Advancing beyond

Efficient Automated Scenario Tests for PON Deployment

Network Master Pro MT1000A/MT1040A

1. Introduction

A Passive Optical Network (PON) is composed of an optical fiber network distributing data to and from optical line terminals (OLTs) at a central office via an optical splitter from and to multiple optical network units (ONUs) in a one-to-many constellation each located at a subscriber's building. G-PON with a transmission capacity of 1 Gb/s was standardized for Fiber to the x (FTTx) in 2003. The current main standard is XGS-PON with 10 Gbit/s. Moreover, by using a combination of time domain multiplexing (TDM) and wavelength domain multiplexing (WDM), the newer NG-PON2 standard supports a transmission capacity of 40 Gb/s and development of 50G-PON is currently being investigated. On the other hand, the 25GS-PON MSA Group is progressing with 25GS-PON standardization.





Next-generation PON standards after XGS-PON are investigating use of up to 128 to 256 branches from the optical splitter. This means that the optical power to each branch decreases as the number of branches increases. Consequently a high loss budget (difference between optical Tx module output power and optical Rx module minimum sensitivity) is required. End-to-End PON should be verified to maintain high quality of communications, while ensuring that loss and reflection due to optical fiber bending, fiber connections, and splices and meets PON system tolerances.

Moreover, the recent increase in PON installation and maintenance (I&M) work places a heavy workload on optical network I&M engineers while there is also a shortage of manpower. As a result, key issues are how to improve the efficiency of I&M work and train new engineers.

The most common troubles in PON I&M works are missed implementation of specified test items, test result misjudgment occurred by leaving to engineers, and backtracking of subsequent processes. Such troubles not only reduce work efficiency and incur unnecessary costs, but also delay the start of services. Therefore, substantial training for engineers is necessary. Use of test scenarios and automated testing can offer uniform tests and reduce training costs, solving the above issues. This document explains how to use scenarios with the Network Master Pro MT1000A and MT1040A to automate PON system tests.

2. Scenario Types and Test Items

The two types of scenario files are listed in Table 1, where 1550 nm and 1650 nm represent the OTDR module test wavelengths.

Table 1 Scenario Files.

File Name	Description		
PON(1550nm).obcfg	Scenario files for 1550 nm wavelength		
PON(1650nm).obcfg	Scenario files for 1650 nm wavelength The 1650 nm wavelength is used only for PON maintenance.		

Table 2 lists the testers and test items.

Table 2 Testers and Test Items.

Tester	Item
MT1000A/MT1040A Autofocus Inspection Probe G0382A	For inspecting optical fiber end face
MT1000A/MT1040A OTDR Module	For measuring OLT output power Measures optical fiber network transmission loss, connection loss, backscatter, etc., from ONU connected to optical splitter to OLT to troubleshoot fiber breaks

3. Scenario Registration

1. After unzipping the downloaded file, copy the file named "PON(******).obcfg"*1 to a USB memory stick and insert the stick into the MT1000A/MT1040A.

*1: "******" means either 1550 nm or 1650 nm.

The 1650 nm scenario file (*PON(1650nm).obcfg*) is used for maintenance to prevent interference with the in-service optical signal output from the OLT.

- 2. Start *Scenario.Mgr* by touching the *icon* on the MT1000A/MT1040A *Utilities* screen.
- 3. Select the scenario to register at the 🆄 icon at the screen top-right.



Starting Scenario.Mgr

Selecting Scenario Setting Screens

Registering Scenario

Figure 2 Setting Screens.

4. How to Execute Scenario

This section describes the scenario execution sequence. Scenario files have the set default values listed in Table 3 to Table 5. Section 6 explains the procedure for changing the optical power meter measurement wavelength setting.

Section 7 explains the procedures for setting the G0382A and changing the settings for the OTDR number of optical splitters, number of branches, and IOR.

Table 3 Optical Fiber End Face Inspection (G0382A) Default Settings.

Parameter	Default
Тір Туре	LC-APC-F-L
Test Profile	SM-APC

Table 4 Optical Power Measurement Default Settings (OTDR Module).

Parameter	Default
Setting Wavelength	1550 nm

Table 5 Optical Fiber Test Default Settings (OTDR Module).

Parameter	Default
Number of Splitters	2
Test Profile	SM-APC
1 st Splitter Number of Branches	1 × 16
2 nd Splitter Number of Branches	1 × 8
Index of Refraction (IOR)	1.4682 for Scenario file "PON(1550nm).obcfg" 1.4685 for Scenario file "PON(1650nm).obcfg"

The scenario sequence is illustrated below.



Figure 3 PON Test Scenario Sequence.

