

QT-600 Ethernet & Triple-Play Probe

NetComplete™ Service Assurance Solutions Portfolio



Key Features

- Uses a centralized approach with carrier-class, scalable, multiservice probes distributed at key points in the network
- Simplifies fault isolation and troubleshooting
- Supports proactive service-based performance monitoring
- Combines 24x7 monitoring with on-demand and scheduled testing by a single probe
- Performs active and passive testing and monitoring

Applications

- Tests whether VoIP service meets acceptable quality standards
- Detects, segments, and troubleshoots IPTV/digital video quality issues
- Troubleshoots and sectionalizes issues with Ethernet services using ping, traceroute and RFC2544 standard testing
- Monitors network traffic, performs top N analysis, captures traffic, and applies filters/triggers to drill down into data and pinpoint problems

The JDSU QT-600 is a carrier-grade, scalable, multiservice Ethernet and triple-play probe that combines active and passive quality of service (QoS) monitoring and analysis, continually, with flexible, on-demand, and scheduled testing.

Worldwide, service providers delivering triple-play services over a converged carrier Ethernet network must cost effectively bulletproof the transport layer as well as ensure the quality of services that ride on top, such as voice over IP (VoIP) and IPTV and digital video. While customers expect their new services to be inexpensive and high quality, service providers expect to more efficiently manage complex network architectures and still reduce operational costs, maximize revenue, and increase customer retention.

An integral component of the JDSU NetComplete Service Assurance Solution, the QT-600 addresses both sets of expectations. Through proactive monitoring, the QT-600 detects patterns of QoS degradation and then, from a centralized location, quickly segments the network to identify the source of the problem. The detailed view of network and service performance that is the by-product of the distributed data gathering and consolidated reporting capabilities of the QT-600 gives service providers the confidence to guarantee service-level performance. Converting this information into proactive measures has a positive impact—building greater customer retention and loyalty and contributing to reduced operational costs by decreasing the deployment of multiple technicians to remote locations.

The QT-600 is easily integrated into the NetComplete world-class operations support system (OSS) infrastructure, which includes the JDSU NetAnalyst™ Test OSS for automated and on-demand test and results management and the JDSU NetOptimize™ Performance Management for performance monitoring, trend analysis, and historical reporting. The QT-600 leverages the operational synergies between departments' roles and responsibilities for proactively identifying service degradation, isolating problems, troubleshooting, and resolving problems.

Product Features

Carrier-Class Ethernet Network Probe

Built for carrier-class networks worldwide, the QT-600 has both Nebs level 3 and CE mark certifications. Its scalable architecture includes 10/100 RJ45, 1000BaseT and 1000 optical gigabit interface connector (GBIC) testing interfaces, allowing up to four concurrent active synthetic tests to run simultaneously. A centralized Element Management System (EMS) takes care of all configuration requirements and an automated software upgrade function allows the system administrator to specify all or a subset of the QT-600 to upgrade in a single command.

Simplified, Error-Proof Testing

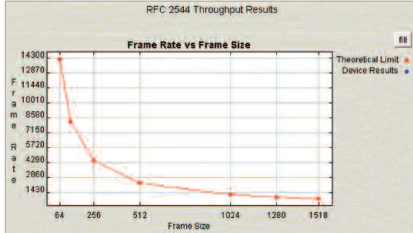
The QT-600, via its open eXtensible Markup Language (XML) application programming interface (API), seamlessly integrates with the NetAnalyst Test OSS, providing centralized test creation and management that ensures standardized, consistent test procedures are followed, thereby reducing user error. Additionally, through its scheduling capability, NetAnalyst can run repeatable test campaigns at specific times and intervals to assess network and service level quality. Test results can be automatically emailed and also can serve as a baseline for future comparison over time. Its customer-to-QT-600 mapping function enables tests to be created and run against customer services rather than against specific QT-600 probes, making the testing process more intuitive, simpler, and less prone to error.

