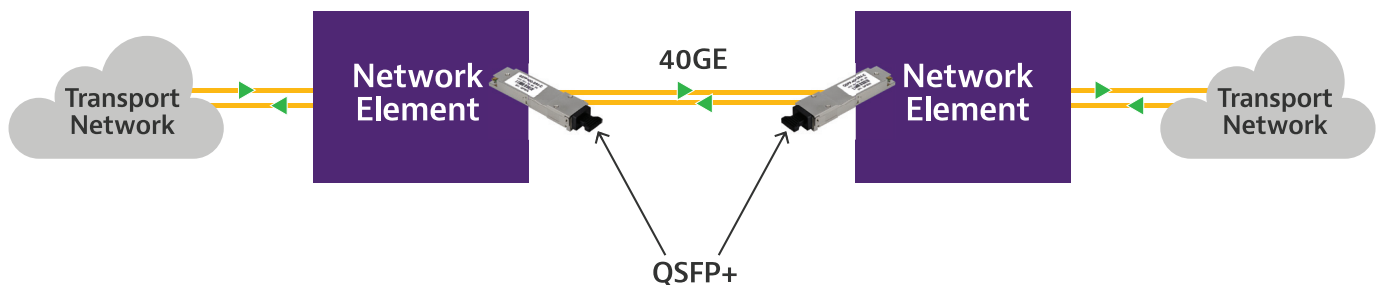


# Testing QSFP+ 10GE Breakout with Viavi ONT MTM

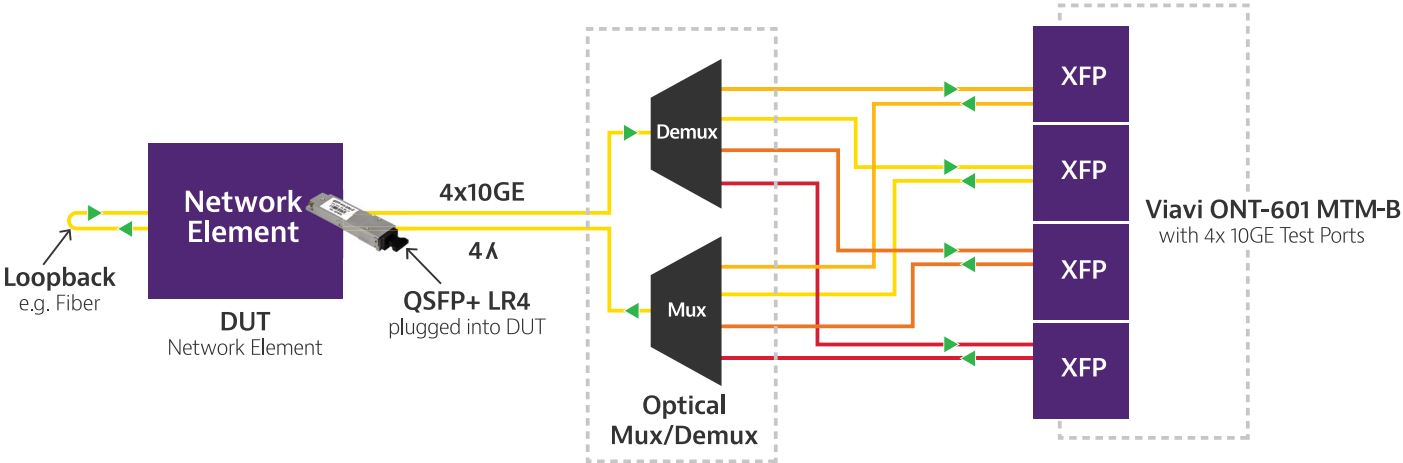
Service Providers and Data Centers are faced with exploding bandwidth demand. As a result, the ability to implement higher data speeds in their networks is critical. If that isn't challenging enough, they also face the double-edged pressure of increasing capacity while lowering costs for operations and maintenance. One approach to these major technical and cost challenges is the introduction of network elements with higher port densities, higher data transfer rates, and lower implementation and maintenance costs. With all of these complex demands, Network Component Vendors are continuously developing new generations of optical transceivers with higher data rates packaged into smaller form factors with lower power consumption.

An example of that innovation is the QSFP+ transponder (Quad Small Form-factor Pluggable). QSFP+ SR4 is an industry standard which provides 40GE transport via four individual MM fibers. QSFP+ LR4 is an evolution of QSFP+ that supports 40GE via four lambdas on one single-mode fiber.

