

# OTM2612

## 10G Ethernet/SDH/OTN Test Module



OTM2612 10G Packet Ethernet/SDH/OTN Test Module is a multi service test solution for the installation and maintenance for Metro/Carrier Ethernet, IP services, SDH/SONET, OTN circuit test up to 10G. Not only does it supply a compact test solution for 10G packet Ethernet, include ITU-T Y.1564 Standard for SLA test features, but also for SDH/SONET supports Out-of Service test, Round Trip Delay, In-service test, overhead controlling and decoding, troubleshooting, APS timing etc.

This module is compatible with OTP6200v2 (OPWILL Intelligent Network Test Platform).

- 10Gbit/s data stream in maximum;
- RFC2544 test includes throughput, latency, frame loss, and back-to-back;
- Y.1564 test;
- BERT and loopback test from layer 1 to layer 4 with or without VLAN and MPLS tags;
- Generate up to 512 traffic flows with different MAC address, VLAN tags, MPLS, IP address, TCP/UDP, payload, and bandwidth;
- Service disruption test, IPV6;
- STM-1/STM-4/STM-16/STM-64 and OC-3/OC12/OC-48/OC-192 SDH/SONET (SFP+ port);
- Support bit error ration test and performance analysis;
- Support SDH/SONET overhead control and decode;
- Pointer monitoring and adjustment, G.783 pointer test sequences generation;
- APS time measurement;
- OTN test includes OTU2E/OTU1E/OTU2/OTU1, FEC test according with ITU-T O.182;

### Platform Briefs: OTP6200



#### Colour Touchscreen

Advanced TFT transfective display provides perfect visibility in any sunlight conditions. Graphical menu makes your operation easier and faster.

#### LEDs

LEDs offer crucial test information

#### Interfaces

USB A/B and RJ45

#### Dial

Rugged and durable

#### Number Keys

Conveniently input number and IP address

#### Function Keys

Quickly achieve various configurations

- Compact and lightweight designed;
- Graphical user interface, easy to operate;
- 6.5inches outdoor-enhanced LCD colour touch screen;
- Ultra-high capacity field-exchangeable Li-ion battery pack extends testing time;
- Powerful modular intelligent network test platform;
- Dial, number keys and function keys for flexible scrolling and selecting;
- Remote control by PC using 10/100M Base-T port.

**Key Feature:****Ethernet:**

- Dual 10G Base-X test interfaces;
- Dual 10/100/1000M Base-T and 100/1000M Base-X dual media test interfaces;
- Network configuration testing and performance testing per standard ITU-T Y.1564;
- RFC2544 and Y.1564 Bidirectional testing;
- Traffic scan according with MAC, IP, VLAN, MPLS label, and so on;
- Smart loop mode for layer 1, layer 2, layer 3, and layer 4.
- Perform throughput, latency, frame loss, and back-to-back measurements per industry-standard RFC2544;
- Generate up to 512 traffic flows with different MAC address, VLAN tags, MPLS, IP address, TCP/UDP, payload, and bandwidth;
- IPv4 and IPv6 traffic generation;
- Ethernet BERT and Loopback testing at layer1, layer2, layer3, and layer 4;
- MAC and VLAN flooding;
- Service disruption test;

**SDH/SONET:**

- Dual SFP+ port for STM-1/STM-4/STM-16/STM-64;
- SDH/SONET overhead control and decode;
- Pointer monitoring and adjustment, G.783 pointer test sequences generation.
- Dual SFP+ port for OC-3/OC-12/OC-48/OC-192;
- Bit error ratio and performance analysis;

**OTN:**

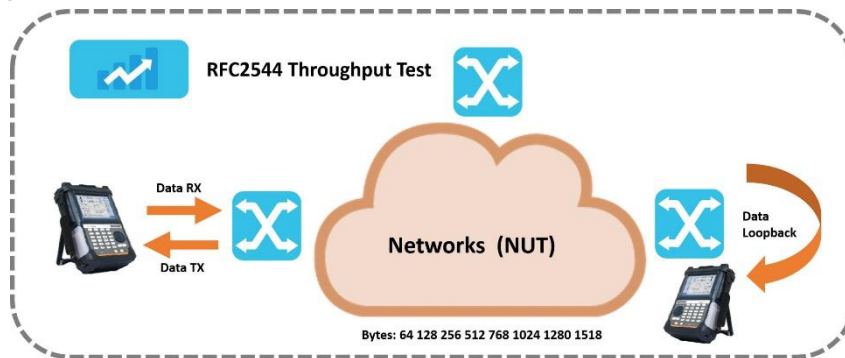
- Dual SFP+ ports for OTU2E/OTU1E/OTU2/OTU1 test;
- OTN APS and SDT test;
- Propagation delay test;
- OTN BERT Test;
- OTN through mode, and can insert alarm and errors when use through mode;
- FEC test according with ITU-T O.182

**Ethernet Applications:**

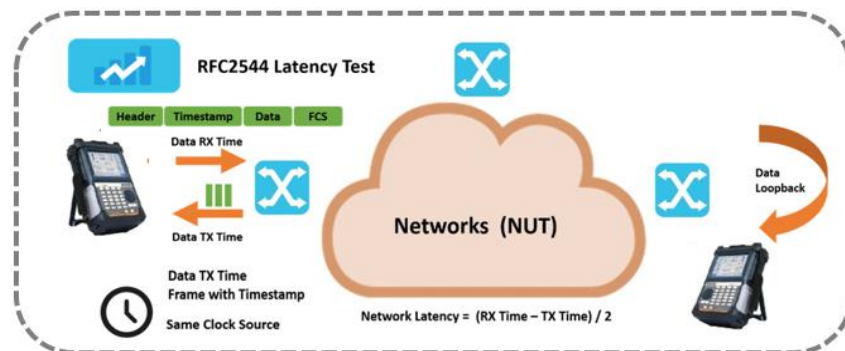
**RFC2544 Test:**

OTM2612 fully meets RFC2544 standard, supports Throughput; Latency; Frame loss; and Back-to-Back test in metro network, and can be able to generate a complete test report.

