OPWILL TECHNOLOGIES (BEIJING) CO., LTD

OTP6126 Handheld Gigabit Ethernet Test Set User Guide

Version: V2.10

OPWILL

Revision History

The following tables shows the revision for this document.

Date	Version	Revision
18/04/2011	1.0	Initial Release
3/07/2015	2.0	Revised the whole document; New interface;
12/08/2015	2.10	Add Constant transmit mode in Table 7.6: Frame Analysis Configuration: Traffic Shaping; Add Power saving mode in Table 8.3: System Setting: Power.

The product and the user guide could be upgraded or modified without notice. Please visit the website of OPWILL (www.opwill.com) or contact us for the further information.

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1. Introduction

1.1 Overview

OTP6126 Handheld Gigabit Ethernet Test Set is one of Ethernet test product of OPWILL. The product fully meets Ethernet standards (ITU-T Y.1564, IETF RFC2544, IETF RFC3393, IEEE 802.3, IEEE802.1 etc.,), and supports Ethernet WAN and LAN network test with high reliability, convenience, and flexibility. Meanwhile, the module can provide a high efficient SLA test function for service provider.

The PTN test module is specially designed for testing PTN (Packet Transport Network) of mobile backhaul transport network. It fully meets IEEE; ITU-T; and RFC standards, and supports a comprehensive test of PTN to provide performance guarantee for PTN business. Also it can support 155M; 622M; and 2.5G SDH/PDH test. Customers can depend on their various test demands during the establishment of PTN network to select or customise these optional test functions.

1.2 Main Features

OTP6126 Handheld Gigabit Ethernet Test Set has the following features:

- Interface user-friendly, operation simply, and durable;
- High resolution LCD colour touchable screen;
- Support all Gigabit Ethernet tests;
- Rapid start technology;
- Battery life: more than 8 hours.

2. Description

2.1 Front Panel

2.1.1 Front Panel Diagram

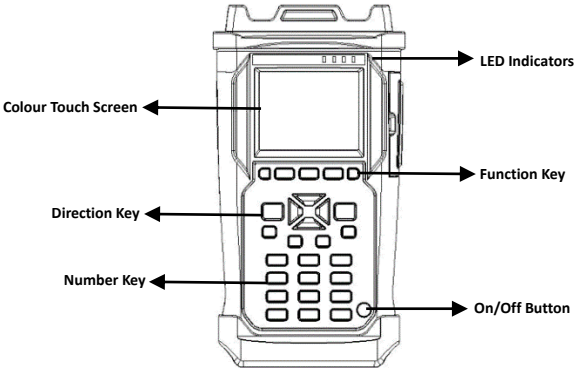


Figure 2.1 OTP6126 Handheld Gigabit Ethernet Test Set Front Panel View

2.1.2 LED Indicators

LED locations for all LEDs on OTP6126 has been shown in Figure 2.1. Table 2.1 describes the LEDs placed on OTP6126 as indicators.

Table 2.1 LED Indicator Definitions

LED	Status	Description
	Green	On;
	Off	Off, and unplugged in,
	Green	Plugged in and battery is fully charged,
	Green, **(Flashing)**	Battery is on charge,
	Red, **(Flashing)**	Unplugged in, and battery is weak,
	Red	Battery error,
	Off	• Off; • Unplugged in, and battery level is above the 'critical threshold',
	Green	Result status: success ***(Current result of the application does not exceed the predefined threshold),***
	Red	Result status: failure ***(Current result of the application exceeds the predefined threshold),***
	Green, **(Flashing)**	Laser status LED, at least one module is transmitting an optical signal,
	Off	No module is transmitting signal.

2.1.3 Buttons

Table 2.2 describes the functions of OTP6126 Handheld Gigabit Ethernet Test Set's buttons.

Table 2.2 Buttons Description

Button	Description
F1, F2, and F3	Function keys: Select the one sub menu from main menu displayed on the screen;
◀ ▶	Function keys: Switch the main menu;
CANCEL **X**	Cancel/Exit;
OK √	OK/Confirm;
◀ ▲ ▼ ▶	Navigation arrows: Left; right; up; and down;
SYSTEM	Click to enter system setting;
BACKLIGHT	Click to adjust screen backlight;
HOME	Back to main menu;
RUN/STOP	Click to run or stop test;
⏻	On/Off ***(Specific operation information can be seen in Section 5.1)***;

2.2 Right Panel

2.2.1 Right Panel Diagram

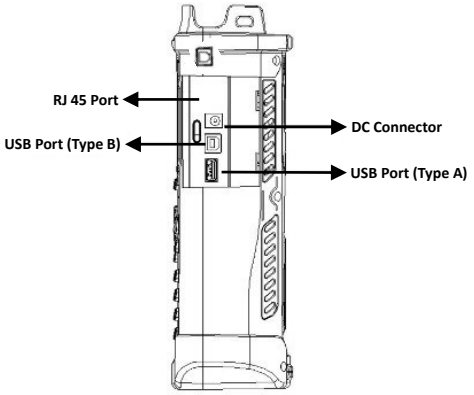


Figure 2.2 OTP6126 Handheld Gigabit Ethernet Test Set Right Panel View

2.2.2 Interfaces

Table 2.3 describes the interfaces of OTP6126 Handheld Gigabit Test Set.

Table 2.3 Interfaces Description

Interfaces	Quantity	Description
RJ-45 Port	1	Connect to Ethernet network,
USB Host Ports	1	• Connect USB memory drive; • Connect keyboard; • And connect mouse device, etc.
Mini USB port	1	Connect a USB cable for data transferring between the device and a computer,
Audio Output Port	1	Connect headphone/microphone,
DC Connector	1	Connect A/C adapter.

2.3 Top Panel

2.3.1 Top Panel Diagram

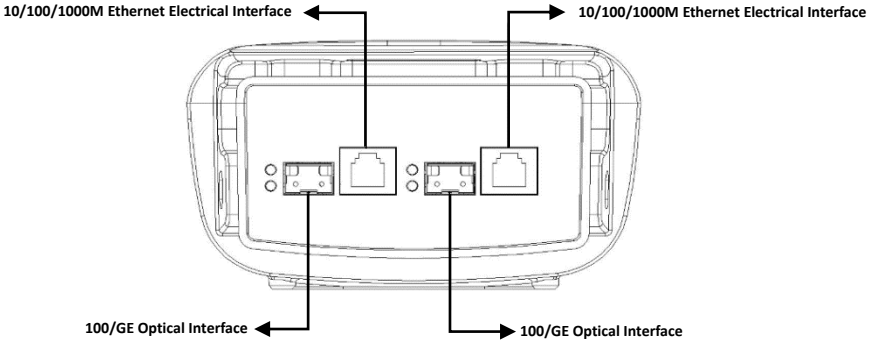


Figure 2.3 OTP6126 Handheld Gigabit Ethernet Test Set Top Panel View

2.3.2 Interfaces

Table 2.4 describes the interfaces of OTP6126 Handheld Gigabit Test Set.

Table 2.4 Interfaces Description

Interfaces	Quantity	Description
100/1000M BASE-X Optical port	2	• Signal: 100/1000Mb/s optical signal; • Type: SFP optical port.
10/100/1000 BASE-TX Electrical port	2	• Signal: 10/100/1000Mb/s electrical signal; • Type: RJ-45.

2.4 Bottom Panel

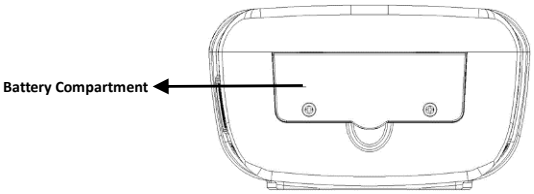


Figure 2.4 OTP6126 Handheld Gigabit Ethernet Test Set Bottom Panel View

3. Specifications

3.1 Environmental Guidelines

The OTP6126 can work normally and stably under the severe environmental condition. Table 3.1 defines these environmental conditions which are complied with the OTP6126.

Table 3.1 Environmental Ranges

	Temperature Range	Humidity Range
Operational	-10℃～50℃	0%～95%(non-condensing)
Storage	-40℃～70℃	0%～95%(non-condensing)
(Note: The device is able to perform satisfactorily without any degradation at an altitude up to 3000 meters above mean sea level.		

3.2 Adapter and Battery

3.2.1 AC/DC Adapter and Fuses

AC/DC adapter can be plugged into any standard electrical socket but only for indoor using, and can charge rechargeable Lithium-Ion battery.

Table 3.2 Input and Output Requirement

	Voltage	Current
Input	150-270VAC (50±2 Hz)	Max 2A
Output	15VDC	2A
Fuses	24V	3A

3.2.2 Rechargeable Lithium-Ion Battery

Rechargeable Lithium-Ion battery will supply the power for the device automatically when the AC/DC adapter has been unplugged.

(Note: OTP6126 Handheld Gigabit Ethernet Test Set will only work normally when the battery has been installed in the battery compartment properly and the compartment cover has been locked properly whether the device is using power source or not).

- The device work will not be affected by switching power supply between power source and Lithium-Ion battery;
- Automatically charge when the device has been connected to power source;
- At least 8 continuous working hours under Bellcore TR-NWT-001138 standard.

3.3 Other Physical Specifications

Table 3.3 describes other physical specifications of OTP6126 Handheld Gigabit Ethernet Test Set.

Table 3.3 Other Physical Specifications

Specification	Description
Power consumption	< 10W
Dimension	Dimension (H×W×D) = 80mm x 135mm x 250mm;
Weight	< 1.1kg

4. Safety Information

4.1 General Safety Information

If the device has not been stored properly under the storage temperature range, the device's temperature must be guaranteed to reach the operational temperature before turn it on ***(Specific environmental information can be found in Table 3.1)***.

4.2 Laser Safety Information

- Do not install or detach fibres directly when a light source is activated;
- Do not attempt to look directly into the fibre, in case your eyes will be injured by optical signal;
- The device is Class 1M laser product, complies with IEC 60825-1 Amendment: 2001 and 21 CFR 1040.10, hence invisible laser radiation could be emitted from optical fibre output port;
- Safety can be guaranteed by operating the device under a predictable and reasonable conditions, however using an optical instrument to view the laser beam whether is diverged or not is potentially hazardous, therefore do not attempt to use an optical instrument to view the laser beam directly;
- When the laser safety light is flashing, which indicates at least one module is transmitting an optical signal, please check all modules working status, because the module which is transmitting the signal might not be the one currently using.

4.3 Electrical Safety Information

- Ventilation should be guaranteed around the device;
- Operating the device under the environment with highly inflammable gas will cause a significant safety incident;
- To avoid lightning strike, do not attempt to operate the device during the thunderstorm, particularly when any part of the device surface ***(Cover, panels, etc.)*** has been damaged.

- Damage will be occurred if the input voltage or current of power source has exceeds the maximum voltage or current limitation,
  (Specific information for input requirement can be seen in Section 3.2 Adapter and Battery);
- If the device needs to be powered off completely, please make sure the adapter has been unplugged, and removes the batteries;
- Replacement of any components or modules must be conducted under complete power off condition;
- Capacitors in the device may be still under the charged condition even if the device has been disconnected from its power supply;
- Only the person who is authorised by the firm can open the device without power off to do the test, maintenance, and repair, and emergency workers must be present.

5. Installation of the Device

5.1 Turn the Device On or Off

Power on/off button: , Table 5.1 describes sepcific instruction of turnning the device on or off.

Table 5.1 Turn On or Off Instruction

Function	Description
Turn on	Press on/off button to turn on the device,
Sleep	• Press on/off button for 5 seconds until the device beeps once; • Then release the on/off button, the device will be hibernated; • Then press on/off button once, the device will be awaked; ***(Note: The device only can be hibernated when all applications have been terminated),***
Turn off	Press on/off button for 10 seconds until device is powered off.

5.2 Installing or Upgrading the Applications

All essential applications have been preinstalled and configured at the factory. Also, extra applications will be installed or existing applications will be required to upgrade, when new test modules have been purchased and installed, or newest version of the application has been purchased. Table 5.2 describes the hardware requirements for applications installing or upgrading.

Table 5.2 Application Installing or Upgrading Hardware Requirements

Name	Quantity
CD for Installation	1
Computer with USB Port	1
OTP6126 Handheld GIGABIT ETHERNET Test Set	1
USB Memory Drive or USB Cable	1 or 1

Applications can be installed or upgraded by the following steps:

- Turn on the computer and insert the installation CD into the CD-ROM drive;
- Copy ‘Setup. exe’ into the USB memory stick;
- Plug the USB memory stick into OPT6126 Handheld GIGABIT ETHERNET Test Set;
- Select ‘System’ from main menu and enter ‘Explore’, then enter USB memory folder;

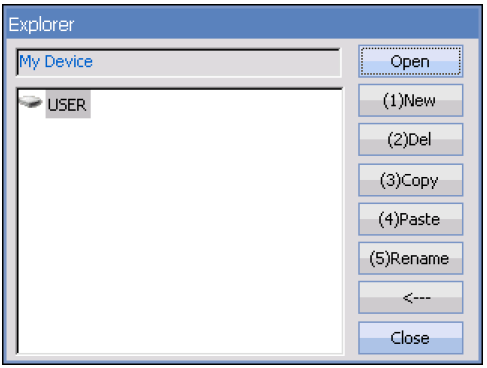


Figure 5.1 Explore

- Run 'OTP6126_GIGABIT ETHERNET _V1.0.0.1_SETUP.exe' software;
- Click 'Setup' button.

5.3 Installing a USB Keyboard or Mouse

USB keyboard and mouse are supported by OTP6126 Network Test Platform, please follow the following steps to install a keyboard or mouse:

- Plug the keyboard or mouse into the USB A type port which is placed on the right side of the device;
- Keyboard or mouse will be detected and recognised automatically by the system.

(Note: It is not necessary to turn off the device before connecting the keyboard or mouse. The system will detect automatically. Even a keyboard is connected, the touch screen keyboard will still be displayed when operating under system.)

5.4 Install Interfaces

In order to guarantee this optical port's performance stability and test result precision and accuracy, please ***ONLY*** use ***OPWILL's SFP optical module***. The specific module models information is demonstrated in Table 5.2. Also please follow the following steps to install the 100/1000M BASE-X optical port to ensure the port can be installed properly.

- Insert SFP optical module into Gig-E slot;
- Plug optical fibres into Tx port and Rx port of SFP optical module carefully;
- Check the optical fibres have been plugged into the connectors completely.

Table 5.3 10G XFR Optical Module

Model Type	Wavelength (nm)	Distance Range	Connector
GA 14 023 111	850	550m	SW
GA 14 023 230	850	550m	SR
GA 14 023 370	1310	2km	LW

10/100/1000 BASE-TX electrical interface is used for 10/100/1000M Ethernet connection.

6. Ethernet/PTN User Interface

OTP6126 power on progress is the tester self-checking progress, at first, the OTP6126 loading well, it will display the OTP6126 main menu screen. If the OTP6126 cannot detect, it will display 'OTP6126 Loading Failed.'; and then it will check OTP6126 test interface, if the test interface have problem will display 'OTP6126 hardware or FPGA loading is failed'.

The main interface of OTP6126 is comprised by Status Bar; Function Selection; and Toolbar these 3 parts.

