TEST REPORT

Tolly.

#221113

June 2021

Commissioned by Opale Systems

MultiDSLA Voice Quality Test System

Voice Quality Testing with Network Impairments

Executive Summary

Unified Communication as a Service, UCaaS for short, has taken the world by storm of late. The Covid crisis necessitated remote working and remote working fueled UCaaS adoption. Assuring the quality of end-user experience (EUE) for VoIP and other UCaaS applications is an essential requirement. Understanding how VoIP apps behave under varying network conditions is a prerequisite for providing good EUE. Opale Systems' MultiDSLA Voice Quality Test System provides voice generation and measurement capabilities.

Opale Systems commissioned Tolly to evaluate the voice quality testing capabilities of its MultiDSLA solution.

Tolly tests confirmed the need for benchmarking UCaaS/VoIP applications showing that different VoIP solutions respond differently to network impairments such as packet loss and deliver different levels of EUE. See Figure 1.

Tolly found the Opale Systems MultiDSLA easy to set up and run. The system automatically analyzed voice quality by comparing the original audio with the received audio and produced empirical voice quality scores.

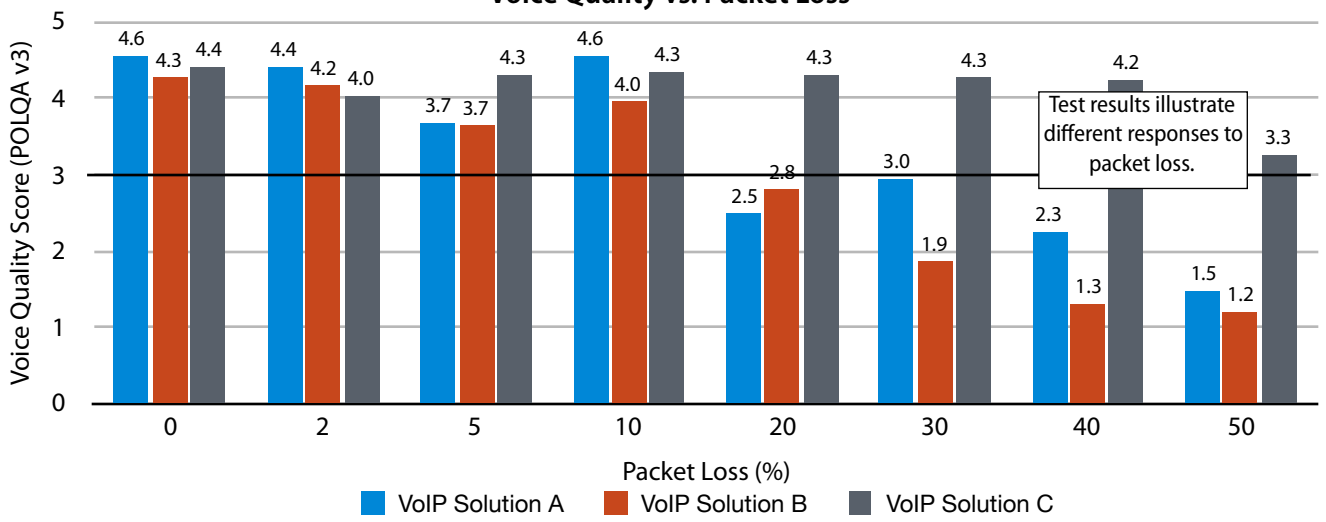
The Bottom Line

Opale's MultiDSLA Voice Quality Test System provides:

1. Easy-to-use, hardware-based call generation and quality analysis
2. Flexible configuration of voice call characteristics
3. Programmable call testing scenarios
4. Integration with POLQA3 testing suite
5. Extensive reporting capabilities

MultiDSLA Voice Quality Test System - POLQA v3 Voice Quality Measurements

Voice Quality vs. Packet Loss



Notes: POLQA score below 3.0 is usually considered unacceptable. Good quality is usually considered 3.5 or above. POLQA is an ITU-T standard that is a more sophisticated successor to MOS and PESQ scoring. Aukua Systems MGA2510 Ethernet Test Platform used to generate link impairments

Source: Tolly, August 2020

Figure 1

The Need for Network Impairment Testing

Just a quick glance at Figure 1 reveals the important fact that not all UCaaS/VoIP solutions respond to network impairments in the same way. That is apparent when one observes the impact of frame loss on the POLQA v3[1] voice quality score that represents the quality of the conversation.

Unless one benchmarks voice quality and other application performance characteristics (such as file download time for remote storage or cloud based applications and services) using a network impairment generator, the impact of network issues on end-user experience cannot be known.

Some might be surprised by the disparity in voice quality results shown in Figure 1. After all, one might say, VoIP protocols are standard, shouldn't the results be standard?

While protocols are standard, implementations are not. Some UCaaS vendors route all VoIP packets via their cloud - even when the clients communicating are on the same LAN and local to each other. Due to latency and bandwidth constraints, this, by itself, can degrade quality even without packet loss. Other solutions can detect when clients have a more efficient network path between them and route the traffic directly between the two clients once the session is setup.

