



T-BERD®/MTS Fibre Channel Testing

T-BERD/MTS Fibre Channel Functionality—The Tool You Need to Maximize Storage Area Network Revenue

In today’s business environment, Fibre Channel (FC) is the technology that enterprises rely on to transport data to remote sites and store it for protection against potentially damaging natural and human events. The practice of building these storage area networks (SANs) supports business continuity and enables data protection, backup, mirroring, and restoration. For enterprises, reliable SANs can minimize and alleviate the risk associated with loss of access to data and applications. For providers who can test and ensure reliable FC functionality, SANs are bringing a lucrative service opportunity.

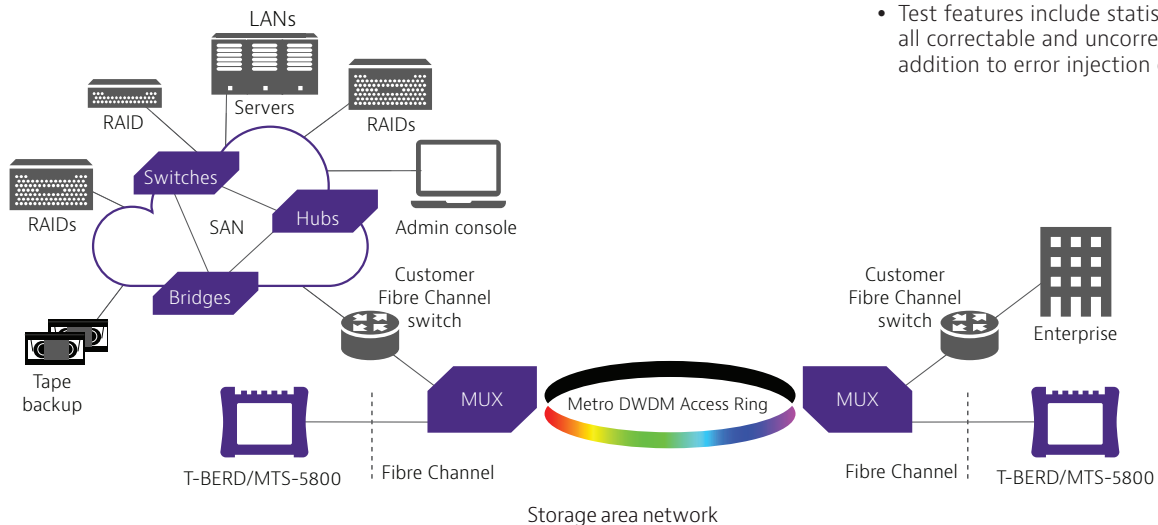
Viavi Solutions™ T-BERD/MTS, enabled with Fibre Channel functionality, are the tools providers need to maximize SAN business potential. A breakthrough in economy and efficiency, the Transport Module leverages providers’ existing investments in equipment and technician training. Using the already familiar T-BERD/MTS interface, technicians can install and maintain SAN-related links and test to ensure that service level agreements (SLAs) are met.

Key Features

- 1/2/4/8/10/16/32 G Fibre Channel testing at 100% wire speed
- Dual-port capability to install and troubleshoot multiple circuits simultaneously
- Enhanced BER Testing at Layer 1 and Layer 2 for FC circuits per INCITS and IEEE 802.3 standards
- Support for Implicit and Explicit flow control login
- ‘RFC 2544-like’ automated testing for FC circuit installation with buffer-to-buffer credit estimation that verifies minimum required buffer size to meet FC SLAs

RS-FEC

- For 32GFC, there is a mandatory RS-FEC layer.
- Test features include statistics to report all correctable and uncorrectable errors in addition to error injection capabilities.

