Umetrix Voice

Voice Experience Evaluation for VoNR, VoLTE, VoWi-Fi, OTT, and Legacy Voice Services

Solution for Voice Experience Evaluation

Umetrix Voice (Nomad UX) evaluates voice experience for any device and any voice service including Voice over New Radio (VoNR), Voice over LTE (VoLTE), Voice over Wi-Fi (VoWi-Fi), over-the-top (OTT), and more.

Use Cases

1. **Launch readiness assessment for new voice services (VoNR, VoWi-Fi, VoLTE, OTT, etc.) and new voice codecs.** Compare the user experience of new voice services to legacy or competitive services prior to launch. Set launch criteria and evaluate trial, soft launch, and commercial networks to determine readiness.

KEYSIGHT

2. **Comparative analysis and ranking of voice experience across device models.** Compare and rank any device based on live network voice experience criteria such as speech quality, call completion success rate, and audio delay. Use the rankings to drive device marketing and acceptance.
3. **Pre-testing for carrier device acceptance programs.** Umetrix Voice enables device manufacturers to pre-test new device models prior to submission to carrier acceptance programs. By addressing issues proactively, acceptance can proceed without delay.

Highlights

- Assess the launch readiness of new voice services such as VoNR, VoWi-Fi, VoLTE, OTT, and more
- Compare and rank the voice experience of device models for device marketing and acceptance
- Evaluate the user experience of voice services in the live network using actual consumer mobile devices
- Reduce test time by up to 70% vs. previous Umetrix Voice models
- Perform OTT voice codec testing with increased confidence with the POLQA V3 algorithm

Key Metrics

Speech Quality MOS (POLQA)

Call Completion Success Rate

Audio Delay

Features

Automate the evaluation process. Accelerate the entire user experience evaluation process including setup of tests, validation of test results, data aggregation, and reporting.

Evaluate six devices simultaneously. Umetrix Voice includes six channels for evaluating mobile devices. That reduces the time required to complete tests by 30-50% over the previous Umetrix Voice instrument, depending on the specific test plan.

Test call and speech simultaneously. Umetrix Voice allows call performance and speech quality tests to be performed at the same time. As a result, the time to complete typical test plans is reduced by 10-20%.

Use consistent metrics on any mobile device. Umetrix Voice measures the user experience of voice services with a consistent approach across any mobile device platform. Make direct comparisons of voice services including VoNR, VoLTE, VoWi-Fi, HD, 3G, OTT, and more.

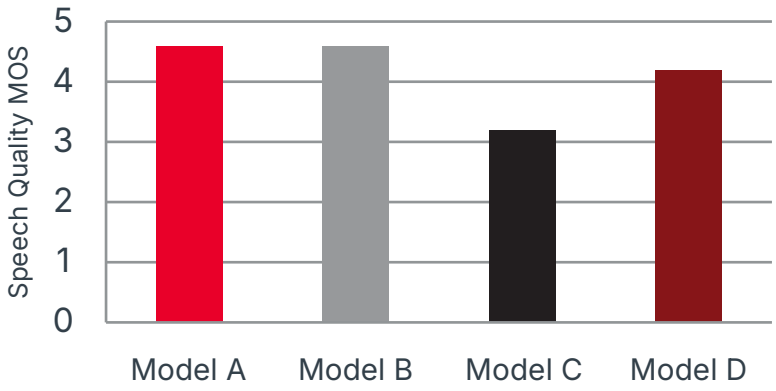


Figure 1. Umetrix Voice produces reports that compare device models, service providers, or service types

Leverage support for HD speech. Perform both Narrowband and HD speech quality analysis with support for 48-kHz bandwidth and the wideband-ready POLQA speech quality algorithm. Supports all wideband codecs including the Enhanced Voice Services (EVS) codec.

Measure experience in the live network. Umetrix Voice measures live network voice experience using three approaches: mobile-to-mobile, mobile-to-IMS, and mobile-to-PSTN.