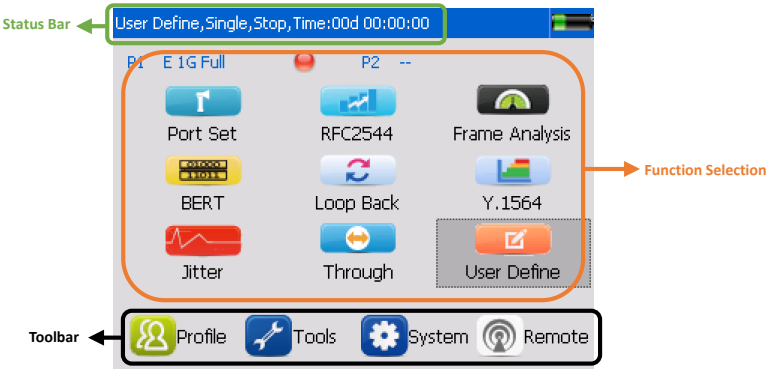


Figure 6.1 Main Interface of 10G Ethernet/PTN Application

6.1 Status Bar

Status Bar displays the current test status.

Figure 6.2 Status Bar

6.2 Function Selection

Function Selection is comprised by 'Port Set'; 'RFC2544'; 'Frame Analysis'; 'BERT'; 'Loopback'; 'Y.1564'; 'Jitter'; 'Trough'; and 'User Define' these 9 sub menus.

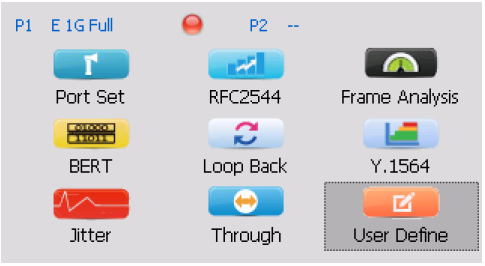


Figure 6.3 Function Selection

6.3 Toolbar

The toolbar is comprised by 'Profile'; 'Tools'; 'System'; and 'Remote'.

Figure 6.4 Toolbar

7. Start a Test Case

7.1 Start a RFC2544 test case

Start a RFC2544 test case needs to follow the following steps:

- Step 1: Select 'Port Set', the detail instruction for setting port parameters is demonstrated in Table 7.1 Port Setup;

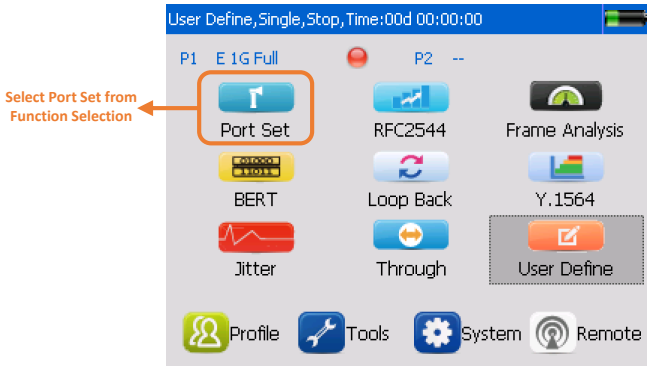


Figure 7.1 Step1: Select Port Set

- Step 2: After all parameters of port have been set completely, select 'RFC2544', the click 'Stream Generation' tab to configure data stream parameters, the detail instruction for setting data stream is demonstrated in Table 7.2 RFC2544 Data Stream Generation;

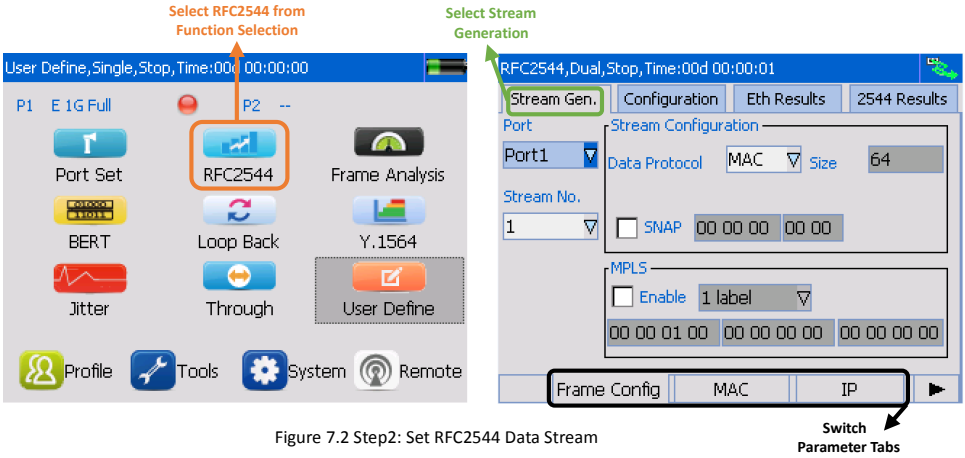


Figure 7.2 Step2: Set RFC2544 Data Stream

Step 3: After all parameters of data stream have been set completely, switch menu to configure RFC2544 parameters, the detail instructions for setting RFC2544 is demonstrated in Table 7.3 RFC2544 Setting;

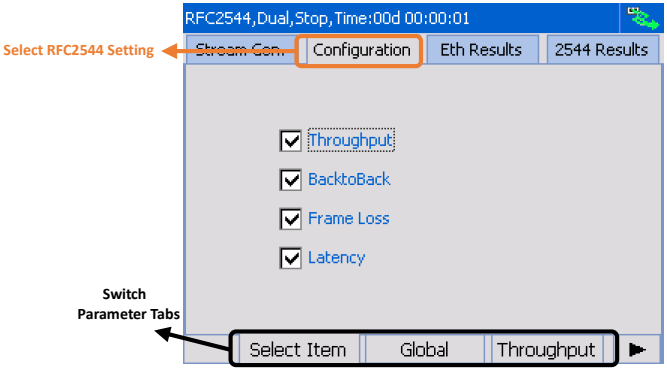


Figure 7.3 Step3: Set RFC2544 Parameters

- Step 4: After all the parameters have been set completely, Click RUN/STOP button to run the test;

Figure 7.4 Step4: Run RFC2544 Test

- Step 5: After the test has been done completely, switch the menu to view the Ethernet test results and RFC2544 test results. The detail information of Ethernet test results and RFC2544 test results have been demonstrated in Table 7.4 Ethernet Test Results and Table 7.5 RFC2544 Results.

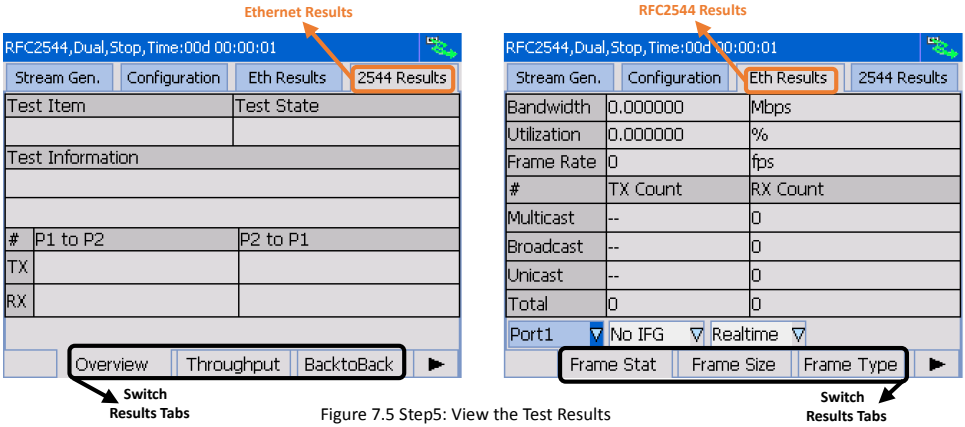


Figure 7.5 Step5: View the Test Results

Table 7.1 Port Set

Sub menu	Parameters
Setting	• Physical Port: Select test port, support, • Port 1; • Port 2; ***(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Speed: Select interface data transmission rate, support, • 1Gbps; • 100Mbps; • 10Mbps; ***(Note: The electrical port supports 1Gbps, 100Mbps and 10Mbps; the optical port supports 1Gbps and 100Mbps.)***
	• Duplex: Select duplex mode, support, • Full duplex; • Half duplex; ***(Note: The duplex mode is ONLY available under electrical mode.)***
	• MDI/MDIX: Select type of Ethernet crossover, support, • AUTO; • MDI • MDIX. ***(Note: When AUTO mode has been selected, the MDI/MDIX will be identified automatically.)***
	• Transceiver Mode: Select mode for transceiver, support, • Electrical; • Optical;
	• Flow Control: Click to receive and respond flow control frame;
	• Auto-negotiation: Click to enable auto-negotiation in data transmission link between transmitting end and receiving end; • Advanced Auto-negotiation: Click to enable; the remote port's rate and duplex mode will be set as the same as the local port.) ***(Note: The auto-negotiation should be enabled if the remote connected port is set to auto-negotiation; otherwise it should be disabled.)***
	• Negotiation Status: Display the auto-negotiation status, • 'Negotiating'; • 'Negotiation completed'; ***(Note: The negotiation status is displayed only the auto-negotiation is enabled.)***

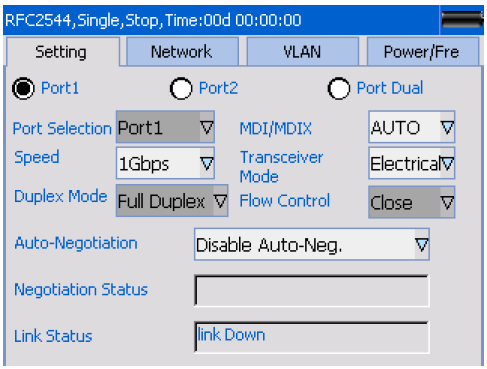
<table>
<tr><th>Sub menu</th><th>Parameters</th></tr>
<tr><td rowspan="2">Setting</td><td>• Link Status: Displays the link status,
• Link up; • Link down;</td></tr>
<tr><td> 

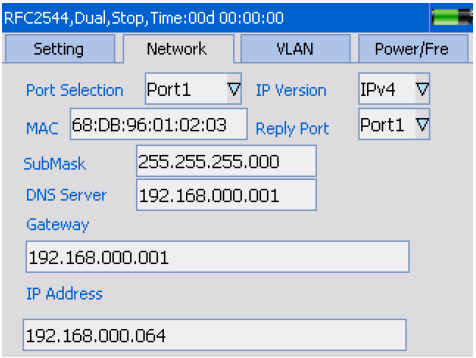
Figure 7.6 Port Setting</td></tr>
<tr><td rowspan="4">Network</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Reply Port: Support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Network Setting: Set network parameters,
• IP version; • Subnet mask; • MAC;
• IP address; • Gateway; • DNS;</td></tr>
<tr><td> 

Figure 7.7 Network Setting</td></tr>
<tr><td rowspan="4">VLAN</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• VLAN: Click to enable VLAN;</td></tr>
<tr><td>• VLAN Config: Click to enter VLAN Config dialogue box;</td></tr>
<tr><td>• Stack VLAN (Q-in-Q): Select WLAN stack layers, support,
• Layer 1; • Layer 2; • Layer 3;
(Note: The programme allows to select 3 WLAN stack layers in maximum at same time.)</td></tr>
</table>

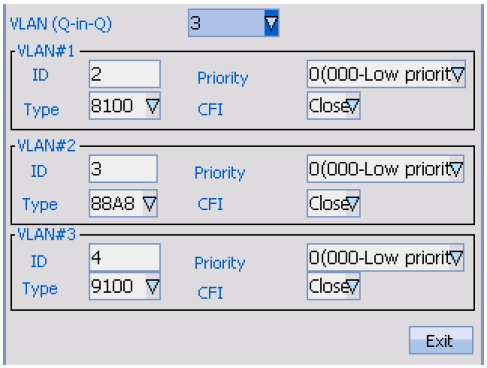
<table>
<tr><th>Sub menu</th><th>Parameters</th></tr>
<tr><td rowspan="5">VLAN</td><td>• VLAN #1/#2/#3：Input VLAN ID, choose values from 1 to 4094;
(Note: 4095 is retention value, and 0 and 1 are reserved for special purposes.)</td></tr>
<tr><td>• Priority: Select PRL of WLAN,
• 0: 000-Low PRL; • 1: 001-Low PRL; • 2: 010-Low PRL; • 3: 011-Low PRL; • 4: 100- High PRL; • 5: 101- High PRL; • 6: 110- High PRL; • 7: 111- High PRL;</td></tr>
<tr><td>• Type: Choose the types of Ethernet, support,
• 8100; • 88A8; • 9100; • 9200; • 9300;</td></tr>
<tr><td>• CFI: Canonical Format Indicator,
• Select this option, CFI value is 1, means non canonical format;
• Unselect this option, CFI value is 0, means canonical format.
(Note: This option is unselected by default.)</td></tr>
<tr><td> 

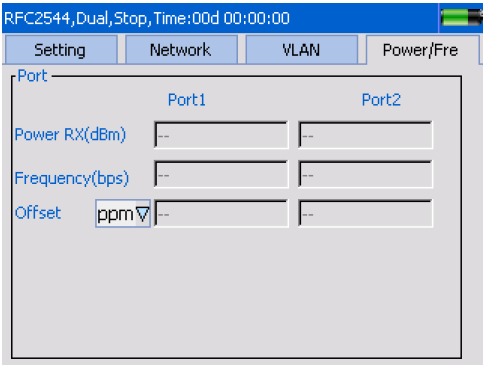
Figure 7.8 Network Setting</td></tr>
<tr><td>Power and Frequency</td><td>• Port: Display the information for Port 1 and Port2, include,
• Power TX (dBM); • Power RX (dBM); • Frequency; • Offset.</td></tr>
<tr><td> 

Figure 7.9 Power and Frequency</td></tr>
</table>

Table 7.2 RFC2544 Data Stream Generation

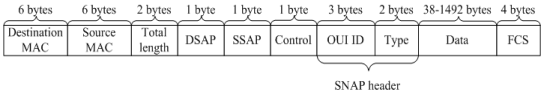
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="6">Frame Config</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Stream Number: Select data stream;
(Note: RFC2544 support stream1.)</td></tr>
<tr><td>• Data Protocol: Select transmission layer of the data stream,
• MAC; • IP; • UDP; • TCP;</td></tr>
<tr><td>• Size (bytes): Set the length of the stream, range from 64 to 16000;
(Note: The default vales is 64 bytes.)</td></tr>
<tr><td>• SNAP Header: Enable SNAP Header, Figure 7.10 shows its format;
(Note: SNAP Header is NON-available in layer 1. Enable SNAP Header will enable LLC Header automatically.)
 