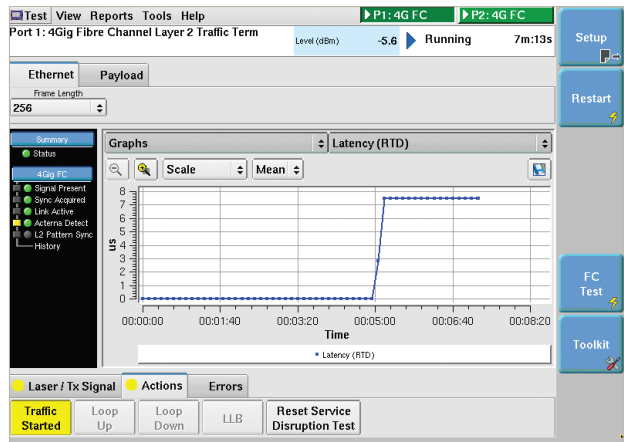


Applications

The T-BERD/MTS-8000, -6000A MSAM and CSAM, and T-BERD-5800 with Fibre Channel functionality analyzes transport networks used in SAN deployments. It supports test applications from verifying network connectivity to performing bit error rate (BER) measurement and proving that FC SLAs are met. Additionally, it allows technicians to understand the critical impact of flow control (buffer-to-buffer credit) on SLAs. For storage applications, the ability to determine the optimal network buffer credit size makes meeting SLAs possible without increasing deployment costs.

Throughput and RTD Verification

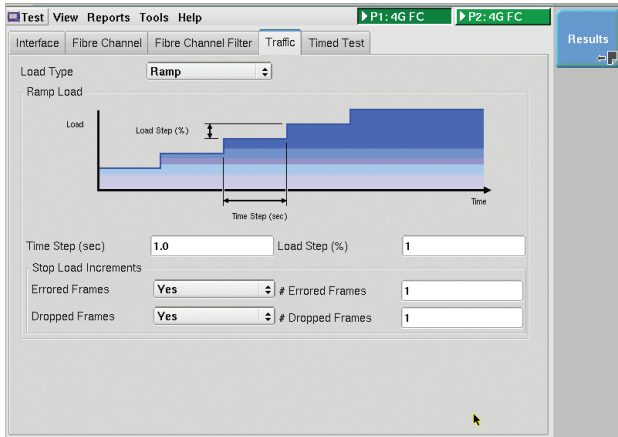
The Transport Module ensures physical layer integrity and verifies end-to-end connectivity of the circuit. By generating FC traffic up to full line rate, T-BERD/MTS instruments can verify error-free throughput of the link. With the functionality to loop back frames at the far end, it enables the qualification of the link in both directions, and it performs the round trip delay (RTD) measurement, which is a critical parameter for delay sensitive applications such as SANs.



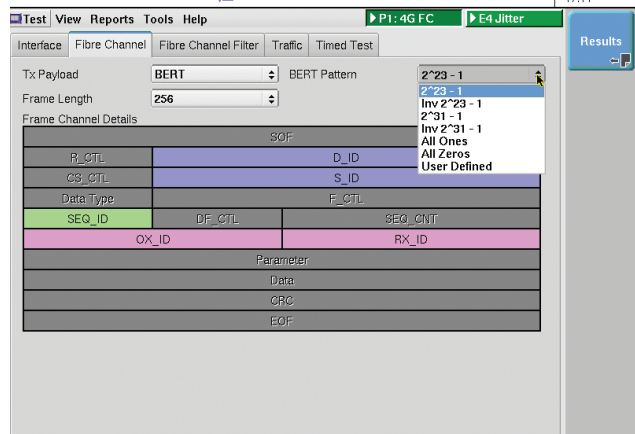
RTD verification

Bit Error Testing

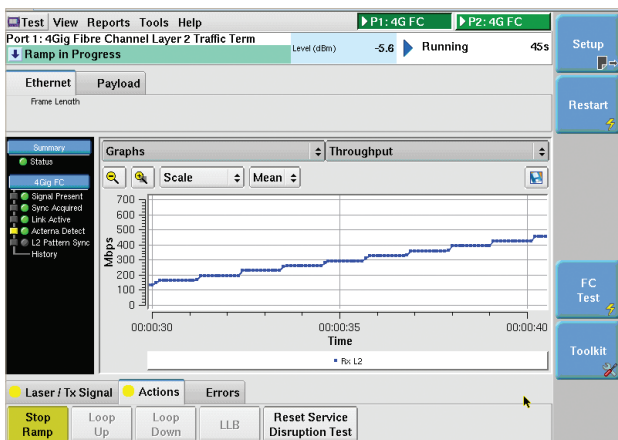
T-BERD/MTS instruments feature BER testing at both Layer 1 (physical layer) and Layer 2 of FC circuits using a variety of stress test patterns per INCITS and IEEE 802.3 standards. The ability to stress test both network layers enables accurate benchmarking at the time of service installation.