Table 1. Pros and cons of various approaches

Approach	Pros and cons
Mobile-to-Mobile	• Easy to set up • Supports HD codecs for VoNR, VoLTE, VoWi-Fi, and OTT voice testing • No isolation of uplink/downlink
Mobile-to-IMS	• Requires Umetrix HD Voice Server in core network • Isolates uplink and downlink/IMS for faster troubleshooting of issues
Mobile-to-PSTN	• Easy setup (Keysight-hosted) • Isolates uplink and downlink • Narrowband codec only

System Overview

Umetrix Voice. The Umetrix Voice UX solution consists of a portable hardware unit and PC-based control software. The unit controls up to six mobile devices simultaneously using a Bluetooth interface to initiate and terminate calls. It performs voice experience tests over a Bluetooth audio link or via the mobile device's audio jack. The instrument performs three types of tests: mobile-to-mobile (between two devices on the same or different instruments), mobile-to-PSTN, or mobile-to-IMS. Umetrix Voice UX evaluates the voice experience of end-to-end connections by performing speech quality tests (POLQA), call initiation and retention tests, and audio delay tests.

Umetrix HD Voice Server. The HD Voice Server enables mobile-to-IMS tests using narrowband or wideband/HD codecs. The server is deployed within a carrier's core network and interfaces directly to the IMS, acting as a virtual SIP/IP device and experience testing endpoint. The HD Voice Server helps isolate issues by enabling independent analysis of the uplink and downlink for a specific mobile-to-IMS connection. This helps isolate issues better than mobile-to-mobile tests where the end-to-end connection includes the uplink and downlink of both mobile devices under test.

Umetrix Cloud. The Umetrix Cloud is a worldwide set of Keysight-hosted cloud endpoints for voice and data test services. The **Umetrix Voice Server** enables mobile-to-PSTN tests using narrowband codecs. With the Voice Server, customers can get uplink MOS delivered to their Umetrix Probe in real time while conducting field testing. The server is hosted in the Umetrix Cloud and connects to the PSTN via a T1 or E1 interface. The Voice Server acts as a virtual landline phone and voice probe for performing end-to-end voice experience evaluation. The Voice Server helps isolate issues by enabling independent analysis of uplink and downlink voice service metrics. In addition, the Voice Server enables evaluation of narrowband codecs and PSTN connectivity for the network, service, or device under test. The Umetrix Cloud also contains **Umetrix Data Media Servers**, which act as an endpoint for all data experience tests, hosting various types of media and services required to perform HTTP, FTP, and UDP file transfers and ping tests.