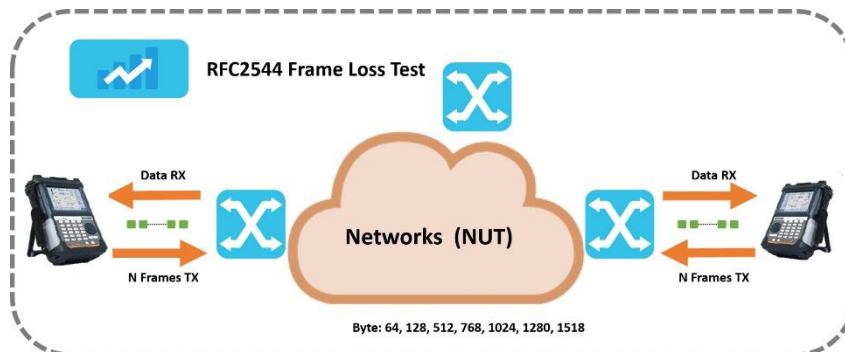
**Throughput**



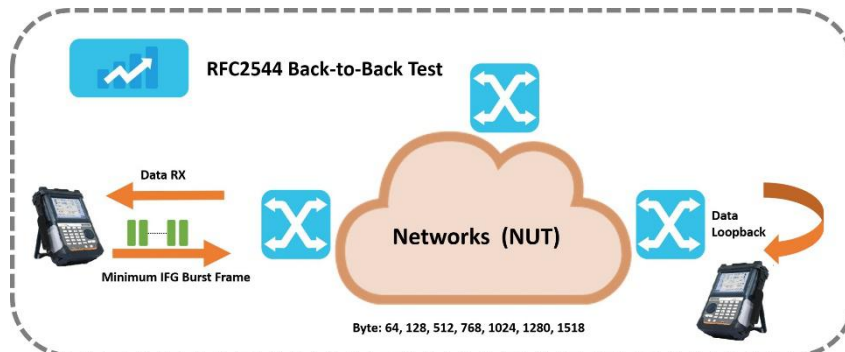
**Latency**



**Frame Loss Test**

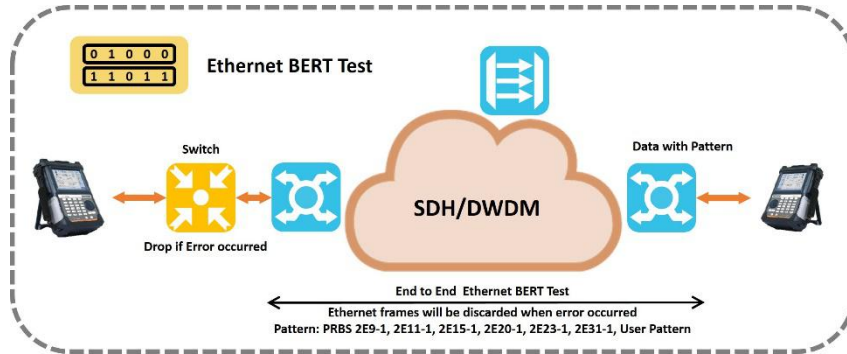


**Back-to-back Test**



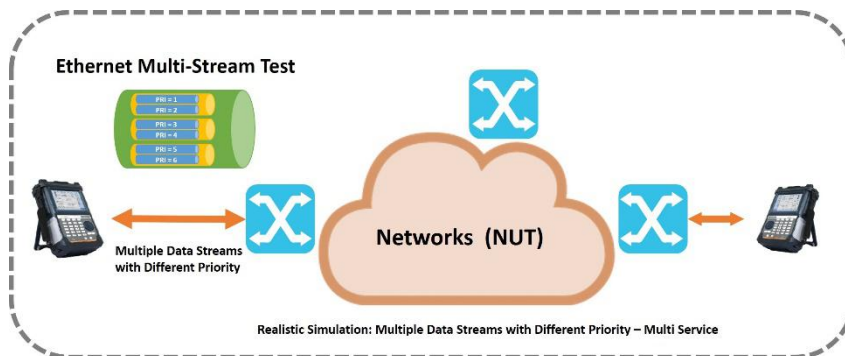
**BERT Test:**

Ethernet BERT test adopts the similar principle of SDH BERT test. It is by transferring the Ethernet frames with special test code, then analyse these frames at the receiver to test the network.



**Multi-Stream Test:**

OTM2612 supports to generate multiple data streams to test the forward ability of these service in Ethernet network. In addition, multiple data streams can be set as different priority.

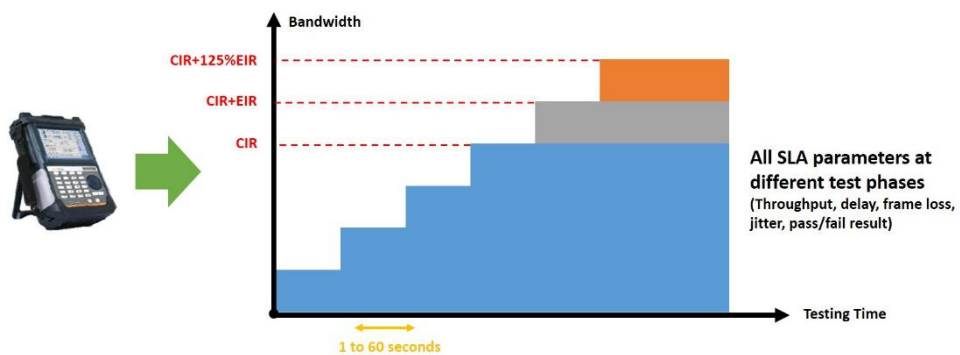


**Y.1564 Test:**

RFC2544 was the most popular standard for Ethernet test. However, it is specially designed for indoor network facilities test, not suitable for outdoor field test. Hence, ITU-T Y.1564sam is particularly introduced for telecom operator to do Ethernet network service launch and fault diagnosis. Compared with RFC2544, it includes critical SLA standards such as packet jitter identification and QoS measurements, which could increase test speed promptly, save test time and resource, and optimises QoS.

