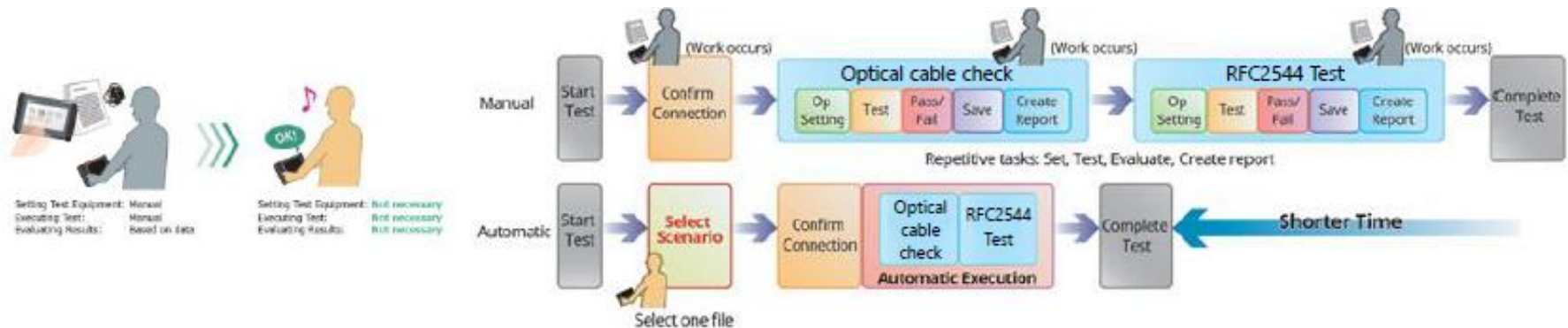
One button operation : SEEK (Scenario Edit Environment Kit)

ANRITSU UNIQUE : Flexible scenario as to user test sequence and guidance!!

Collective measurement procedures into one button

Automate from setting to result acquisition → Massively reduced measurement time

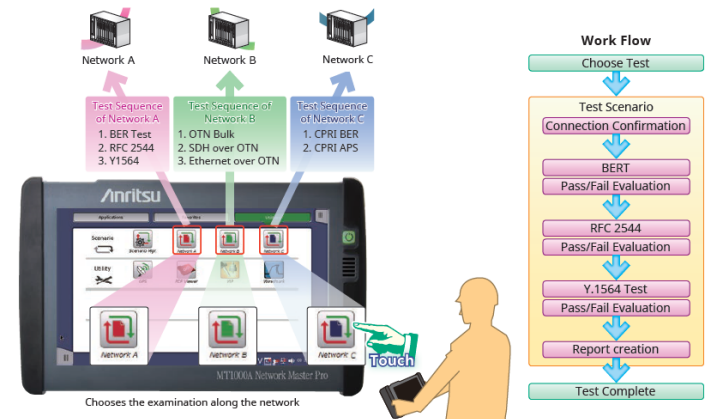
Perform complex procedures with one button → Allows easily achievable measurements



Prepare multiple scenarios according to the measurement targets and goals

→ Improves operating efficiency of test equipment

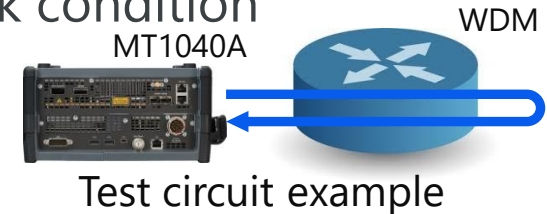
Test equipment can be shared by multiple workers



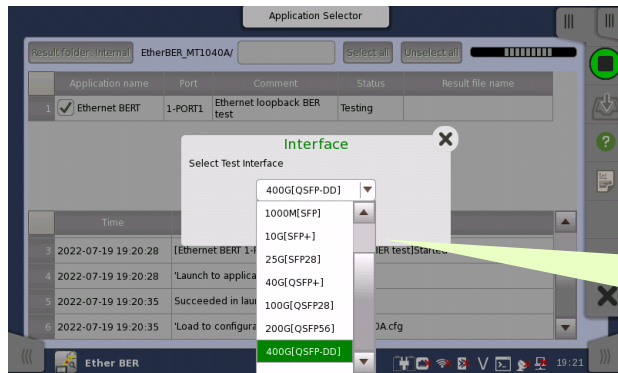
Key Features

One button operation : SEEK (Scenario Edit Environment Kit)

- Scenario Example: Frame loss test with loopback condition
No need to dig around GUI to find setting for Addresses, Frame length and transmission rate.
Scenario pops up the required parameter according to the test sequence and shows the procedure with picture.



