TCP Wirespeed – Verify TCP Throughput up to 10G Using the T-BERD®/MTS-6000A Multi-Services Application Module (MSAM)

Ordering Information:

CTLAYER4 – 10M to 1GigE TCP Wirespeed
CT10GLAYER4 – 10G TCP Wirespeed

Use Case:

Verify TCP throughput of Carrier Ethernet and IP field networks

Intended Audience

- Special Operations and Central Office technicians responsible for fault troubleshooting.
- Professional Services and Managed Service Engineers responsible for the maintenance, troubleshooting and evolution of end-customer access networks.
- Enterprise and Government network professionals responsible for circuit and network installation and fault analysis.

Applications

Prove that a provider's network delivers an SLA at the TCP layer, eliminating the finger pointing that occurs when a customer's applications (i.e. file downloads, email, Internet access) cannot achieve SLA throughput.

Solution Description

TCP Wirespeed is a test option for the T-BERD/MTS-6000A MSAM that provides TCP throughput testing from 10Mbps to 10Gbps for up to 64 simultaneous TCP sessions. Unlike PC-based software test solutions such as "iperf," the TCP Wirespeed option is implemented in test tool hardware, thereby eliminating the limitations and inaccuracies of PC-based performance. TCP Wirespeed testing supports the ability to specify various window sizes to maximize TCP throughput. The TCP Wirespeed option also supports the concurrent testing of up to four (4) background traffic streams, providing the ability to verify proper prioritization of TCP traffic versus background streams.

Value Proposition

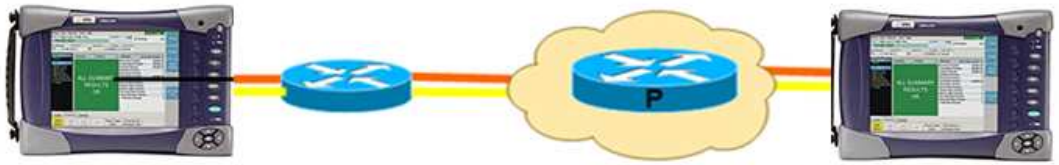
For technicians responsible for the turn-up and qualification of Ethernet networks, the TCP Wirespeed test option provides the powerful capability to conduct throughput testing at Layer 4 which can help prove whether a problem is occurring in the service provider's network or in the customer's applications, such as file downloads, email, or internet access. Traditional Layer 3 throughput testing may show that network performance is acceptable, yet issues such as loss, latency, improperly configured window sizes, traffic policing, or prioritizations can drastically reduce TCP throughput and cause application performance degradation. The T-BERD/MTS-6000A emulates a true TCP client/server by establishing up to 64 stateful TCP connections, providing a more accurate assessment of the network's ability to carry application traffic and helping to prevent and resolve customer complaints.

TCP Wirespeed Feature/Benefit Summary

Feature	Description	Advantage	Benefit
10M → 10G TCP testing	Wirespeed TCP throughput verification	TCP throughput testing more closely emulates customer traffic	Reduce / eliminate customer finger-pointing when service is activated
Simultaneous testing of 64 TCP Sessions	Throughput, RTD, and retransmission results for each session	Collect pertinent throughput, latency, and loss results for many sessions	Emulate realistic customer conditions by generating multiple “host” traffic
Window size testing	Test with multiple window sizes and find ideal window size for maximum throughput	Simplifies window size tuning and testing efforts	Quickly discern if improperly configured window sizes are causing low TCP throughput
TCP and Background Stream testing	Concurrent TCP testing with background streams	Test for proper CoS/QoS settings in the network	Verify customer TCP vs. UDP traffic is prioritized properly
Compatible with popular “iperf” TCP tool	Test T-BERD/MTS-6000A against standard server running ”iperf”	Sectionalize TCP performance issues	Prove to the customer that CPE may be the problem

