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Overview

The CTIA Speech Performance Test Plan specifies test methods to assess the minimum requirements for the acoustic characteristics of LTE, GSM/UMTS and CDMA terminal devices.

HEAD acoustics implemented the narrowband (NB) part of the speech quality measurements laid out in version 2.4 of the Speech Performance Test Plan in the automated test suite CTIA SPTP-NB for ACQUA.

CTIA SPTP-NB allows manufacturers of LTE, GSM/UMTS and CDMA terminal devices to ensure that they meet the requirements specified in the CTIA Speech Performance Test Plan.

Description

The business association CTIA represents the wireless communications industry in the USA. Their Speech Performance Test Plan lays out tests for the electroacoustic performance aspects of mobile terminals. The test plan is based on measurements out of:

- 3GPP TS 26.132 v16.2.0 (2020-03) (for LTE and GSM/UMTS)
- 3GPP2 C.S0056-A v1.0 (2013-03) (for CDMA)
- ITU-T P.381 (2017-03) (for analog headset interface tests)

CTIA-SPTP-NB covers requirements for:

- Handsets
- Handheld hands-free / speakerphones
- Headsets
- Headset interfaces
- Wrist-worn wearables (e.g. smartwatches)

The latest release of the CTIA Speech Performance Test Plan is version 2.4 issued in June of 2021. It contains metrics to assess speech quality such as:

- Loudness rating
- Noise
- Frequency response
- Delay
- Speech quality
- Influence of background noise
- Distortion
- Double talk

HEAD acoustics implemented the narrowband (NB) part of the contained tests in the automated test suite CTIA SPTP-NB for the advanced communication quality analysis software ACQUA. An upgrade to add tests for wideband (WB) and super-wideband (SWB) is available as UG CTIA-SPTP WB/SWB (Code 60062)

If desired, measurements in the test suite can be modified or extended for additional tests as well as combined to create individual test sequences. However, testing for compliance with the CTIA Speech Performance Test Plan requires unaltered measurements.

With its predefined measurement descriptors and automated measurement sequences, the test suite CTIA SPTP-NB allows fast and easy acquisition, analysis and documentation of measurement data.

Key Features

- Easily applicable automated test suite
- Includes all narrowband tests out of CTIA Speech Performance Test Plan
- Allows modification and/or extension for in-depth testing

Applications

- Conformance testing, automated quality analysis as well as experimental development & optimization of LTE, GSM/UMTS and CDMA mobile terminals according to CTIA Speech Performance Test Plan

Overview of database revisions and specification versions		
Database Revision	**Based on Specification Version**	**Min. ACQUA Version**
Rev. 02	CTIA Speech Performance Test Plan version 2.4 (June 2021) Narrowband part	5.0.100

