



T-BERD[®]/MTS-4000 Multiple Services Test Platform

Triple-Play Services Software Option



The Viavi Solutions T-BERD/MTS-4000 equipped with the Triple-Play Software option delivers comprehensive Internet Protocol (IP) service-level testing in a rugged, handheld, battery-operated platform that is ideal for access and home network turn-up, troubleshooting, and maintenance.

Triple-play services growth has changed the landscape of the telecommunications industry by creating new opportunities, while also introducing significant challenges for service providers. To remain competitive, providers must efficiently deploy bundled voice, video, and data to the exacting demands of customers—delivering on both quality of service (QoS) and experience (QoE), while reducing operating expenses.

The T-BERD/MTS-4000 meets these challenges and more as the first multi-application platform with fully integrated copper and fiber functionality that addresses the complete set of requirements for triple-play, such as turn-up, troubleshooting, and maintenance. The T-BERD/MTS-4000 Triple-Play Services Software gives field service technicians who install and maintain triple-play service over leading-edge fiber- and copper-based digital subscriber line (DSL) access networks a complete suite of essential testing tools in one unit.

Flexible connectivity, including universal serial bus (USB), high-speed 10/100/Gigabit Ethernet (GigE), Wireless Fidelity (WiFi), and Bluetooth[®], interfaces simplifies downloading software and offloading captured test data, increasing productivity and baseline network performance.

Key Features

- Video service (IPTV) testing
 - IP Multicast test (broadcast video service): Generate IGMP Join and Leave requests to verify stream flow, channel change, and multi-cast communication functionality
 - IP Unicast test (video on demand [VoD] service): Generate RTSP client requests for access to VoD media server to verify the of program stream flow and uni-cast communication functionality
 - Decode and display I-Frame
- Voice service (VoIP) testing
 - Emulate a VoIP phone for service turn-up and troubleshooting
 - Supports Cisco SCCP, SIP, MGCP, H.323, and Nortel Unistim signaling protocols
- Data services testing
 - Provides a fully integrated Web browser
 - Offers Throughput testing (FTP, HTTP)
- Class of Service
 - Provides control and results for multiple services (data, VoIP, IPTV) over multiple VLANs

Applications

- Tests IPTV video quality, including analysis of video streams and packet statistics on up to 10 streams in Monitor mode and 6 streams in Terminate mode, including VMOS
- Assesses VoIP packet quality and voice quality rating using MOS and R-Factor
- Tests data services, including ping, trace route, and Web browser functions from a 10/100/1000 Ethernet port or optional WiFi and xDSL modules
- Supports IPoE, Ppoe, and IPV6 data modes
- Scans the virtual local area network (VLAN) for current configuration and activity

Architecture

The T-BERD/MTS-4000 is designed for skilled field technicians who install and maintain various next-generation fiber (FTTx) networks delivering triple-play services that often require advanced troubleshooting, including in-depth physical layer tests on copper or fiber—or increasingly both.

Layered Graphical User Interface

Figure 1 shows the Viavi Quality Layer Model integrated into the T-BERD/MTS-4000 graphical user interface (GUI) to enhance root-cause analysis. Technicians can use it to locate IP service problems more easily and quickly.

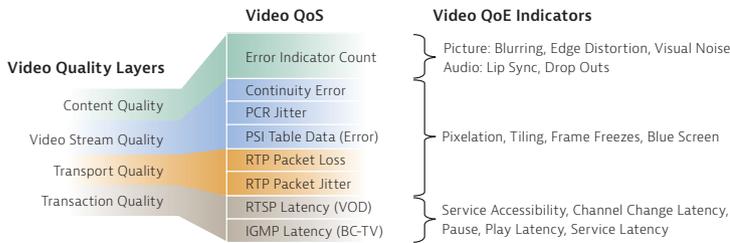


Figure 1. Viavi Quality Layer Model

The Triple-Play Software Option for the T-BERD/MTS-4000 installed on the base unit can be used with the resident Ethernet (10/100/Gig E) port. It is compatible with field-swappable T-BERD/MTS-4000 xDSL interface modules.

