



#224143

August 2024

Commissioned by
Telchemy, Inc.

SQmediator

Real-Time Analytics Scalability & Troubleshooting

EXECUTIVE SUMMARY

Modern enterprise networks blend on-premises, cloud, hybrid, and mobile environments, creating unprecedented challenges in maintaining secure and reliable access to corporate resources from diverse locations. Organizations need comprehensive visibility into application performance, security, and user experience (QoE) across the entire network. Telchemy designs proactive monitoring solutions able to perform application performance testing in secure networks.

Telchemy commissioned Tolly to evaluate the scalability and troubleshooting capabilities of their solution, which integrates the SQmediator® performance management system with DVQattest® software test agents on Windows, macOS, Linux and Android/ChromeOS devices. According to Telchemy this system will scale to over one million DVQattest agents.

Testing demonstrated Controller scalability and resilience along with the capability of troubleshooting and validating connections in a variety of network, VoIP, TLS, and DNS scenarios. Network agent testing was done using VPNs to demonstrate compatibility with secure network connections. See Table 1.

THE BOTTOM LINE

Telchemy SQmediator demonstrated:

- 1 Enterprise-level scalability - supported ~150,000 concurrent test agent connections
- 2 Simple deployment through MDM/endpoint management tools
- 3 Integration with secure networks via TLS testing, certificate validation, and VPN support
- 4 Comprehensive troubleshooting of VoIP, videoconferencing, network and application performance, and ability to identify and diagnose specific impairments
- 5 High efficiency agent – minimal resource usage on host devices (CPU/memory)

Telchemy SQmediator - Results Summary

Area	Capability Demonstrated	Test Passed
Scalability	Automated deployment to Windows, Apple, & Android/ChromeOS	✓
	Controller cluster handling ~150,000 agents*	✓
	Controller failover/failback	✓
	Group tests with multiple and/distributed targets	✓
Troubleshooting	Handling sleep/wake cycles	✓
	Detect range of network failures and impairments	✓
	VoIP: Proactive voice quality testing Test VoIP/SIP targets in various configurations	✓
	Videoconferencing: Simulate Zoom, Teams, Webex, and other services to predict real-world performance	✓
	TLS: Detect and troubleshoot certificate issues	✓
	DNS: Detect performance issues and misconfiguration	✓

Note: *Cluster of four Controllers used for test. Troubleshooting performed in VPN environments.

Source: Tolly, July 2024

Table 1



SQmediator Meets Key Requirements

The testing demonstrated that Telchemy SQmediator meets the following key requirements for Enterprise Performance Management systems.

Scalability: needs to handle large numbers of users and adapt to evolving/growing network environments.

SQmediator demonstrated support for ~150,000 simultaneous agents along with failover/failback Controller resilience. Additionally, the system demonstrated the use of test groups to allow small or large groups of agents to be tested as one.

Mobility: needs to support employees working from diverse locations,

including on-site office, home, and mobile.

SQmediator demonstrated support for devices in various physical and cloud locations both locally and connected via commercial Internet links.

Device/platform support: should work with desktops/laptops, smartphones, tablets on Windows, Linux, macOS, Android/ChromeOS.

SQmediator demonstrated agent support for all of the aforementioned OS environments.

Network compatibility: must seamlessly function in traditional, cloud-based, and hybrid environments.

The SQmediator Controller environment (server/database) is environment independent.

Security: must be able to perform tests in secure networks (VPN, SASE),

support TLS, and identify certificate issues.

SQmediator demonstrated agent testing across VPN connections showing support for secure networks. Furthermore, the system was able to identify certificate issues such as expired certificates and invalid host names.

Comprehensive testing: should simulate realistic VoIP & videoconferencing, test availability/response of diverse servers/applications, detect/diagnose specific network issues.

SQmediator demonstrated network simulation of popular videoconferencing systems (e.g. Zoom, Teams, Webex) along with the capability to detect network outage and performance issues as well as VoIP endpoint issues.