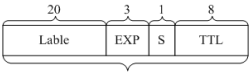
Figure 7.10 IEEE 802.3/802.2 SNAP Frame Format</td></tr>
<tr><td>• Enable MPLS Layer: Select MAC layer which has been enabled,
• Layer 1; • Layer 2; • Layer 3;
(Note: MPLS is ONLY available when data transmission layer has been select MAC layer in Frame Configuration.)</td></tr>
<tr><td>• MPLS:
• Header: indicates the configured header information of MPLS;
• Label: Set value for MPLS label, Figure 7.11 shows the its format;
 

Figure 7.11 MPLS Label Format
• Exp (Experiment level): Select the experiment level, and the default setting is 0 (16hex),
• 0: 000-Low Priority; • 4: 100-High Priority;
• 1: 000-Low Priority; • 5: 100-High Priority;
• 2: 000-Low Priority; • 6: 100-High Priority;
• 3: 000-Low Priority; • 7: 100-High Priority;
• TTL (Time to Live): Set the value of TTL from 00 to FF (16 hex);</td></tr>
</table>

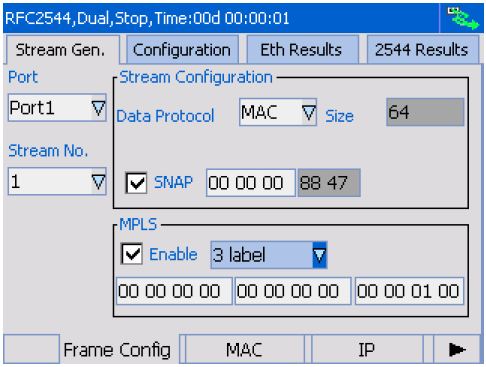
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Frame Config</td><td> 

Figure 7.12 Frame Configuration</td></tr>
<tr><td rowspan="6">MAC</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Stream Number: Select data stream;
(Note: RFC2544 test support stream1.)</td></tr>
<tr><td>• Source:
• MAC Address: Set source MAC address;
• Fixed: Click to enable incremental mode for source MAC address;
(Note: It is NON-available under RFC2544 test.)
• Count: Set incremental number, range from 2 to 65536;</td></tr>
<tr><td>• Coupled: Enable coupled function;
(Note: This is ONLY available under Dual ports test.)</td></tr>
<tr><td>• Destination:
• MAC Address: Set destination MAC address;
• Fixed: Click to enable incremental mode for destination MAC address;
(Note: It is NON-available under RFC2544 test.)
• Count: Set incremental number, range from 2 to 65536;
• Resolve MAC: Click to analyse destination MAC address automatically;
• Resolving Status: Display analysing status, include,
• -- (not enabled); • Analysing;
• Analysed; • Failed;</td></tr>
<tr><td>• VLAN Configuration:
• Stack VLAN (Q-in-Q): Select WLAN stack layers, support,
• Layer 1; • Layer 2; • Layer 3;
(Note: The programme allows to select 3 WLAN stack layers in maximum at same time.)
• ID: Input VLAN ID, choose values from 1 to 4094;
(Note: 4095 is retention value, and 0 and 1 are reserved for special purposes.)
• Priority: select the priority of VLAN,
• 0: 000-Low PRL; • 3: 011-Low PRL; • 6: 110- High PRL;
• 1: 001-Low PRL; • 4: 100- High PRL; • 7: 111- High PRL;
• 2: 010-Low PRL; • 5: 101- High PRL;
• Mode: Select VLAN Ethernet type, support,
• 8100; • 9100; • 9300;
• 88A8; • 9200;
• CFI: Canonical Format Indicator,
• Select this option, CFI value is 1, means non canonical format;
• Unselect this option, CFI value is 0, means canonical format;</td></tr>
</table>

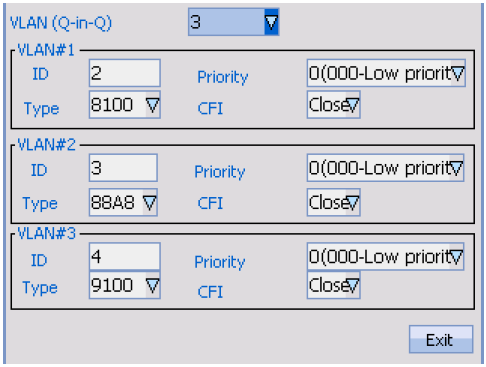
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>MAC</td><td> 

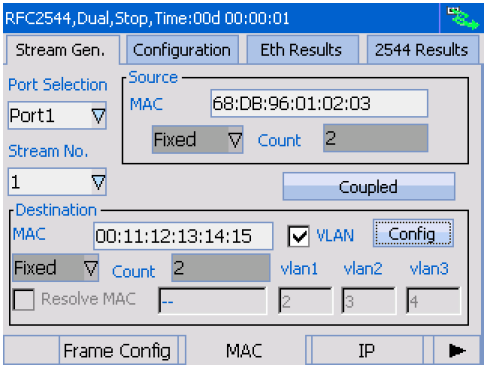
Figure 7.13 VLAN Configuration Dialogue Box


Figure 7.14 MAC</td></tr>
<tr><td>IP</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)
• Stream Number: Select data stream;
(Note: RFC2544 test support stream1.)
• IP Version: Select IP version, support,
• IPV4; • IPV6;
• Source:
• IPv4 Address: Set the source IPv4 address;
(Note: It is ONLY available when IPv4 has been selected.)
• IPv6 Address: Set the source IPv6 address;
(Note: It is ONLY available when IPv6 has been selected.)
• Coupled: Enable coupled function;
(Note: This is ONLY available under Dual ports test.)
• Destination:
• IPv4 Address: Set destination IPv4 address;
(Note: It is ONLY available when IPv4 has been selected.)
• IPv6 Address: Set destination IPv6 address;
(Note: It is ONLY available when IPv6 has been selected.)
• TTL (Time to Live): Set value for TTL, range from 0 to 255;</td></tr>
</table>

<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="2">IP</td><td>
(Note: It is ONLY available when IPv4 has been selected.)
IP TOS/DS: Input the user-defined value, range from 00~FF (16 hex);
(Note: It is ONLY available when IPv4 has been selected. The default value is 00.)
Hop Limit: Set hop limit value for IPV6 data stream, range from 1 to 255;
(Note: It is ONLY available when IPv6 has been selected.)
Traffic Class: Set traffic class for IPV6 data stream, range from 0 to FF;
(Note: It is ONLY available when IPv6 has been selected.)
</td></tr>
<tr><td>

Advanced TOS/DS button:

Enable Differentiated Services:
Enable: Enable DS and disable TOS;
Disable: Enable TOS and disable DS;
DSCP Code Points: Set the DSCP code points, the default value is CS0,

000000: CS0;
001000: CS1;
010000: CS2;
011000: CS3;
100000: CS4;
101000: CS5;
110000: CS6;
111000: CS7;
001010: AF11;
001100: AF12;
001110: AF13;
010010: AF21;
010100: AF22;
010110: AF23;
011010: AF31;
011100: AF32;
011110: AF33;
100010: AF41;
100100: AF42;
100110: AF43;
101110: EF;
User-defined: User-defined;

User-defined Codes: Set User-defined DSCP code points, range from 00 to 3F (16hex);

(Note: This option is ONLY available, when User-defined has been selected in DSCP Code Points.)

ECN: Set value for ECN field, the default setting is 00 (Not-ECT),
00: Not-ECT;
01: ECT-1;
10: ECT-0;
11: CE;
Priority: Set the priority, the default setting is 000 (routine),
000: Routine;
001: Priority;
010: Immediate;
011: Flash;
100: Flash Override;
101: CRITIC/ECP;
110: Ethernet Control;
111: Network Control;
Delay: Set delay level, the default setting is normal,
Normal;
Low;
Throughput: Set throughput level, the default setting is normal,
Normal;
High;
Reliability: Set reliability level, the default setting is normal,
Normal;
High;
Monetary Cost: Set monetary cost level, the default setting is normal,
Normal;
Low;
Reserved bit: Set reserved bit value, the default value is 0,
0;
1;

</td></tr>
</table>

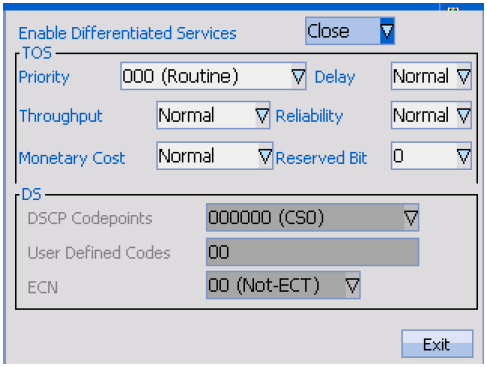
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>IP</td><td> 

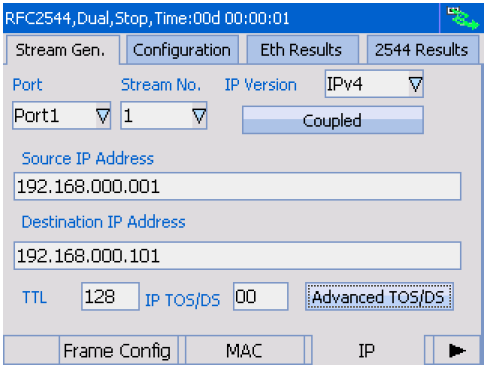
Figure 7.15 Advanced TOS/DS


Figure 7.16 IP</td></tr>
<tr><td rowspan="3">TCP/UDP</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Stream Number: Select data stream;
(Note: Frame analysis test supports stream1 to stream8; RFC2544 and bit error test support stream1.)</td></tr>
<tr><td>• TCP/UDP:
• Source Port: Input the source port number, range from 0 to 65535;
• Destination Port: Input destination port number, range from 0 to 65535;</td></tr>
</table>

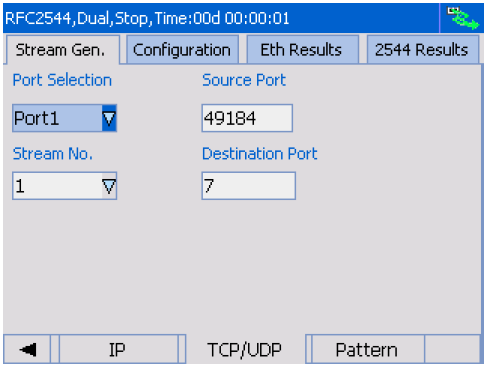
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>TCP/UDP</td><td> 

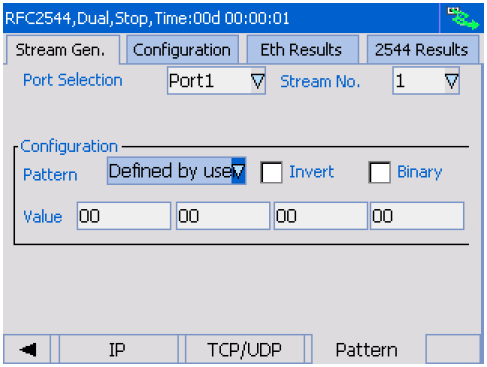
Figure 7.17 UDP/TCP</td></tr>
<tr><td rowspan="6">Pattern</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Stream Number: Select data stream;
(Note: Frame analysis test supports stream1 to stream8; RFC2544 and bit error test support stream1.)</td></tr>
<tr><td>• Configuration:
• Test Pattern: Select the test type, support,
• PRBS 2^9-1; • PRBS 2^23-1; • CRPAT;
• PRBS 2^11-1; • PRBS 2^31-1; • JTPAT;
• PRBS 2^15-1; • PRBS 2^29-1; • SPAT;
• PRBS 2^20-1; • HF; • User-defined;</td></tr>
<tr><td>• Invert: Select to Invert the test pattern, for example ‘0’ inverts to ‘1’, and ‘1’ inverts to ‘0’;
(Note: This option is disabled by default.)</td></tr>
<tr><td>• Binary: Click to enable binary mode;
(Note: This option is disabled by default.)</td></tr>
<tr><td>• Value: Input the user-defined pattern in binary or 16 hex, the default setting is 16 hex.
(Note: This option is ONLY available when select the user-defined pattern.)</td></tr>
<tr><td> 

Figure 7.18 Pattern</td></tr>
</table>

Table 7.3 RFC2544 Setting

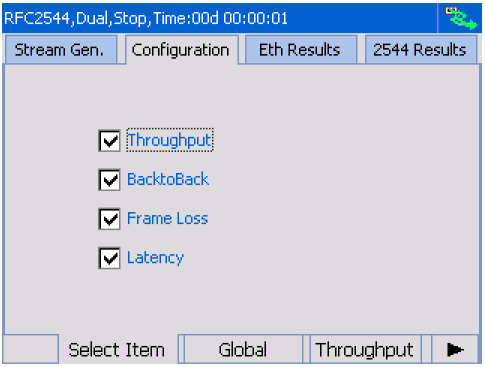
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="2">Select Item</td><td>• Select Test Functions: Support,
• Throughput; • Frame Loss;
• Back to Back; • Latency;</td></tr>
<tr><td> 

Figure 7.19 Select Test Functions</td></tr>
<tr><td rowspan="4">Global</td><td>• Distribution: Select the frame size distribution, support,
• RFC2544; • User-defined;</td></tr>
<tr><td>• Quantity: Select the quantity of frame size, range from 1 to 7;
(Note: This option is ONLY available when user-defined distribution has been selected.)</td></tr>
<tr><td>• Test Direction: Select test direction, support,
Single port:
• TX-to-RX;
Dual ports:
• P1-to-P2;
• P2-to-P1;
• Double direction;</td></tr>
<tr><td>• Symmetry Test: Enable symmetry test;
(Note: This option is ONLY available when dual ports this option has been selected and under bidirectional test.)</td></tr>
<tr><td></td><td>• Frame Size (Bytes): Set frame size, range from 64 to 16000;
(Note: This option is ONLY available when user-defined distribution has been selected. If RFC2544 distribution has been selected, the frame size will be set by default, which are 64; 128; 256; 512; 1024; 1280; and 1518.)</td></tr>
</table>

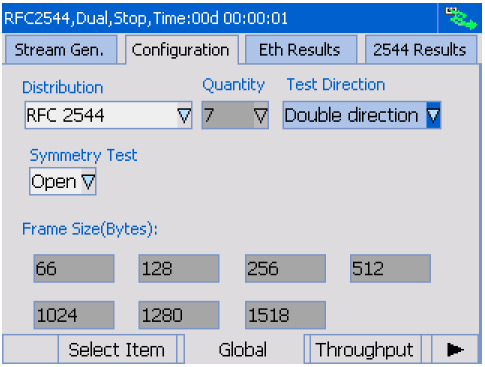
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Global</td><td> 

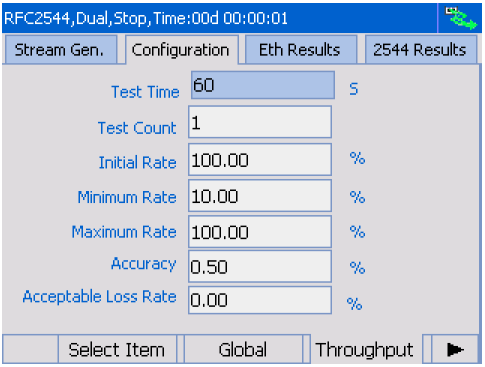
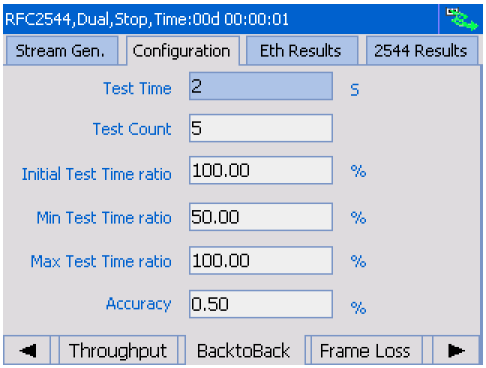
Figure 7.20 Global Setting</td></tr>
<tr><td rowspan="8">Throughput</td><td>• Test Time (s): Set the Throughput test time, range from 1 to 999, the default value is 60s;</td></tr>
<tr><td>• Test Count: Select the times for Throughput test, range from 1 to 60, the default value is 1;</td></tr>
<tr><td>• Initial Rate: Set the initial rate for Throughput test, range from 0.01% to 100%, the default value is 100%;</td></tr>
<tr><td>• Minimum Rate: Show the minimum time run which the programme required to run under the best condition, range from 0.01% to 100%, the default value is 10%;
(Note: The minimum time will be calculated and upgraded when the test has been started.)</td></tr>
<tr><td>• Maximum Rate: Set the maximum rate for Throughput test, range from 0.01% to 100%, the default value is 100%;</td></tr>
<tr><td>• Accuracy: Set the accuracy value, range from 0.01% to 100%, the default value is 0.5%;
(Note: The accuracy will be calculated based on the Ethernet link rate.)</td></tr>
<tr><td>• Acceptable Loss Rate: Set an acceptable package loss rate, range from 0.00 to 100, the default value is 0.00;</td></tr>
<tr><td> 