Test circuit example

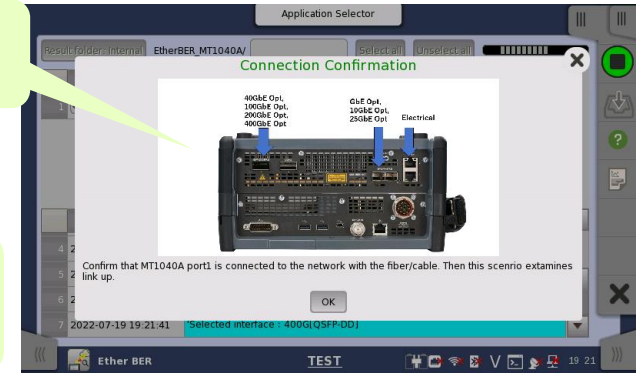


Interface selection

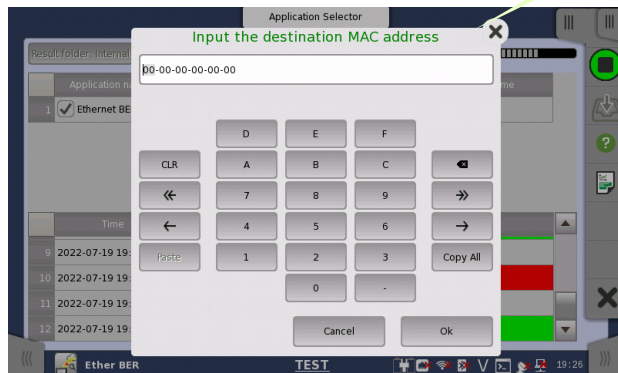
Shown any picture to guide test procedure.



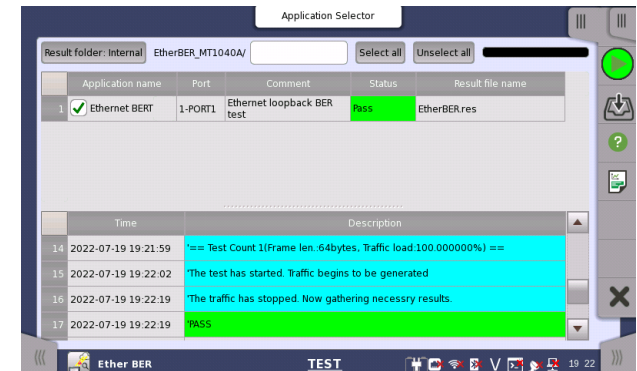
Popped up Required parameters with test sequence