1. Touch PON(*****nm) on the MT1000A/MT1040A Utilities screen and then touch the start () icon on the Application Selector screen.



Start PON Test



2. Input the name of the splitter under test and the number of fibers, and then touch OK.

Note: Splitter name: Input only alphanumeric characters. Number of fibers: Input a numerical value between 1 and 128.

Application Selector	Application Selector	
default_splitter_name	Results folder: POHI25 Enter Number of fibers per cable (1 to 128).	
Longite 22/64	VW No. 1 Max	20
	3 √ Standard 0 CLA 7 8 9 G	
	K- 4 5 6 -¥	
	2023-03-0114 Polu 0. Copy J	
	Cancel Ok	

Splitter Name



3. Perform the fiber end face test. Connect the G0382A (VIP in diagram) to the USB port of the MT1000A/MT1040A and insert the fiber under test into the G0382A. Then, touch *OK*.



4. If the optical fiber end face test result is Pass, connect the next optical fiber to test. Touch *Yes*. Repeat the test for the number of fibers set at step 2 above. If the optical fiber and face test result is Fail, clean the optical fiber end face and touch *Retry* to re-test. Note: Touching Yes starts the next measurement. Only touch Yes after connecting the next fiber to test.



5. Set the received optical power Pass evaluation threshold by inputting the minimum permissible optical power.



6. Follow the displayed screen guidance to disconnect the fiber from the power meter (Input) port, and then close the protective cover to shield the port from incident light.



7. Follow the displayed screen guidance to connect the optical fiber to the optical power meter port. Measurement is repeated for the number of optical fibers set at step 2 above.



8. Follow the displayed guidance on the screen to connect the optical fiber to the OTDR port. Touch *OK* to start the fiber test using the OTDR.



9. The test scenario starts automatically after completing the above steps.



10. The test result files shown in Table 6 are saved automatically in the path Internal/Scenario_logs/PON(1×50nm) v1/_YYYY-MM-DD@HH-MM-SS_Pass/Fail.



Table 6 Test Result Files.

File Name	Description				
Summarypdf	Test Summary Report (PDF format)				
[Splitter name]_[number].pdf	Optical Fiber End Face Test Report PDF format)				
[Splitter name]_OTDR.pdf	Optical Fiber (OTDR) Test Report (PDF format)				
[Splitter name]_PM.pdf	Power Meter Measurement Report (PDF format)				
[Splitter name]_[number].vipi	Optical Fiber End Face Results File (Anritsu VIP application format)				
[Splitter name]_PM.csv	Power Meter Measurements (CSV format)				
[Splitter name]_OTDR.sor	OTDR Test Results File (SOR format)				
Summaryobres					
CommandLog.txt	Scenario debugging file (not used usually)				
SequenceLog.txt					

5. Pass/Fail Conditions

The following table shows the OTDR Pass/Fail default values. Use the procedure described in section 7 to change these values as necessary.



6. How to Change Scenario Setting Parameters

Users can change the following setting parameters.

Power Meter Measurement Wavelength

Touch Scenario.Mgr at the MT1040A Utilities screen, select the test name PON(*****nm)vX.0, and touch Edit.



Settable parameters are listed in the red frame shown below.

	1					
7	Application name	Commer	nt	Va	llue	
	VIP	VIP test				
	olts	PM test		1-P0	ORT1	
	Standard OTDR	OTDR Full Auto test 1550nm	t at	1-PORT1		
	Nam	ie		Note	Value	
	Nam	ne (Created whe	Note n test starts, don't	Value	
	Clatteres a				No input required	
1	FileName		enter here, t	ransfers file name ac		() I
1	FileName TestFail		enter here, t Used to tran: apps	sfer failed test across	No Input required	

Table 7 Test Parameters.

Parameter	Description		
PowerMeterRef	Power Meter Wavelength		

7. How to Edit Scenario

1. Download the Scenario Edit Environment Kit (SEEK) MX100003A from the following Web site.

https://www.anritsu.com/en-US/test-measurement/support/downloads/software/dwl17488

2. Install SEEK in the PC.

Unzip the downloaded ZIP file and start setup.exe.

- Application Files
- DotNetFX46
- OBTEditor 2.0.0.62.application
- OBTEditor 2.0.0.62.exe
- setup.exe

3. Start MX100003A (SEEK) XXXX (where XXXX is the version number).

4. Touch Open to open the scenario for editing.

1	MX100003A	(SEEK)						- 0	×
File	Settings	Help							
	New	Dpen	Save	MT1X00A Connection	Instrument Configuration	Scenario Settings	Report Settings	Global Variables	
	C	ommand	Selecti	ions	Command S	equence	Comm	and Details	
1	😸 Loa	id Setup	- M	essage					
(Sta	rt	Re	quest					
	Sto	p	🡆 Ac	tion					

How to Change Settings (G0382A)

Touch *Load Setup* and then touch *Edit* to display the screen shown on the right where Probe Model, TipType, and Test Profile can be changed.