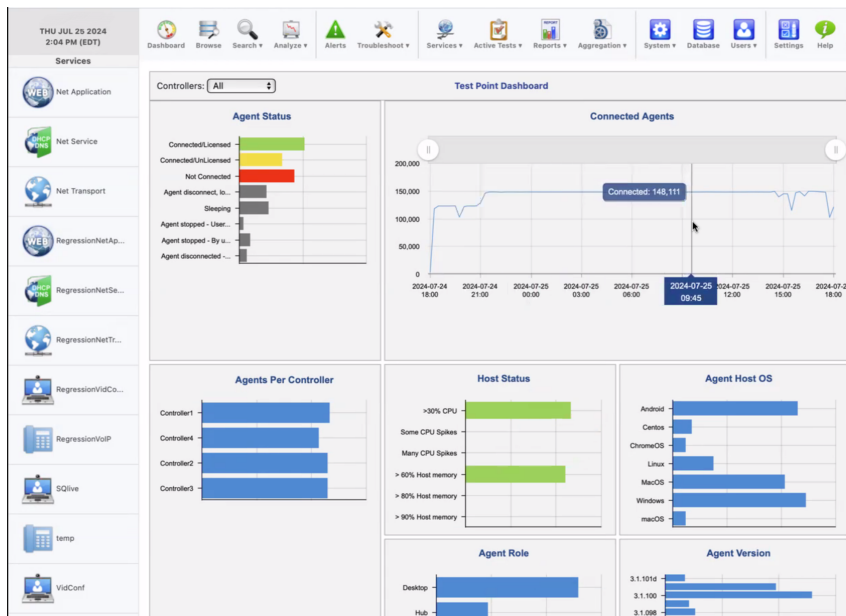
Efficiency: must run tests with minimal impact on user device performance (memory/CPU).

SQmediator demonstrated a small memory footprint and near-zero CPU consumption for its agent across Windows, Mac, Linux, and Android/ChromeOS environments tested.

Proactive monitoring: needs to detect and alert on issues before they affect users.

SQmediator demonstrated the capability of running automated tests and triggering alerts to system operators in the event of various failures or performance thresholds being reached. See Figure 3 for an example enterprise network monitoring diagram.

SQmediator: Dashboard Showing ~150,000 Connected Agents



Source: Tolly, July 2024

Figure 1



Test Results

Scalability

Deployment and Automated Configuration

Testers demonstrated automated deployment and configuration in three different environments: Apple MacOS systems using Jamf, Microsoft Windows computer using NinjaOne, and Google Chromebook using the Google Console. For Jamf, the only user interaction was to accept the invitation. Google Console can also be used to install on Android phones and tablets.

Controller Capacity

Testers demonstrated that a cluster of four Controller systems could support ~150,000 agents simultaneously. For practical reasons, the agents were implemented using multiple agent simulators, each of which could

simulate the actual connection and protocol exchanges of thousands of agents. Tolly noted that agents were automatically load-balanced across the multi-Controller cluster. See Figure 1. Telchemy states that the system scales linearly with the number of Controllers.

Controller Resilience

Using a three-Controller cluster, testers demonstrated that, when one Controller was deliberately failed, agents reconnected automatically and were distributed across the active Controllers. Similarly, when the failed Controller was brought back online, Tolly noted that, over time, agents connected to that Controller, preserving the load balance across Controllers.

Group Tests

In larger environments, it is important to be able to run tests to/from multiple agents simultaneously. Testers

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Tested July 2024

demonstrated that SQmediator could easily configure and run tests using groups of agents in many-to-one, and many-to-many scenarios.