Use Case: End-to-End, TCP-Only Turn-Up Testing

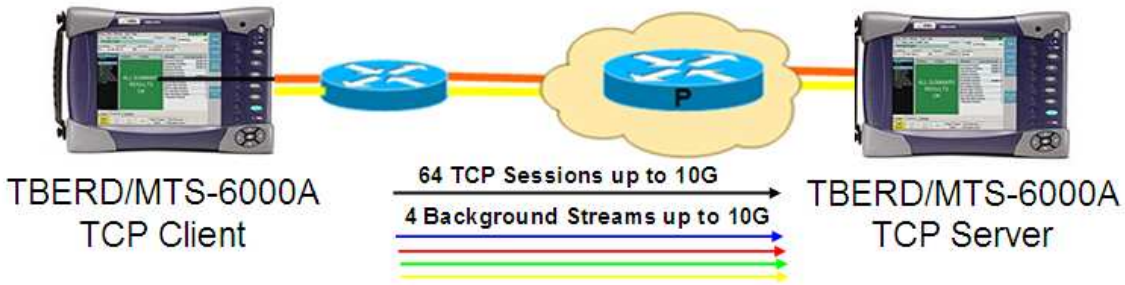
With Layer 3 tests (below TCP layer), the latency of the network does not affect the achievable Layer 3 throughput. In other words, a 10 GigE link with 30 usec delay could achieve nearly 10 Gbps at Layer 3 but for TCP (Layer 4), latency is a key factor along with the TCP window size setting. With the TCP Wirespeed option, the T-BERD/MTS-6000A provides results that characterize the achieved TCP throughput per various TCP window size settings. In addition, the T-BERD/MTS-6000A provides resultant retransmission counts (due to packet loss) and provides much greater confidence that customer applications will achieve expected throughput.



.

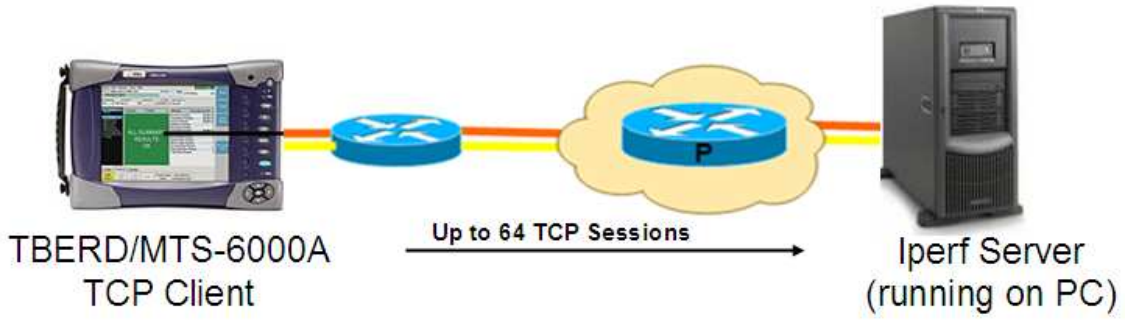
Use Case: End-to-End, TCP + Streams Turn-up Testing

To verify proper CoS/QoS prioritization in the operator's network, an end-end test with concurrent TCP and background streams should be conducted. This test proves that customer application sessions (TCP) will receive expected priority versus background traffic types, i.e., UDP streams.



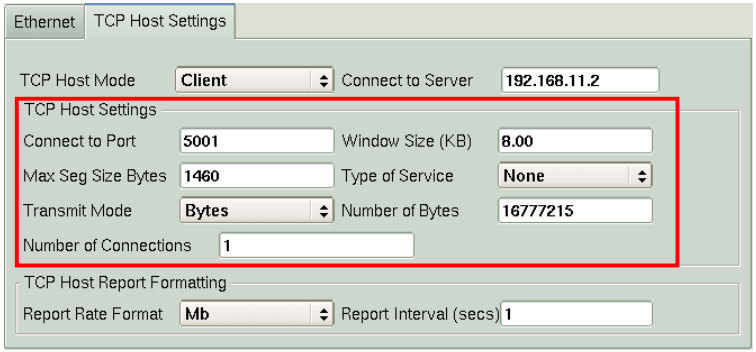
Use Case: TCP Throughput Testing with an "iperf" Host

In this scenario, the T-BERD/MTS-6000A MSAM acts as Client and communicates with an iperf Server. The iperf server runs industry standard, open source TCP test software. This test allows a network operator to go one step further in terms of throughput isolation by either using a test server or the actual customer server for a TCP throughput test. The T-BERD/MTS-6000A can be considered a "golden" data source because its hardware TCP implementation transmits TCP data at the full line rate.



Application Example: Simplified, UI-Based TCP Test Configuration

Select the **Layer 4 TCP Wirespeed** for the intended interface. Press the **Setup** button and under the **TCP Host Settings** tab select Client or Server mode. In the example below, the TCP Host is configured to be a Client and to communicate with the Server at IP address 192.168.11.2.