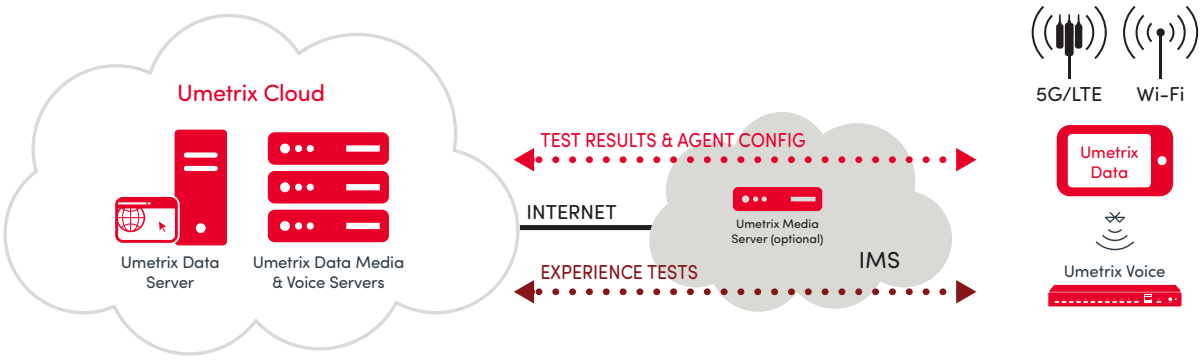


Figure 2. Flow diagram showing multiple products in the Umetrix portfolio

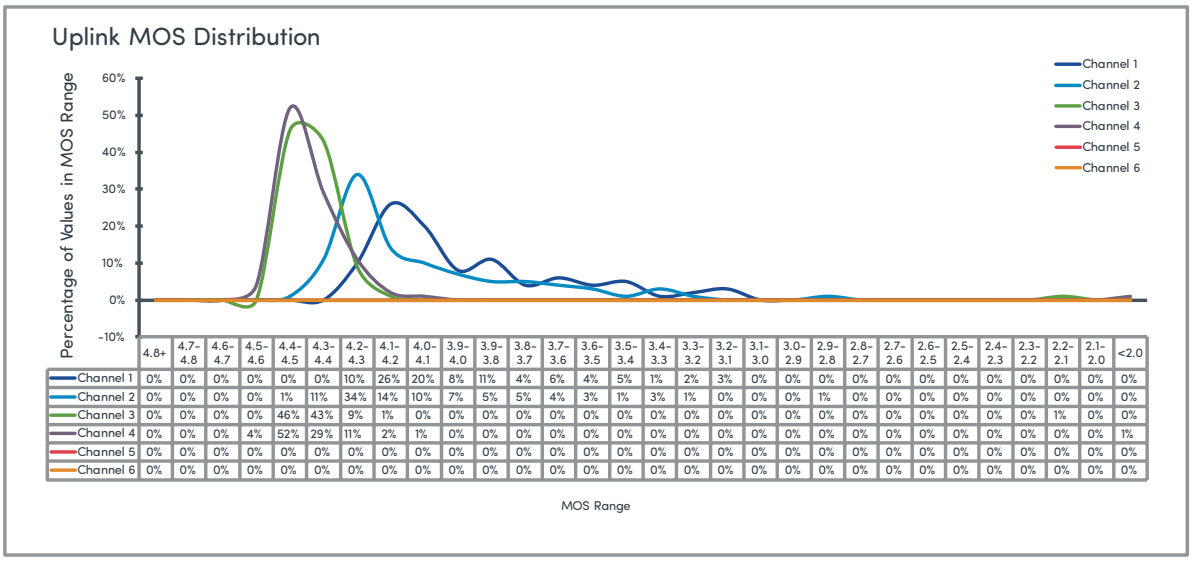
Example Outputs

Speech Quality by Service or Device Model

Umetrix Speech Quality Report

Market Selection: Chicago

	Downlink MOS						Uplink MOS					
	1	2	3	4	5	6	1	2	3	4	5	6
Average	3.58	3.70	3.96	4.09			3.93	4.06	4.36	4.36		
Standard Deviation	0.43	0.35	0.30	0.22			0.28	0.30	0.23	0.25		
Maximum Score	4.34	4.24	4.43	4.42			4.26	4.42	4.48	4.50		
Count	99	99	99	99			100	100	100	100		
% MOS >= 3.2	79.8%	87.9%	99.0%	100.0%			97.0%	99.0%	99.0%	99.0%		
% MOS < 3.0	11.1%	3.0%	1.0%	0.0%			0.0%	1.0%	1.0%	1.0%		
% MOS < 2.0	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	1.0%		
% MOS <= 1.8	0.0%	0.0%	0.0%	0.0%			0.0%	0.0%	0.0%	0.0%		
Scoring Algorithm	POLQA	POLQA	POLQA	POLQA			POLQA	POLQA	POLQA	POLQA		



	4.8+	4.7-4.8	4.6-4.7	4.5-4.6	4.4-4.5	4.3-4.4	4.2-4.3	4.1-4.2	4.0-4.1	3.9-4.0	3.9-3.8	3.8-3.7	3.7-3.6	3.6-3.5	3.5-3.4	3.4-3.3	3.3-3.2	3.2-3.1	3.1-3.0	3.0-2.9	2.9-2.8	2.8-2.7	2.7-2.6	2.6-2.5	2.5-2.4	2.4-2.3	2.3-2.2	2.2-2.1	2.1-2.0	<2.0
Channel 1	0%	0%	0%	0%	0%	0%	10%	26%	20%	8%	11%	4%	6%	4%	5%	1%	2%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Channel 2	0%	0%	0%	0%	1%	11%	34%	14%	10%	7%	5%	5%	4%	3%	1%	3%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Channel 3	0%	0%	0%	0%	46%	43%	9%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Channel 4	0%	0%	0%	4%	52%	29%	11%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
Channel 5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Channel 6	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Figure 3. Example outputs showing how Umetrix Voice lets you compare the speech quality of new services such as VoNR, VoWi-Fi, and VoLTE to 3G voice and OTT services