Troubleshooting

Sleep/Wake Cycle Recognition

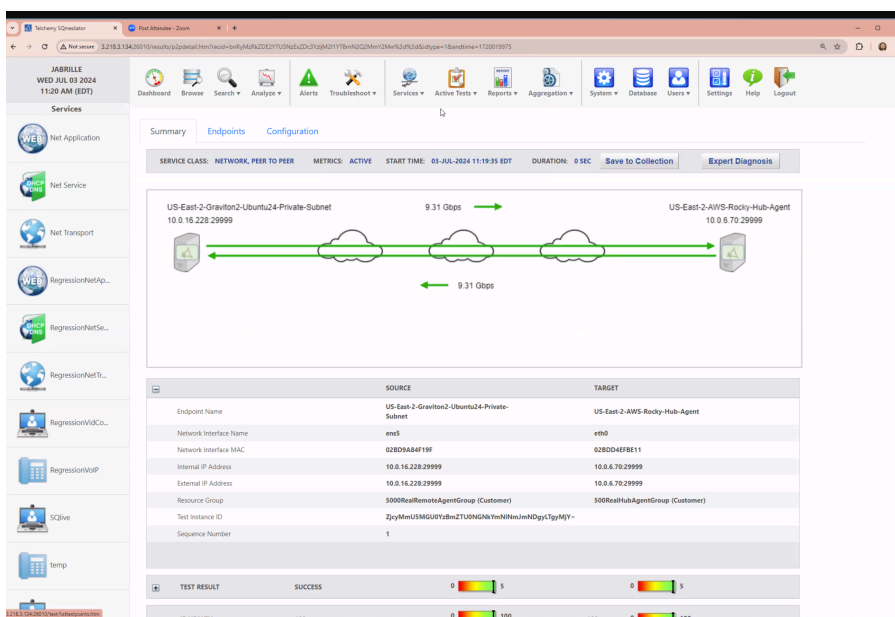
Testers demonstrated that the system avoided reporting a “sleeping” agent system as an error and was able to connect with an agent when it returned to “awake” status. See Figure 2 for an example test results screen.

Network Problem Detection

Testers verified that the system could detect the following network problems: 1) access network failure, 2) restricted bandwidth, 3) packet loss, and 4) degraded Wi-Fi signal.

For the access network failure, engineers disconnected the access network connection. For the restricted bandwidth and packet loss tests, engineers used NetEm network emulation software between the pair of agents to reduce available bandwidth and then introduce packet loss into the link. For the Wi-Fi test, engineers used a laptop and manually walked it away from its access point until the signal degraded.

Telchemy SQmediator: Example Test Results Screen



Source: Tolly, July 2024

Figure 2



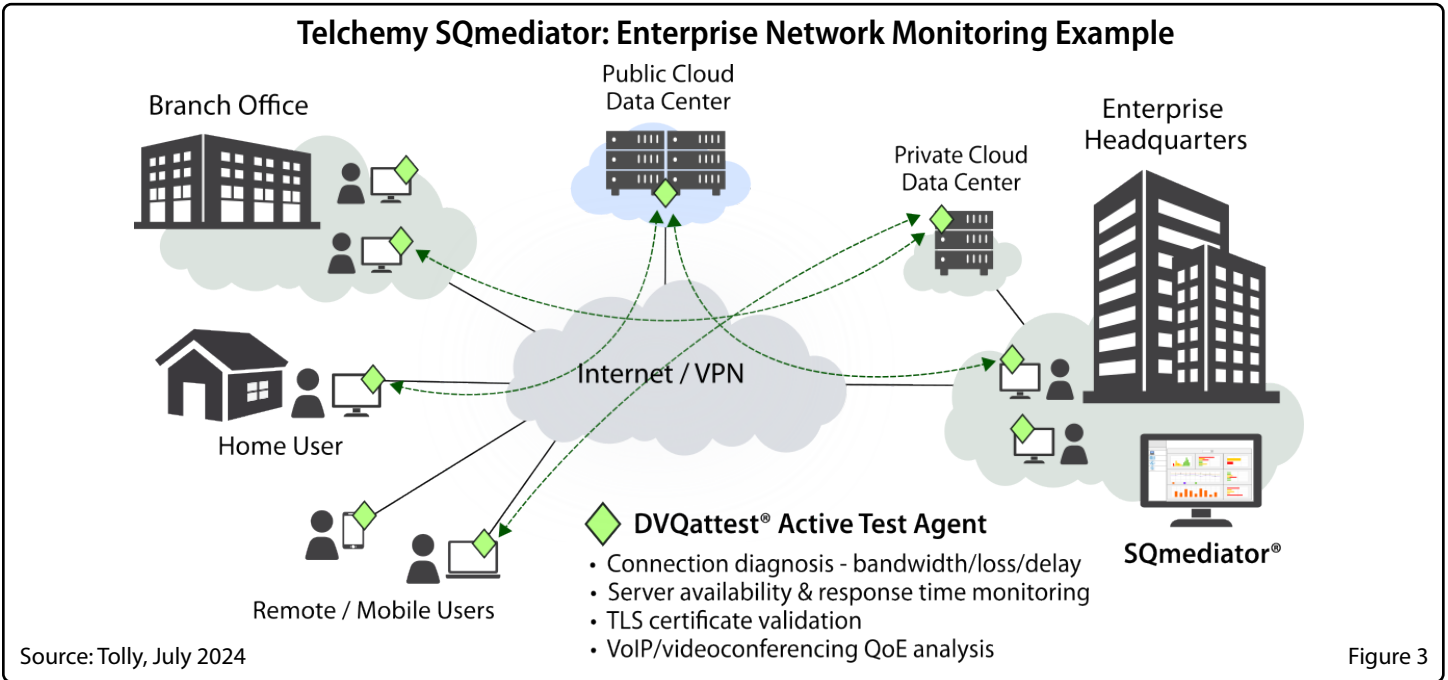
Telchemy SQmediator Detailed Tests and Results

