

T-BERD/MTS 8000 Transport Module

Dual-Port Test Applications

Introduction

As service providers expand their offerings into new data and wavelength services, test requirements are also expanding beyond traditional SONET and T-Carrier technologies into Data and Optical layer technologies. Service providers are now responsible for installing and maintaining new network elements and service types that were not present in legacy networks.

The T-BERD/MTS 8000 (TB/MTS 8000) Transport module addresses these trends by providing the necessary test functionality to support all of these services in one integrated module. Weighing less than 15 pounds and operating on battery power for up to two hours at 10 Gb/s line rates, the TB/MTS 8000 is conveniently sized and designed for field test applications.

The TB/MTS 8000 Transport module's Ethernet configuration allows for Ethernet and IP test capabilities from all Ethernet interfaces – 10/100/1000 copper, optical Gigabit Ethernet (GigE), and 10GigE LAN-Phy and WAN-Phy. Key test applications of the TB/MTS 8000 include connectivity, throughput, and quality of service (QoS) testing for emerging IP networks. The TB/MTS 8000 also provides RFC 2544 testing for verification of Ethernet and IP conformance to service level agreements (SLAs).

The TB/MTS 8000 features a full dual-port capability for 10/100/1000 copper and optical GigE interfaces – with two transmitters (TX) and two receivers (RX) – allowing for the simultaneous testing of two Ethernet/VLAN or IP circuits. These circuits may be provisioned for two fully independent customers, or they may represent two routes in a single network.

The dual-port capability of the TB/MTS 8000 Transport module enables field technicians to perform three important types of testing during turn-up and first-line of maintenance:

- Simultaneous Circuit Testing: Testing of two independent circuits concurrently
- Network Element Wrap Testing: Testing an element from the client to the network side
- In-Service Troubleshooting: Monitoring from two different directions on the circuit

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Simultaneous Circuit Testing

Each of the TB/MTS 8000 Transport module's two Ethernet ports has its own transmitter and receiver, both of which are able to connect to the customer's switch or router. This enables field technicians to test separate Ethernet/VLAN or IP connections through the network (Figure 1).

In a multi-site network, technicians can use the TB/MTS 8000 to test two routes independently of one another. If the service is straightforward Ethernet transport, meaning no switching occurs, the traffic can be returned to the origination point by a simple hard loop at the far-end destination point. If the traffic is switched at the MAC (layer 2) or IP (layer 3) layers, then another TB/MTS 8000 test instrument is required to perform the loop at the far end. In the loopback testing scenario, the TB/MTS 8000 takes the source and destination MAC or IP addresses of the transmitting Ethernet frame or IP packet and swaps them, thereby ensuring that the originating traffic travels properly through the network back to its origination point. In addition to testing the connectivity of each route, the TB/MTS 8000 enables technicians to test the performance of specific class of service (CoS) applications, using VLAN-based or TOS/DSCP-based traffic prioritization schemes.

Testing Parallel Virtual Connections Simultaneously

The TB/MTS 8000 Transport module also enables technicians to test two routes between the same origination point and the same termination point. If a customer is experiencing different delays on two parallel routes, the TB/MTS 8000 can be used to establish two VLAN or IP connections, with different tags and user priorities on each port, to a remote site. This test setup allows for verification of the round trip delay (RTD) on each path independently to determine if the delay is the same on both routes, and to verify/compare the delay on the two different routes.

Testing Two Independent Routes Simultaneously

When installing service to two separate customers, service providers only need one dual-port TB/MTS 8000 Transport module to perform installation testing. The TB/MTS 8000 emulates the customer's switch/router, sends IEEE-complaint Ethernet traffic, and performs RFC 2544 tests for both end customers. This allows the service provider to consistently and repeatedly test the Ethernet traffic at every route and to save time by turning-up two customer circuits simultaneously.