**Network Configuration Test**

Network configuration test will conduct a test for every service to verify whether the service configuration is correcting or not, and whether all specific KPI or SLA parameters have been satisfied.



**Performance Test**

When the configuration of every service has been checked, and verified successfully, OTM2612 will conduct a test for the quality of service simultaneously.

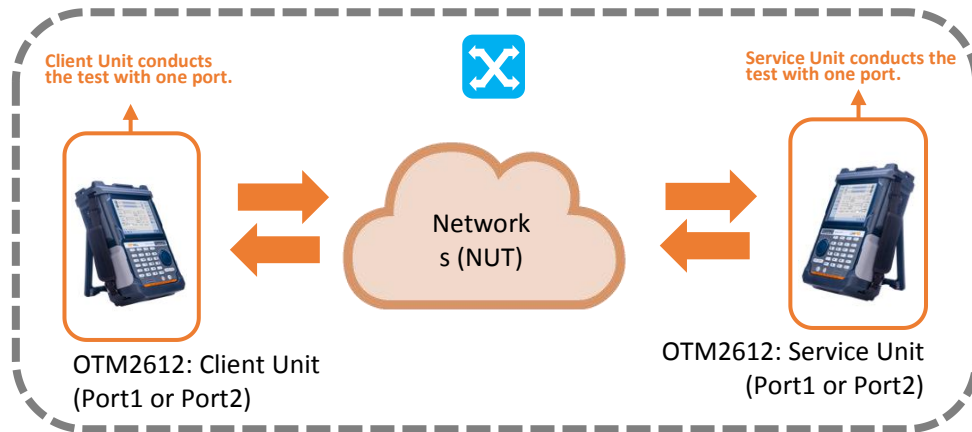


### RFC6349 Test

RFC6349 provides a practical method for end-to-end testing of TCP throughput in Trusteeship IP networks, aiming at improving user experience. OPWILL has researched and developed a detail test method for RFC6349 in OTM2612. Therefore Operators just need to load the relevant test configurations and start the test button, and then will get the test report.

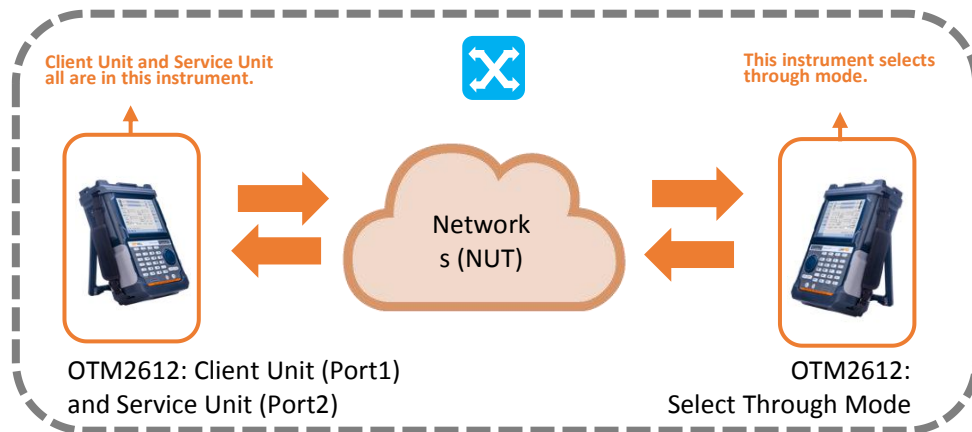
### Single Port Test

Operators need to prepare two OTM2612 instruments, and then one instrument is as Client Unit, another one is as Service Unit. Meanwhile select one port (Port1 or Port2) to be test port separately from the instruments. And then build the connection and Client Unit transports the data information to Service Unit, also Service Unit transports the its data information to Client Unit, Finally Client Unit will complete the data statistics and generate the report.



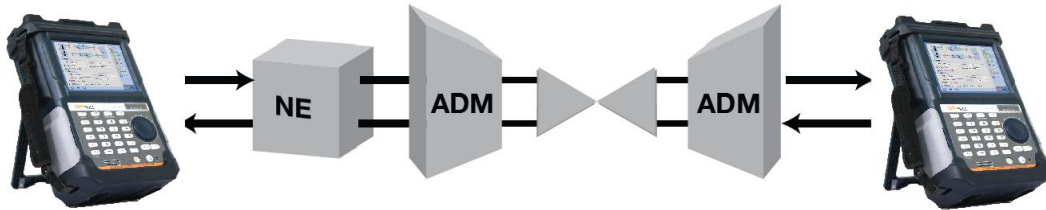
### Dual Ports Test

Also because OTM2612 have two ports, Now In order to operate conveniently, OTM2612 provides that Port1 is as Client Unit and Port2 is as Service Unit. Meanwhile Use one OTM2612 to select through mode in the remote terminal. And then build the connection, Client Unit transports the data information to the Networks, after go through the remote instrument, return Service Unit. Finally Client Unit will complete the data statistics and generate the report.