Connection guidance



Parameter setup

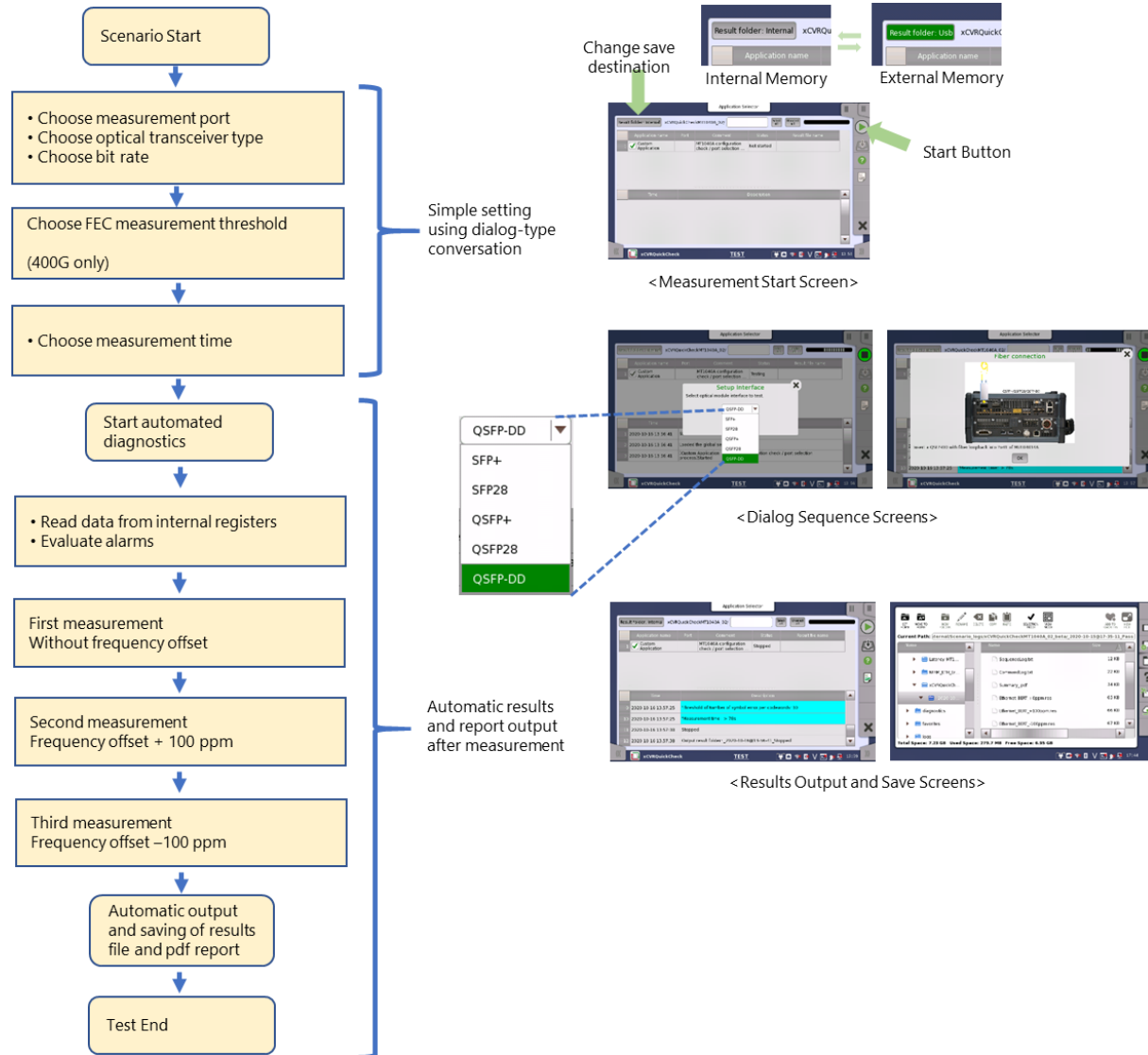


Auto Pass/Fail judgement

Key Features

One button operation : SEEK (Scenario Edit Environment Kit)

- Scenario Example
Optical module tests
- Easy on-site work using conversational dialog-type sequences
- In addition to BER tests and optical-module internal warning/alarm evaluations, also supports key Symbol Error tests for FEC performance evaluation
- Autonomous test execution, and results and report output



Key Features

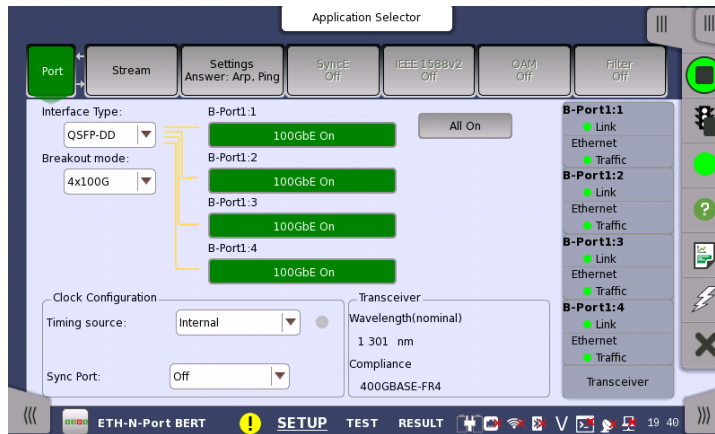
Breakout test

ANRITSU UNIQUE : Ethernet test on breakout connection!!