File Settings Help	0 28		0 B		🖉 VIP Clg File Editor	- 85 ISB - 86		200000	×
New Open	Save MT08094.Com	median Instrument Configuration Is	arranie Settings Report Settings	Onder Groups			Test Crite		
Comman	d Selections	Command Seq	uence Com	mand Details	Proho Model	GONDA		Auto Measure	
D Sur	1 least	b sublition	×		Tip Type	LC-APC-F-L		Auto Capture	
M and	Actor	H	N N		Test Profile	SM APC	2		
		- Constant							
		A Atte	8						Close

How to Change Settings (OTDR)

Touch Load Setup in Standard OTDR in Command Sequence and touch Edit in Command Details.

File Settings	Help						
New	Quen Open	Save	MT1X00A Connection	Instrument Configuration	Scenario Settings	Report Settings	Global Variables
С	ommand	l Selecti	ons	Command S	Sequence	Comm	and Details
👯 Loa	d Setup	Me	essage	Standard OTD	R 24	Select File	Browse PC Browse MT1X00A
Star	t	Re	quest	Action	×	File Name	TUP.CFG
Sav		😽 Ju	ige	Action Messag		Create File	Letter .
⊞ [Optical-Fib	er Testing		Load Se	tup 🗶		
E	Utility	_		Start	×		
Ħ	Other	_		Save	×		

To change the Pass/Fail conditions, touch the Pass/Fail tab and input the values.

2 OTDR Cfg File Editor					×
Measurement lor/Bsc Header Prefe	Test	Criteria			
Output Port • SM	• мм	Wavelength	1550	×	nm
Test Mode • Auto Distance Range 0.5 km	Manual	Resolution	Coarse	÷	1
Pulse Width 3 ns	~	Average Time	15 s	v	l.
Auto Detect Pass/Fail Fiber	Analy	sis Criteria			
Pass/Fail Judgement Criteria	Manual	~			
Non-Refl. Event Loss 🗹	0.1 dB	То	tal Loss 🔲	3	dB
Reflective Event Loss 🗹	0.5 dB	Optical Retu	ırn Loss 🔲	27	dB
Reflectance 🗹	-35 dB	Split	ter Loss 🛛	3	dB
Fiber Loss (dB/km) 🛛	0.25 dB/k	m Questionable	Splitter 🔳		
				Close	

To set Number of Splitters and splitter 1 and 2, touch the Fiber tab and input the values.

2 OTDR Cfg File Editor		×							
Test Criteria									
Measurement Tor/Bsc Header Preferences									
Output Port 🍳 SM 🔎 MM	Wavelength 1550 r	nm							
Test Mode 🍳 Auto 🔹 Manual									
Distance Range 0.5 km 🛛 💉	Resolution Coarse 🗸 🗸								
Pulse Width 3 ns 🗸 🗸	Average Time 15 s								
		_							
Ana Auto Detect Pass/Fai <mark> Fiber</mark>	alysis Criteria								
Launch Fiber None 💉	Recieve Fiber None -								
Launch Length	km Recieve Length	ĸm							
Launch Length Correlation 2	% Receive Length Correlation	%							
Number of Splitters 2	1 1x16 × 2 1x8 ×								
	Close								

To change the IOR, touch the *lor/Bsc* tab and input the value.

2 OTDR Cfg File Editor					×			
Measurement lor/Bsc Header Preference	es	Test Criteria						
IOR ^{11.4682} BSC ^{-81.5} Fiber Type Other	·	dB						
Analysis Criteria								
Auto Detect Pass/Fail Fiber					_			
Event Loss 0.5	dB	Splitter 1x2 3	dB	Splitter 1x32	dB			
Reflectance -60	dB	Splitter 1x4	dB	Splitter 1x64 18	dB			
Fiber End ³	dB	Splitter 1x8	dB	Splitter 1x128 ²¹	dB			
Macro Bend ☑ ^{0.3}	dB	Splitter 1x16	dB					
				Close				

How to Save Scenario

Touch Save after changing the settings.



Advancing beyond

United States

Anritsu Americas Sales Company 450 Century Parkway, Suite 190, Allen, TX 75013 U.S.A. Phone: +1-800-Anritsu (1-800-267-4878)

• Canada Anritsu Electronics Ltd. 700-100 Queen Street Ottawa, Ontario K1P 1J9, Canada

Phone: +1-800-Anritsu (1-800-267-4878) • Brazil

Anritsu Eletronica Ltda. Praça Amadeu Amaral, 27 - 1 Andar 01327-010 - Bela Vista - Sao Paulo - SP, Brazil Phone: +55-11-3283-2511 Fax: +55-11-3288-6940

• Mexico Anritsu Company, S.A. de C.V.