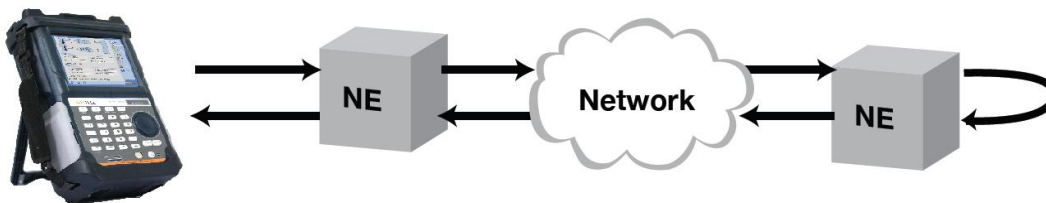
**SDH/SONET and OTN Applications:**

**Out of Service**

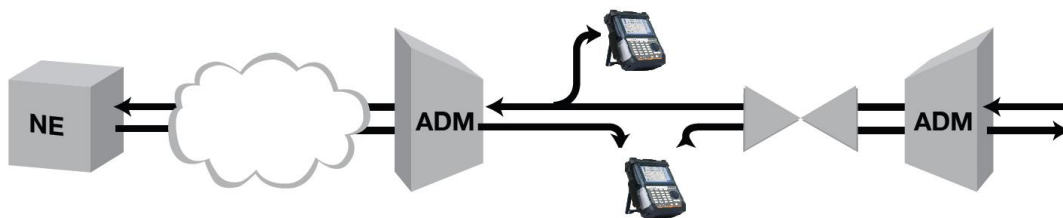


- End-to-end error free transmission verification;
- Automatic protection switching verification;
- SDH/SONET mapping verification down to VC12/VT1.5.

**Round Trip Delay**



**In-Service Test**



- Through mode;
- In-service monitoring protected monitoring points or optical splitters;
- Overhead bytes monitoring and decoding;
- Pointer monitoring.



**General Specifications: OTP6200 + OTM2612**

<b>GENERAL SPECIFICATIONS</b>	
<b>User Interface</b>	
Screen	6.5 Inch TFT Touch Screen (640 x 480);
<b>Other Interface</b>	
USB	<ul style="list-style-type: none"> <li>• USB2.0, A type, 2;</li> <li>• USB2.0 Mini B type, 1;</li> </ul>
Ethernet	Ethernet 10/100M, RJ45;
Audio	3.5mm Audio Interface;
Storage	16G;
<b>Physical Specifications</b>	
Temperature	<ul style="list-style-type: none"> <li>• Operating: -10°C to 50°C;</li> <li>• Storage: -40°C to 70°C;</li> </ul>
Relative Humidity	0% to 95%(non-condensing);
Size(H×W×D)	<ul style="list-style-type: none"> <li>• OTP6200: 319mm x 202mm x 105mm;</li> <li>• OTM2612:25mm x 97mm x 259mm;</li> </ul>
Weight	<ul style="list-style-type: none"> <li>• OTP6200: 2.8kg;</li> <li>• OTM2612:0.4kg;</li> </ul>
Vibrancy	10Hz to 500Hz < 1.5g (on 3 main axes);
Mechanical Shock	6 sides, 8 edges < 760cm, according to GR-196-CORE;
EMC	<ul style="list-style-type: none"> <li>• EN55022/CIPSR22;</li> <li>• EN61000-3-2;</li> <li>• EN55024;</li> </ul>
<b>Battery and Power Supply</b>	
Battery	<ul style="list-style-type: none"> <li>• Rechargeable Li-Ion batteries;</li> <li>• Working time: 4 hours (typical for 10G Ethernet test);</li> <li>• Charging time: 3.5hours (typical: 25°C);</li> </ul>
Power Source	<ul style="list-style-type: none"> <li>• Input: 100-240VAC, 50-60Hz,2A;</li> <li>• Output: 19VDC, 4A.</li> </ul>

**Technical Specifications: OTM2612**

<b>TECHNICAL SPECIFICATIONS</b>	
<b>Ethernet</b>	
Port	<ul style="list-style-type: none"> <li>• Optical interface: 2ports,10G Base-X with SFP+;</li> <li>• Optical interface: 2 ports,100/1000M Base-X;</li> <li>• Electrical interface: 2 ports, 10/100/1000M Base-T;</li> </ul> <i>User selectable optical module: 850nm, 1310nm, 1550nm.</i>
Ethernet Feature	Auto negotiation, flow control;
Configuration	Monitor/Generate, pass-through;
Encapsulation	Ethernet type II, IEEE802.3 with 802.2, IEEE802.3 with SNAP;
<b>Configuration, Monitoring, and Generation</b>	
Traffic Generation	<ul style="list-style-type: none"> <li>• Variable line rate traffic generation, up to full line rate;</li> <li>• Traffic generate mode: continuous, burst, ramp, n-frame, n-burst, n-ramp;</li> <li>• Adjustable frame size:46bytes to 16000 bytes;</li> <li>• Frame size:fixed, increase, decrease, random;</li> <li>• User-defined traffic mix of unicast and broadcast frames;</li> <li>• Fixed, increase, decrease, random MAC/IP identifier;</li> <li>• User programmable DSCP/TOS byte;</li> <li>• Configurable IP and Ethernet source and destination addresses (support IPv4 and IPv6 addressing);</li> <li>• User programmable TCP/UDP address;</li> <li>• Generate pause frames, respond to pause frames;</li> <li>• Answer incoming ARP, ping requests;</li> </ul>
Stacked VLAN	<ul style="list-style-type: none"> <li>• Up to 3 user-settable VLAN tags;</li> <li>• Parameters per VLAN tag:                             <ul style="list-style-type: none"> <li>• Ethernet type II 0x8100(802.1Q),0x88a8(802.1ad),0x9100, 0x9200, 0x9300;</li> <li>• User-defined VLAN ID, CFI, VLAN priority;</li> <li>• Address fixed, increments,decrement, random generation supported;</li> </ul> </li> </ul>
Multi stream	Number of streams: up to 512streams per port can be activated;
Error Injection	FCS, IP check sum error, UDP/TCP check sum Error, bit error, BER test sequence error;
Alarm generation	No link;
<b>Result, Monitoring and Generation</b>	
Status	<ul style="list-style-type: none"> <li>• Link status, interface type, jabber detected, frames present, MPLS/VLAN, speed, full or half duplex, signal present, bit rate of incoming Ethernet signal, auto negotiation complete;</li> <li>• Link partner abilities: speed/duplex;</li> <li>• Indicators of utilisation, throughput, errored frames;</li> <li>• Signal level indication for optical Ethernet interfaces;</li> </ul>
Performance Statistics	Utilisation, throughput,frame rate;
Frame Statistics	<ul style="list-style-type: none"> <li>• Total frames, totaltesting frames, totalnot testing frames, Unicast/multicast/broadcast frames, number of pause frames;</li> <li>• Total VLAN frames;</li> <li>• Total MPLS frames;</li> <li>• Total errored framed, number of oversized, normal, and runt frame, number of FCS errored;</li> </ul>

