

# TESTING VOICE SERVICES IN 5G NR (VoNR)

Assessing the functionality and performance of 5G VoNR service



## Your task

Mobile voice services play an important role in 5G. More and more network operators have started to deploy 5G standalone (SA) networks, opening the door for high quality 5G voice over New Radio (VoNR) .

## The technology behind 5G voice services

VoNR is similar to voice over LTE (VoLTE) and is the voice service enabler for 5G using 5G core and IP multimedia subsystems (IMS). The session initiation protocol (SIP) is the base IMS protocol and establishes connections between subscribers. 3GPP introduced and standardized the enhanced voice service (EVS) codec as the new voice codec family for 4G IP based mobile wireless speech services. The EVS codec is also suitable for 5G systems and plays an important role for operators to provide a great user experience.

Every mobile device must have an IP address provided by the network for direct session establishment. The IMS infrastructure establishes the connection between mobile

devices and manages the relevant quality of service (QoS) flow for optimized voice experience.

## VoNR test requirements

Although the general VoLTE and VoNR test setups are very similar, different test areas need to be examined. When testing voice services in 5G, testing the basic implementation and functional behavior are the starting points and include registration on the IMS server and call setup procedures. However, testing voice in 5G also includes VoLTE aspects for the non-standalone (NSA) and EPS fallback scenarios. These provide the handover from NR to LTE, or a RAT fallback during voice connection setups when 5G coverage is limited or phones do not support VoNR. Lastly, VoNR audio quality tests are needed to provide the best voice performance and user experience.

A test system for voice over 5G must fulfill complex requirements and support the EVS codec mentioned above, along with the adaptive multirate (AMR) wideband and narrowband codecs (AMR-WB, AMR-NB).

Application Card | Version 02.00

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Make ideas real



## Rohde & Schwarz solution

The R&S®CMX500 radio communication tester, has everything needed for testing voice services on mobile devices. The solution supports LTE and 5G NR testing for both standalone and non-standalone connectivity. It also features an internal IMS server for registering 5G devices and setting up necessary bearers and QoS flows for voice services.

### Intuitive user interface simplifies test setup

The IMS server comes with a virtual user equipment (UE) emulation for establishing mobile originated and mobile terminated end-to-end voice calls in loopback mode for fast and easy VoNR functional tests. Users can select the supported codecs, such as EVS, AMR-WB or AMR-NB and their codec rates. The R&S®CMX500's intuitive graphical user interface makes controlling the setup and testing EPS fallback scenarios easy.

### Testing audio quality for best user experience

An analyzer is required to test audio quality during a call. It must be able to generate and analyze audio waveforms using the latest PESQ® or POLQA® methods. POLQA® is used for audio quality measurements during VoNR and VoLTE calls. Here the R&S®CMX500 setup can be expanded to include an audio analyzer, as shown below. There are two options for connecting an audio analyzer. The audio data can either be output via IP or come from the R&S®CMX-ZG180A external media endpoint if an

analog audio analyzer is preferred. Users have maximum flexibility in choosing the preferred audio analyzer that suits their needs.

In electrical measurements of the mobile device under test, the speaker output can be connected directly to the audio analyzer input and the microphone output directly to the audio analyzer.

For acoustic tests in line with 3GPP and ETSI, the audio analyzer can use an artificial head with artificial ear and mouth. Audio analyzers and artificial heads are available from third-party suppliers.

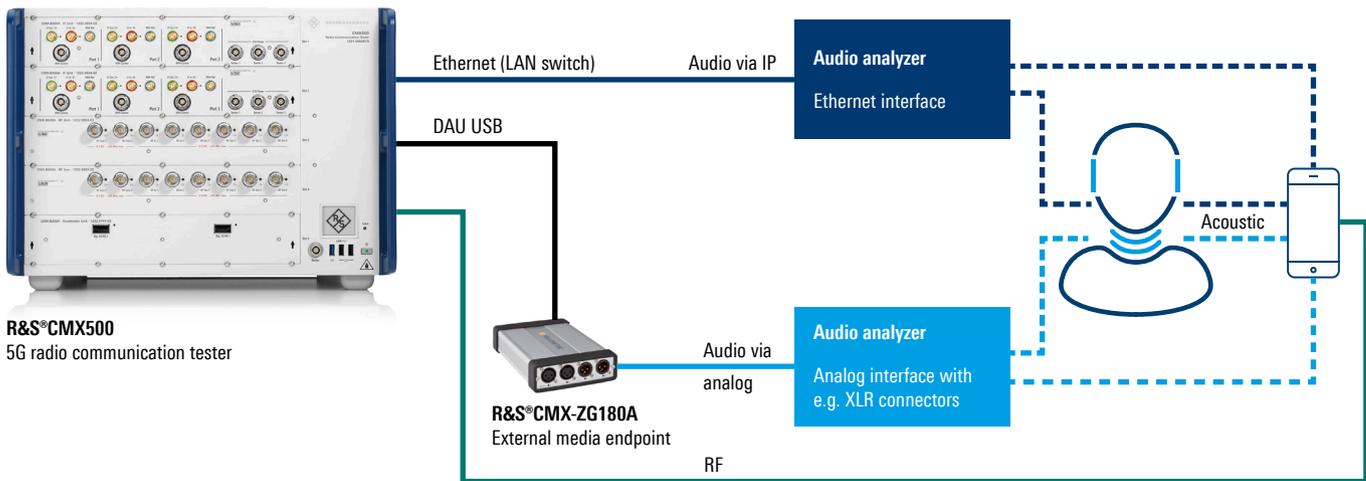
### Flexible voice testing solutions from 2G to 5G

Supporting LTE and 5G NR makes the R&S®CMX500 ideal for testing voice services for both standalone and non-standalone connectivity. Many audio testing labs already use the R&S®CMW500 radio communication tester for 2G, 3G and 4G voice quality analysis. They can use the R&S®CMX500 to easily expand their setups to include 5G VoNR testing. Rohde&Schwarz supports device manufacturers and network operators by ensuring an optimized 5G voice experience early on and gives end users the maximum flexibility based on well established solutions.

### See also

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

## Maximum flexibility in 5G audio quality analysis



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