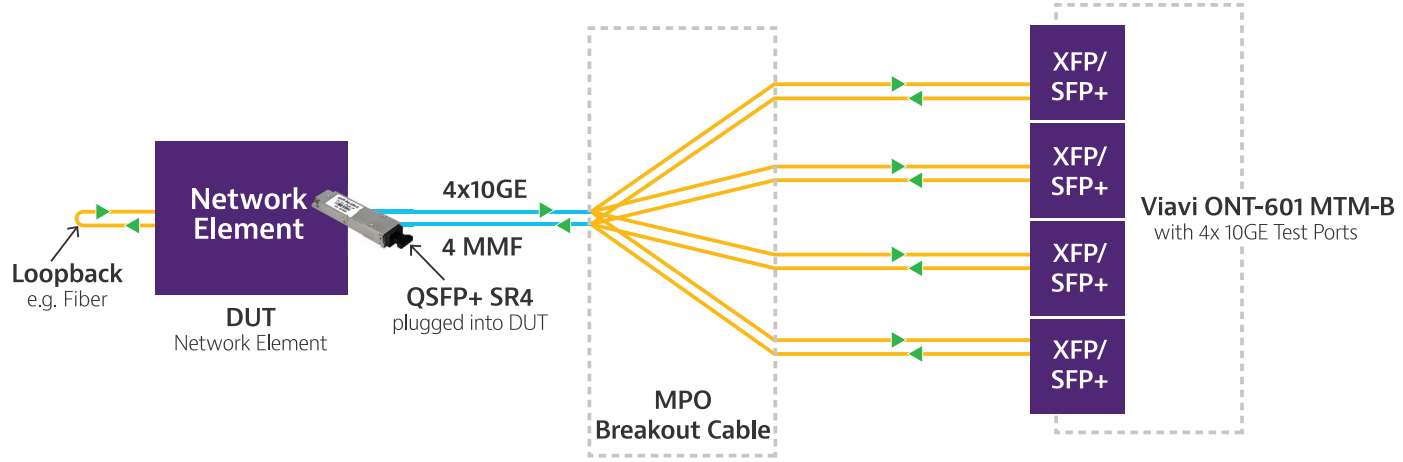


Network Elements utilizing QSFP+ Plug-ins

Now the same technology is used to transport four native 10GE services. A common challenge is how to test four individual 10GE Services because the methodology for testing two QSFP+ interfaces back-to-back is not suitable for the 10GE mode. To ensure the full interworking in a real-life scenario it is necessary to test with four individual 10GE signals in terms of switching the signals on/off, independent and separate clocks, and variation of components. The following illustrations show the different test setups for QSFP+ LR4 and QSFP+ SR4 pluggables in 10GE mode, tested by Viavi's ONT-601 Multiport Test Module-B.



Network Element Interface Test with QSFP+ LR4 Plug-in

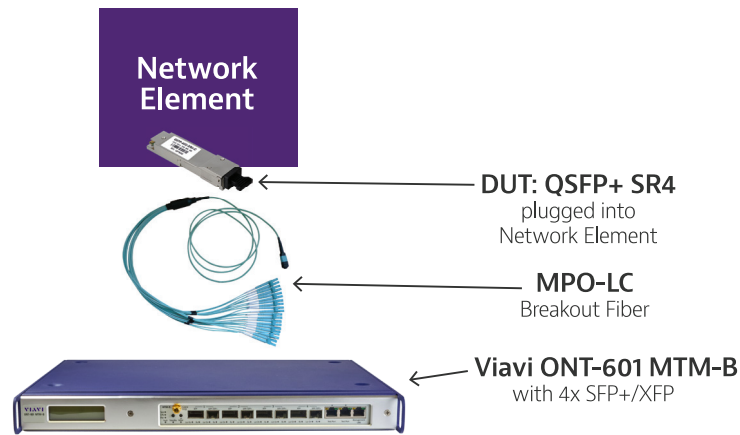


Network Element Interface Test with QSFP+ SR4 Plug-in Module

## QSFP+ SR4 Test Setup

One alternative is provided by the QSFP+ SR4 industry standard for transceivers. Instead of two optical single mode fibers, the SR4 standard uses eight optical multimode fibers to transmit and receive the four transmission channels. Hence there's no need for an Optical Mux/Demux to connect to the Multiport Test Module.