Figure 7.21 Throughput Setting</td></tr>
</table>

Sub Menu	Parameters
Back-to-Back	• Test Time (s): Set the Back-to-Back test time, range from 1 to 999, the default value is 2s;
	• Test Count: Select the times for Back-to-Back test, range from 1 to 60, the default value is 5;
	• Initial Test Time Ratio: Set the initial rate for Back-to-Back test, range from 0.01% to 100%, the default value is 100%;
	• Minimum Test Time Ratio: Show the minimum time run which the programme required to run under the best condition, range from 0.01% to 100%, the default value is 50%; ***(Note: The minimum time will be calculated and upgraded when the test has been started.)***
	• Maximum Test Time Ratio: Set the maximum rate for Back-to-Back test, range from 0.01% to 100%, the default value is 100%;
	• Accuracy: Set the accuracy value, range from 0.01% to 100%, the default value is 0.50%; ***(Note: The accuracy will be calculated based on the Ethernet link rate.)***
	 Figure 7.22 Back-to-Back Setting
Frame Loss	• Test Time (s): Set the Frame Loss test time, range from 1 to 999, the default value is 10s;
	• Test Count: Select the times for Frame Loss test, range from 1 to 60, the default value is 1;
	• Initial Rate: Set the initial rate for Frame Loss test, range from 0.01% to 100%, the default value is 80%;
	• Maximum Rate: Set the maximum rate for Frame Loss test, range from 0.01% to 100%, the default value is 100%;
	• Step Rate: Set step rate for frame Loss test, range from 1% to 100%, the default value is 10%;

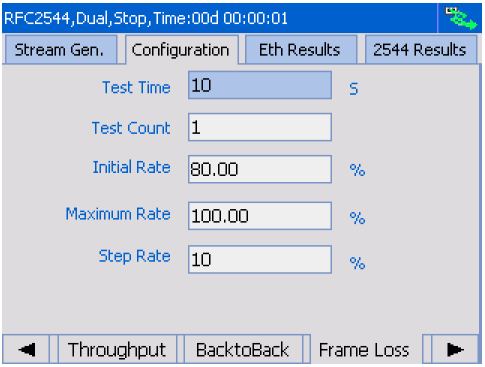
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Frame Loss</td><td> 

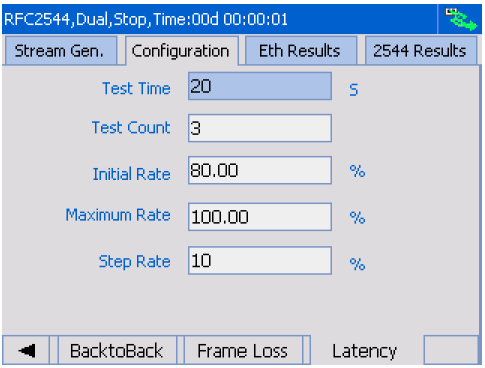
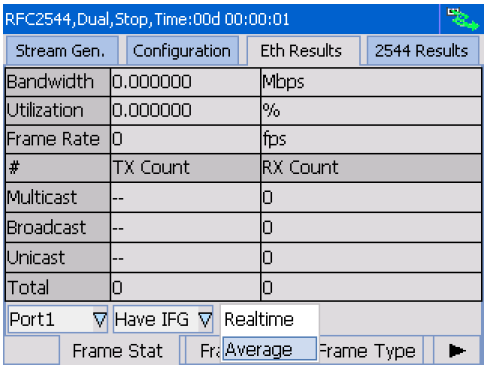
Figure 7.23 Frame Loss Setting</td></tr>
<tr><td rowspan="5">Latency</td><td>• Test Time (s): Set the Latency test time, range from 1 to 999, the default value is 20s;</td></tr>
<tr><td>• Test Count: Select the times for Latency test, range from 1 to 60, the default value is 3;</td></tr>
<tr><td>• Initial Rate: Set the initial rate for Latency test, range from 0.01% to 100%, the default value is 80%;</td></tr>
<tr><td>• Maximum Rate: Set the maximum rate of Latency test, range from 0.10% to 100%, the default value is 100%.
(Note: Normally, the maximum rate of Latency test is set less than the actual throughput rate, for considering the differences of switches' buffer sizes and forwarding mechanism. For example, set as 99% of throughput rate.)</td></tr>
<tr><td>• Step Rate: Set step rate for Latency test, range from 1% to 100%, the default value is 10%;</td></tr>
<tr><td> 

Figure 7.24 Latency Setting</td></tr>
</table>

Table 7.4 Ethernet Test Results

Sub Menu	Parameters
Frame Statistic	• Bandwidth (Mbps): Display the receiving data rate;
	• Utilisation (%): Display the percentage of line rate utilization;
	• Frame Rate (fps): Display the quantity of frames have been received per second;
	• Multi-cast: Show the quantity of multi-cast frames transmitted/received without any FCS errors;
	• Broadcast: Show the quantity of broadcast frames transmitted/received without any FCS errors; ***(Note: Broadcast frames have the FF-FF-FF-FF-FF-FF MAC address.)***
	• Unicast: the number of unicast frames transmitted/received without any FCS errors;
	• Total: Show the quantity of frames transmitted/received without any FCS errors.
	• Port Selection: Select test port, support, • Port 1; • Port 2; ***(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Select IFG: Select IFG or not;
	• Statistic Result type: Support, • Real-time; • Average;
	 Figure 7.25 Frame Status
Frame Size	• Count: Show the size of each received frame (valid and invalid);
	• Percentage (%): Show the percentage of each received frame size;
	• < 64: Frame size less than 64 bytes;
	• 64 – 127: Frame size from 64 to 127 bytes;
	• 128 – 255: Frame size from 128 to 255 bytes;
	• 256 – 511: Frame size from 256 to 511 bytes;
	• 512 – 1023: Frame size from512 to 1023 bytes;
	• 1024 – 1279: Frame size from 1024 to 1279 bytes;
	• 1280 – 1518: Frame size from 1280 to 1518 bytes;
	• > 1518: Frame size more than 1518 bytes;
	• Total: Show the total frame count;

<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="2">Frame Size</td><td>

Port Selection: Select test port, support,

Port 1;
Port 2;

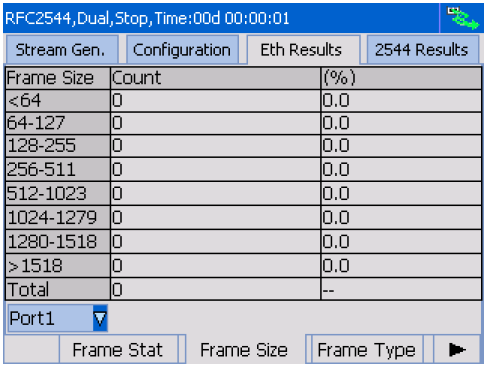
(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)
</td></tr>
<tr><td>


Figure 7.26 Frame Size
</td></tr>
<tr><td rowspan="2">Frame Type</td><td>

Frame Type: Count data packet types, include,

Test;
IPv4;
TCP;
Non-test;
IPv6;
VLAN;
MAC;
UDP;
MPLS;

</td></tr>
<tr><td>

Port Selection: Select test port, support,

Port 1;
Port 2;

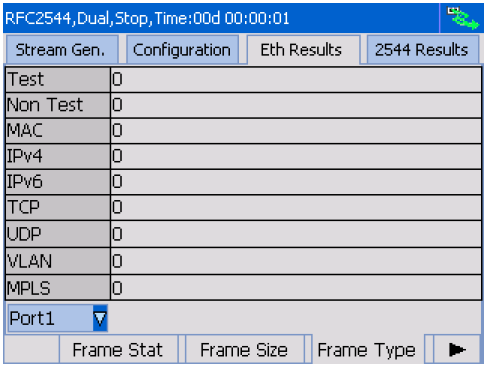
(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)


Figure 7.27 Frame Type
</td></tr>
<tr><td rowspan="2">Alarm/ Bert 1</td><td>

Alarm status:

Grey: Indicate the test is not running or alarm is not valid;
Green: Indicate no alarm/error;
Red: Indicate at least one alarm/error has been occurred;

</td></tr>
<tr><td>

RX: Show the time and times of alarm/error relevant to other Ethernet test, include,

Link;
UDP/TCP;
Idle;
Los;
FCS;
Excessive;
IP;

</td></tr>
</table>

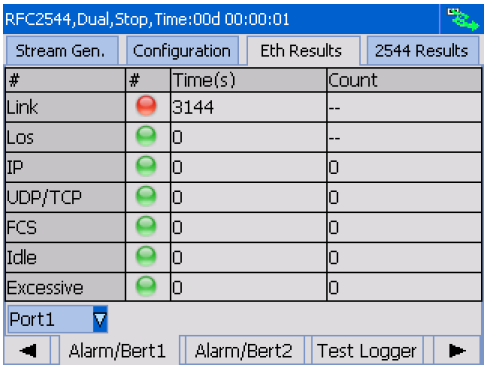
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Alarm/
Bert 1</td><td>
Port Selection: Select test port, support,
Port 1;
Port 2;
(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)


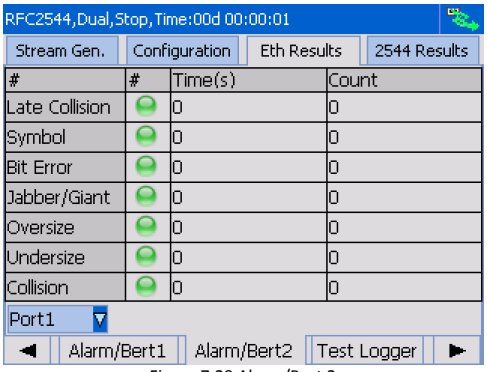
Figure 7.28 Alarm Bert 1
</td></tr>
<tr><td>Alarm/
Bert 2</td><td>
RX: Show the time and times of alarm/error relevant to other Ethernet test, include,
Later Collision;
Symbol;
Bit Error;
Jabber/Giant;
Oversize
Undersize;
Collision;


Figure 7.29 Alarm/Bert 2
</td></tr>
<tr><td>Test
Logger</td><td>
Event List:
ID: Show the event number sequentially;
Event: Show the alarm/BERT of the test;
Start time: Show the event starting time;
Stop time: Show the event end time;
</td></tr>
</table>

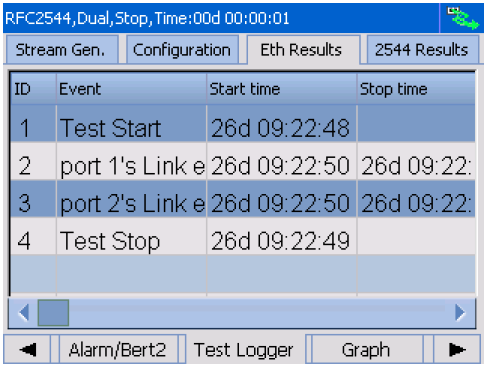
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Test Logger</td><td> 

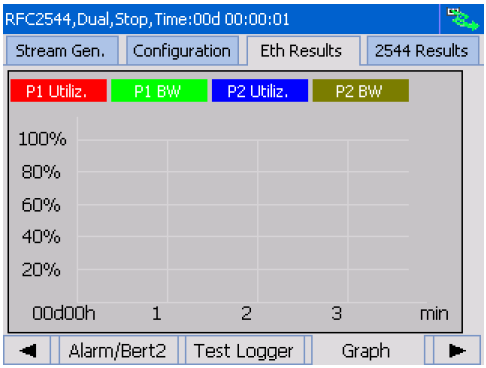
Figure 7.30 Logger</td></tr>
<tr><td rowspan="2">Graph</td><td>• Graph: Display test results, include,
• Port 1: Utilisation ratio;
• Port 2: Utilisation ratio;
• Port 1: Bandwidth;
• Port 2: Bandwidth;</td></tr>
<tr><td> 

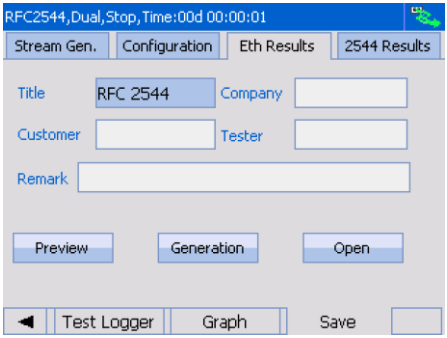
Figure 7.31 Graph</td></tr>
<tr><td rowspan="2">Save</td><td>• Save the test results.</td></tr>
<tr><td> 

Figure 7.32 Save</td></tr>
</table>

Table 7.5 RFC2544 Results

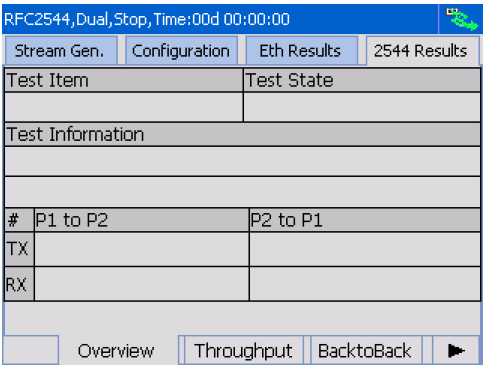
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="5">Overview</td><td>• Test Item: Show the current test item;</td></tr>
<tr><td>• Test State:
• -- : Indicate the test has not been started;
• Testing: Indicate the test is running;
• Stop Test: Indicate the test has been done;</td></tr>
<tr><td>• Test Information: Show the current test information,
• For example: “Packet: 64 Rate: 100.0%. Times: 1 transmitting test frames’;</td></tr>
<tr><td>• Frame Count: Count the quantity of frames,
• TX Frame Count: Show the quantity of transmission frames;
• RX Frame Count: Show the quantity of frames has been received;</td></tr>
<tr><td> 

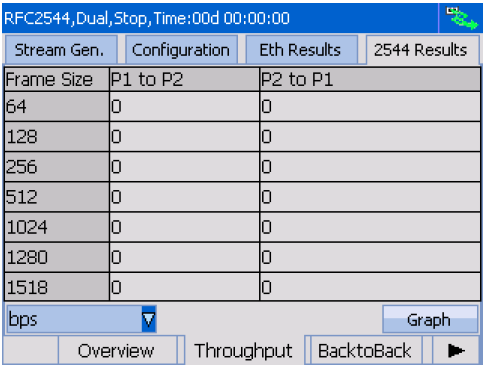
Figure 7.33 Overview</td></tr>
<tr><td rowspan="2">Throughout</td><td>• Throughput Result:
• Frame Size: Show the frame size;
• TX to RX: Show the quantity of frames from TX to RX;
• P1 to P2/P2 to P1: Show the quantity of frames from P1 to P2 / P2 to P1;
• Unit: Select the throughput unit, support,
• bps; • Kbps; • Mbps; • Gbps; • fps;
• Bps; • KBps; • MBps; • GBps; • %;</td></tr>
<tr><td> 

Figure 7.34 Throughout Result</td></tr>
</table>

<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="2">Back to Back</td><td>

Back-to-back Result:

Frame Size: Show the frame size;
TX to RX: Show the quantity of frames from TX to RX;
P1 to P2/P2 to P1: Show the quantity of frames from P1 to P2 / P2 to P1;
Unit: Select the back-to-back unit, support,

bps;
Kbps;
Mbps;
Gbps;
fps;
Bps;
KBps;
MBps;
GBps;
%;

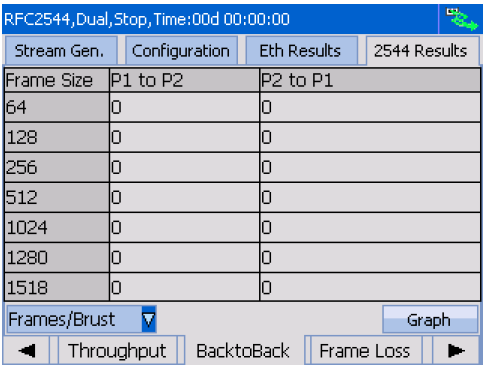
</td></tr>
<tr><td>


Figure 7.35 Back to Back
</td></tr>
<tr><td rowspan="2">Frame Loss</td><td>

Frame Loss Result:

Frame Size: Show the frame size;
TX to RX: Show the quantity of frames from TX to RX;
P1 to P2/P2 to P1: Show the quantity of frames from P1 to P2 / P2 to P1;
Unit: Select the frame loss unit, support % only.