Scalability		
Test	Capability Demonstrated	Result
Automated Deployment	Automated deployment of agent to Apple Mac via Jamf	✓
Automated Deployment	Automated deployment of agent to Microsoft Windows via NinjaOne	✓
Automated Deployment	Automated deployment of agent to Google Android/ChromeOS via Console	✓
Controller Agent Capacity	Support for handling ~150,000 simultaneous agent connections	✓
Controller Resilience	Failover and failback when one of three Controllers disabled/re-enabled	✓
Group Test - Single Target	Test of a group of agents to a single target agent	✓
Group Test - Multiple Targets	Test of a group of agents to multiple target agents	✓
Comprehensive Network Troubleshooting in Secure VPN Environments		
Sleep/Wake Cycle Detection	Correctly diagnose agent response failure as agent device in "sleep"	✓
Network - Access Failure	Diagnose failure of access network (when local network still available)	✓
Network - Detect Restricted Bandwidth	Detect when available bandwidth falls below a specified level	✓
Network - Detect Packet Loss	Detect when packet loss exceeds a specified level	✓
Network - Detect Weak Wi-Fi Signal	Detect when Wi-Fi signal strength falls below a specified level	✓
Videoconference - Bandwidth Modeling	Model performance (QoE) of popular videoconference solutions using simulated traffic. Support for Teams, Zoom Webex, and others	✓
VoIP - Voice Quality/QoE	Test voice quality using simulated VoIP calls with various codecs	✓
VoIP - Validate VoIP Target	Validate that a VoIP target station is online and reachable	✓
VoIP - Detect Non-TLS Target	Detect target not supporting TLS	✓
SIP Options PING via TLS Proxy	Validate connection via TLS proxy	✓
SIP Options PING via Non-TLS	Validate connection via non-TLS	✓
TLS - Baseline Certificate Validation	Confirm host with valid certificate	✓
TLS - Detect Expired Certification	Detect host with expired certificate	✓
TLS - Confirm "Wrong Host"	Detect connection where the host name is incorrectly configured	✓
DNS - Detect Server Misconfiguration	Detect a DNS server that is configured incorrectly	✓
DNS - Detect Performance Issues	Detect a DNS server that is experiencing performance (response time) issues	✓

Note: Network agent tests run through VPN to demonstrate viability in SASE environments in addition to non-SASE/VPN environments.

Source: Tolly, July 2024

Table 2



Videoconference Bandwidth Modeling

Videoconferencing has become a mandatory part of virtually every enterprise. With many work-from-home and mobile users and many different network characteristics, it is important for network architects to be able to model the performance of popular videoconference systems between any two network endpoints.