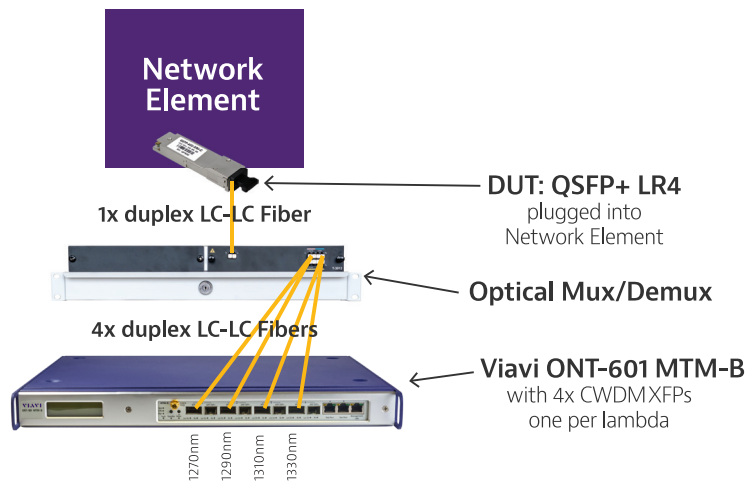
The MPO-LC Breakout Fibers cable connects the different fibers of the QSFP+ SR4 transceiver to the four ONT-601 MTM-B ports.



Test Setup with MPO-LC Breakout Fibers

## QSFP+ LR4 Test Setup

Optical Multiplexers/Demultiplexers (Mux/Demux) are standard components used in WDM systems for multiplexing and routing fiber optic signals, as well as selectively adding and dropping individual (or sets) of wavelength channels from a CWDM stream. For the test setup illustrated below, an Optical Mux/Demux is used to insert/drop the four wavelengths of a QSFP+ LR4 Transceiver being tested in four MTM test ports.



Test Setup with Optical Mux/Demux

Using these methods, we can test four 10GE links transported via LR4 simultaneously using the comprehensive ONT-601 feature set with the economic scale of the Multiport Test Module. The MTM offers four independently clocked 10GE interfaces which are required for this test.

## Solution Components

### Viavi ONT-601 with MTM-B



### Optical Mux/Demux Package



### Transponders

#### LR4 Test

4 colored XFPs per system needed

- 10 Gbps XFP CWDM 1270 nm
- 10 Gbps XFP CWDM 1290 nm
- 10 Gbps XFP CWDM 1310 nm
- 10 Gbps XFP CWDM 1330 nm

#### SR4 Test

- 4 Multimode XFP or SFP+ Transponders (provided by customer)

#### Rack Drawer

For storing the various accessory components a Rack Drawer can be mounted on top or below of the Mux/Demux.

1U height (41 mm):

- 4 CWDM XFPs
- 1 MPO breakout cable
- 4 Multi-Mode XFPs or Multi-Mode SFP+ (provided by customer)
- 4 duplex LC-LC cables (provided by customer)

### Viavi Package (Order Item 3076/96.10) includes

- CWDM Mux/Demux
- RackMount for Mux/Demux
- CWDM XFP 1270 nm
- CWDM XFP 1290 nm
- CWDM XFP 1310 nm
- CWDM XFP 1330 nm
- MPO breakout cable, 1 m
- 4 mating sleeves, duplex MM
- 19" Rack Drawer assembly, 1UE

### Conclusion:

With the accessories outlined here, the MTM-B module is capable of performing System Verification Tests with Network Elements hosting LR4 or SR4 components for 10GE break-out interfaces. The illustrated accessories can be ordered as a complete package from Viavi by using the part number 3076/96.10.

## Viavi ONT-601 MTM-B

Viavi's ONT-601 platform is a highly configurable, multi-application and multi-port platform for system verification and acceptance testing. The ONT-601 Multiport Test Module (MTM-B) provides high density 155 Mbps to 11.1 Gbps testing from layer 1 to layer 3. Concurrent users can control a broad protocol range including OTN, GigE/10GigE LAN, FiberChannel, Generic Framing Procedure and Synchronous Optical/Synchronous Digital Hierarchy (SONET/SDH) technologies.



Viavi ONT-601 MTM-B

The MTM-B supports multiport testing with four SFP/SFP+/XFP ports. Each port supports one test, enabling up to four concurrent test sessions. This flexibility enables each user to generate/analyze traffic over a broad range of protocols and line rates. By adding Optical Add/Drop multiplexers multiple wavelength channels can be combined in a single optical transmission fiber. With the solution described above both LR4 and SR4 Optics can be tested with four independent 10GE links.

## Acronyms

10GE	10 Gbps Ethernet
CWDM	Coarse Wavelength Division Multiplexing
Demux	Demultiplexer
DUT	Device under Test
LAN	Local Area Network
LC	Lucent Connector
LR	Long Reach
MM	Multi-Mode
MMF	Multi-Mode Fibers
MPO	Multiple Parallel Optics
Mux	Multiplexer
ONT	Optical Network Tester
QSFP	Quad Small Form-factor Pluggable
SFP	Small Form-Factor Pluggable
SR	Short Reach
U	19" Rack Unit height
WDM	Wavelength Division Multiplexing
XFP	10 Gigabit Small Form Factor Pluggable



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