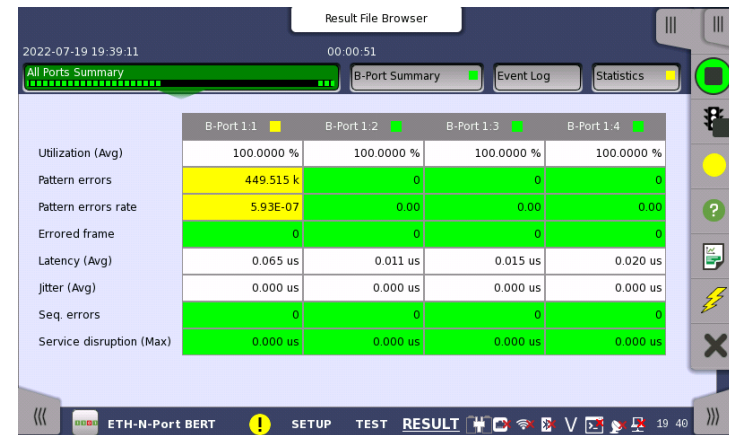
Breakout connection becomes much popular in live network to save cost and to smoothly upgrade the network. To measure the performance, Ethernet test on breakout ports is required, different from Layer 1 BER test.



Throughput, latency, BER measurement and ping for each 100GbE



Independent interface setup



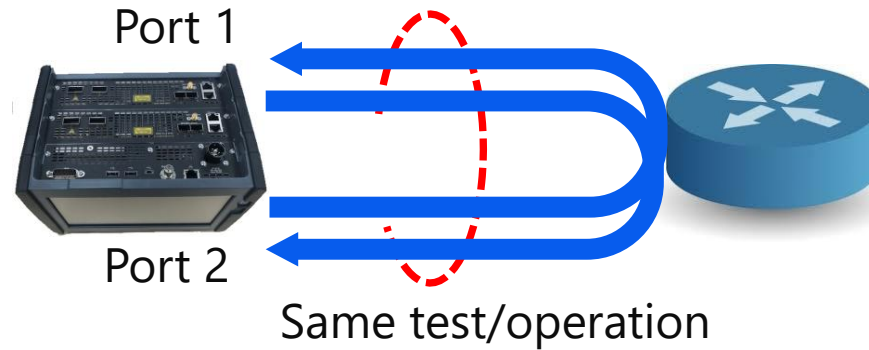
Ethernet performance on each port

Key Features

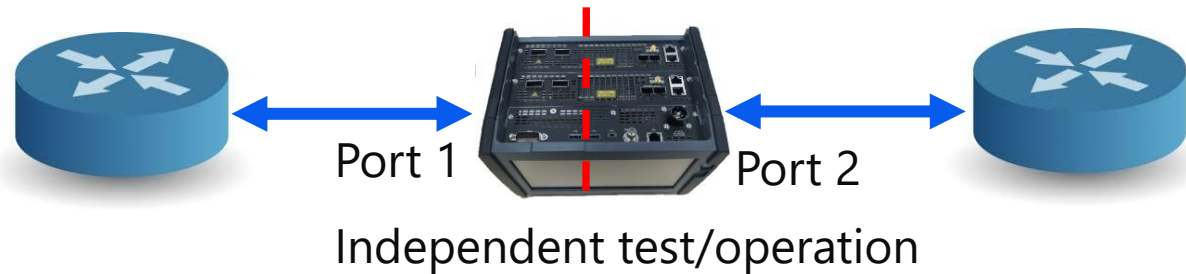
2x400 GbE, 4x100 GbE

MT1040A multiple port configuration provides various usage and benefits.

