

USE CASE

Voice Quality & Performance Assessment

for Home Gateways, Wi-Fi Routers & Broadband CPE

✓ **Analog & VoIP Ports**
FXS/FXO + SIP on one system

✓ **Network Impairment**
Packet loss / jitter

✓ **POLQA / PESQ MOS**
Standards-based quality scoring

✓ **Automated Regression**
R&D bench to pre-release testing

CONTEXT & CHALLENGES

Validating Voice Performance on Residential Gateways

Residential gateways, Wi-Fi routers, and broadband CPE devices increasingly integrate analog voice ports (FXS/FXO) alongside VoIP/SIP capability, bridging the home phone to the operator's voice network. As these devices ship at scale, manufacturers and operators need to confirm that voice quality and reliability hold up — not only in ideal lab conditions, but under degraded real broadband access networks.

Validating this end-to-end voice path — from the analog handset port, through the gateway, to the SIP/RTP stream on the WAN side — requires a test system that combines analog and VoIP measurement in one automated, repeatable workflow.

The challenge for gateway manufacturers and their operator customers is therefore to:

- Perform analog voice port testing — automated call setup, voice quality MOS, echo, latency, DTMF integrity.
- Reproduce real-world network degradation to evaluate VoIP quality under a degraded broadband link
- Automate long-duration stability tests under continuous unattended call load

OPALE SYSTEMS SOLUTION

MultiDSL A — End-to-End Gateway Voice Testing

The Challenge

- > **Multiple interfaces:** gateways expose analog (FXS/FXO), Ethernet/SIP, and Wi-Fi simultaneously.
- > **Real-world conditions:** field impairments vary widely and are hard to reproduce consistently in the lab.
- > **Manual regression:** each firmware update requires re-validating voice quality by hand.
- > **Long test campaigns:** stability issues often only emerge over extended run times.

The Opale Solution

Opale Systems' MultiDSL A combines DSL A analog nodes with VoxPort Packet (VPP) VoIP nodes to test the complete voice path of a gateway — from the FXS/FXO port to the SIP/RTP stream — under fully automated, repeatable conditions.

- > **DSL A analog node** connects directly to the gateway's FXS port, replacing the phone to voice quality, latency, echo and DTMF tests.
- > **VPP VoIP node** models the WAN-side SIP call, with built-in packet loss, jitter impairment generation.
- > **Automated regression** scheduled tasklists re-run the full suite on every firmware build, with pass/fail thresholds and alerts.

KEY FEATURES

What MultiDSL A Delivers

Feature	Description
Analog voice testing (POTS)	Call setup, off-hook/on-hook, ring detect, MOS (PESQ/POLQA), DTMF, up to three echoes.
Network impairment emulation	Built-in packet loss, jitter on the VPP node to stress-test VoIP quality under degraded broadband.
Long-duration stability testing	Continuous or scheduled test campaigns with automated call repetition to catch intermittent and long-run failures.
Automated regression testing	Scheduled tasklists re-validate voice performance on every firmware build, with pass/fail thresholds and alerts.
Standards-based quality scoring	POLQA (ITU-T P.863), PESQ (ITU-T P.862/862.1/862.2) with graphical analytics.
Scalable from the lab to the production	The same system scales from the R&D development phasis to the QA lab and into production.
Reporting & observability	Drill-down graphical analytics, CSV/Excel export, and JSON export to dashboard for 24/7 monitoring.

BENEFITS FOR GATEWAY MANUFACTURERS & OPERATORS

Operational Value from Bench to Production

R&D validation Bench-test new gateway designs early	Firmware regression Catch voice regressions before release	Field-condition emulation Validate MOS under real-world impairments	Reduced engineering time Automated campaigns replace manual checks
---	--	---	--

CONCLUSION

One System, From Bench to Production Line

As voice ports become a standard feature of residential gateways, Wi-Fi routers, and broadband CPE, manufacturers need objective, repeatable proof that call quality holds up under real network conditions — not just in an ideal lab setup. Opale Systems' MultiDSL A validates both the analog and VoIP sides of the gateway in one automated workflow.

By combining DSL A analog nodes, VPP VoIP nodes with network impairment emulation, and an automation engine with Python/REST API support, MultiDSL A lets the same test system serve R&D validation and pre-release firmware regression alike — reducing engineering time while increasing confidence in every release.

By reproducing real broadband conditions and automating the full analog-to-VoIP test path, MultiDSL A helps gateway manufacturers ship every firmware release with confidence — turning voice quality assurance from a manual bench exercise into a continuous, repeatable process.

To learn more or request a demonstration, contact info@opalesystems.com