Some UCaaS solutions are able to detect when packet loss is occurring and attempt to remediate that loss by sending duplicate packets. While this certainly uses more bandwidth it can provide an effective remedy and help deliver a good end-user experience.

Testing With The Opale MultiDSLA

This report will focus on the benchmarking tool rather than the UCaaS/VoIP systems under test.

The MultiDSLA system is a hardware-based system that is controlled via standard Microsoft Windows computer. The hardware generates real, analog audio and, in the Tolly test, interfaced with laptops serving as endpoints using the analog microphone/speaker port.

MultiDSLA Setup

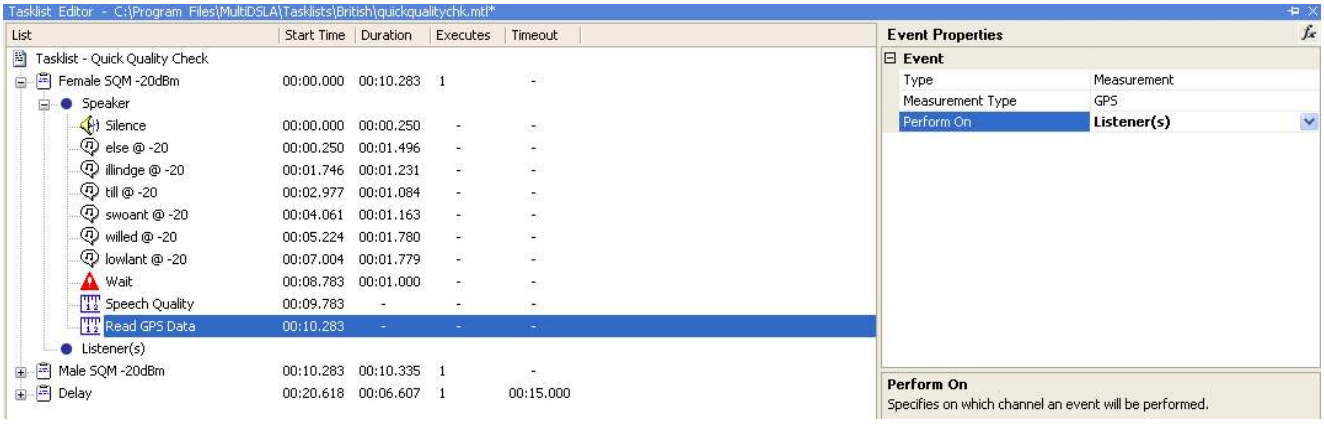
Tolly engineers make use of many different solutions and understand how a steep learning curve can impact the productivity of a test team. Thus, it is important to consider how quickly a test team can get up to speed on any test tool.

The Opale Systems was quick to set up. The hardware component needed only an IP address. The Windows-based controller was a straightforward installation followed by activating licenses for the controller and, in the Tolly test, the POLQA v3 optional component.

As noted, the MultiDSLA system is highly programmable and, thus, has a rich

Opale Systems MultiDSLA GUI

Example Configuration Screen: Voice Quality Tasklist



Source: Tolly, August 2020

Figure 2

[1] Perceptual Objective Listening Quality Analysis v3 (POLQA v3) is ITU-T standard P.863 http://www.polqa.info/index.html.

interface. The requirements for the Tolly test were such that basic testing scripts (task lists), provided with MultiDSLA were used.

Figure 2 shows an example task list an illustrates the very granular level to which a test can be programmed. This test includes both female and male audio samples. Within each, the specific series of sounds and silence can be specified along with the directive to calculate quality scores at the end of the task list.