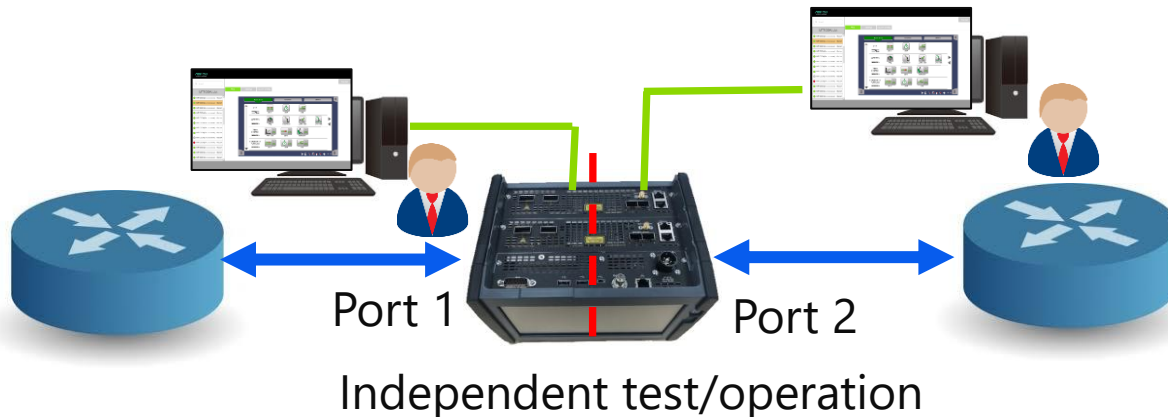
- Multi port



- Multi application



- Multi user

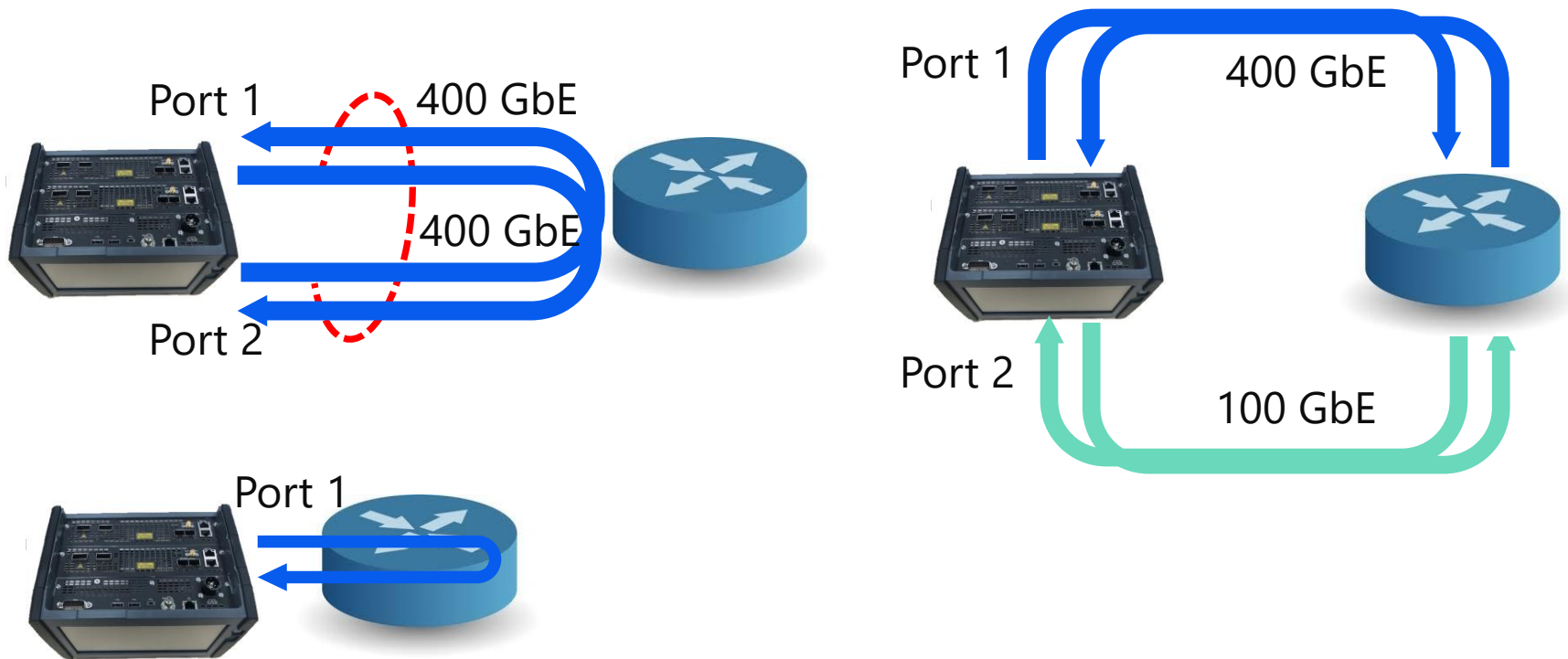


Key Features

2x400 GbE, 4x100 GbE

1) Bidirectional test with multi port

- Possible to measure both direction simultaneously to get the detail of performance such as bandwidth / Latency / SDT.
- Possible to test Uplink / downlink test with different bit rate interface.