Intelligence Based on Proactive Monitoring

The QT-600 calculates QoS data at physical line rates—ensuring information is not lost and results are accurate—and sends the data to NetOptimize, the performance and monitoring OSS. NetOptimize augments the QoS information of the QT-600 with customer/service information from other sources and uses a flexible reporting engine to aggregate high-level statistics. The flexible reporting engine also provides detailed views of the networks and services performance along with trends in use, capacity, and traffic over specified time periods, with areas of degradation highlighted. The intelligence gained through this in-depth analysis enables service providers to initiate proactive troubleshooting and prevent problems from developing. With the added advantage of continuous service monitoring, service providers can quickly pinpoint trouble areas and immediately correct problems before they severely impact network performance and customer services.

Scheduled, Automated Testing

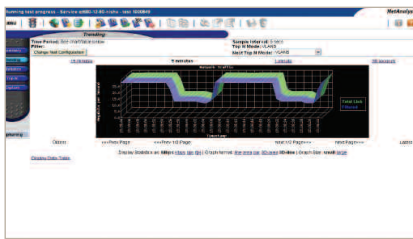
The QT-600 optimizes resources by automatically scheduling and queuing tests to run when resources become available. Automated test access and management control is achieved through the ability of the QT-600 to configure the service provider's switch, expediting and simplifying the workflow process. In addition, the QT-600 manages service turn-up end-to-end by automatically looping edge and customer premises equipment (CPE) devices and test equipment that may include the JDSU FST-2802, other QT-600s in the network, and third-party network interface units (NIUs).



Throughput results

Active Triple-Play Testing

The QT-600 can emulate end-user equipment and actively generate traffic that simulates actual customer traffic patterns. Connectivity is tested and validated using ping and traceroute while service turn-up and fulfillment are verified with RFC2544 throughput, latency, frame loss, and back-to-back tests. By placing and terminating VoIP calls, the QT-600 acts as a VoIP endpoint and then reports mean opinion score (MOS)/R-factor results and packet statistics for these synthetic transactions. It also can mimic IPTV channel change and video on demand requests and measure QoS parameters such as jitter, program clock reference (PCR) jitter, packet loss, and packet rates and the time it takes to service a channel change request. In all cases, once the tests are completed, the QT-600 automatically reports the QoS results pertinent to the active transaction. Up to four active tests can run concurrently.



NetAnalyst test

Passive Triple-Play Testing and Monitoring

The QT-600, working with NetComplete, provides a flexible interface that intelligently reduces the traffic captured on a per port and/or virtual local area network (VLAN) basis and distinguishes between transmit and receive directions. Monitoring can be continuous or scheduled for specific time intervals. The QT-600 also captures data at full line rates and provides 120 MB of nonvolatile cache. Working in conjunction with NetAnalyst, the QT-600 uses JDSU Examine software to automatically transfer all captured cache data for archival and decode purposes.

The QT-600 can monitor more than 8000 simultaneous VoIP calls measuring and reporting packet statistics, jitter, and MOS/R-factor. The QT-600 can also monitor more than 1000 simultaneous MPEG-2 transport streams reporting on key performance indicators such as Media Delivery Index (MDI), packet loss, jitter, PCR jitter, channel bandwidth, program association table (PAT), program map table (PMT) and packet identifier (PID) errors. Users have the flexibility to define alarm thresholds based on these key performance indicators (KPIs). For more in-depth troubleshooting, analysis, and monitoring, the QT-600 can display data utilization trends that include frame distribution statistics as well as broadcast, unicast, and multicast frame counts over a 15-minute window. Tracking and reporting topN statistics and displaying the worst offenders along with setting filters spontaneously enables the user to easily drill down further into the data to pinpoint the root cause of a problem.

