TCP Throughput Tests

True RFC 6349-based Throughput Testing

MT1000A Network Master Pro

MU100010A 10G Multirate Module

MT1100A Network Master Flex

MU110010A 10G Multirate Module
MU110011A 100G Multirate Module

Modern networks require tuned performance and IP network operators and service providers are currently checking their networks using standards such as IETF RFC 2544 or ITU-T Y.1564.
However, even after these performance tests are passed with good results, some end users still complain about poor throughput. Sometimes, this occurs because the Transmission Control Protocol (TCP) connection with end users is not optimized or a network element is configured incorrectly.
TCP is a connection protocol that checks the information is correct at receiving to establish a reliable network connection. However, the actual throughput at the TCP layer can be degraded compared to throughput at the Ethernet/IP layer because the window size or buffer capacity of network elements is not set to the optimal value.
The RFC 6349 standard defines the methodology for testing throughput at the TCP layer by operators and service providers.
The MT1000A/MT1100A “TCP Throughput” option supports speeds up to 10 Gbps, helping end users configure parameters to optimize TCP Throughput, as well as test using existing standards, such as RFC 2544 and Y.1564.

Introduction

Throughput is a key parameter for evaluating Ethernet performance. It is generally defined as the maximum bandwidth without packet loss. However, most network connections are established using TCP which requires throughput tests at the TCP layer where flow control and retransmission become more important. The TCP Throughput test methodology is defined by the RFC 6349 standard.

Figure 1. RFC 6349 TCP Throughput Test

Application 1

RFC 6349 TCP Throughput testing for IP network operators

IP network operators must test their networks using RFC 2544 or Y.1564 to confirm compliance with customers' Service Level Agreements (SLA). However, the methods in these standards do not test TCP networks, which is what most customers use. Consequently, end users often feel their network performance is very different from the speeds promised in the SLA contract with their operator. Operators can help end users configure their network parameters by testing TCP Throughput based on RFC 6349. This is beneficial for both the operator and end user because it cuts the cost of managing customers' complaints and reduces churn.
The MT1000A/MT1100A can perform TCP Throughput tests based on the RFC 6349 standard by emulating end users' network elements. It also supports more advanced testing abilities over TCP.

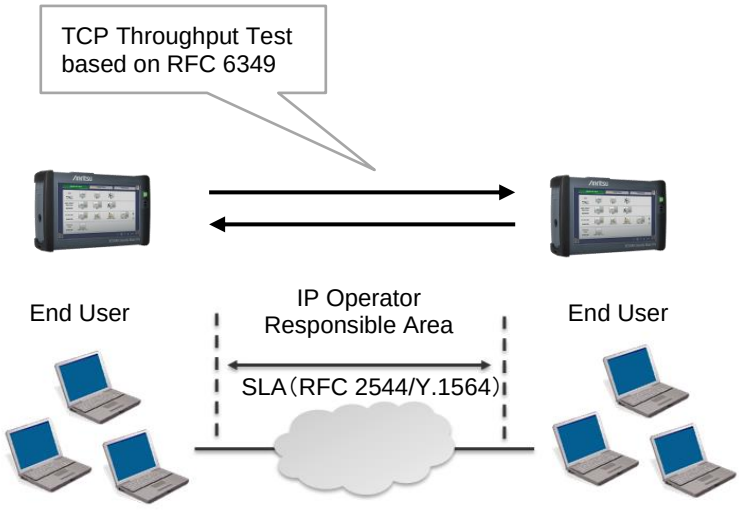

Figure 2. IP Network Operator

Application 2

TCP Throughput testing using iperf for service providers

Service providers use servers and networks to provide customers with services. Because critical services are based mainly on TCP connections, TCP Throughput is checked using iperf, a software-based TCP Throughput test tool. However, because iperf is a software tool that depends on the end user's terminal performance, it has low repeatability.
The MT1000A/MT1100A uses hardware-based TCP Throughput tests to a connected iperf server for high reliability and high accuracy.