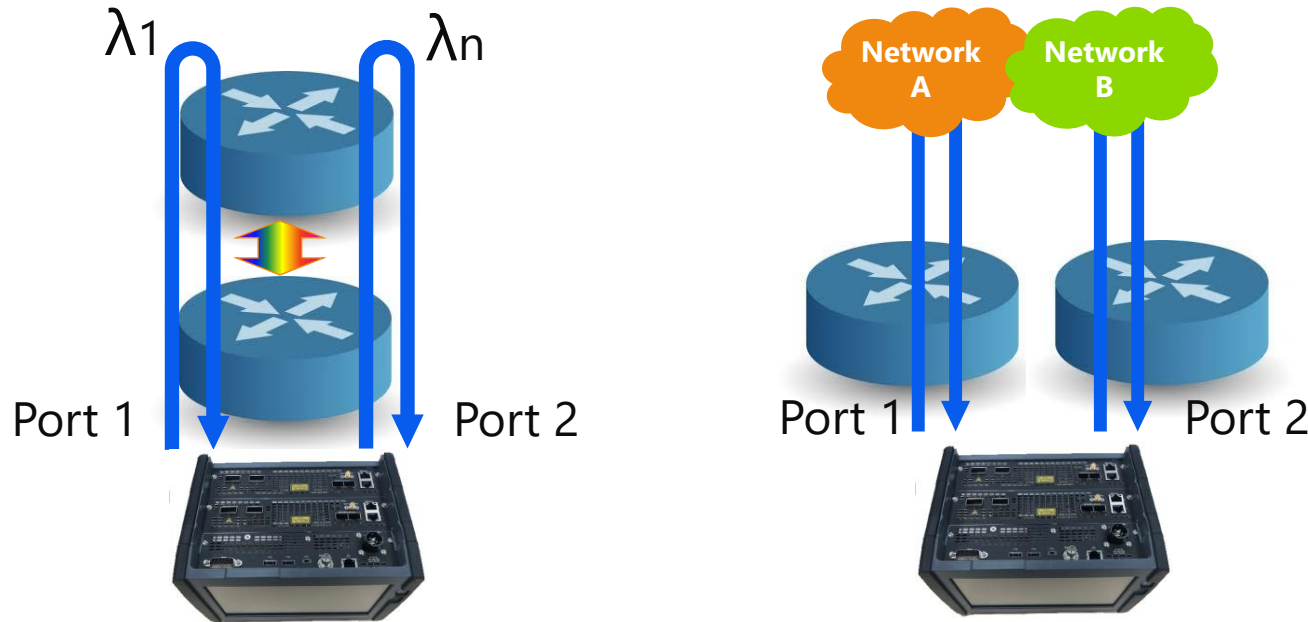
One port tester can measure the performance just on loopback connection.
Difficult to find which direction has the bottle neck.

Key Features

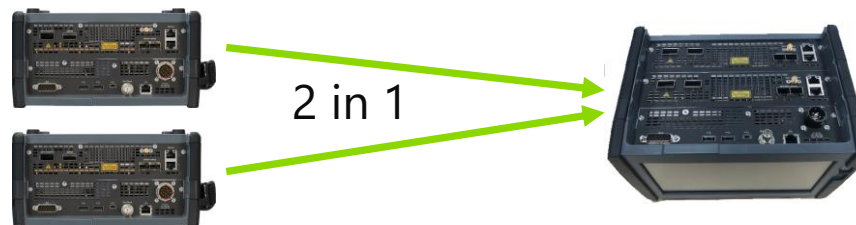
2x400 GbE, 4x100 GbE

2) Simultaneous two lines test with multi port

- Easy to compare each wavelength performance on one GUI and report.
- Compare two networks performance.
Both performance is shown on same GUI and reported on one file.