Service Assurance Applications

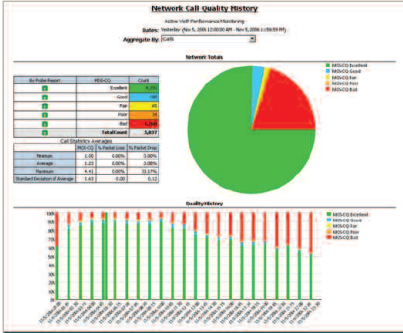
Ethernet Services

The QT-600 for Ethernet services can characterize the performance of a customer VLAN before turning up service to the end customer. Adding the 802.1q VLAN tag lets the QT-600 emulate the end customer's traffic and operate in a QinQ or preserved VLAN environment. Additionally, the QT-600 can control VLAN priority or IP priority settings using Diffserv and ToS bits. This allows the traffic being generated to take on characteristics of the customer's traffic patterns, eliminating the need for coordinated dispatches to multiple remote sites to turn up service. This, in turn, reduces operational costs and ultimately speeds up the service fulfillment process.

With the capability to run multiple tests such as ping, traceroute, throughput, latency, and frame loss as well as back-to-back tests (RFC2544), service providers can rapidly troubleshoot and isolate faults remotely from a single location. Input parameters for each QT-600 test are highly configurable, giving service providers maximum flexibility when troubleshooting.

The QT-600 can be placed into loopback mode and can also automatically loopback various edge and CPE devices. Running loopback tests from QT-600 to QT-600 and out to the customer premises quickly segments the network and clearly identifies problems to be within or outside of the service provider's domain.

The QT-600 also combines active testing with passive monitoring of Ethernet services. During passive monitoring of customer traffic, service providers can apply filters to highlight data of interest and perform total versus filtered data reporting. The data includes utilization trend graphs; frame utilization statistics and distribution; and topN classifiers such as talkers, protocols, conversations, applications, and IP/MAC listeners and pairs. The ability to apply filters and change the classifier settings spontaneously lets service providers drill down into the data and pinpoint problems.



NetOptimize

Voice over IP

Ensuring the availability and quality of VoIP service is an integral component of any service assurance solution. Users can initiate active synthetic call campaigns to proactively monitor and ensure high-quality services across the network. This advanced functionality allows multiple QT-600 units to be placed at key points in the network to originate and answer VoIP calls at user-defined intervals. Test results include full quality analysis and verification that service is available and has acceptable quality. With this proactive testing, problems can be identified and resolved before end-users notice them. Once problems are encountered, the on-demand active testing feature allows service providers to drill down, sectionalize the network, and rapidly isolate faults for troubleshooting.

The QT-600 has the capacity to continuously monitor more than 8000 VoIP calls simultaneously for QoS. User-defined thresholds let the QT-600 identify poor-quality calls and report call quality statistics such as MOS/R-factor, jitter, and packet loss for each identified call. Call signaling messages also can be captured and decoded to resolve connection problems quickly.

In addition to calculating both conversational (CQE) and listening quality estimates (LQE) as defined by industry standards, the QT-600 uses patent-pending algorithms to perform a network performance estimate (NPE) that aids in quickly identifying the root cause of service degradation within the network.

IPTV/Digital Video Testing and Performance Monitoring

As IPTV and digital video services gains traction in the marketplace, the QT-600 is poised to support the delivery of broadcast-quality video over a converged Ethernet infrastructure that equals the performance of a traditional cable network. The QT-600 provides an operator with the tools necessary to detect, segment, and troubleshoot any IPTV or digital video quality issues resulting from the content traveling through the network. By passively monitoring more than 1000 simultaneous single program or multi-program transport streams and reporting and alarming on KQIs such as video MOS (VMOS), media delivery index (MDI), loss distance, loss period, PCR jitter, and packet loss, operators are alerted of situations that could impact customers' QoE.

The JDSU NetComplete portfolio provides the company's comprehensive Service Assurance Solutions—including industry-leading test probes, software, and systems—that support worldwide communications providers delivering next-generation network and fixed mobile convergence (FMC) services. NetComplete provides best-in-class business solutions so service providers can effectively manage the entire lifecycle for quality voice, video, data, and wireless services.