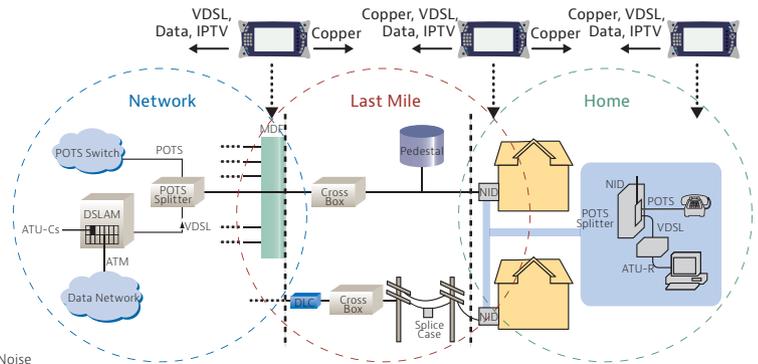


Figure 3. Example of a typical DSL architecture

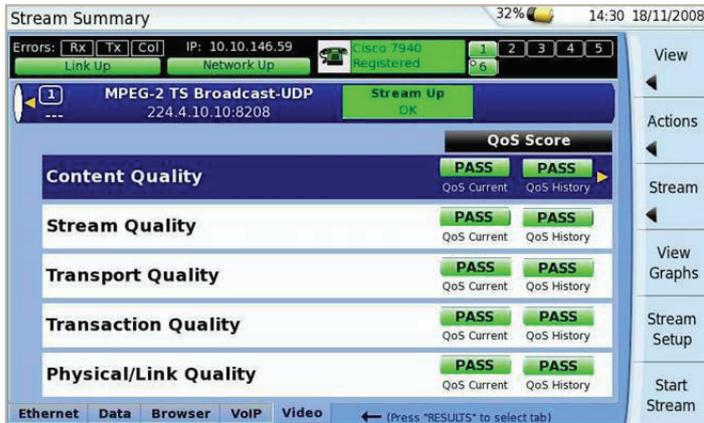


Figure 2. Example of Video test results using the T-BERD/MTS-4000 GUI with the Viavi Quality Layer Model

Applications

The T-BERD/MTS-4000 provides the full range of capabilities needed to test today's leading-edge FTTx and copper access networks plus the expandability needed to test next-generation networks. The wide range of testing technologies offered by the T-BERD/MTS-4000 provide all of the testing functions that technicians need at every stage of the network lifecycle, from the physical layer to the application layer, in a single handheld and rugged unit.

The T-BERD/MTS-4000 delivers an integrated approach to field testing with test support for specific application use cases. Field-swappable modules are available for multi-service testing and two modules can run simultaneously.

IP Video Testing

The T-BERD/MTS-4000 enables analysis of the video service (IPTV) stream anywhere in the Access network using a DSL or Ethernet interface. With its advanced performance monitoring features, the T-BERD/MTS-4000 accurately measures video QoS and QoE using built-in tests for content, transport, transaction, and physical link quality.



Figure 4. Example of IPTV Video Stream test

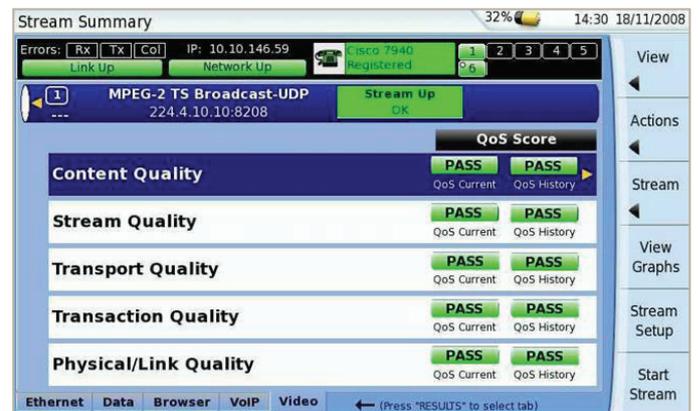


Figure 5. Example of IPTV Summary test screen

VoIP Testing

Technicians can use the T-BERD/MTS-4000 to turn up and troubleshoot voice service (voice over IP [VoIP]) connectivity, feature availability, and voice quality. They can also conduct IP ping, packet statistic, and trace route analysis to identify, diagnose, and sectionalize VoIP network and equipment problems.