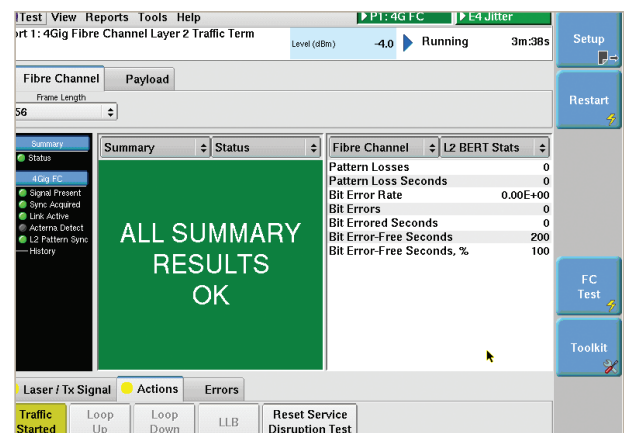
Throughput setup



BER test setup



Throughput results



BER test results

Flow Control Verification

In order to support FC service installation with flow control, the Transport Module tailors RFC 2544 methodology to FC circuits. This FC test provides an automated test routine and result analysis for consistent and repeatable installation of services, and it can be configured to automatically verify the optimal buffer credit size to meet the desired SLAs of the link by:

- Finding the optimal buffer size: large enough not to lose data, small enough not to slow down the link
- Calculating the minimum buffer credit size for the specified throughput at each frame length (see Table 1)
- Measuring the throughput at various buffer credit sizes to assess the overall health of the link (see Table 2)

Table 1. Buffer credit test results

Frame Length (Bytes)	Cfg Rate (Mb/s)	Minimum Buffer Size (Credits)
76	1700.0	375
128	1700.0	278
256	1700.0	155
512	1700.0	83
1024	1700.0	43
1536	1700.0	30
2076	1700.0	22
2140	1700.0	22

Table 2. Throughput at incremental buffer credit size

Frame Length (Bytes)	Buffer Size (Credits)	Cfg Rate (Mb/s)	Measured Rate (Mb/s)	Measured Rate (%)	Measured Rate (frames/s)
76	1	1700.0	4.1	0.24	4802
76	2	1700.0	8.3	0.49	9604
76	4	1700.0	16.7	0.98	19208
76	8	1700.0	33.1	1.95	38416
76	16	1700.0	66.3	3.90	76832
76	32	1700.0	132.8	7.81	153664
76	64	1700.0	265.5	15.62	307328
76	96	1700.0	398.3	23.43	460911
76	128	1700.0	531.1	31.24	614610
76	160	1700.0	663.7	39.04	768176
76	192	1700.0	796.5	46.85	921833
76	224	1700.0	928.2	54.60	1074402
76	256	1700.0	1060.8	62.40	1227849
76	288	1700.0	1193.4	70.20	1381315
76	320	1700.0	1326.0	78.00	1534774
76	352	1700.0	1458.6	85.80	1688229
76	375	1700.0	1554.0	91.41	1798528

Full Line Rate Bidirectional Testing

The dual-port 1/2/4/8/10/16/32 G FC configuration enables providers to simultaneously stress two circuits up to full line-rate traffic. In addition, performing bidirectional unobtrusive monitoring of FC circuits verifies that the network can support reliable communications without impact to live traffic.

Ordering Information

Description	Part Number
T-BERD/MTS-5800	
1, 2, and 4 G Fibre Channel	C51G2G4GFC
8 G Fibre Channel*	C58GFC
10 G Fibre Channel*	C510GFC
16 G Fibre Channel*	C516GFC
32G Fibre Channel**	C532GFC
T-BERD/MTS-8000, -6000A MSAM	
1 and 2 G Fibre Channel	CT1G2FC
4 G Fibre Channel	CT4GFC
8 G Fibre Channel	CT8GFC
10 G Fibre Channel	CT10GFC

* Options only available on model numbers T-BERD/MTS-5822P and -5811P.

** Option only available on T-BERD/MTS-5800 100G.



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