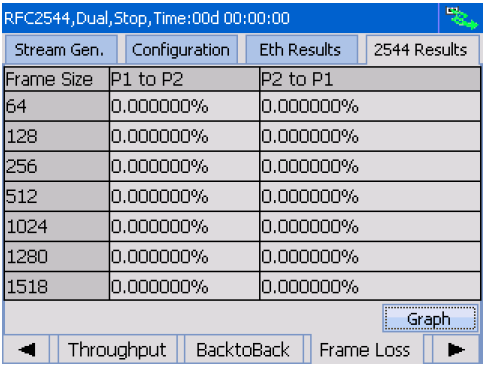
</td></tr>
<tr><td>


Figure 7.36 Frame Loss
</td></tr>
<tr><td>Latency</td><td>

Latency Result:

Frame Size: Show the frame size;
TX to RX: Show the quantity of frames from TX to RX;
P1 to P2/P2 to P1: Show the quantity of frames from P1 to P2 / P2 to P1;
Unit: Select the latency unit, support,

us;
ms;
s;

Model: Select latency model, support,

CT;
SF;

</td></tr>
</table>

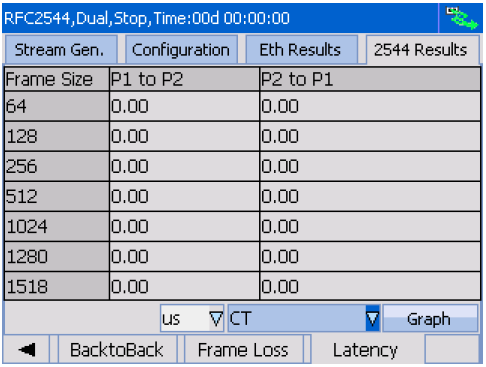
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Latency</td><td> 

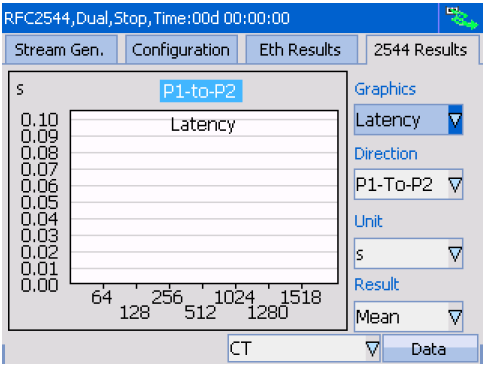
Figure 7.37 Latency</td></tr>
<tr><td>Graph Mode</td><td>• Click to see the test results in graph mode.
 

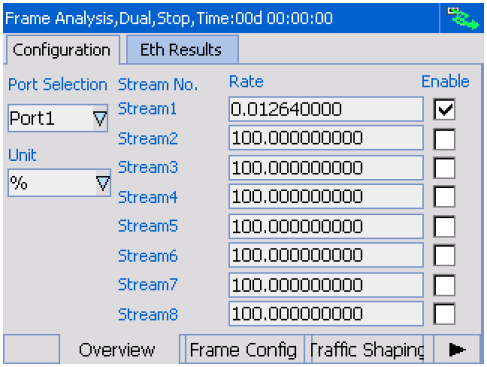
Figure 7.38 Graph mode</td></tr>
</table>

7.2 Start a Frame Analysis Test Case

Start a Frame Analysis test case needs to follow the following steps:

- Step 1: See section 7.1 Start a RFC2544 test case Step 1 to configure port parameters;
- Step 2: After all parameters of port have been set completely, select 'Frame Analysis', then click 'Configuration' to configure parameters, the detail instruction for setting data stream is demonstrated in Table 7.6 Frame Analysis Configuration;
- Step 3: After all the parameters have been set completely, Click RUN/STOP button to run the test;
- Step 4: After the test has been done completely, switch the menu to view the Ethernet test results in Table 7.7 Ethernet Test Results (Frame Analysis).

Table 7.6 Frame Analysis Configuration

Sub Menu	Parameters
Overview	• Port Selection: Select test port, support, • Port 1; • Port 2; ***(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Stream Selection: • Rate: Set data transmission rate, maximum value is 100%; • Enable: Select to enable the data stream; • Unit: The default setting is %, support, • %; • Mbps; • KBps; • bps; • Gbps; • MBps; • Kbps; • Bps; • GBps;
	 Figure 7.39 Overview (Frame Analysis)
Frame Config	• See Frame Config in Table 7.2 RFC2544 Data Stream Generation;

Sub Menu	Parameters
Traffic Shaping	• Port Selection: Select test port, support, • Port 1; • Port 2; ***(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Stream Number: Select data stream;

	• Transmit Mode: Select data transmission mode for data stream, support,
	  • Continuous: Transmit the frames continuously based on the bandwidth which has been selected;
	  • Burst: Set duty cycle and burst time firstly, and transmit the frames based on the maximum bandwidth;
	  • Ramp: Set steptime, stepcount, and max bandwidth, and transmit the frames which have been selected based on incremental ladder mode;
	  • N- Frame: Transmit the frames which have been selected;
	  • N- Burst: Transmit the burst frames which have been selected;
	  • N- Ramp: Transmit the selected incremental counts.
	  • Constant: Transmit the streams which set with Frame Size,Frame Rate and Run Time.
	(Note: The default setting is continuous.)

	• Frame count: Input the frame count number; ***(Note: This option is ONLY available under N-Frame transmit mode.)***

	• Burst: ***This option is ONLY available under Burst and N-Burst modes***;
	  • Bandwidth (duty cycle): Set the bandwidth (duty cycle), range from 0 to100% ***(Only available under N-Burst mode)***;
	  • Burst time (s): Set the burst time, range from 1 to 99999;
	  • Unit: Set the burst time unit, the default setting is s;
	  • Burst count: Set the burst count, range from 1 to 999 ***(Only available under N-Burst mode)***;

	• Ramp: ***This option is ONLY available under Ramp and N-Ramp modes***;
	  • Number of Steps: Set the number of steps, range from 0 to 100%;
	  • Step Time (s): Set the time for each step, range from 0 to 99999;
	  • Unit: Set the step time unit, the default setting is s;
	  • Ramp cycle count: Set the number of ramp cycle count, range from 0 to 999 ***(Only available under N-Ramp mode)***;
	• Constant: ***This option is ONLY available modes***;
	  • Frame Size: enter Frame Config screen, change the Frame Size, the frame size range is 40 to 16000 byte.
	  • Frame Rate: enter overview screen, you can change the frame rate.
	  • Run Time: enter tool->setting screen, you can set the Run Time.

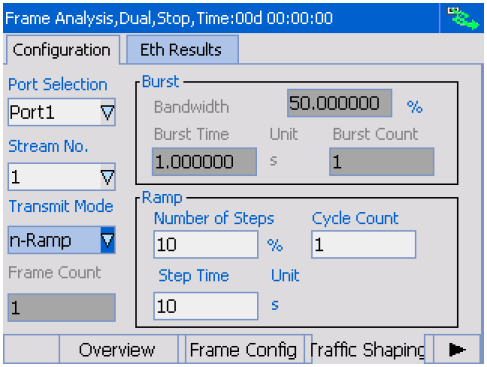
Sub Menu	Parameters
	 Figure 7.40 Traffic Shaping
MAC	• See MAC in Table 7.2 RFC2544 Data Stream Generation;
IP	• See IP in Table 7.2 RFC2544 Data Stream Generation;
TCP/UDP	• See TCP/UDP in Table 7.2 RFC2544 Data Stream Generation;
Pattern	• See Payload in Table 7.2 RFC2544 Data Stream Generation.

Table 7.7 Ethernet Test Results (Frame Analysis)

Sub Menu	Parameters
Frame Statistic	• See Frame Status in Table 7.4 Ethernet Test Results;
Frame Size	• See Frame Size in Table 7.4 Ethernet Test Results;
Frame Type	• See Frame Type in Table 7.4 Ethernet Test Results;
Stream Statistics 1	• Stream Statistics: Allow to count stream, include, • TX Count; • RX Count; • BW (Mbps);

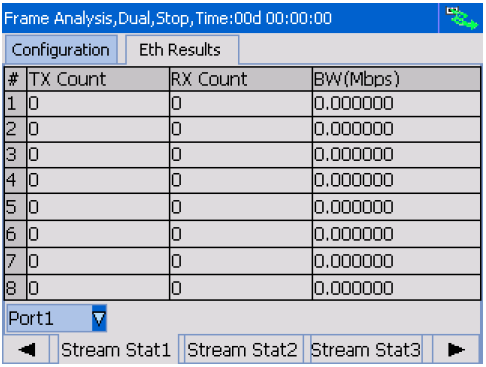


Figure 7.41 Stream Statistic 1

Stream Statistics 2	• Stream Statistics: Allow to count stream, include, • Bit Error; • TCP/UDP Error; • IP Error; • FCS;

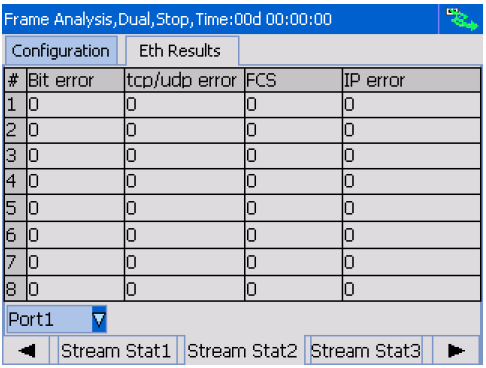
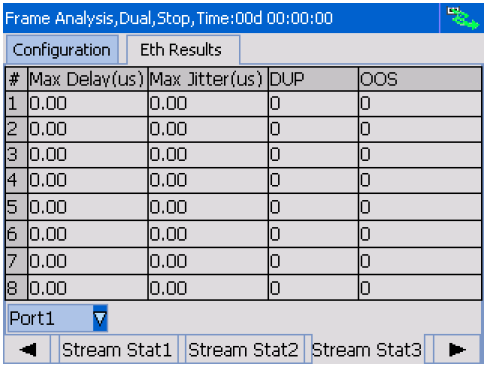


Figure 7.42 Steam Statistics 1 to 3

Stream Statistics 3	• Stream Statistics: Allow to count stream, include, • Max Delay; • Max Jitter; • DUP; • OOS;

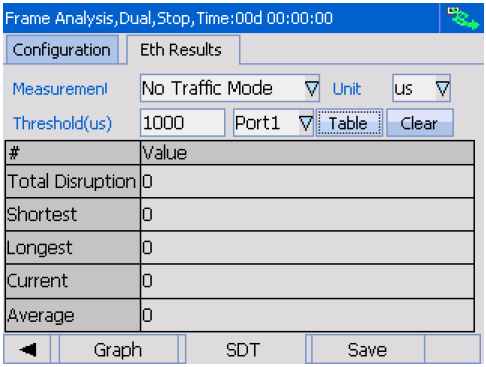
Sub Menu	Parameters
Stream Statistics 3	
Alarm/Bert	• See Alarm Bert 1&2 in Table 7.4 Ethernet Test Results;
Test Logger	• See Test Logger in Table 7.4 Ethernet Test Results;
Graph	• See Graph in Table 7.4 Ethernet Test Results;

SDT*(Service Disruption)*	• Measurement Mode: Select the service disruption measurement mode, support,
	  • No Traffic: Indicate the time between the last frame has been received and a new frame has been received, or the time between the last frame has been received and the end of test period;
	  • Defect Time: Indicate the time between the defect occurrence and defect elimination;

	• Unit: Select time unit, support, • ns; • us; • ms; • s; • min;
	• Threshold (us): Set value for service disruption test threshold, range from 1 to 100,000; ***(Note: When service disruption time is longer than the threshold, it will be regarded as one disruption.)***

	• Statistic:
	  • Total Disruption Count: Display the times of SDT happened;
	  • Shortest: Show the shortest disruption time which has been measured;
	  • Longest: Show the longest disruption time which has been measured;
	  • Current: Show the current disruption time caused by traffic absence or defect detection;
	  • Average: Show the average disruption time;

Figure 7.43 Stream Statistic 3

Sub Menu	Parameters
SDT*(Service Disruption)*	 Figure 7.44 Service Disruption
Save	• See Save in Table 7.4 Ethernet Test Results.

7.3 Start a Bit Error Test Case

Start a Bit Error test case needs to follow the following steps:

- Step 1: See section 7.1 Start a RFC2544 test case Step 1 to configure port parameters;
- Step 2: After all parameters of port have been set completely, select 'BERT', then click 'Configuration' to configure parameters. The configuration instruction can be seen in Table 7.2 RFC2544 Data Stream Generation or Table 7.6 Frame Analysis Configuration.
- Step 3: After all parameters of port have been set completely, Click 'Error Injection' to configure parameters for inserting bit error. The detail instruction for setting Bit Error Injection is demonstrated in Table 7.8 Bit Error Injection;
- Step 3: After all the parameters have been set completely, Click RUN/STOP button to run the test;
- Step 4: After the test has been done completely, switch the menu to view the Ethernet test results. The results information can be seen in Table 7.4 Ethernet Test Results or Table 7.7 Ethernet Test Results (Frame Analysis).