Audio Delay by Device Model

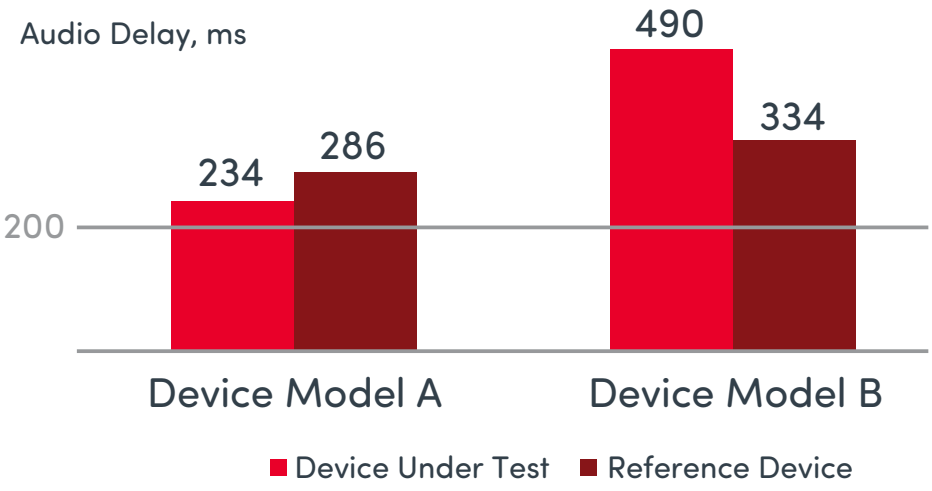
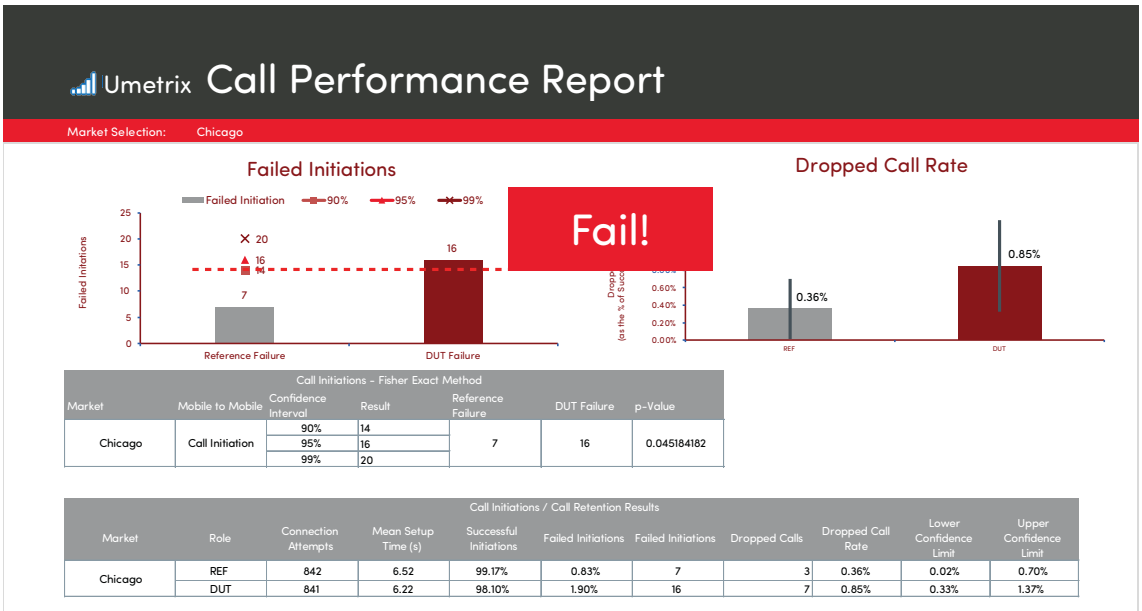


Figure 4. Determine if the audio delay of new devices and services will meet user expectations

Call Performance by Device Model or Service (VoNR, VoLTE, VoWi-Fi, OTT, 3G, etc.)



Call Initiations - Fisher Exact Method

Market	Mobile to Mobile	Confidence Interval	Result	Reference Failure	DUT Failure	p-Value
Chicago	Call Initiation	90%	14	7	16	0.045184182
		95%	16			
		99%	20			

Call Initiations / Call Retention Results

Market	Role	Connection Attempts	Mean Setup Time (s)	Successful Initiations	Failed Initiations	Failed Initiations	Dropped Calls	Dropped Call Rate	Lower Confidence Limit	Upper Confidence Limit
Chicago	REF	842	6.52	99.17%	0.83%	7	3	0.36%	0.02%	0.70%
	DUT	841	6.22	98.10%	1.90%	16	7	0.85%	0.33%	1.37%

Figure 5. Evaluate call metrics such as failed initiations to determine launch readiness of new services