SMDs and requirements for specific tests in CTIA SPTP-NB					
• = required - = not required ○ = either / or (see footnote on last page)	Handset	Handheld hands-free / Speakerphone	Headset	Headset interface	Wrist-worn wearables
SMD title					
RLR (dB) - Receive Loudness Rating (nominal vol.)	•	•	•	-	-
RLR (dB) - Receive Loudness Rating (maximum vol.)	•	•	•	-	•
RLR (dB) - Rcv. Loudness Rating (max. vol.) w/ BGN	•	-	-	-	-
SLR (dB) - Sending Loudness Rating	•	-	•	-	•
Idle Channel Noise SND	•	-	•	-	-
Idle Channel Noise RCV	•	-	•	-	-
RFR - Receive frequency response	•	•	•	•	•
SFR - Send frequency response	•	•	•	•	•
TCLw (weighted terminal coupling loss)	•	•	•	•	•
Quality in presence of ambient noise: SMOS, NMOS, GMOS	•	•	-	-	•
Round-trip Delay (ms)	•	-	•	-	-
Max acoustic pressure	•	-	-	-	-
STMR (Sidetone Masking Rating)	•	-	•	•	-
Sidetone delay	•	-	•	•	-
Delay and speech quality with packet jitter and loss	•	-	-	-	-
Speech Quality (reference condition)	•	-	-	-	-
Level in Receive for Nominal speech input level	-	-	-	•	-
Level in Send for Nominal speech input Level	-	-	-	•	-
Noise in Send	-	-	-	•	-
Noise in Receive	-	-	-	•	-
Delay (Send + Receive) (ms)	-	-	-	•	-
Distortion SND (3GPP methods)	•	-	•	-	-
Distortion RCV (3GPP methods)	•	-	•	-	-
Double Talk	•	-	-	-	-
Software requirements					
ACOPT 09 (Code 6819), Option SLVM P.56	-	-	-	•	-
ACOPT 21 (Code 6844), Option 3QUEST - 3fold Quality Eval. of Speech in Telecommunication (NB/WB)	•	•	-	-	-
ACOPT 30 (Code 6857), Option POLQA - Perceptual objective listening quality analysis	•	-	-	-	-
ACOPT 32 (Code 6859), Option speech-based double talk analysis	•	-	-	-	-
HAE-BGN (Code 6971), Background noise simulation system with semi-automated equalization for labs	•	○[1]	-	-	-
3PASS lab (Code 6990), Advanced background noise simulation system with automated equalization - lab version	-	○[1]	-	-	-
Hardware requirements					
Impedance simulator left (for chosen HMS variant) • **HIS L (Code 1701)** for HMS II.3/4/5 **or** • **HIS L LN (Code 1701.1)** for HMS II.3 LN **or** • **HIS L LN HEC (Code 1701.2)** for HMS II.3 LN HEC	-	•	•	-	•
HHP IV (Code 1406)[2], HEAD Handset Positioner for HMS II.3, MotoMount (Hexapod) Version	•	-	-	-	-
HIB I (Code 6002), Headset interface box	-	-	-	•	-
coreBEQ (Code 7740), labCORE Binaural Equalization, incl. filter set for one artificial head	-	•	-	-	•

General requirements

The following software and hardware items are generally required for any use-case. Please also check the table to determine additionally needed software and/or hardware for your individual use-case(s).

Software

- **ACQUA (Code 6810 etc.)**, Advanced Communication Analysis System

Hardware

- **labCORE (Code 7700)**, Modular multi-channel hardware platform
  - **coreBUS (Code 7710)**, I/O bus mainboard
  - **coreOUT-Amp2 (Code 7720)**, Power amplifier board, for sending direction
  - **coreIN-Mic4 (Code 7730)**, Microphone input board, for receiving direction
  - **coreIP (Code 7770)**, labCORE I/O module, Voice over IP reference gateway
  - **coreIP-IMP (Code 7771)**, labCORE VoIP impairment option
  - **coreIP-AMR (Code 7772)**, labCORE VoIP AMR codec option
- One of the following **HEAD Measurement Systems**[3]
  - **HMS II.3 (Code 1703)** HEAD Measurement System, basic version with right ear simulator, 3.3 pinna & artificial mouth

  or

  - **HMS II.3 LN (Code 1703.1)** HEAD Measurement System, low-noise version with right ear simulator, 3.3 pinna & artificial mouth (based on IEC 60318-4, low-noise, high dynamics)

  or

  - **HMS II.3 LN HEC (Code 1703.2)** HEAD Measurement System, low-noise version with human-like ear canal simulator right, 4.4 pinna & artificial mouth
- **Radio communication tester** capable of LTE/UMTS/GSM/CDMA (not provided by HEAD acoustics)

Options

- **BT-Vol HHP IV (Code 1415)**, Bluetooth® volume control of device under test for HHP IV
- **UG CTIA SPTP-WB/SWB (Code 60062)**, Wideband & super-wideband extension, requires Code 60060

