

USE CASE

Voice Quality Assessment in Air Traffic Control Communications

<p>✓ POLQA ITU-T Compliant Standards</p>	<p>✓ MOS Score Multi-level calibration</p>
<p>✓ Flexible integration ATC Audio Systems</p>	<p>✓ Automated testing Reproducible Campaigns / Monitoring</p>

CONTEXT & CHALLENGES

Ensuring Voice Quality in Critical ATC Operations

Air Traffic Control (ATC) relies on clear, reliable, and intelligible voice communications. Whether for ground-to-ground coordination between control centers or air-to-ground exchanges with pilots, voice quality is a critical requirement. Any degradation (distortion, latency, or loss of intelligibility) can directly impact operational efficiency and, above all, safety.

In complex ATC environments, the communication chain involves multiple interconnected audio systems: radios, gateways, recording systems, and switching equipment. Each component may introduce gain variations, noise, or signal processing effects, making objective end-to-end voice quality assessment particularly challenging.

The challenge for Air Navigation Service Providers (ANSPs) is therefore to:

- Precisely measure voice quality across the entire communication path
- Reproduce realistic operational scenarios without disrupting live traffic
- Identify degradations introduced at different points in the audio chain
- Ensure compliance with strict performance and safety requirements

OPALE SYSTEMS SOLUTION

MultiDSLAs -- End-to-End Voice Quality Testing

<p>The Challenge</p> <ul style="list-style-type: none"> > Operational disruption: traditional tests require two human operators. > Inconsistency: human subjectivity introduces variability from one session to the next. > Time-consuming: reconfiguring equipment (gains, codecs, radio paths) is slow. > Incomplete: subjective tests cannot provide objective and standardized MOS scores. 	<p>The Opale Solution</p> <p>Opale Systems' MultiDSLAs is deployed directly in the control tower or within the communications infrastructure, enabling comprehensive end-to-end testing on ground-to-ground and air-to-ground links without requiring controllers to be present.</p> <p>The DSLA simultaneously emulates both ends of the communication:</p> <ul style="list-style-type: none"> > Transmitting controller (transmission path) > Receiving controller (reception path) <p>This enables continuous, repeatable, and automated tests under fully controlled conditions.</p>
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KEY FEATURES

What MultiDSLAs delivers

Feature	Description
End-to-end voice quality measurement	Objective measurements using PESQ and POLQA (ITU-T P.863), providing MOS values that accurately reflect perceived audio quality.
Realistic communication emulation	By replacing both the speaker and the listener, tests are performed under real operational conditions without human intervention.
Detailed signal analysis	Beyond MOS scores, waveform analysis and associated metrics allow precise identification of degradation sources within the audio chain.
Flexible Integration	Seamless connectivity with ATC audio systems: radios, gateways, recording systems, and switching equipment.
Configurable audio calibration	Fine-tuning of input/output levels to ensure compliance with system specifications of the tested environment and guarantees accurate, consistent measurements.
Automated and reproducible tests	Automated test campaigns ensure consistent benchmarking over time and facilitate regression analysis after updates or reconfiguration.
End-to-end latency measurement	Latency is measured by comparing reference and received signal, highlighting delays that may impact communication clarity.
Intelligibility measurement	Based on ABC-MRT16, providing an objective indicator for end-to-end speech clarity and intelligibility.

BENEFITS FOR ATC OPERATIONS

Operational Value for ANSPs

Upgrade validation Voice quality verification after updates	Audio diagnostics Rapid identification of audio degradations	Continuous monitoring 24/7 voice quality monitoring with MOS alerts	Acceptance testing System and equipment compliance validation
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CONCLUSION

Raising the Standard of Voice Communications in ATC

In critical environments such as air traffic control, ensuring consistent, high-quality voice communications is essential. Opale Systems' MultiDSLAs provides a powerful and flexible solution to objectively assess and monitor voice performance across complex audio infrastructures.

By enabling realistic end-to-end testing with detailed analysis, MultiDSLAs helps ANSPs maintain the highest standards of communication reliability and safety, transforming voice quality assurance from a one-time compliance exercise into an continuous operational capability.

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