Result, Monitoring and Generation	
Frame Distribution Statistics	<ul style="list-style-type: none"> <li>Total valid/frames, &lt;64, 64-127, 128-511, 512-1023, 1024-1518, &gt;1518;</li> </ul>
Multi stream	<p><b>Display information per stream:</b></p> <ul style="list-style-type: none"> <li>Frame loss count/rate, throughput, latency, packetjitter, frames and bytes received and transmitted;</li> </ul>
Transmit Statistics	Total frames, unicast/multicast/broadcast;
Filter	<p><b>Filter condition support:</b></p> <ul style="list-style-type: none"> <li>Source and destination MAC/IP, IPv6, VLAN ID and VLAN Priority, MPLS, IP TOS, TCP/UDP source and destination port, Ethernet type and IP protocol;</li> </ul>
BER Test and Service Disruption Test	
BER Test	<ul style="list-style-type: none"> <li>Generation and detection of test pattern, count of errors in received test pattern;</li> <li>Pattern generation: layer 1 to layer 4;</li> <li>Frame loss count and frame loss seconds;</li> <li>BER measurement results;</li> <li>Test pattern: PRBS9, PRBS11, PRBS15, PRBS20, PRBS23, PRBS31, CRPRJ, JTPAT, SPAT,32bits user defined;</li> </ul>
Error Injection	FCS, IP check sum error, UDP/TCP check sumerror, BIT error, BER test sequence error;
Service Disruption Test	<p><b>Service disruption test activated as part of BER test:</b></p> <ul style="list-style-type: none"> <li>Max/Avg service disruption test, resolution:0.1us;</li> <li>Number of service disruption;</li> </ul>
Loopback	
Loopback Test	<ul style="list-style-type: none"> <li>Layer 1 to layer 4loopback test;</li> <li>Advanced loopback test:                             <ul style="list-style-type: none"> <li>Packet loss setting: percentage, packetcount, time;</li> <li>Loopback drop enable: protocolloss,protocolpass,control, CRC error;</li> </ul> </li> </ul>
RFC2544	
RFC2544 Test	<ul style="list-style-type: none"> <li>Switch/Router test and single ended network test mode:                             <ul style="list-style-type: none"> <li>Throughput, frame loss,latency,back-to-back;</li> </ul> </li> <li>End-to-End network test mode (2 units in local-remote setup):                             <ul style="list-style-type: none"> <li>Throughput, frameloss,back-to-back;</li> </ul> </li> </ul>
Service Activation Test (Y.1564)	
Service Activation Test	<p><b>ITU-T Y.1564 service activation test:</b></p> <ul style="list-style-type: none"> <li>Up to 512services per port;</li> <li>Colour-aware and non-colour-aware in combinations;</li> <li>Verification against service acceptance criteria: information rate, frame transfer delay, frame delay variation, frame loss rate, availability;</li> </ul>
Service Configuration Test	<ul style="list-style-type: none"> <li>Subtest for: CIR, EIR, traffic policing;</li> <li>Step duration:1-60s (user define);</li> <li>Number of steps: 1 to 4;</li> <li>Result: pass/fail indication, IR(min/avg/max), FL(Count/FLR), FTD,FDV (min/Avg/max (during measurement));</li> </ul>
Service Performance Test	<ul style="list-style-type: none"> <li>All services tested simultaneously at CIR;</li> <li>Duration 15min, 2hours, 24 hours, or user defined;</li> <li>Result: pass/fail indication, IR(min/avg/max), FL(count/FLR), FTD, FDV (min/avg/max (during measurement));</li> </ul>

Remote Smart Loopback Test	
Remote Smart Loopback	<ul style="list-style-type: none"> <li>• Use as local unit control another remote unit for RFC2544 and Y.1564 bi-directional testing;</li> <li>• Support layer 1 to layer 4 smart loopback test;</li> </ul>
Advanced IP Tools	
PING	<b>For connectivity and configuration check:</b> <ul style="list-style-type: none"> <li>• Round trip time(RTT);</li> <li>• Support IPv4, TTL, URL;</li> </ul>
Trace Route	<b>Trace IP route over IP network:</b> <ul style="list-style-type: none"> <li>• Information per hop: PINGtime, number of ping timeouts;</li> </ul>
VCT Cable Test	<b>Use for CAT5 cable connectivity check:</b> <ul style="list-style-type: none"> <li>• Status: pass/fail;</li> <li>• Channel;</li> <li>• Fault location;</li> <li>• Polarity;</li> <li>• Pair Skew;</li> </ul>
Flow Control	<b>Flow control time, us:</b> <ul style="list-style-type: none"> <li>• Pause time: total, last, max, min;</li> <li>• Pause frame count: TX, RX;</li> </ul>
FTP Upload/Download	<b>Use for FTP server and client emulation:</b> <ul style="list-style-type: none"> <li>• Support IPv4 and URL;</li> <li>• File upload/download;</li> <li>• Username/password;</li> <li>• Result: pass/fail indication, upload/download time display;</li> </ul>
HTTP	<b>WEB access:</b> <ul style="list-style-type: none"> <li>• Support IPv4 and URL;</li> <li>• HTTP access pass/fail;</li> </ul>
Advanced PING <i>(Topology)</i>	<b>Advance/fast PING, PING segments of the IP one by one in one time:</b> <ul style="list-style-type: none"> <li>• IP address range: start, end</li> <li>• Timeout (ms);</li> <li>• Send count;</li> <li>• Status: pass/fail indication;</li> </ul>
MPLS	
Number of MPLS Header	Up to 3 MPLS header set by user;
Parameter per MPLS Header	<b>User defined label, exp and TLL fields in each MPLS header:</b> <ul style="list-style-type: none"> <li>• Label fixed, increment, decrement, random generation;</li> </ul>
Statistics	MPLS frame count;
Ethernet Frame Capture	
Capture Buffer Size	<ul style="list-style-type: none"> <li>• 16Kbytes;</li> <li>• When capture buffer full: stop;</li> </ul>
Capture Frame Slicing	Can capture frame length by user defined;
Capture Data	CAP format for display in Wireshark.