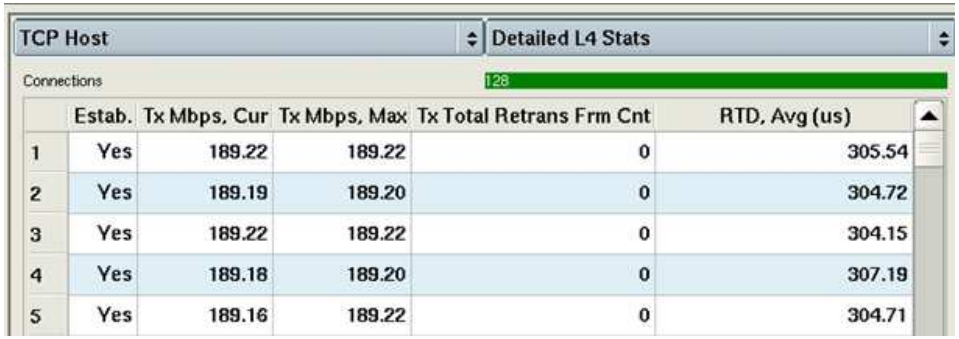


In the **TCP Host Settings** section, the primary field to set is the Window Size (KB) setting. This field represents the amount of data that the TCP Client will send to the TCP Server without receiving an acknowledgement, and is the crux of TCP throughput testing. Non-optimal settings for the TCP Window can cause a drastic reduction in TCP throughput.

The simple rule is that the higher the network latency, the larger the TCP window size needed to achieve optimum throughput.

Application Example: Powerful Hardware-Based Results for up to 64 TCP Sessions

In the Results area and under the **TCP Host** category, the TCP Client displays each TCP connection established along with the real-time throughput achieved (**Tx Mbps**), TCP Retransmission Counts (**Tx Total Retrans Frm Cnt**), and network Round Trip Delay (**RTD).**



	Estab.	Tx Mbps, Cur	Tx Mbps, Max	Tx Total Retrans Frm Cnt	RTD, Avg (us)
1	Yes	189.22	189.22	0	305.54
2	Yes	189.19	189.20	0	304.72
3	Yes	189.22	189.22	0	304.15
4	Yes	189.18	189.20	0	307.19
5	Yes	189.16	189.22	0	304.71

In this example, five (5) TCP connections were tested on a GigE link and each connection achieved the full Layer 4 network throughput at the tested TCP Window size.

FAQ

Q: Do our competitors offer this or a similar feature?
A: Only one competitor offers a hardware-based TCP solution, but it is inferior in the following ways: The product's line rate is up to only 1G (versus 10G with the T-BERD/MTS-6000A); the product supports only one TCP session (versus 64 sessions with the T-BERD/MTS-6000A), the product does not support concurrent background streams (versus 4 streams with the T-BERD/MTS-6000A), and the product does not offer compatibility with an industry-standard iperf software tool. Also, JDSU has filed a patent covering this unique aspect of test capability in a handheld test set (concurrent multi-session TCP and background streams). Combined with the Capture option, the T-BERD/MTS-6000A can capture up to 10G line rate which the competition cannot do.

-

Q: Network operators do not manage customer applications. Why is TCP layer testing compelling for network operators?
A: Traditional Layer2/3 RFC-based testing does not completely verify the ability of the network to carry application traffic. Specifically, network devices (routers, switches, etc.) employ traffic policing techniques that drop packets in a way that at Layer2/3 may be acceptable, but can cause serious performance degradation at Layer 4 (TCP). Network operators can reduce finger-pointing by providing TCP layer results to their customers and prove that the network is not the cause of poor application performance.

Q: What is iperf?
A: iperf is a commonly used network testing tool that creates TCP sessions to measure the throughput of a network. The iperf tool runs on Windows and Linux computers and is commonly used by customers and advanced network engineers to verify TCP throughput performance. The key limitation is that iperf is software-based and cannot be used to test higher speed networks (100-200 Mbps upper limit is a good rule of thumb).

Q: Is this a software or hardware upgrade to existing units in the field and will this be available on the T-BERD/MTS-8000?
A: The TCP Wirespeed option is a software upgrade for the T-BERD/MTS-6000A. Current T-BERD/MTS-8000 support will occur when the Dual MSAM Carrier slice (DMC) is made available for the T-BERD/MTS-8000 in the near future.