3) Multi user Save cost and space

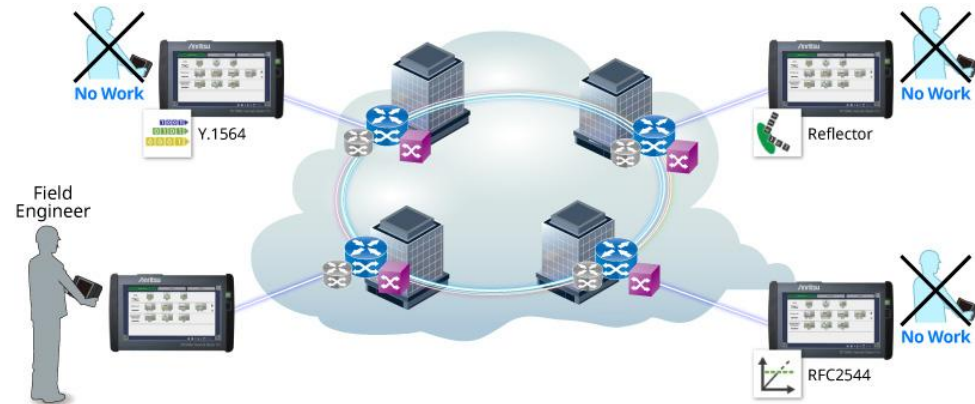


Key Features

Remote access and control

◆ In-Band control and Auto discovery

- ✓ No Need for Two Engineers for End-to-end Test
- ✓ One engineer controls both local and remote testers without dedicated LAN for remote access
- ✓ Testing from one end cuts OPEX



◆ Remote control MX100001A software

- ✓ Remote GUI operation
- ✓ Remote wake-up
- ✓ Remote shut down
- ✓ Remote firmware update

◆ VNC (remote operation)

- ✓ Multi user access



Supported Interface

Interface	Application	Form Factor	Distance	Wave length	Connector type	Required option
Coherent	100ZR	QSFP28	120 km	1550 (Tunable)	LC	MU104014B/15A/11A-006 and (-015, 016, 055 or 056)
	400ZR	QSFP-DD	120 km		LC	MU104014B-033 400GE option
	OpenZR+	QSFP-DD	> 300 km		LC	
	OpenROADM	QSFP-DD	> 300 km		LC	
400GE	400GBASE-DR4	QSFP-DD	500 m	1310	12 MPO	MU104014B-033 400GE option
	400GBASE-FR4	QSFP-DD	2 km	1310	LC	
	400GBASE-LR4	QSFP-DD	10 km	1310	LC	
100GE	100GBASE-SR4	QSFP28	100 m	850	12 MPO	MU104014B-015/-016 100GE option
	100GBASE-LR4	QSFP28	10 km	1310	LC	
	100GBASE-ER4	QSFP28	40 km	1310	LC	
	100GBASE-DR1	QSFP28	500 m	1310	LC	
	100GBASE-FR1	QSFP28	2 km	1310	LC	
	100GBASE-LR1	QSFP28	10 km	1310	LC	
200GE	200GBASE-DR4	QSFP56	500 m	1310	12 MPO	MU104014B-031 200GE option
	200GBASE-FR4	QSFP56	2 km	CWDM4	LC	
	200GBASE-LR4	QSFP56	10 km	LAN-WDM4	LC	
N x Ethernet	400G-2FR4	OSFP	2 km	CWDM4	CS x 2	MU104015A-035 2x 200G option
	400G-XDR4	QSFP-DD	2 km	1310	12 MPO	MU104014B-034 4x 100G option

Small

- Compact, lightweight, and battery operated
- 9-inch touch screen and intuitive easy-to-use GUI

Flexible

- All-in-one support for 10 Mbps to 400 Gbps Ethernet, eCPRI, OTN, SDH/SONET, FC, and CPRI
- Also supports optical fiber measurements when combined with OTDR and VIP
- Stackable structure for 2x 200G/400G, 4x 100G and with OTDR.

Powerful

- Quantitative and visual 200G/400G FEC analysis function
- Contiguous media monitoring for 400ZR/ZR+/OpenROADM line monitoring
- Optical module automatic tests tools as standard
- Conversational dialog-type automation test function as standard for strong network commissioning support



➤ General

- Direct adapter-free QSFP56, QSFP-DD and OSFP installation
- Compact [all-in-one dual-port 200G/400G](#) design
- Support for 200G/400G BASE-LR4, FR4, DR4, ZR, OpenZR+, OpenROADM and AOC
- Full support for 200G/400G I&M, [simultaneously using installed OTDR and 400G modules](#)
- Support for diverse communications standards, including Ethernet, OTN, SDH/SONET, eCPRI/RoE, CPRI/OBSAI, FC
- [One-button operation](#) from settings to results display for efficient field testing
- VNC remote control support

➤ Key Ethernet Functions

- 200G/400GbE BERT, Throughput and Latency tests, Multistream tests
- RFC2544 Tests
- [Quantitative evaluation and easy-to-understand graphical display of 200G/400G FEC corrected Symbol Error distribution](#)