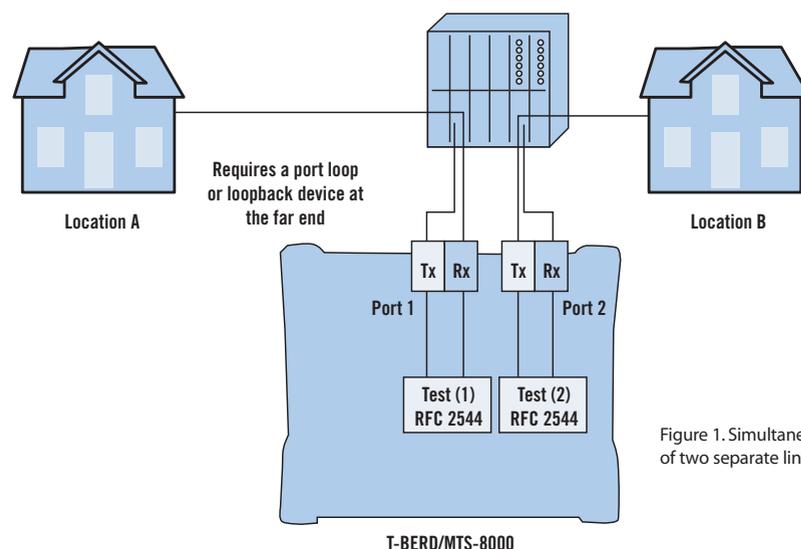
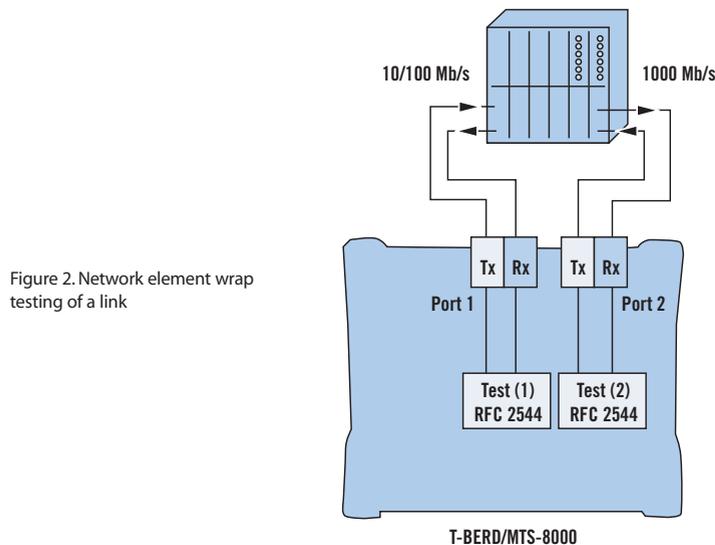


Figure 1. Simultaneous circuit testing of two separate links

Network Element Wrap Testing

The TB/MTS 8000 Transport module also supports network element wrap testing. This enables technicians to pre-qualify a switch or router before bringing it into service. Full Gigabit Ethernet (1 Gige) throughput testing can be accomplished by connecting a single TB/MTS 8000 to two separate ports on both sides of the network element – client side and network side (Figure 2).

In addition, sub-rate line cards can be verified at different rates other than the network rate. For example, technicians can connect one TB/MTS 8000 port to the 10/100 Mb/s client card and the other TB/MTS 8000 port to the 1 Gige (1000 Mb/s) network card and perform throughput testing through the network element. This ensures that the network element backplane can sufficiently buffer and pass incoming traffic, without dropping any frames/packets. The TB/MTS 8000 can perform RFC 2544 testing to verify the configuration of the network element and the throughput of its line cards, as well as ensure consistent backplane functionality in both directions.



Traffic Prioritization Tests

Traffic prioritization parameters, including VLAN tag, VLAN priority, type of service (TOS), and diff serve code points (DSCPs), set different traffic priorities and allow providers to create differentiated classes of service. By creating a test sequence that emulates customer traffic with different priorities, switches and routers can be verified and tested at the time of the service turn-up.

In-Service Troubleshooting

On occasion, a circuit will pass the test without issues when using traffic generated from the TB/MTS 8000 Transport module in an out-of-service test scenario. However, a fault may persist once the end customer's equipment is connected to the provider's network. In this case, it is necessary to monitor the connection while it is in service. The TB/MTS 8000 provides technicians with the ability to monitor traffic from both directions of the circuit without disrupting the service. This allows for the identification of VLANs, IP traffic, FCS, and IP checksum errors in both directions. This information can be used to determine whether the VLAN and IP addressing schemes have been provisioned correctly. In addition, this particular capability allows service providers to resolve finger-pointing situations at the hand-off between them and their end customers.

This application enables the easy and fast resolution of more difficult configuration problems that are not often obvious when testing an out-of-service route.

Conclusion

A major theme of the growing Metro Ethernet networks is the movement to the next generation of IP-converged networks, which allows service providers to run various legacy and emerging data services and gain additional revenue streams. However, the major goals of service providers – to reduce mean-time-to-repair, limit errors in the field, and reduce technician dispatches – have remained the same.

With this developing market trend, the TB/MTS 8000 Transport module is well-suited to enable technicians to use one test set to turn up services ranging from 10/100/1000 copper Ethernet, optical GigE, and optical 10 GigE – all from a single module. In addition, with its dual-port configuration, the TB/MTS 8000 provides a comprehensive and robust turn-up tool, thereby minimizing follow-on installation and maintenance issues.

JDSU's comprehensive portfolio of Ethernet field test instruments introduces unique market designs, leverages installed product base, offers breadth and depth to Ethernet applications, and ensures compatibility with other JDSU Ethernet offerings. All of these factors, along with our world-class customer support, allow service providers to reliably and efficiently address issues that impact their SLAs – on-time service, reliability, and service guarantees.

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