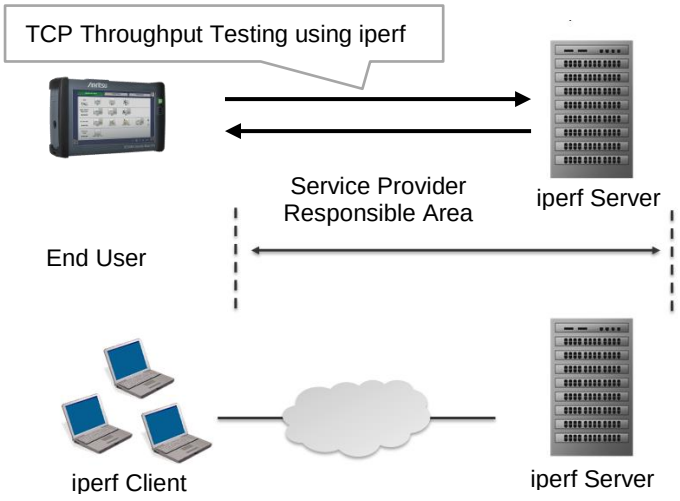

Figure 3. Service Provider

Testing

The MT1000A supports TCP Throughput tests at up to two ports simultaneously. The MT1100A can test up to four ports simultaneously.
Multi-port testing reduces test times for multiple connection tests in the laboratory before commissioning, or when testing a customer's main network and back-up simultaneously.
The MT1000A/MT1100A support speeds up to 10 Gbps at the full-line rate.

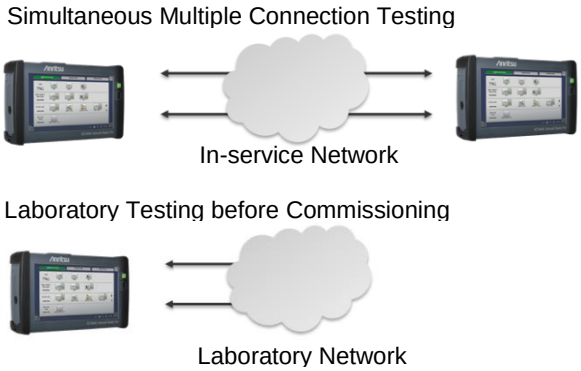

Figure 4. Multi-port and TCP Throughput Tests (Up to 10 GigE)

The optimized window size is tested by displaying the TCP Throughput at multiple steps.

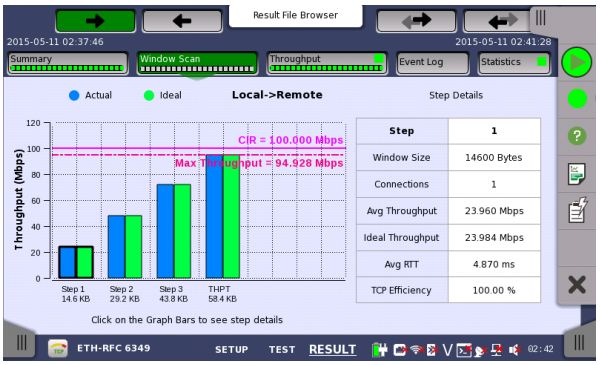

Figure 5. Window Scan

The calculated ideal and tested TCP Throughput as well as details like retransmitted bytes, round-trip delay, etc., are also displayed.
Graphs of TCP Throughput/time and other parameters are also displayed, helping users identify possible issues quickly.

Figure 6. TCP Throughput

Bi-directional testing is also supported to display TCP Throughput performance across non-symmetrical networks, emulating real networks more realistically.

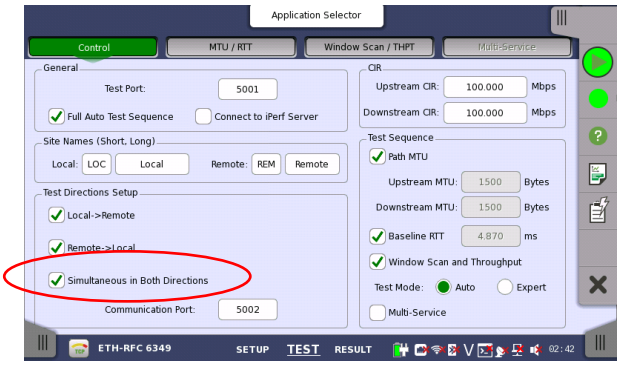

Figure 7. Bi-directional Testing

Configuration of simultaneous tests for 16 TCP sessions supports realistic multi-service network emulation and analysis. This test can also be performed with different DSCP/TOS priorities per session.