Table 7.8 Bit Error Injection

Sub Menu	Parameters
Bit Error Injection	• Port Selection: Select test port, support, • Port 1; • Port 2; ***(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Bert Type: Select bit error injection types, support, • Bit Error; • UDP; • Derangement; • TCP; • IP; • FCS; ***(Note: IP is ONLY available when transmission type is IP. UDP and TCP are ONLY available transmission types are UDP and TCP. FCS is ONLY available when the scheduling mode is FPS.)***
	• Manual: • Amount: Set quantity for inserting bit error, range from 1 to 16000000, ***(Note: The default value is 1.)*** • Send Button: Click to inject bit error manually;
	• Auto: • Every: Set interval of bit error insertion, range from 1 to 16000000; ***(Note: The default value is 1.)*** • Start Button: Click to insert bit error automatically.

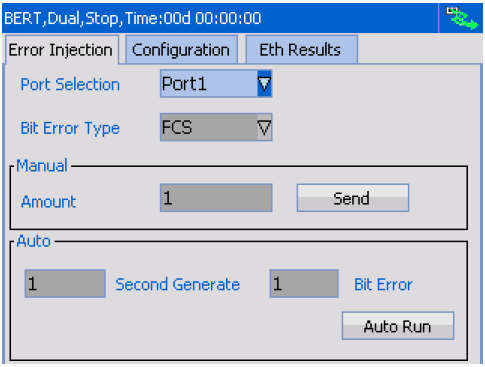
Sub Menu	Parameters
Bit Error Injection	

Figure 7.45 Bit Error Injection

7.4 Strat a Loopback Test Case

Start a Loopback test case needs to follow the following steps:

- Step 1: See section 7.1 Start a RFC2544 test case Step 1 to configure port parameters;
- Step 2: After all parameters of port have been set completely, select 'Loopback', then click 'Configuration' to configure parameters, the detail instruction for setting data stream is demonstrated in Table 7.9 Loopback Configuration;
- Step 3: After all the parameters have been set completely, Click RUN/STOP button to run the test;
- Step 4: After the test has been done completely, switch the menu to view the Ethernet test results. The results information can be seen in Table 7.4 Ethernet Test Results or Table 7.7 Ethernet Test Results (Frame Analysis).

Table 7.9 Loopback Setting

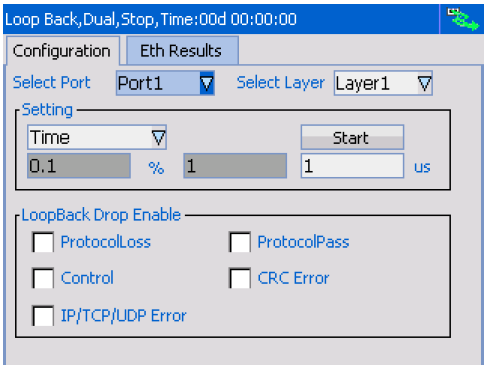
Sub Menu	Parameters
Loopback Setting	• Port Selection: Select test port, support, • Port 1; • Port 2; ***(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Select Layer: Support, • Layer 1; • Layer 2; • Layer 3; • Layer 4;
	• Setting: Select test mode, support, • Time; • Percentage; • Packet Count;
	• Loop Drop Enable: Select loop filter to filter information, support, • CRC Error; • Protocol Loss; • IP/TCP/UDP Error. • Control; • Protocol Pass;
	

Figure 7.46 Loopback

7.5 Start a Y.1564 Test Case

Start an Y.1564 test case needs to follow the following steps:

- Step 1: See section 7.1 Start a RFC2544 test case Step 1 to configure port parameters;
- Step 2: After all parameters of port have been set completely, select 'Y.1564', then click 'Configuration' to configure parameters, the detail instruction for setting data stream is demonstrated in Table 7.10 Y.1564 Configuration;
- Step 3: After all the parameters have been set completely, Click RUN/STOP button to run the test;
- Step 4: After the test has been done completely, switch the menu to view the Ethernet test results in Table 7.4 Ethernet Test Results or Table 7.7 Ethernet Test Results (Frame Analysis). The Y.1564 test results can be seen in Table 7.11 Y.1564 Results.

Table 7.10 Y.1564 Configuration

Sub Menu	Parameters
Y.1564	• Configuration Step Time (s): Set time for step test, range from 1 to 60;
	• Performance Time (m): Set time for performance test, range from 1 to 1440;
	• Test direction: Select test direction, support, Single port: • TX-to-RX; Dual ports: • P1-to-P2; • P2-to-P1; • Bidirectional;
	• CIR Test: • CIR step Enable: Select to enable CIR step test; • Step 1/2/3/4: Set step time, range from 0.01 to 1;
	• Port Selection: Select test port, support, • Port 1; • Port 2; ***(Note: This option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Service No. : Select service from 1 to 8; ***(Note: Only one option can be enabled.)***
	• Configure Service: • Frame Size: Set frame size, range from 64 and 1518; • CIR (Mbps): Set CIR value; ***(Note: The minimum value is 0.001 and the maximum value is determined by the packet length.)*** • EIR (Mbps): Set EIR value, ***(Note: The minimum value is 0.001 and the maximum value is determined by the packet length.)*** • Max FLR (ms): Set max FLR value, range from 0.0E+000 and 5.0E-001; • Max FTD (ms): Set max FDV value, range from 1 and 1000; • Max FDV (ms): Set max FDV value, range from 1 and 1000.

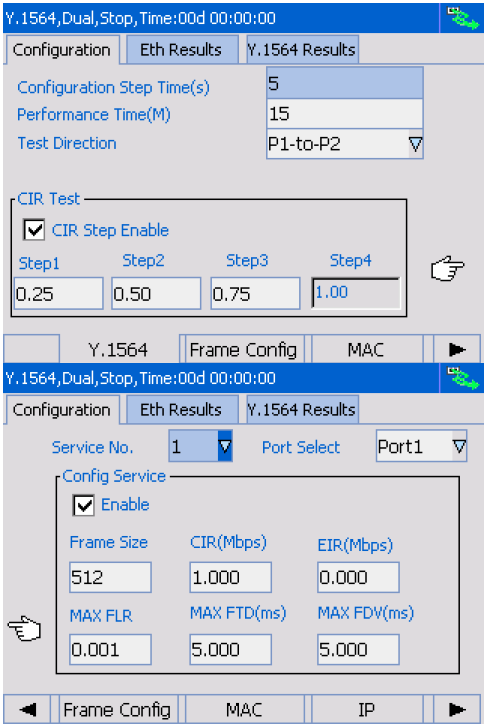
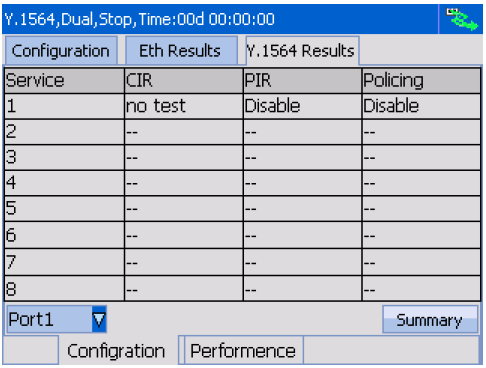
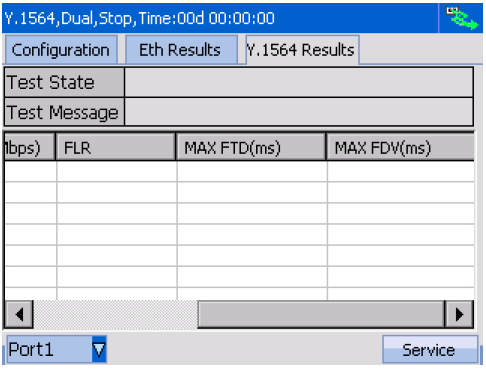
Sub Menu	Parameters
Y.1564	 Figure 7.47 Y.1564
Frame Config	• See Frame Config in Table 7.2 RFC2544 Data Stream Generation;
MAC	• See MAC in Table 7.2 RFC2544 Data Stream Generation;
IP	• See IP in Table 7.2 RFC2544 Data Stream Generation;
TCP UDP/	• See UDP/TCP in Table 7.2 RFC2544 Data Stream Generation;
Pattern	• See Payload in Table 7.2 RFC2544 Data Stream Generation.

Table 7.11 Y.1564 Results

Sub Menu	Parameters
Y.1564 *(Service)*	• Show the Y.1564 test result; • Summary: Click to enable summary interface;  Figure 7.48 Y.1564 Result (Service)

Y.1564 *(Summary)*	• Test State: Display the test state;
	• Test Result: Show test result, include,
	  • Test Item; • FLR;
	  • Result; • MAX FTD (ms);
	  • IR (Mbps); • MAX FDV (ms);
	• Test Message: Display the information during the test;
	• Service: Click to show service interface.
	 
	
	Figure 7.49 Y.1564 Result (Summary)

7.6 Strat a Jitter Test Case

Start a Jitter test case needs to follow the following steps:

- Step 1: See section 7.1 Start a RFC2544 test case Step 1 to configure port parameters;
- Step 2: After all parameters of port have been set completely, select 'Jitter', then click 'Configuration' to configure parameters, the detail instruction for setting data stream is demonstrated in Table 7.12 Jitter Configuration;
- Step 3: After all the parameters have been set completely, Click RUN/STOP button to run the test;
- Step 4: After the test has been done completely, switch the menu to view the Ethernet test results in Table 7.4 Ethernet Test Results or Table 7.7 Ethernet Test Results (Frame Analysis). The Jitter test results can be seen in Table 7.13 Jitter Results.

Table 7.12 Jitter Configuration

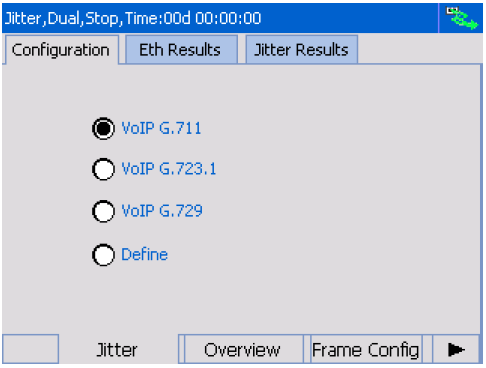
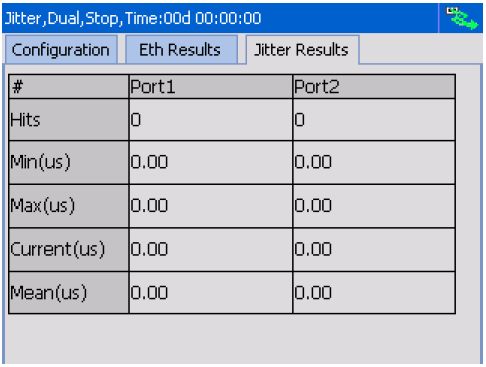
Sub Menu	Parameters
Jitter	• Select Jitter Type: support, • VoIP G7.11; • VoIP G729; • VoIP G723.1; • Define;  Figure 7.50 Jitter
Overview	• See Overview in Table 7.6 Frame Analysis Configuration;
Frame Config	• See Frame Config in Table 7.2 RFC2544 Data Stream Generation;
MAC	• See MAC in Table 7.2 RFC2544 Data Stream Generation;
IP	• See IP in Table 7.2 RFC2544 Data Stream Generation;
TCP/UDP	• See TCP/UDP in Table 7.2 RFC2544 Data Stream Generation;
Pattern	• See Payload in Table 7.2 RFC2544 Data Stream Generation.

Table 7.13 Jitter Results

Sub Menu	Parameters
Jitter Results	• Show Jitter Result.  Figure 7.51 Jitter

7.7 Strat a Through Test Case

Start a Through test case needs to follow the following steps:

- Follow the steps of Section 7.4 Start a Loopback Test Case.

7.8 Strat a User-defined Frame Test Case

Start a User-defined Frame test case needs to follow the following steps:

- Step 1: See section 7.1 Start a RFC2544 test case Step 1 to configure port parameters;
- Step 2: After all parameters of port have been set completely, select 'User-define', then click 'Configuration' to configure parameters, the detail instruction for setting data stream is demonstrated in Table 7.14 User-define Configuration;
- Step 3: After all the parameters have been set completely, Click RUN/STOP button to run the test;
- Step 4: After the test has been done completely, switch the menu to view the Ethernet test results in Table 7.4 Ethernet Test Results or Table 7.7 Ethernet Test Results (Frame Analysis).

Table 7.14 User-defined Packet

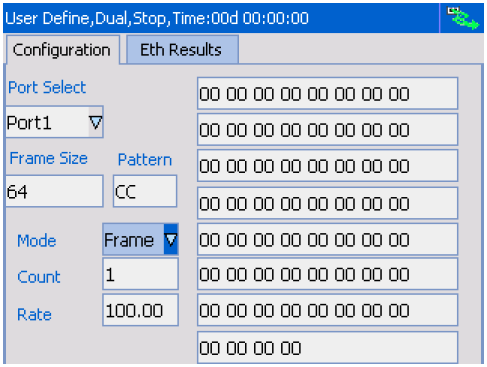
Sub Menu	Parameters
User-defined	• Port Selection: Select test port, support, • Port 1; • Port 2; ***(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Frame Size: Set size for the data packet, range from 64 to 2048;
	• Pattern: Set the frame pattern;
	• Mode: Select transmission mode, support, • Continue; • Frame;
	• Packet Count: Set the quantity of user-defined packet transmission;
	• Rate (%): Set the rate for data packets. ***(Note: This option is ONLY available under continue mode.)***
	

Figure 7.52 User-defined Packet

8. Toolbar

8.1 Profile

Profile includes ‘File’; ‘Report Generation’; and ‘Print’. Table 8.1 describe the profile in detail.

Table 8.1 Profile

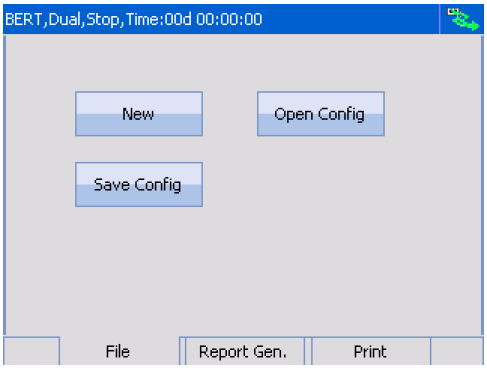
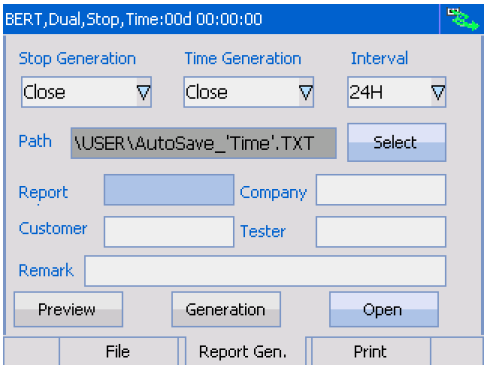
Sub menu	Function
File	• New: Create a new configuration; • Open: Load the test configuration file which has been saved before; • Save: Save the current test configuration;
	
Report	• Create Test Report: Create a test report when test is done;
	
Print	• Print: Print out the report.