Specifications

Ethernet Services Testing

Ping	
Traceroute	
RFC2544 tests	Throughput, Frame Loss, Latency, Back-to-back
QT-600 loopback	
In-band loopback interoperability with Accedian EtherNID, FST-2802, MTS-8000, and SmartClass Ethernet portables	
Out-of-band loopback interoperability with Canoga Perkins and Advantia NIUs	
Data analysis troubleshooting with capture and filters	
Rolling 15 minute data utilization trending graph	
Frame statistics and distribution	
TopN analysis	Top conversations, Top applications, Top VLANs, Top VLAN priorities, Top pairs (Mac and IP), Top listeners (Mac and IP), Top talkers (Mac and IP)

VoIP Active Performance Monitoring and Testing

One-way and two-way calls	
Pre-canned voice samples	
Call generation configurable input parameters	
SIP, MGCP signaling	Codec (G.711, G.729 μ -law and A-law)
Jitter buffer emulation with configurable buffer size	
Standard versus reference tone frequencies	
Interoperability with JDSU HST	
Configurable test pass/fail threshold criteria (MOS/R-factor)	
RTCP statistics	
QoS analysis results	MOS score LQE, CQE, NPE; R-factor LQE, CQE, NPE; Jitter RFC and instantaneous (min, max, average, and standard deviation); clock skew; packet statistics (total, lost, dropped) RTCP jitter, round-trip delay, packet loss degradation factors

Per call signaling and RTP capture with post analysis through Examine and PVA 1000

VoIP Passive Performance Monitoring

Continuous monitoring of more than 8000 VoIP calls with interim and summary reporting of call quality statistics and thresholding	
MOS score LQE, CQE, NPE; R-factor LQE, CQE, NPE; jitter; clock skew; packet statistics (total, lost, dropped) RTCP jitter, round-trip delay, packet loss degradation factors	
Continuous reporting of statistics for 20 worst calls and end of test averages, min, max, and standard deviation	
Quick quality reference bands	Excellent, good, fair, poor, bad
Control plan capture (SIP, MGCP, Cisco Skinny, H.323) and viewing through Examine	
Sophisticated filter and trigger options	

IPTV/Digital Video Testing and Troubleshooting

Continuous monitoring of more than 500 simultaneous transport streams with interim and summary reporting of key quality statistics and user-defined thresholding	
Stream/Program Statistics	Program/stream/PID availability, stream, program and per PID bandwidth, video bandwidth, audio bandwidth, MDI-DF, MDI-MLR, loss distance, OOS Packets loss period, RTP jitter, packet loss
MPEG Statistics	PCR discontinuity, PCR repetition, PCR network jitter, PID, PAT, PMT, CRC error, CAT error, PTS error, continuity and sync errors
Support for single and multiprogram transport streams, IGMP v2 and v3	
SNMP alerts	
Channel change emulation with ZAP times	
Embedded video capture	

Operations

Multiuser support for four simultaneous active tests	
Single passive monitoring test	
Centralized administration via EMS	
Carrier grade	
Automated test access management (TAM) control	

Filtering/Triggering

Multifilter support	
Sliding window	
Fixed offset	
Packet	VLAN, MPLS, VLAN priority, Dest/Src IP, application, ToS/DSCP, IP flags

Capture

Various stop conditions	On-trigger, time, network utilization
Buffer optimizer and status reporting	
Post capture viewing and analysis with Examine and PVA 1000	

Interfaces

Ethernet ports	10/100 Mbps RJ-45 connector
1000 Mbps GBIC optical	
1000BaseT	
Duplex modes	Full/Half
Flow control (Ethernet) supported	

Mechanical dimensions

Width	43.9 cm (17.3 in)
Height	4.5 cm (1.75 in)
Depth	23.5 cm (9.25 in)
Weight	4 kg (8.8 lb)
Compatible with ANSI (19 in or 23 in) and ETSI (21 in) racks (515 mm between fixing screws)	

Power supply

Meets the following electrical specifications:	
ETSI ETS 300 132-2 Equipment Engineering (EE)	
AC power option using an AC power adaptor	
DC power option using one or two -48 V DC supply input ports that operate from a nominal supply voltage of -48 V DC	
Range	35 V DC up to 60 V DC
Power consumption	<50 W

Compliance

CE	
NEBS3 GR-1089-CORE Issue 3, GR-63-CORE Issue 3, and GR-78-CORE Issue 3	

Test & Measurement Regional Sales

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