SDH and SONET Test	
Port	<ul style="list-style-type: none"> <li>STM-1/STM-4/STM-64/STM-16, OC-3/OC-12/OC-192/OC-48 optical interface: ( SFP+), 2port; <i>User selectable optical module:850nm/1310nm, 1550nm</i></li> </ul>
Measurement	<ul style="list-style-type: none"> <li>Out-of-service mode;</li> <li>In-service mode;</li> </ul>
Operation	<ul style="list-style-type: none"> <li>Through mode;</li> <li>Pointer-to-pointer mode;</li> <li>Enhance through mode;</li> </ul> <i>Can be changed SOH/TOH, can injection alarms and errors under Enhance Through Mode.</i>
Frame and Scramble	<ul style="list-style-type: none"> <li>SDH: complies with latest version ITU-T G.707;</li> <li>SONET: complied with latest version Telcordia GR-253;</li> </ul>
Line Code	NRZ
Transmitter Clock	<ul style="list-style-type: none"> <li>Internal clock:                             <ul style="list-style-type: none"> <li>Accuracy: 4.6ppm, up to 2ppm;</li> <li>Clock Offset: <math>\pm 70</math>ppm (1ppm steps);</li> </ul> </li> <li>TTL level external 2.048MHz clock;                             <ul style="list-style-type: none"> <li>E1: 2.048Mbps;</li> <li>DS1: 1.544Mbps;</li> </ul> </li> </ul>
Receive Single Rate	<ul style="list-style-type: none"> <li><math>\pm 100</math>ppm;</li> <li>Frequency deviation indication resolution: <math>\pm 1</math>ppm;</li> </ul>
TCM Frame Format	<ul style="list-style-type: none"> <li>ITU-T G.783, G.707 Annex D and Annex E, POH bytes:                             <ul style="list-style-type: none"> <li>HP-N1(SDH);</li> <li>LP-N1(SDH);</li> <li>LP-N2 (SDH);</li> <li>Z5(SONET);</li> <li>Z6(SONET);</li> </ul> </li> <li>TCM access point identifier (Apid): 15 bytes ASCII sequence, CRC-7;</li> </ul>
<b>SDH Mapping</b>	
<b>SONET Mapping</b>	
Alarm	<p><b>Alarm can to be detected and generated:</b></p> <ul style="list-style-type: none"> <li>SDH: LOS, LOF, OOF, MS-AIS, MS-RDI, AU-AIS, AU-LOP, HP-PLM, HP-UNEQ, HP-TIM, HP-RDI, TU-LOM, TU-AIS, TU-LOP, LP-PLM, LP-UNEQ, LP-TIM, LP-RDI, LP-RFI, LSS;</li> <li>SONET: LOS, LOF, OOF, AIS-L, RDI-L, AIS-P, LOP-P, TIM-P, PLM-P, UNEQ-P, RDI-P, LOM-V, AIS-V, LOP-V, PLM-V, UNEQ-V, RDI-V, TIM-V, LSS;</li> </ul>

