TESTING VOICE QUALITY WITH POLQA®

The R&S®CMX500 radio communication tester is ideal for analyzing VoNR and VoLTE voice quality and performance in mobile devices.

The importance of 5G voice services

5G New Radio is known for high data throughput and connecting millions of IoT devices. However, voice services are still essential. Emergency services and the transportation industry depend on real-time, reliable voice connectivity for critical operations. Most consumers also expect voice calls to be part of their 5G contracts and expect high-quality mobile voice services to be available everywhere and at anytime.

3GPP specifies that 5G networks must provide high-quality voice over NR (VoNR) services and a path for operators to migrate existing voice data to 5G NR from their 2G, 3G and 4G networks. As with voice over LTE (VoLTE) for 4G, the underlying technology in 5G networks is IP multimedia subsystem (IMS).

The default 5G voice codec enables "HD voice+" using the enhanced voice services (EVS) in 5G-capable devices. Voice quality and performance in these devices are graded according to a mean opinion score (MOS), which is compiled using an algorithm, such as the perceptual objective listening quality analysis (POLQA®). The MOS grades voice quality on a scale from one (bad) to five (excellent). Voice performance tests are essential to mobile service providers and device manufactures. They help them understand mobile device voice performance and limitations while also helping identify issues in the early design stage.

Traditional approach

To evaluate audio performance, a mobile communications tester and an external PC establish a cellular connection and simulate the IMS infrastructure for the device under test (DUT). An additional external audio analyzer is required when evaluating uplink and downlink voice quality and determining the MOS, making quick evaluations of voice quality complicated and time-consuming.

Rohde & Schwarz solution

The R&S®CMX500 radio communication tester simplifies voice quality and performance testing with an internal IMS server and the integrated R&S®CMX-KA181 POLQA® audio measurements option. The one-box solution simulates a 5G NR or 4G LTE network with a radio link to the user equipment under controlled and error-free conditions, while also providing the required IMS infrastructure. All standard-specific voice codecs for VoNR and VoLTE calls are supported, including the 5G-mandated EVS.

The integrated R&S®CMX-KA181 POLQA® audio measurements option eliminates the need for an external audio analyzer, when evaluating uplink and downlink voice quality. The tests are carried out via the electrical interface in the user equipment headset to establish a bidirectional audio connection between the user equipment and the radio communication tester.

ROHDE & SCHWARZ

Make ideas real

Test procedure

The R&S®CMX500 comes with industry standard ITU-T P.501 voice reference signals to be played back and inserts them into the transmission channel. During transmission, the voice signal will degrade due to voice compression and transmission artefacts. The R&S®CMX500 records the degraded audio signal and compares it to the reference signal. The integrated POLQA® audio measurements option evaluates voice quality in line with the ITU-T P.863 recommendation and calculates the MOS. All tests can also be performed under fading and IP impairment conditions to validate the robustness of speech decoders and jitter buffers of the DUT.

Scripting and automation

The R&S®CMsequencer is a graphical scripting interface that is integrated in the R&S®CMX500 and can fully automate 3GPP 26.954 VoLTE and VoNR voice quality tests. Users can define a testing campaign in just a few clicks. The internal POLQA® audio measurements option can also run with XLAPI scripts.

From R&D to production

The integrated POLQA® audio measurements option makes the R&S®CMX500 suitable for a wide range of use cases. In the design phase, the application enables simple and early testing of new software, new codecs and codec updates. VoNR and VoLTE performance and robustness tests are easy to integrate into R&D testing and production. The solution lets network operators quickly check whether the audio functions in a device comply with specifications.
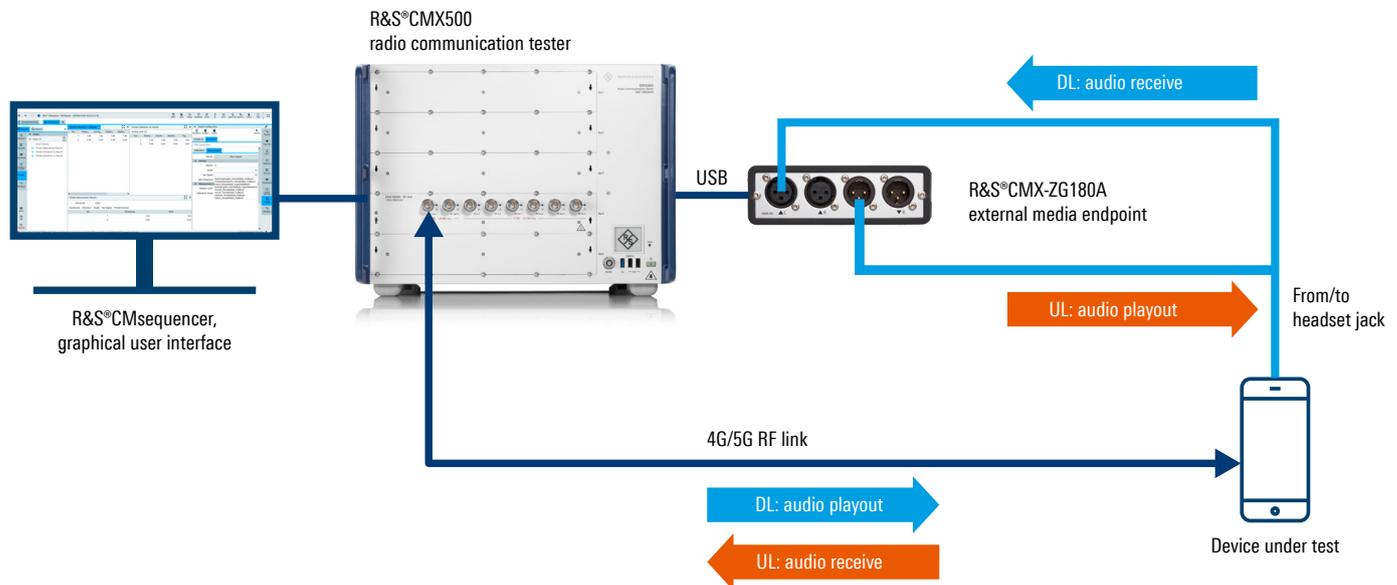
Maximum flexibility

The R&S®CMX500 from Rohde & Schwarz offers maximum audio testing flexibility. Different test setups are supported for any required audio measurements. The R&S®CMX500 one-box solution makes POLQA® measurements easy. For more complex audio tests such as acoustic tests, the R&S®CMX500 can be easily and quickly connected with multiple external audio analyzers.

More information

White paper: 5G Voice over New Radio (VoNR)
www.rohde-schwarz.com/vonr-wp

The R&S®CMX500 radio communication tester is a one-box solution for POLQA® uplink (UL) and downlink (DL) measurements