Blvd Miguel de Cervantes Saavedra #169 Piso 1, Col. Granada Mexico, Ciudad de Mexico, 11520, MEXICO Phone: +52-55-4169-7104

• United Kingdom Anritsu EMEA Ltd.

Annisu Eivie A Ltu. 200 Capability Green, Luton, Bedfordshire, LU1 3LU, U.K. Phone: +44-1582-433200 Fax: +44-1582-731303

• France

Anritsu S.A. 12 avenue du Québec, Immeuble Goyave, 91140 VILLEBON SUR YVETTE, France Phone: +33-1-60-92-15-50

• Germany

Anritsu GmbH Nemetschek Haus, Konrad-Zuse-Platz 1, 81829 München, Germany Phone: +49-89-442308-0 Fax: +49-89-442308-55

• Italy

Anritsu S.r.l. Spaces Eur Arte, Viale dell'Arte 25, 00144 Roma, Italy Phone: +39-6-509-9711

• Sweden Anritsu AB

Kistagången 20 B, 2 tr, 164 40 Kista, Sweden Phone: +46-8-534-707-00

 Finland Anritsu AB

Filoso Aviapolis, Teknobulevardi 3-5 (D208.5.), Filo1530 Vantaa, Finland Phone: +358-20-741-8100

Denmark

Anritsu A/S c/o Regus Winghouse, Ørestads Boulevard 73, 4th floor, 2300 Copenhagen S, Denmark Phone: +45-7211-2200

• Russia Anritsu EMEA Ltd. Representation Office in Russia Tverskaya str. 16/2, bld. 1, 7th floor., Moscow, 125009, Russia Phone: +7-495-363-1694

Fax: +7-495-935-8962 • Spain

Anritsu EMEA Ltd.

Representation Office in Spain Paseo de la Castellana, 141. Planta 5, Edificio Cuzco IV 28046, Madrid, Spain Phone: +34-91-572-6761

• Austria

Anritsu EMEA GmbH Am Belvedere 10, A-1100 Vienna, Austria Phone: +43-(0)1-717-28-710

• United Arab Emirates Anritsu EMEA Ltd. Anritsu A/S

Office No. 164, Building 17, Dubai Internet City P. O. Box – 501901, Dubai, United Arab Emirates Phone: +971-4-3758479

• India

Anritsu India Private Limited 6th Floor, Indiqube ETA, No.38/4, Adjacent to EMC2, Doddanekundi, Outer Ring Road, Bengaluru – 560048, India Phone: +91-80-6728-1300 Fax: +91-80-6728-1301 Specifications are subject to change without notice.

Singapore

Anritsu Pte. Ltd. 11 Chang Charn Road, #04-01, Shriro House, Singapore 159640 Phone: +65-6282-2400 Fax: +65-6282-2533

Vietnam
Anritsu Company Limited
16th Floor, Peakview Tower, 36 Hoang Cau Street, O Cho Dua Ward,
Dong Da District, Hanoi, Vietnam
Phone: +84-24-3201-2730

• P.R. China (Shanghai) Anritsu (China) Co., Ltd.

Room 2701-2705, Tower A, New Caohejing International Business Center No. 391 Gui Ping Road Shanghai, 200233, P.R. China Phone: +86-21-6237-0898 Fax: +86-21-6237-0899

• P.R. China (Hong Kong) Anritsu Company Ltd.

Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza, No. 1 Science Museum Road, Tsim Sha Tsui East, Kowloon, Hong Kong, P.R. China Phone: +852-2301-4980 Fax: +852-2301-3545

• Japan Anritsu Corporation 8-5, Tamura-cho, Atsugi-shi, Kanagawa, 243-0016 Japan Phone: +81-46-296-6509 Fax: +81-46-225-8352

• Korea

Anritsu Corporation, Ltd. 5FL, 235 Pangyoyeok-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, 13494 Korea Phone: +82-31-696-7750 Fax: +82-31-696-7751

Australia Apritou Ptv 1 td

Anritsu Pty. Ltd. Unit 20, 21-35 Ricketts Road, Mount Waverley, Victoria 3149, Australia Phone: +61-3-9558-8177 Fax: +61-3-9558-8255

2302

Taiwan Apritsu Compa

Anritsu Company Inc. 7F, No. 316, Sec. 1, NeiHu Rd., Taipei 114, Taiwan Phone: +886-2-8751-1816 Fax: +886-2-8751-1817