SDH and SONET Test	
Alarm	<ul style="list-style-type: none"> <li>TCM: TC-LTC, TC-TIM, TC-UNEQ, TC-AIS, TC-RDI, TC-ODI;</li> </ul> <p><b>Alarm generation mode:</b></p> <ul style="list-style-type: none"> <li>Continuous;</li> <li>Alternate;</li> <li>Burst;</li> </ul>
Error	<p><b>Error can be detected and generated:</b></p> <ul style="list-style-type: none"> <li>SDH: FAS, B1, B2, MS-REI, HP-B3, HP-REI, LP-B3, LP-BIP2, LP-REI, Bit Error;</li> <li>SONET: FAS, B1, B2, REI-L, B3, REI-P, B3-V, BIP2-V, REI-V, Bit Error;</li> <li>TCM: TC-IEC, TC-BIP2, TC-REI, TC-OEI;</li> </ul> <p><b>Error generation mode:</b></p> <ul style="list-style-type: none"> <li>Single;</li> <li>Continuous;</li> <li>Alternate;</li> <li>Burst;</li> <li>Rate;</li> <li>N-frame;</li> </ul>
BERT Pattern	<ul style="list-style-type: none"> <li>Pattern generation and monitor for O.181 bulk test pattern;</li> </ul> <p><b>Support to generate and detect:</b></p> <ul style="list-style-type: none"> <li>PRBS9, PRBS11, PRBS15, PRBS20, PRBS23, PRBS31;</li> </ul> <p><b>Support reversed PRBS pattern:</b></p> <ul style="list-style-type: none"> <li>16bit user define pattern;</li> </ul>
Pointer	<ul style="list-style-type: none"> <li>Support AU/TU, STS/VT pointer monitor and generation;</li> <li>Support ITU-T G.783 pointer test sequences;</li> <li>Display pointer value of receiver side;</li> </ul>
Overhead	<ul style="list-style-type: none"> <li>Generation of section/transport and path overhead bytes;</li> <li>Display of current section/transport and path overhead bytes;</li> <li>All overhead can be decoded, including decoded J0, J1, J2 byte;</li> <li>All overhead and anyone overhead PRBS BER testing;</li> <li>Just All overhead and anyone overhead PRBS BER (Including with DCC) testing;</li> <li>256 frames overhead capture and decode;</li> </ul>
SDH Tributary Scan	<ul style="list-style-type: none"> <li>DS1 embedded in selected VC-11;</li> <li>E1 embedded in selected VC-12;</li> <li>E2 embedded in selected VC-2;</li> <li>E3/DS3 embedded in selected VC-3;</li> <li>E4 embedded in selected VC-4;</li> </ul>
SONET Tributary Scan	<ul style="list-style-type: none"> <li>DS1 embedded in selected VT-1.5;</li> <li>E1 embedded in selected VT-2;</li> <li>E3/DS3 embedded in selected STS-1;</li> <li>E4 embedded in selected STS-3c;</li> </ul>
Smart Scan	Remote single auto detects and auto setup for SDH/SONET analyser;
SDH and SONET Result	
Status	<p><b>Display information of current status:</b></p> <ul style="list-style-type: none"> <li>Alarms and errors;</li> <li>Frequency deviation;</li> <li>Actual bit rate;</li> <li>Frequency ;</li> <li>Input power of optical signal;</li> </ul>
Statistics	<p><b>Event log display:</b></p> <ul style="list-style-type: none"> <li>Alarms (seconds);</li> <li>Errors (count and rate);</li> <li>Pointer operations;</li> <li>Start/stop time;</li> <li>All events refresh with 1 second resolution;</li> </ul>
Histogram	All alarms and errors detected can be display in histogram;
Error Performance	G.821/G.826/G.828/G.829/M.2100/M.2110 analysis of received signals based on detected errors and alarms: ES, SES, BBE, AS, UAS, and so on;
APS	<p><b>APS (Automatic protection switching):</b></p> <ul style="list-style-type: none"> <li>Independently select start and complete trigger;</li> <li>All SDH/SONET alarms and errors, Bit error, errors with threshold;</li> <li>Number of switchovers indicated by APS protocol;</li> <li>K1/K2 bytes set and displayed;</li> <li>Display and save APS time, frequency, pass/fail, minimum/maximum/ average value.</li> </ul> <p><b>APS time resolution: 1us;</b></p>
Propagation Delay Measurement	<ul style="list-style-type: none"> <li>Resolution: 0.1us;</li> <li>Measurement max time: 10.0 s.</li> </ul>

OTN Test	
Port	<ul style="list-style-type: none"> <li>OTU2, OTU1e, OTU2e, OTU1 optical interface: SFP+, 2 ports;</li> <li><i>User selectable optical module: 1310nm, 1550nm.</i></li> </ul>
Measurement	<ul style="list-style-type: none"> <li>Out-of-service Mode;</li> <li>In-service Mode;</li> </ul>
Operation	<ul style="list-style-type: none"> <li>Pointer-to-pointer Mode;</li> <li>Through mode;</li> <li>Enhanced through mode;</li> <li><i>The OTU, ODU and OPU overhead can be changed; and the FEC encoder and decoder can be set ON/OFF in any mode.</i></li> </ul>
Frame and Scramble	In accordance with ITU-T G.709 and G.sup43;
Transmitter Clock	<ul style="list-style-type: none"> <li>Internal clock:                             <ul style="list-style-type: none"> <li>Accuracy: 4.6ppm, up to 2ppm;</li> <li>Clock Offset: <math>\pm 100</math>ppm (1ppm steps);</li> <li>Recovered clock;</li> </ul> </li> <li>TTL level external 2.048MHz clock;                             <ul style="list-style-type: none"> <li>E1: 2.048Mbps;</li> <li>DS1: 1.544Mbps;</li> </ul> </li> </ul>
Receive Single Rate	<ul style="list-style-type: none"> <li><math>\pm 100</math>ppm;</li> <li>Frequency deviation indication resolution: <math>\pm 1</math>ppm;</li> </ul>
TCM Frame Format	<ul style="list-style-type: none"> <li>ITU-T G.783, G.707 Annex D and Annex E, POH bytes:                             <ul style="list-style-type: none"> <li>HP-N1 (SDH);</li> <li>LP-N1 (SDH);</li> <li>LP-N2 (SDH);</li> <li>Z5 (SONET);</li> <li>Z6 (SONET);</li> </ul> </li> <li>TCM access point identifier (Apid): 15 bytes ASCII sequence, CRC-7;</li> </ul>
<p><b>OTN Mappings</b></p>	
OTN Alarm	<p><b>Alarm can to be detected:</b></p> <ul style="list-style-type: none"> <li>OTU: OTU-AIS, LOF, OOF, LOM, OOM, SM-TIM, SM-BIAE, SM-BDI, SM-IAE;</li> <li>ODU: ODU-AIS, ODU-OCI, ODU-LCK, PM-TIM, PM-BDI;</li> <li>ODU Multiplex: ODU-LOF, ODU-OOF, ODU-LOM, ODU-OOM;</li> <li>OPU: PLM, OPU-MSIM, CSF, LSS;</li> <li>TCM: TCMi-TIM, TCMi-BIAE, TCMi-BDI, TCMi-IAE (i=1-6);</li> <li>TCM: TCMi-TIM, TCMi-BIAE, TCMi-BDI, TCMi-IAE (i=1-6);</li> </ul> <p><b>Alarm can to be generated:</b></p> <ul style="list-style-type: none"> <li>OTU: OTU-AIS, LOF, OOF, LOM, OOM, SM-TIM, SM-BIAE, SM-BDI, SM-IAE;</li> <li>ODU: ODU-AIS, ODU-OCI, ODU-LCK, PM-TIM, PM-BDI;</li> <li>ODU Multiplex: ODU-LOF, ODU-OOF, ODU-LOM, ODU-OOM;</li> <li>OPU: LSS, CSF;</li> <li>TCM: TCMi-TIM, TCMi-BIAE, TCMi-BDI, TCMi-IAE (i=1-6);</li> </ul> <p><b>Alarm generation mode:</b></p> <ul style="list-style-type: none"> <li>Continuous;</li> <li>Alternate;</li> <li>Burst;</li> </ul>