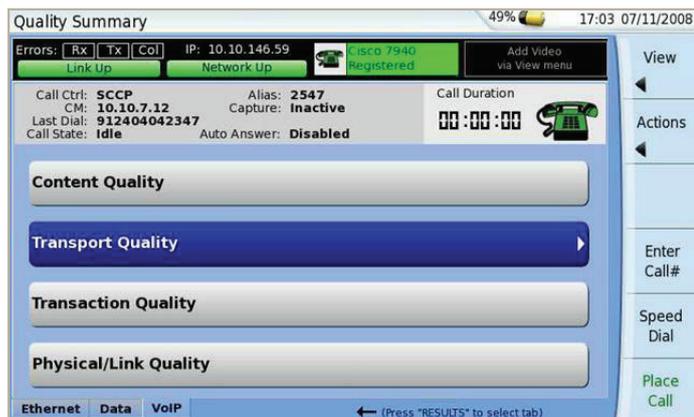


Figure 6. VoIP test interface

IP Data Testing

The T-BERD/MTS-4000 enables Internet connectivity testing using an integrated Web browser and also performs required IP data tests (such as IP ping delay) to verify bandwidth requirements for real-time applications and services (such as online gaming and streaming video).



Figure 7. IP Ping test interface

CoS Testing

With its advanced test capabilities that address each triple-play application QoS metric, the T-BERD/MTS-4000 let carriers focus on effective Class of Service (CoS) testing to ensure priority mapping for IP services. All three applications can be run at the same time simulating mixed traffic flows. Interactions that violate CoS rules can be identified quickly.

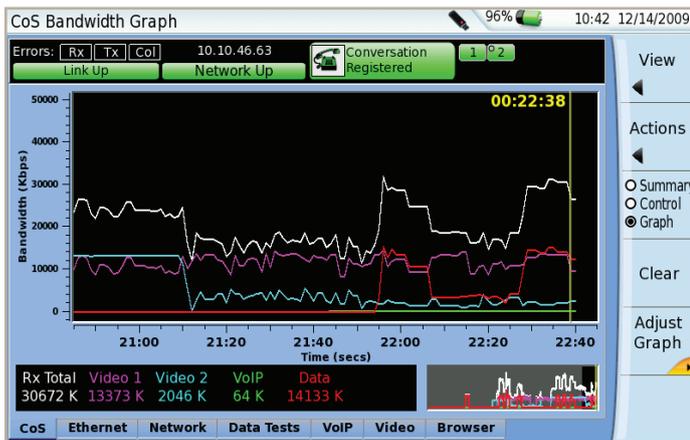


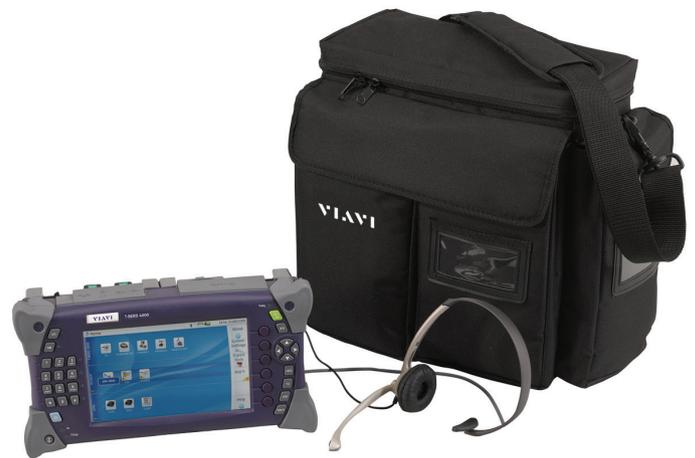
Figure 8. COS Bandwidth Graph



Figure 9. COS Summary

The Right Tool for Today's Triple-Play Tests

The lightweight, rugged, and battery-operated T-BERD/MTS-4000 cost-effectively scales to provide an all-in-one solution for field installation, maintenance, and troubleshooting across a wide range of test applications for copper, fiber, and triple-play services. With automation features, such as auto tests, custom scripts, work flow ticket support, and flexible connectivity that improve workforce efficiency, the T-BERD/MTS-4000 is ideally suited to optimize even the most complex and advanced FTTx networks.