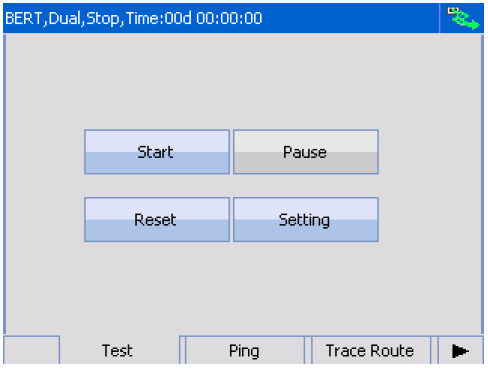
Figure 8.1 Result

Figure 8.2 Report

8.2 Tools

Tools includes ‘Test’; ‘Ping’; ‘Trace Route’; ‘VCT Test’; ‘Flow Control’; ‘Service Scan’; ‘FTP’; ‘HTTP’; ‘Filter’; ‘Capture’; and ‘Topology’. Table 8.2 describes these tools in detail.

Table 8.2 Tools

Sub Menu	Parameters
Test	• Start: Click to start the test; • Pause: Click to pause the test; • Reset: Click to reset the test; • Setting: Click to enter general parameters setting dialogue box;  Figure 8.3 Test

Test *(Setting)*	• Time control:
	  • Start Timing Control: Click to enable test duration control;
	  • Run Time: Select the fixed test duration mode, support,
	  • 15 m; • 24h; • 3d;
	(Note: This uses for Constant transmit mode.)
	  • User-defined Mode: Select user-defined mode to set the test end time, support,
	  • Day; • Hour; • Minute; • Second;
	• Test Start time Control：
	  • Enable Test Start Time Control：Click to enable test start time control;
	  • Time Setting：Set test start time, support,
	  • Year; • Day; • Minute;
	  • Month; • Hour; • Second;
	• Alarm Bell Control：
	  • Enable Alarm Bell Control: Click to enable alarm bell;

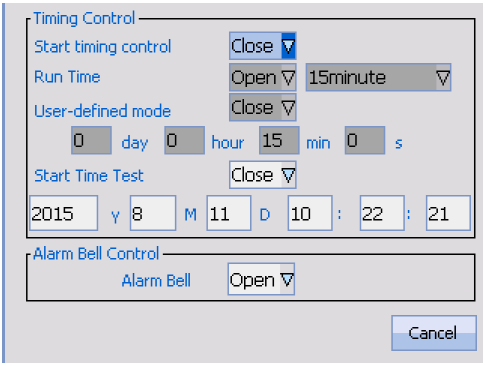
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Test
(Setting)</td><td> 

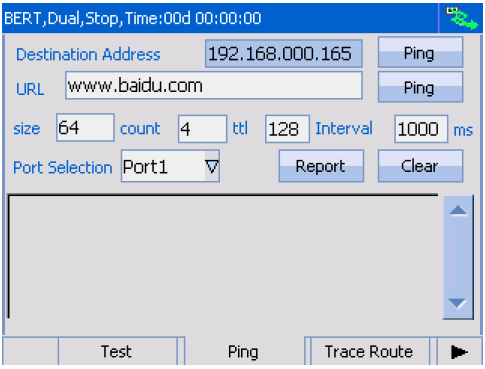
Figure 8.4 Setting</td></tr>
<tr><td rowspan="3">Ping</td><td>• Ping Setup:
• Report: Click to generate a test report;
• Destination Address: Set IP address for destination;
• Destination Address Ping button: Click to ping destination IP address;
• URL: Set destination URL;
• URL Ping Button: Click to ping destination URL;
• Packet Size: Set the size for ping packet;
• Packet Count: Set quantity of ping packet for transmission;
• TTL: Set live time for ping packet;
• Interval: Show interval time between two packets;
• Clear Button: Click to clear textbox;
• Textbox: Show the ping result;</td></tr>
<tr><td>• Port Selection: Select the test port, support,
• Port 1 or Port 2 (in the Ethernet Teat module);
• Host port (located on the right side of the test platform);</td></tr>
<tr><td> 

Figure 8.5 Ping Setup</td></tr>
<tr><td>Trace Route</td><td>• Port Selection: Select the test port, support,
• Port 1, Port 2 (in the Ethernet Teat module);
• Host port (located on the right side of the test platform);</td></tr>
</table>

<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="2">Trace Route</td><td>

- Trace Route Setup
  - Destination Address: Set IP address for destination;
  - Start Button: Click to start to trace destination IP address;
  - URL: Set destination URL;
  - URL Start Button: Click to start to trace destination URL address;
  - Textbox: Show the result of trace route;

</td></tr>
<tr><td>

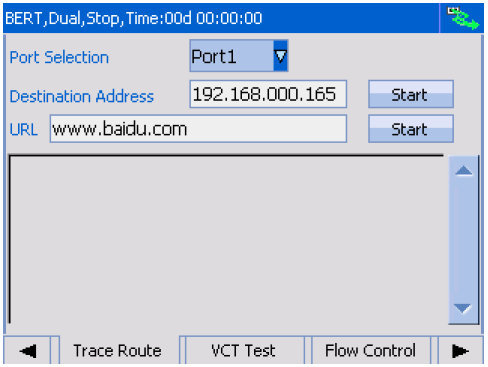


Figure 8.6 Trace Route

</td></tr>
<tr><td rowspan="3">VCT Test</td><td>

- Port Selection: Select test port, support,
  - Port 1;
  - Port 2;

(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)

</td></tr>
<tr><td>

- VCT Mode:
  - 1G Link Status: display the 1G link status;
    - Green: Connecting;
    - Red: Unconnected;
  - Start: Click to start manual VCT test;
  - Status Bar: Display the test status;

</td></tr>
<tr><td>

- Result:
  - Status: Display the status of 4 pairs' cable after the test has been completed, include,
    - Good;
    - Open;
    - Short;
  - Defect Location: Display the probable location of the defection;
  - Channel: Display the sequence of cables, include,
    - A;
    - B;
    - C;
    - D;
  - Polarity: Display polarity of cables, include,
    - Normal
    - Reversed.
  - Pair Skew: Display the time of end on deviation for each pair of cable;

</td></tr>
</table>

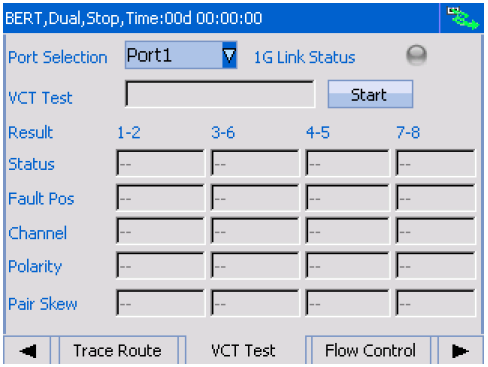
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>VCT Test</td><td> 

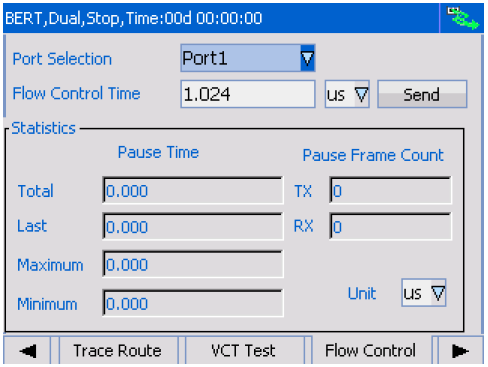
Figure 8.7 VCT Test</td></tr>
<tr><td rowspan="4">Flow Control</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Insert Stoppage Time Quantity:
• Flow Control Time: Set suspended time for packet transmission;
• Unit: us;
• Send Button: Click to insert suspended time during packet transmission;</td></tr>
<tr><td>• Statistics:
• Pause Time: Count the suspended time of the received flow control frame, include,
• Total; • Last; • Maximum; • Minimum;
• Unit: us;
• Pause Frame: Count suspended frames of sending and received, include,
• TX; • Rx.</td></tr>
<tr><td> 

Figure 8.8 Flow Control</td></tr>
<tr><td rowspan="2">Service Scan</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)</td></tr>
<tr><td>• Scan Mode: Support,
• Manual; • Auto;</td></tr>
</table>

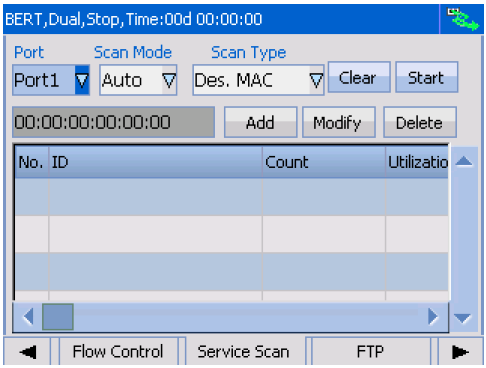
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="5">Service Scan</td><td>• Scan Type: Support,
• Destination MAC; • Vlan2 Id;
• Source MAC; • MPLS Label;
• VLAN Id; • MPLS2 Label;</td></tr>
<tr><td>• Clear: Click to clear data;</td></tr>
<tr><td>• Start: Click to start online scan;</td></tr>
<tr><td>• Manual Setting:
• Address Box: Set address information manually;
• Add: Click to the address information after the information has been inputted in address box;
• Modify: Click to modify the address information which has been selected;
• Delete: Click to delete the address information which has been selected;
• Delete all: click to delete all address information;</td></tr>
<tr><td>• Scan Result: Display the result information, include,
• No.; • Count; • IP error;
• ID; • Fcs; • Bandwidth;
• Utilisation;</td></tr>
<tr><td> 

Figure 8.9 Service Scan</td></tr>
<tr><td rowspan="10">FTP</td><td>• Service: Input the server IP address;</td></tr>
<tr><td>• User: Input FTP User name;</td></tr>
<tr><td>• Pass: Set FTP password;</td></tr>
<tr><td>• Connect Button: Click to connect the FTP site;</td></tr>
<tr><td>• Download button: Click to download the files from FTP;</td></tr>
<tr><td>• Upload Button: Click to upload local files to FTP;</td></tr>
<tr><td>• Status: Display the current FTP status;</td></tr>
<tr><td>• D_Rate Test: Click to test download speed and display in the information bar;</td></tr>
<tr><td>• U_Rate Test: Click to test upload speed and display in the information bar;</td></tr>
<tr><td>• Stop: Click to stop file upload/download;</td></tr>
<tr><td>• Display Box: Display the file information of remote FTP site, include,
• File name; • File size (byte);</td></tr>
</table>

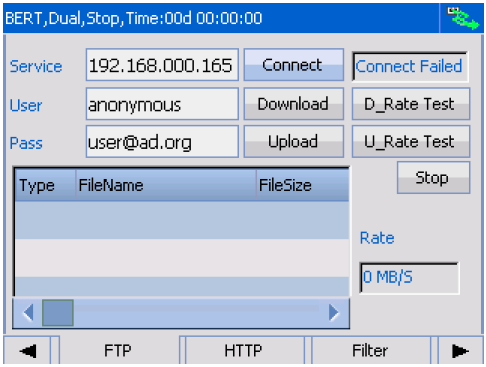
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>FTP</td><td> 

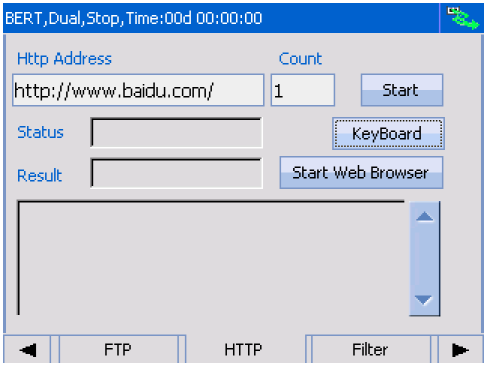
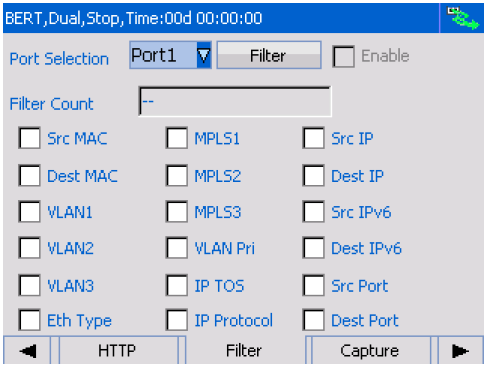
Figure 8.10 FTP</td></tr>
<tr><td>HTTP</td><td>• HTTP Address: Input HTTP address for test;
• Count: Set times for HTTP test;
• Start Button: Click to start or stop HTTP test;
• Status: Display test status of the connected HTTP;
• Result: Display test result of connected HTTP;
• Test Information Box: Display test Information of the connected HTTP;
• Key Board: Click to enable key board;
• Strat Web Browser Button: Click to open the web of HTTP address;
 

Figure 8.11 HTTP</td></tr>
<tr><td>Filter</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)
• Filter Count： Show the actual quantity of the packets have been filtered;
• Filter: Include,
• Src MAC; • Dest MAC; • VLAN1; • VLAN2; • VLAN3; • Eth Type; • MPLS1; • MPLS2; • MPLS3; • VLAN Pri; • IP TOS; • IP Protocol; • Src IP; • Dest IP; • Src IPv6; • Dest IPv6; • Src Port; • Dest Port;</td></tr>
</table>

Sub Menu	Parameters
Filter	• Enable: Click to enable this filter;  Figure 8.12 Filter
Capture	• Port Selection: Select test port, support, ◦ Port 1; ◦ Port 2; ***(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)***
	• Capture Mode: Select capture mode, support, ◦ All; ◦ Filter; ◦ FCS OK; ◦ FCS Error; ◦ IP Check Error; ◦ UDP/TCP Check Error; ◦ UDP/TCP/IP Check Error;
	• Start Button: Click to start or stop to capture packet;
	• Export Button: Click to save packet information which has been captured;
	• Import Button: Click to open the packet which has been captured;
	• Clear Button: Click to clear packet information which has been captured;
	• Preview Button: Click to preview the packet information which has been captured;
	• Capture Information Box: Display information of packet has been captured, include, ◦ No.; ◦ Time (s); ◦ Source; ◦ Destination; ◦ Type; ◦ Length (Byte);
	• Status: Display the status of packet capture;
	• Number: Display the quantity of the captured packets.

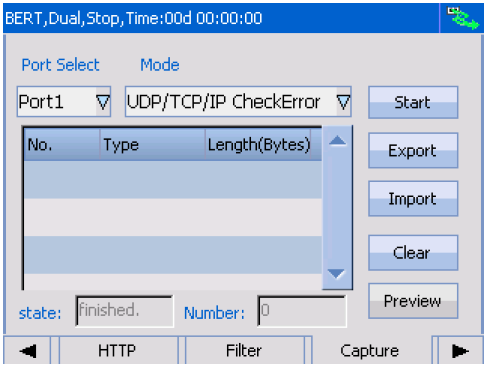
<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td>Capture</td><td> 

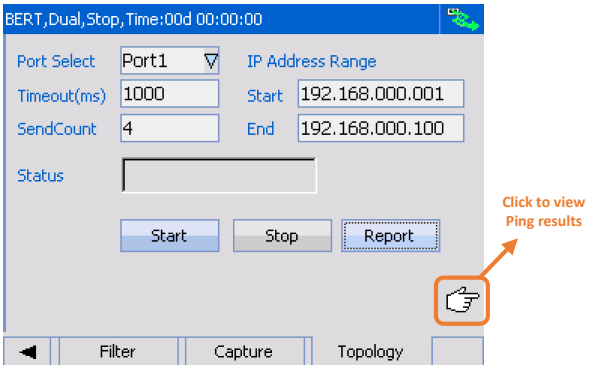
Figure 8.13 Capture</td></tr>
<tr><td>Topology</td><td>• Port Selection: Select test port, support,
• Port 1; • Port 2;
(Note: The option is ONLY available under the dual port test situation, the default setting is port 1.)
• Timeout (ms): Set timeout value;
• Send Count: Set send times;
• IP Address Range: Set a range of IP to Ping;
• Status: Show the Ping results;
• Start: Click to start to Ping;
• Stop: Click to stop to Ping;
• Report: Click to save the report.
 