**OTP6200 + OTM2612 Ordering Information**

OTP6200+OTM2612 STANDARD CONFIGURAIOTN		
Module	Description	
OTP6200	Test platform, support SDH, OTN, Ethernet, Packet Ethernet, OTDR test modules;	
OTM2612	Dual 10 Gigabit Ethernet test module;	
	Dual 10G Base-X optical interfaces;	
	Dual 10/100/1000M Base-T electrical interfaces;	
	Dual 100/1000M Base-X optical interfaces;	
	Layer 1 to Layer 4 BERT test;	
	Up to 16 streams generation and analysis with MAC/VLAN/IP/TCP/UDP;	
	RFC2544 standard test with Throughput, Latency, Frame Loss, Back-to-Back and Jitter;	
	Layer 1 to Layer 4 loopback and smart loopback test;	
	Enable to drop data packet under loopback mode;	
	Up to 10G streams generation with 3 Layer VLAN;	
	Ping, Trace Route, FTP Download/Upload, and HTTP tools;	
	Ethernet service disruption test;	
	Packet capture and analysis to 10G rate;	
	Enable to generate frame with increment, decrement, random length;	
	Enable to generate data streams with increment, decrement, random MAC, IP, VLAN, MPLS, and Port Number;	
	Bi-directional test;	
	Layer 1 bandwidth statistics;	
	Remote control by PC;	
	SDH	Dual 155M/622M/2.5G/10G Base-X optical SFP+ interface;
		One SMA clock interface (input and output share);
		STM1/4/16/64 and OC-3/12/48/192 SDH/SONET test by the optical interface;
		Mapping and Conciliatory Mapping from VC4-64c/STS-192c to VC11/VC12 and VC1.5/VT2;
		Control and decoding of SDH/SONET overhead;
		Pointer monitoring and adjustment, the generation of G.783 pointer test sequence;
		Measurement of APS (Service interruption);
		Full channel loading and scanning of background information flow;
		Round-Trip delay time;
	Full path intelligent scanning;	
	OTN	Dual SFP+ ports for OTU2E/OTU1E/OTU2/OTU1 test;
		OTN BERT test;
		OTN APS and SDT test;
		OTN through mode, and can insert alarm and errors when use through mode
		Propagation delay test;
FEC TEST according with ITU-T O.182;		



<b>OTP6200+OTM2612 STANDARD CONFIGURAIOTN</b>	
<b>Accessories Code</b>	<b>Accessories Description</b>
16080010	LC/PC to LC/PC full-duplex single-mode fibre, 3 meters, one;
16060040	CAT5 cable, 3 meters, one;
14020491	10G 1310nm 10Km LC SFP+ optical modules, two;
05020050	SFP/SFP+ optical port dust proof cap - black - rubber, two;
05020060	RJ45 electrical port dust proof cap - black - rubber, two;
16060010	3 pins adapter cable, one;
43170020	OTP6200 100-240V input and 19V output AC/DC power adapter, one;
18080010	Disc include user manual and OPWILL remote control software, one;
19070010	OTP6200 package, one;
18010010	Factory test report, one;
18010020	Calibration certificate, one;
18040011	One year warranty service.

OTM2612 OPTIONAL CONFIGURATION	
Optional Software (ETH)	
OPAP-Y1564TGeEth	Y.1564 standard service configuration and performance test for SLA QoS with CIR/EIR/Traffic Dropped up to 10GE;
OPAP-DPY1564TGeEth <i>(Need to order OPAP-Y1564TGeEth first)</i>	Bi-directional Y.1564 test;
OPAP-RFC6349TGeEth	RFC6349 TCP throughput test features;
OPAP-IPv6TGeEth	IPv6 feature, the test interface can set IPv6 address and can generate stream with IPv6;
OPAP-ScanTGeEth	Traffic scan according with destination MAC/IP, source MAC/IP, 3 Layer VLAN, 3 Layer MPLS in-service test;
OAPA-EPINGTGeEth	Advance/Fast PING, PING segments of the IP one by one in one time;
OPAP-3MPLSTGeEth	Up to 10G rates generation with 3 Layer MPLS label;
OPAP-128StreamsTGeEth	Up to 128 streams generation and analysis with MAC/VLAN/IP/TCP/UDP for 10G port;
OPAP-512StreamsTGeEth	Up to 512 streams generation and analysis with MAC/VLAN/IP/TCP/UDP for 10G port;
OPAP-EautoAGeEth	Advance auto-negotiation, can set the remote equipment auto-negotiation the speed and duplex as you want;
OPAP-DPRFC2544AGeEth	Enhancement RFC2544 test, support different upstream and downstream rates setup for Throughput, Frame Loss and Back-to- Back test;
OPAP-FXAGeEth	Dual 100M Base-X optical ports;
OPAP-10GWANATGeEth	10GE WAN Test Function;
Optional Software (SDH and SONET)	
OPAP-ThroughTGeSDH	SDH/OTN Enhanced Through Function;
OPAP-TCMTGeSDH	TCM Test;
Optional Software (OTN)	
OPAP-OHSeqCapture	256 frames OTN overhead capture and decode capability
OPAP-ODU0Mapping	ODU0 mapping capability test
OPAP-ODUflexMapping	ODU flex mapping capability test
OPAP-TCM	TCM Test
OPAP-RFC2544	RFC2544 (when the payload is ETH, can be used)
Optional Hardware	
43160031	OTP6200 lithium polymer rechargeable battery;
OPAP-Onewarranty	One year extended warranty service;
OPAP-Twowarranty	Two years extended warranty service;

Notes: Product ordering information may update along with the product upgrade, please refer to the final version provided by our sales.

Please visit our website for the further information: [www.opwill.com](http://www.opwill.com)

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