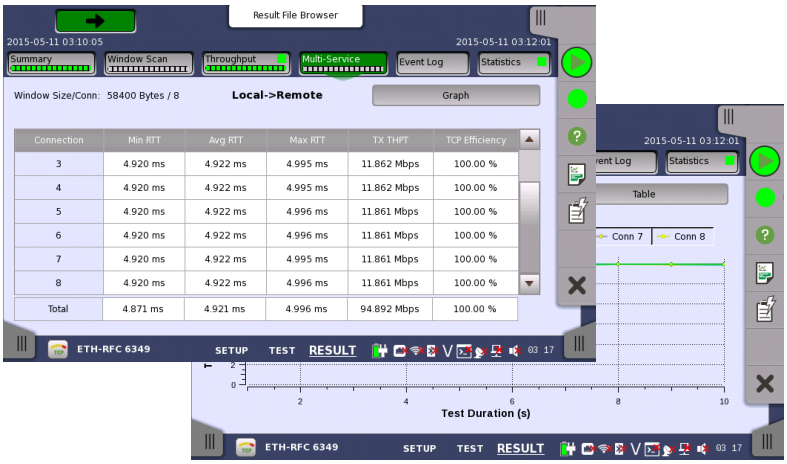

Figure 8. Up to 16 TCP Sessions

TCP Throughput connectivity can be tested by emulating an iperf client to an iperf server.

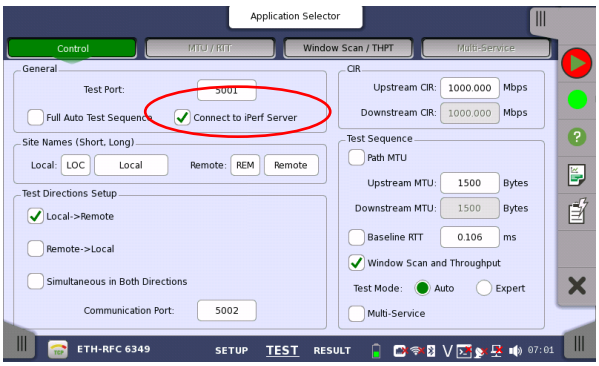

Figure 9. Connecting to iperf Server

Product overview

- Multiple connection tests at up to 2 ports (MT1000A) or 4 ports (MT1100A)
- 10 GigE support
- Bi-directional and simultaneous testing
- Up to 16 TCP sessions emulated and analyzed
- Testing connectivity to iperf server by emulating iperf client

Summary

The MT1000A/MT1100A supports TCP Throughput tests in addition to RFC 2544 and Y.1564 for true analysis of network performance. These tests help improve the quality of expanding networks.

Ordering Information

MT1000A

Mainframe	
MT1000A	Network Master Pro
Modules	
MU100010A	10G Multirate Module
Options	
MU100010A-001	Up to 2.7G Dual Channel
MU100010A-011	Ethernet 10G Single Channel
MU100010A-012	Ethernet 10G Dual Channel
MU100010A-020	TCP Throughput

MT1100A

Mainframe	
MT1100A	Network Master Flex
Modules	
MU110010A	10G Multirate Module
MU110011A	100G Multirate Module
Power Supply Modules	
MU110001A	Battery and AC Power Supply Module
MU110002A	AC only High Power Supply Module
Options	
MU110010A-001	Up to 2.7G Dual Channel
MU110010A-011	Ethernet 10G Single Channel
MU110010A-012	Ethernet 10G Dual Channel
MU110010A-020	TCP Throughput
MU110011A-001	Up to 10G Single Channel
MU110011A-003	Up to 10G Dual Channel
MU110011A-020	TCP Throughput

Note

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Specifications are subject to change without notice.

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