Figure 8.14 Topology</td></tr>
</table>

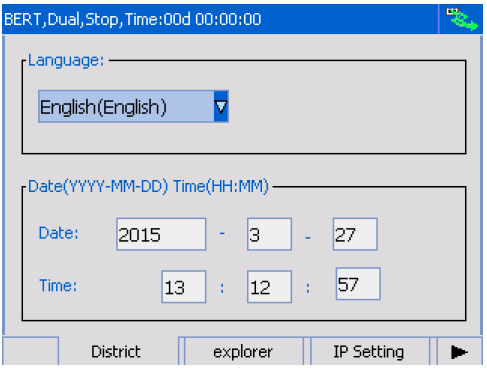
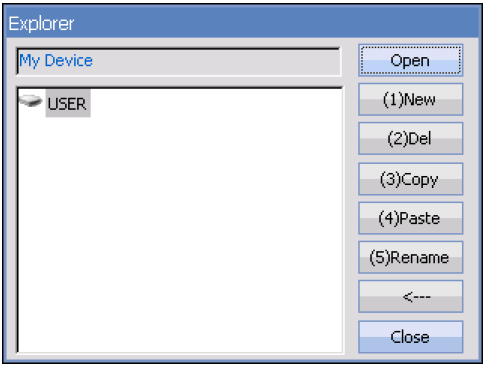
8.3 System Setting

System setting of the device includes 'District'; 'Explorer'; 'IP Setting'; 'Remote Desk'; 'About'; 'Power' and 'Help'. Table 8.3 describe the system setting of the device.

Table 8.3 System Setting

Sub Menu	Function

District	• 'Language': Select language, support,
	  • Chinese,
	  • English;
	• 'Date': Set date;
	• 'Time': Set time;

	 Figure 8.15 District
Explorer	• Explorer: Show all files information in system;
	 Figure 8.16 Explorer

IP Setting	• 'Address Type': Select IP address type, support,
	  • Static,
	  • DHCP;

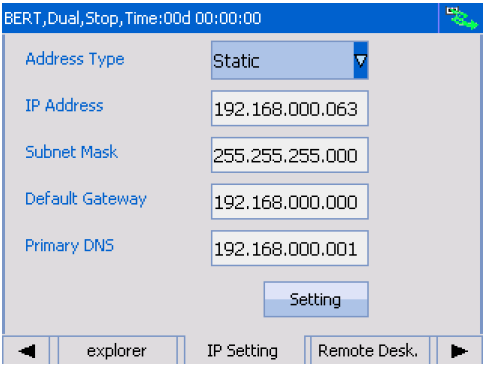
<table>
<tr><th>Sub Menu</th><th>Function</th></tr>
<tr><td rowspan="2">IP Setting</td><td>• ‘IP Address’: Set IP address;
• ‘Subnet Mask’: Set subnet mask;
• ‘Default Gateway’: Set default gateway;
• ‘Primary DNS’: Set primary DNS;
• ‘Setting’: Click to make the setting into effect;</td></tr>
<tr><td> 

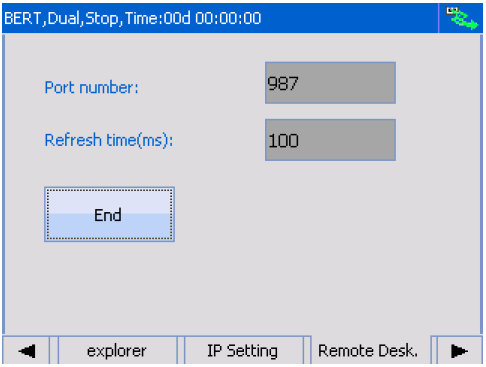
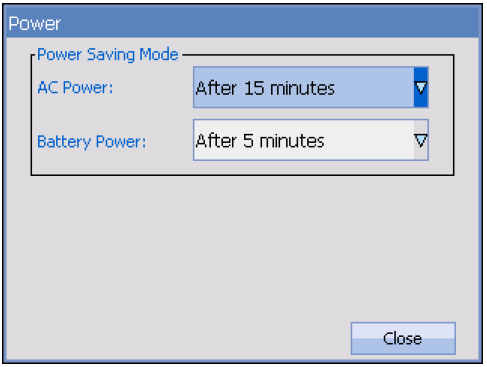
Figure 8.17 IP Setting</td></tr>
<tr><td rowspan="2">Remote Desktop</td><td>• ‘Port number’: Set remote control port number;
• ‘Refresh time’(ms): Set remote control refresh time;
• ‘Strat/End’: Click to strat or end remote control;</td></tr>
<tr><td> 

Figure 8.18 Remote Desktop</td></tr>
<tr><td>About</td><td>• Show corporation and version information;</td></tr>
</table>

Sub Menu	Function
About	 Figure 8.19 About

Power	• Power Saving Mode: Set time for device entering power saving mode, touch the screen to wake the device:
	  • AC Power: Can set as Never, After 1 to 30 minutes;
	  • Battery Power: Can set as Never, After 1 to 30 minutes

	 Figure 8.20 Power
Help	• Help: Click to show help information.

8.4 Remote

Remote is bi-directional test. Table 8.4 demonstrated the bi-directional test parameters.

Table 8.4 Bi-directional Test

Sub Menu	Parameters

Ourselves Device	• Start Function: Click to enable S Bidirectional Test;
	• Device: Display the type of local device;
	• Local Information:
	  • Auto Broadcast: Select to enable auto broadcast;
	(Note: If the remote device choose 'Auto Broadcast', local device will be scanned.)
	  • Auto Search: Click to search remote device automatically, the result will be displayed in the message bar;
	  • Link status: Display the link status of current device,
	  • Red: Not connected;
	  • Green: Connected;
	  • Remote IP: Display the IP address of connected remote device currently;
	  • Connect/ Stop button: Click to establish or stop a connection with remote device.
	• Message Bar:
	  • Device: Show the name or code of the remote device;
	  • MAC: Show the MAC address information of remote device;
	  • IP: Show the IP address information of remote device;
	• Remote Loopback Control:
	(Note: This function is ONLY available when a remote device has been connected.)
	  • Loopback layer: Select Loopback layer, support,
	  • Layer 1; • Layer 2; • Layer 3; • Layer 4;
	  • Start Button: Click to start remote loopback control function.

Partner Device	• Remote Information：
	  • IP Address：Show the IP address of remote device;
	  • MAC: Show the MAC address of remote device;
	  • Module：Show the module information of remote device;
	  • Rate：Show the rate of remote device;
	  • Function: Show specific function which is available of the current remote device;

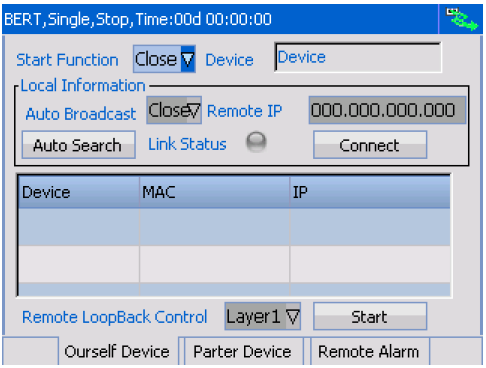


Figure 8.21 Bi-directional Test Ourselves Device

<table>
<tr><th>Sub Menu</th><th>Parameters</th></tr>
<tr><td rowspan="2">Partner Device</td><td>

Remote Statistic:

Display the current statistic information: include,

Tx Count: Packet sent;
Rx Count: Packet received;
Tx Byte Count: Bytes sent;
Rx Byte Count: Bytes received;

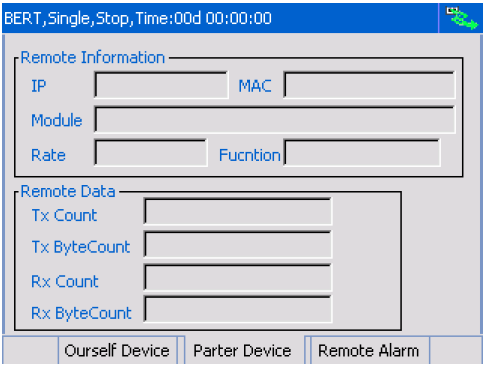
</td></tr>
<tr><td> 

Figure 8.22 Bi-directional Test Partner Device</td></tr>
<tr><td rowspan="2">Remote Alarm</td><td>

Historical and Current Alarm information Status Display: include,

FCS;
IP Checksum;
Jumbo;
Link;
Bit Error;
UDP/TCP Error;
Runts;

Green: No alarm;
Red: Alarm;
Seconds: Display time of alarm;
Counts: Display frequency of alarm.

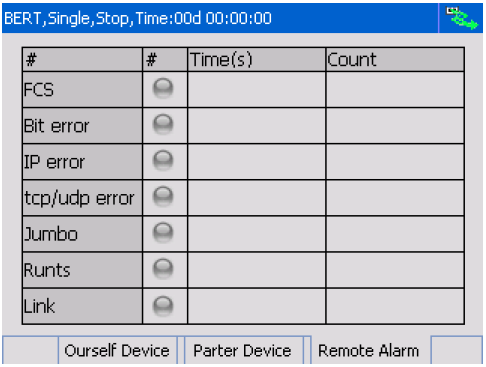
</td></tr>
<tr><td> 

Figure 8.23 Remote Alarm</td></tr>
</table>

9. Maintenance

9.1 General Maintenance Instruction

Please follow the following instruction to maintain the device in order to long term operation with high accuracy and precision.

- Clean optical connectors every time before use;
- Avoid dust, dirt, and ash;
- Use slightly wet cloth to clean the device shell;
- Store the device under clean and dry environment and avoid direct sunshine;
- Avoid the high humidity and great temperature fluctuations environment;
- Avoid the fiercely vibration and impact;
- If any liquid has been spurted to the device or inside the device, please shut down the device immediately, and dry the device completely.

9.2 Transportation

Transportation environmental requirements must be strictly followed the Environmental Guidelines ***(Section 3.1: Environmental Guidelines)***. Improper and inappropriate operation has relatively high probability to cause permanent damage to the device. Follow the following instruction could minimise the possibility of damage occurrence:

- Use the device's original package to pack the device during transportation;
- Avoid to transport the device under the high humidity and great temperature fluctuations environment;
- Avoid direct sunshine and the fiercely vibration and impact.

10. Troubleshooting

10.1 Common Problems Solutions

Table 10.1 describes some common problems and solutions.

Table 10.1 Common Problems and Solutions

Problems	Cause	Solution
Device start failure	Battery power has been consumed entirely.	• Charge the battery; • Replace the battery which has been fully charged; • Plug in an AC/DC adapter.
	External power supply has not been connected.	Connect the external power supply with the device.
	External power supply has not been plugged in the proper socket.	Check the external power supply power has been plugged in socket properly.
	Battery compartment cover has not been locked or placed properly.	Check battery compartment cover has been locked properly, please replace a new one if it has been broken.
Screen display failure	Battery power has been consumed entirely, and the device has been shut down.	• Charge the battery; • Replace the battery which has been fully charged; • Plug in an AC/DC adapter.
Laser LED is off and the connector do not generate the signal	Laser is off;	Turn on the laser;
	The rate of SPF optical module which has been inserted does not match with the test case;	Make sure SFP module which has been inserted support the speed of the test case;
	SFP optical module is not compatible with OTP6126;	Make sure to use an appropriate SFP optical module.

10.2 Technical Support Contact

If any other problems occurs, please contact OPWILL technical support or customer service immediately with product name, serial number ***(which can be found in product identification label)***, and a short description of the problem, which can make our technical supporters to solve your problems as soon as possible. Contact detail is demonstrated in below:

Technical Support

Tel: +86(10)82771386-800

Email: support@opwill.com

10.3 Transportation

Transportation environmental requirements must be strictly followed the Environmental Guidelines ***(Section 3.1: Environmental Guidelines)***. Improper and inappropriate operation has relatively high probability to cause permanent damage to the device. Follow the following instruction could minimise the possibility of damage occurrence:

- Use the device's original package to pack the device during transportation;
- Avoid to transport the device under the high humidity and great temperature fluctuation environment;
- Avoid direct sunlight;
- Avoid the fiercely vibration and impact.

11. Warranty

11.1 Warranty Statement

OPWILL guarantees this device will be warranted for 3 years from the date of initial shipment against the defects caused by material or manufacture.

During the warranty period, OPWILL has authority to repair, replace, or issues credit for any defective products. Free examination and adjustment service for the defective products which need to be repaired, or the products which have an inaccurate default calibration problem also will be provided during the warranty period. However, if the device was delivered back to the factory for examining an inaccurate default calibration problem, but eventually the examination result shows all the measurements meet the requirements which have been published in public, standard calibration fee will be charged by OPWILL even the product is in the warranty period.

The warranty will invalid if:

- Device has been opened or repaired by unauthorised person or non-OPWILL employees;
- Warranty sticker has been removed, or case has been opened without permission;
- Device's serial number has been modified, erased, or removed;
- Device has been damaged by misuse, or accident.

11.2 Disclaimer

OPWILL shall have no liability for any loss or damage resulting from the usage of the product, any performance failure of other items which is connected with the product, misuse or unauthorised modification of the product and its accessories and software. Also OPWILL shall have no liability for any loss or damage caused by force majeure or nature related to.

OPWILL reserves all the right to change and modify the product design and structure. OPWILL shall have no liability to modify any components of the products to meet the customer requirements after the products have been purchased. Accessories,

including but not limited to fuse, LED indicators, batteries and universal interfaces (EUI) used with OPWILL products are not covered by this warranty.

The warranty excludes the any loss or damage resulting from improper or inappropriate usage or installation, normal tear and wear, accident, negligence, fire, water, lightning strike or other force majeure of nature, which are beyond OPWILL's responsibility.

11.3 Service and Repairs

OPWILL commits to provide product repair service for 5 years after the date of the product has been purchased. Following instruction may be helpful, if the device required a technical support or repair service:

- Please call OPWILL's technical support group ***(Section 10.2: Technical Support Contact)***, type of service which is the device required will be determined by OPWILL's technical support employees;
- If the device must be returned to OPWILL or an authorised service centre, OPWILL's technical support employees will issue a Return Merchandise Authorisation (RMA) number and provide an address for returning;
- If possible, back up the device data before sending it back for repairing;
- Pack the device use its original package, please attach a detail report of defect and situation has been observed;
- Please deliver the device to the address which is provided by OPWILL's technical support group, and RMA number must be attached on the parcel otherwise the parcels will be rejected by OPWILL ***(Section 11.1: Warrant Statement)***.

The device will be delivered back to customers immediately when repair or maintenance has been done, and a report with fully detail repair or maintenance information will be attached with the device as well. If the device is not in the warranty period, a receipt of the cost of the repair or maintenance service will be invoiced and attached to the report. If the device is in the warranty period, service fee will not be charged to the customers including the delivery fee for returning the device back, but delivery insurance will be at customer's expense.

OPWILL TECHNOLOGIES (BEIJING) CO., LTD.

Service and Support

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Technical Support

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