Tolly confirmed this capability in SQmediator with support for simulating Teams, Webex, and Zoom. Furthermore, the system allows the user to select the resolution of the session as this impacts the bandwidth required for the connection.

VoIP Endpoint Testing

VoIP connectivity is business critical service for many organizations. SQmediator demonstrated support for running VQmon voice quality tests

between stations using selectable codec types and testing SIP OPTIONS connectivity to TLS and non-TLS stations. Additionally, the system was able to detect a target station that that did not support SIP and report that correctly.

Transport Layer Security (TLS) Certificate Testing

Secure TLS, formerly known as SSL, connections are the default for most enterprise connectivity. SQmediator demonstrated: 1) baseline connectivity with a valid certificate, 2) detection of an expired TLS certificate, and 3) detection of a valid TLS certificate that was associated with an incorrect host name.

DNS Problem Detection

Without DNS, there is no connectivity. SQmediator was able to: 1) detect a misconfigured DNS server, and 2)

detect DNS response time degradation situations.

For the misconfiguration test, engineers used a system as a DNS target that was not configured with the DNS service. For the degradation test, engineers once again used NetEm to introduce delay into the link used to reach the DNS service, thus simulating a DNS with degraded response time.

Agent Resource Efficiency

Testers reviewed the agent status screens that report CPU and memory consumption across multiple agents running various endpoint operating systems.

According to Telchemy, utilization typically reaches only a fraction of 1%, but is rounded to the nearest integer on the Agent Health screen. Using OS reporting tools, average agent CPU use was observed at 0.3% in macOS and 0.42% in Windows 10.



Agent memory consumption was low across all environments with average memory shown in parenthesis: Windows 10 (68MB), MacOS 14.5 Apple M2 (12MB), Google Chromebook (23MB), Debian Linux 12 Raspberry Pi (164MB), and Rocky Linux 9.3 (263MB).

Test Setup & Methodology

Systems Under Test

Components

The SQmediator system is made up of several server based components: Controller(s), Database system, License Broker, and Reporter system. SQmediator can be deployed in the Cloud or a data center; in this case Amazon AWS was used.

For specifications of each of the systems used for this test, see Tables 3-6 below.

Agents

Different systems were used as appropriate for the various tests. Test agents used for this test project were all variants of the 3.1.x release. Telchemy notes that older, back-leveled agents are supported.

Test Environment

Tests were conducted in a simulated enterprise network with both LAN and WAN connections testing both wired and wireless clients as appropriate.

As noted above, agent simulators were used for the Controller scalability testing.

About Telchemy

Telchemy® is the global leader in analytics technology for real-time applications and multimedia IoT with its VQmon®, Embiot®, DVQattest®, SQprobe® and SQmediator® families of service quality monitoring and analysis products.

For more information, visit www.telchemy.com



SQmediator Test Configuration Summary (All AWS VMs)

Controllers (4)

EC2 Type	t3a.2xlarge
OS	Rocky Linux 9.3
CPU	8-vCPU AMD
Memory (RAM)	Total 32GB, used 3GB
Disk Space	Total 50GB, Used 4.5GB

Table 3

License Broker

EC2 Type	t3a.small
OS	Rocky Linux 9.3
CPU	2-vCPU AMD
Memory (RAM)	2GB
Disk Space	Total 25GB, Used 2.5GB

Table 5

Database (PostgreSQL v13.11)

EC2 Type	t3a.xlarge
OS	Rocky Linux 9.3
CPU	4-vCPU AMD
Memory (RAM)	16GB
Disk Space	Total 500GB, Used 167GB

Table 4

Reporter

EC2 Type	t3a.xlarge
OS	Rocky Linux 9.3
CPU	4-vCPU AMD
Memory (RAM)	16GB
Disk Space	Total 35GB, Used 15GB

Table 6



About Tolly...

The Tolly Group companies have been delivering world-class IT services for more than 35 years. Tolly is a leading global provider of third-party validation services for vendors of IT products, components and services. You can reach the company by email at sales@tolly.com, or by telephone at +1 561.391.5610.

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