Specifications

Test Ports/Interface Support	10/100/1GigE (configurable—half/full duplex auto detect), RJ45 Optional ADSL1/2/2+, VDSL1/2 (modem port 8-pin modular—line on center pins, Tip-Ring connections)
Cable Test CAT 3/5	
TDR Results	Fault type open/short Distance to fault
GigE Results	Polarity Skew
Ethernet Data	
Media Type	Auto, 10/100/1000 Mbps full, half duplex
Data Modes	IPoE, PPOE, IPv6oE, Multiple VLANs, data off
IP Mode	DHCP, static
MAC Setting	Factory default, user-defined
VLAN	Tag on/off ID selection 0–4095 Priority selection 0–7
Web Browser	On/Off
Reported Results—Ethernet TE	
Ethernet Statistics	Link status, link speed, link duplex detection TX collisions, TX/RX (bytes, frames, errors, dropped frames)
LAN/WAN Results	IP address, Net mask, gateway, DNS, MAC address
PING	Echoes sent/received, PING delay (Cur/Avg/Max/Min), lost count/percentage Supports IP address or DNS name destination
Trace Route ICMP and UDP Statistics	Hop count, name lookup, and IP address of hops Supports IP address and DNS address destination
FTP/HTTP	Upload/download rate, transfer count, time
VLAN scan	VLAN, priority, frame count, last seen
VoIP	
Modes	Terminate, Monitor
Supported Signaling Protocols	H.323 ITU-T H.323 version 3 Fast Connect H.323 ITU-T H.323 version 3 Full Connect (MSD, CAPSET, OLC exchange) Skinny Cisco Client Protocol (SCCP) SIP RFC 3621 Nortel Unistim MGCP
Supported Codec Configuration	ITU-T G.711 u-law/A-law (PCM/64 kb/s) ITU-T G.723.1 (ACELP/5.3, 6.3 kb/s) ITU-T G.726 (ADPCM/32 kb/s) ITU-T G.729a (GS-ACELP/8 kb/s) ITU-T G.722 64K ITU-T H.261 video conferencing ITU T H.263 video conferencing User-selectable silence suppression, jitter buffer, and voice packet size User-selectable transmit source (live voice conversation, tone transmit (200-5 kHz), pre-recorded wave file (up to 2 Mb))
LAN Settings	User-selectable calling alias User-selectable IP address, static or DHCP User-selectable subnet mask, gateway, and DNS server User-selectable or default MAC address VLAN configurable— IEEE.802.1p/q Configurable IP TOS

