

FST-2802 Dual-Port Test Applications

Introduction

The FST-2802, a member of the TestPad family of products, enables field technicians to turn up and maintain Ethernet, Fibre Channel, and IP services. Testing capabilities of this portable test instrument range from verifying end-to-end connectivity and throughput to performing detailed quality of service (QoS) testing of layer 2 and layer 3 services. It also provides RFC 2544 testing for verification of Ethernet and IP conformance to service level agreements (SLAs). In addition, the FST-2802 provides graphical results and reporting capabilities.

The FST-2802 features a full dual-port capability – 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 FST-2802 enables field technicians to perform three important types of testing during turn-up and first-line of maintenance:

- Dual-Port Turn-up Testing: Testing of two independent circuits simultaneously
- Network Element Wrap Testing: Wrapping an element from the client side to the network side
- In-service Troubleshooting: Performing dual thru mode testing

Dual-Port Test Applications

Simultaneous Circuit Testing

Each of the FST-2802's two ports has its own transmitter and receiver, both of which are able to connect to the customer's switch. This enables field technicians to test two separate Ethernet/VLAN or IP connections through the network (Figure 1).

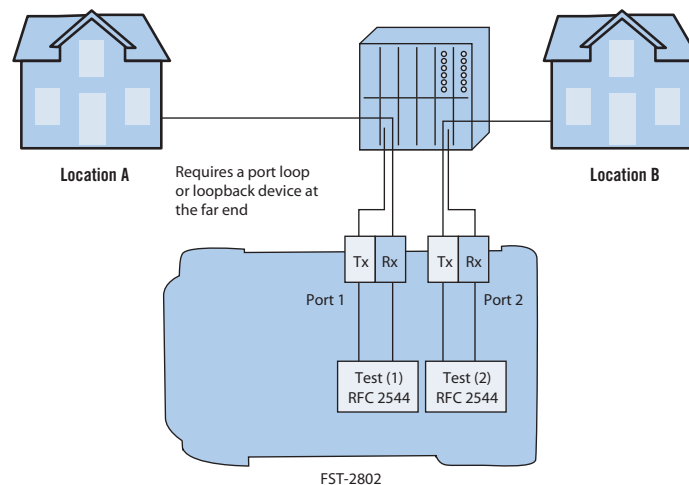


Figure 1: Simultaneous circuit testing of two separate links

In a multi-site network, technicians can use the FST-2802 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 FST-2802 test instrument is required to perform the loop at the far end. In the loopback testing scenario, the FST-2802 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 FST-2802 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 FST-2802 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 FST-2802 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 FST-2802 to perform installation testing. The FST-2802 takes the place of the customer's 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 customers simultaneously.

Network Element Wrap Testing

The FST-2802 supports network element wrap testing. This enables technicians to pre-qualify a switch or a router before bringing it into service. Full Gigabit Ethernet (1 GigE or 1000 Mb/s) throughput testing can be accomplished by connecting a single FST-2802 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 FST-2802 port to the 10/100 Mb/s client card and the other FST-2802 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 FST-2802 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.

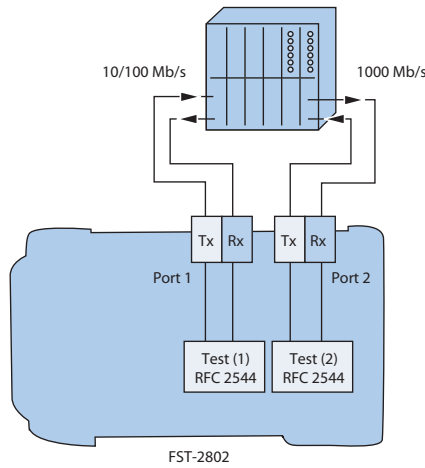


Figure 2: Network element wrap testing of a link

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 traffic profile on the portable field test instrument that overloads the switches/routers and stresses the network, traffic prioritization can be verified and tested at the time of the service turn-up. In this case, the FST-2802 can be configured to generate traffic consisting of multiple traffic streams on two ports simultaneously. These streams can have different profiles (including destination address, tagging, priority, frame/packet size) and bandwidths. The total bandwidth can be more than the backbone capacity; therefore, when traffic is passed through the switch/router, prioritization must occur.

In-Service Troubleshooting

On occasion, a circuit will pass the test without issues, when using the FST-2802 to generate traffic 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 FST-2802 provides a dual thru mode capability that enables traffic to pass through the FST-2802 from both ends (Figure 3). The dual thru mode testing allows for the identification of

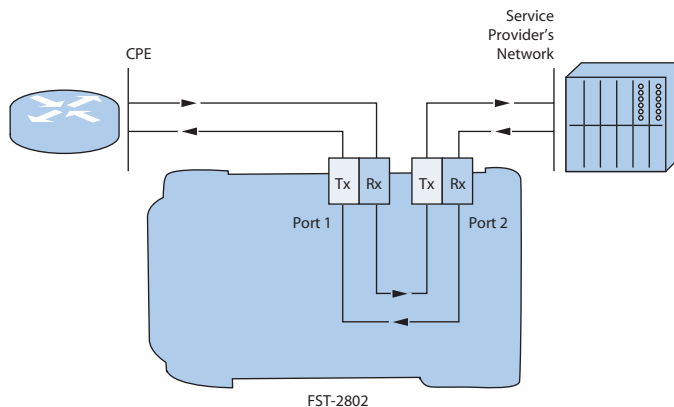


Figure 3: Dual-port thru mode testing of a link

erroneous traffic (for example VLANs, IP traffic with FCS, IP checksum errors, etc.) from either end of the network, while all the equipment is connected. Results obtained during dual thru mode testing can be used to determine whether the correct VLAN and IP addressing schemes are operational at the hand-off and whether they are configured correctly. In addition, this particular capability allows service providers to resolve finger-pointing situations at the hand-off between them and their end users.

During dual thru mode testing, the FST-2802 monitors all of the prioritization schemes (VLAN and/or TOS/DSCP) to verify traffic prioritization. By setting up traffic filters, technicians can also monitor for address-specific traffic and sub-net masks.

All of these applications enable the easy and fast resolution of more difficult configuration problems that are not often obvious when performing an out-of-service test.

Conclusion

As Metro Ethernet deployments evolve, test applications also become increasingly more complex. 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.

The FST-2802's dual-port configuration enables service providers to efficiently turn up and commission circuits, compile a list of benchmark measurements, verify traffic prioritization schemes, and allow for easy-to-use troubleshooting techniques, such as the dual thru mode application.

A major theme of the growing Metro Ethernet networks is the movement to the next generation of IP-converged networks since they allow providers to run various legacy services, as well as provision and maintain next generation voice, video, and data services. With this developing market trend, the FST-2802 is well-suited to enable technicians to use one test set to turn up services ranging from 10/100 Ethernet, Gigabit Ethernet, Fibre Channel, and IP – *all from a single TestPad module*. In addition, with its dual-port configuration, the FST-2802 provides a comprehensive and robust turn-up tool, thereby minimizing follow-up installation and maintenance issues.

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