Integration With Test Environment

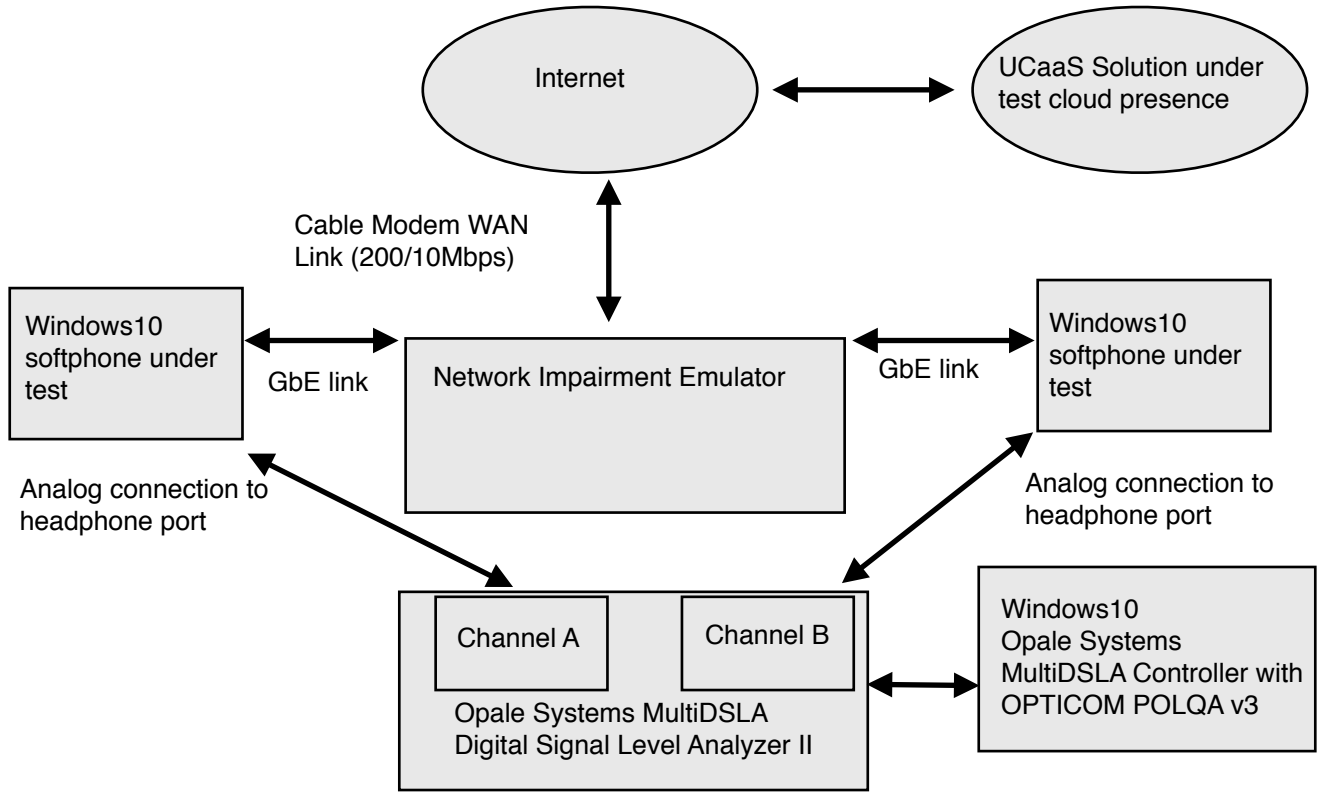
The MultiDSLA integrated with the test environment via a physical analog interface which was external to the test environment. Thus, the presence of the MultiDSLA is completely transparent to the test environment. The Windows laptops serving as test clients communicated as though communicating with a human via an external microphone and speaker connection.

In the Tolly test, the VoIP connection ran out to the Internet and back to a receiving client nearby. For testing, this allowed a single MultiDSLA unit to be used to send and to receive the voice traffic on its two interfaces.

See Figure 3 for a logical diagram of the test environment.

While not part of this test, MultiDSLA does support using multiple hardware devices to test between endpoints in different physical locations.

Voice Quality Test Environment: Logical Diagram



Source: Tolly, August 2020

Figure 3

Voice Call Quality Results Reporting

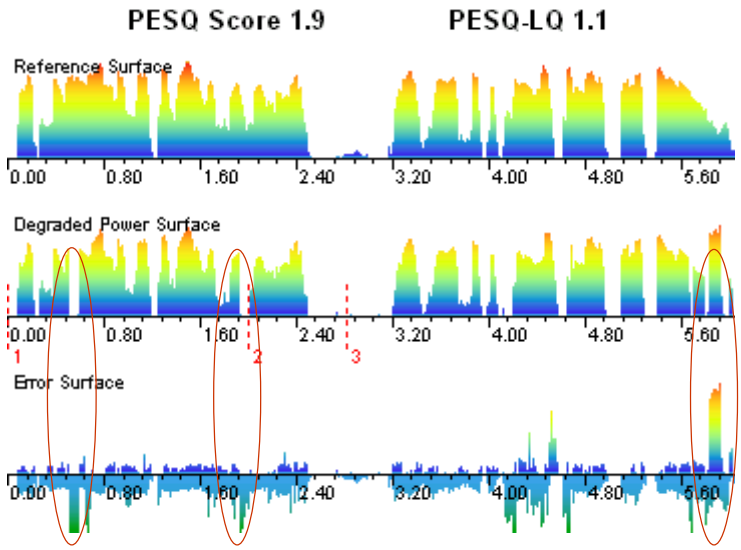
MultiDSLA logs the results of all tests and, thus, provides the basis for both real-time and historical reporting.

Results are reported numerically and many can also be represented visually. Such visual representations can be very helpful when reviewing quality of audio levels.

Figure 4, on the right, provides an example of the visual representation provided by MultiDSLA.

From this report, engineers can quickly see where the degraded signal differs from the audio reference signal.

Opale Systems MultiDSLA
Reporting Example: Visual Comparisons



Source: Tolly, August 2020

Figure 4

Teraquant

Teraquant is a voice/UC & Smart Network Edge technology company, based in Boulder Colorado, the industry leader in voice quality monitoring, that prioritizes performance monitoring and ability to troubleshoot first, ensuring seamless migration to cloud without service or quality disruption

Teraquant is the US representative for Opale Systems and the MultiDSLA Voice Quality Test System.

For more information, please visit: https://teraquant.com/

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www.teraquant.com Answers, not Data

Source: Teraquant

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