Gatekeeper Settings	User-selectable static/auto discovery, or no gatekeeper direct connect mode Supports inbound and outbound calls with or without gatekeeper support	
Reported Results—VoIP		
Call Stats	Full incoming call statistics, including IP address, far-end alias, far-end name, RTCP availability/ports, codec and rate, call signaling support, silence suppression enabled, and call duration	
Throughput Audio/Video	Sent/received in bytes and packets, out-of-sequence packets, remote packets	
Transaction Quality	Transaction Log	
Voice Stream Timeline	Packet delay, packet jitter, packet loss, overall QoS	
Incoming Delay	Network, encoding, packetization, buffering, and total delay	
Content Quality		
Call quality R-Factor	Current/Min/Max/Average	
Line quality R-Factor	Current/Min/Max/Average	
R-Factor G.107	Current/Min/Max/Average	
R-Factor burst	Current/Min/Max/Average	
R-Factor gap	Current/Min/Max/Average	
CQ MOS	Current/Min/Max/Average	
LQ MOS	Current/Min/Max/Average	
PQ MOS	Current/Min/Max/Average	
Transport Quality		
Audio jitter	Current/Min/Max/QoS History	
Audio packets lost	Current/Min/Max/QoS History	
Audio overall QoS	Current/Min/Max/QoS History	
Voice and video quality rating based on packet metrics thresholds set by user MOS rating, R-Factor, and voice degradation factors support packet capture and filtering (save internally or to USB mass memory storage)		
IP Video		
Modes	Terminate, Monitor, Through	
Set Top Box Emulation	IGMPv2 and v3 emulation client IGMP message status/decode status/error message RTSP emulation client	
Service Selection	Auto Broadcast video-UDP Broadcast video-RTP VOD-RTSP-UDP ISMA broadcast ISMA VOD (RTSP-UDP) ISMA VOD (TTSP-TCP) Rolling stream-R-RTP/UDP TTS Broadcast-RTP	
Video Source Address Selection	IP address and port number IP address, port number, and VOD URL extension RTSP port select RTSP vendor select	
Multiple ATM VC Setup Selection	Virtual channels with simultaneous usage Selectable TX peak cell rate (PCR) for signaling channel	
Video Analysis is Per Video Stream	Simultaneous stream support	6 Terminate, 10 Monitor

Specifications (Continued)

IP Video (continued)		
IP Packet Analysis	Total packets RX count Jitter current/max RTP packets lost, count RTP OOS, count RTP errors, count	
PID Analysis (each stream)	PID number PID type (video, audio, data, unknown) PID description	
Summary Statistics	Terminate active stream count	1-6
	Monitor active stream count	1-10
	Data rates combined	Current/Ave/Min/Max
QoS	Error indicator count	
	Continuity error event count	Current/Max
	Continuity error event percentage	Current/Max
	PCR jitter	Current/Max
	IGMP latency	ms
	RSTP latency	ms
	QoS score	
	(Pass/Fail threshold selections)	
Graphs	Packet loss QoS timeline Jitter	
Content Quality	PID, class, description Error indicator count Service name Program name Video MOS R-Factor Degradation (loss, discard, codec)	
Stream Quality	Sync errors	Count
	Continuity errors	Current/Average/Min/Max
	Continuity errors %	Current/Average/Min/Max
	PCR jitter	Count
	PID timeouts	Count
	PAT errors	Count
	PMT errors	Count
Video Stream Data Rates	Total	Current/Average/Min/Max
	IP	
	Video	
	Audio	
	Data	
	Unknown	
All streams		

Transport Quality	MDI delay factor	Current/Average/Max
	MDI MLR	Current/Average/Max/Total
	MDI buffer size	Current/Average/Max
	RTP jitter	Current/Max
	Lost packets	Current/Average/Max
	RTP packet loss	Distance Errors Threshold/ Current/Max/Total Period Errors Threshold/ Current/Max/Total
Transaction Quality	Latency	ms
Error Logging	Timestamp for error events	
	QoS state changes	Pass to Fail, Fail to Pass
Signaling Protocol Message Decode	IGMP Messages RTSP Messages 500 Message FIFO Buffer Storage—File Export	
Standards	RFC2236, IGMP	RFC2326, RTSP
	ISO (IEC 13818), Video Transport	ETSI TR 10-290 V2.1,
	Steam and Analysis	Video Measurements
	TFC-1483; 2684, ATM AAL5	RFC2364, PPPoAAL5
	RFC4445, Media Delivery Index (MDI)	
	Class of Service	Summary Results
	Control	3 Video, 1 VoIP, 1 Data, up to 6 VLANs
	Graphs	Bandwidth kbps

Ordering Information

Description	Part Number
Triple-Play Software Options	
Standard VOIP	C4000-VOIP
Cisco Call Manager	C4000-VOIP-CISCO
Nortel Unistim Call Manager	C4000-VOIP-UNISTIM
Standard IPTV	C4000-IPTV
Cable Diagnostics	C4000-CABLDIAG



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