Delivery items

- **CTIA SPTP-NB (Code 60060)**, delivered as ACQUA database
- **V2C file**
- **Documentation** as PDF
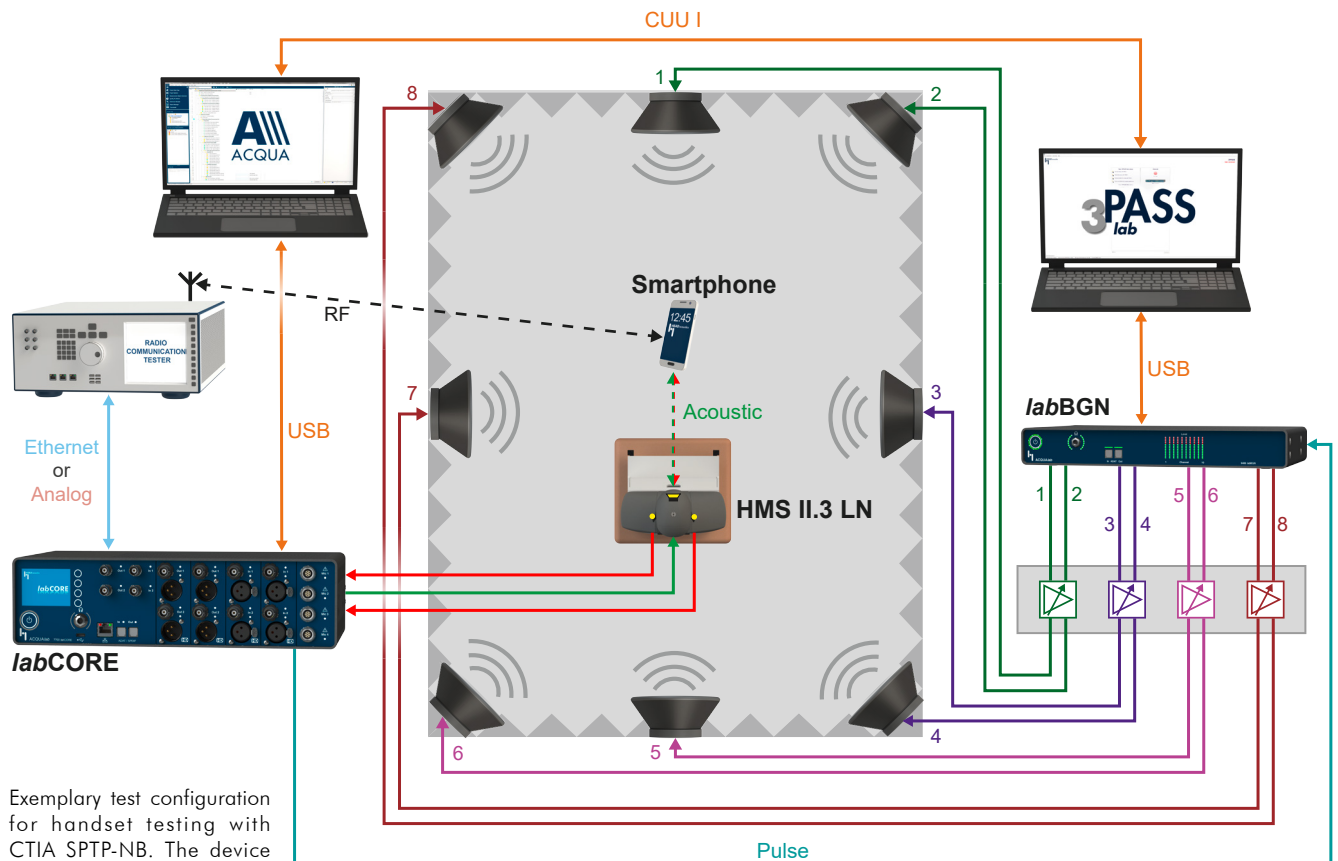
Exemplary test configuration for handset testing with CTIA SPTP-NB. The device under test is a smartphone in handheld hands-free mode. A radio communication tester establishes the RF connection to the phone, HMS II.3 LN simulates its user.
Background noise is simulated via 3PASS lab[1]. In collaboration, labCORE and ACQUA generate, send and receive signals and automatically trigger background noise playback for precise synchronization

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1) For handheld hands-free measurements, either HAE-BGN or 3PASS lab can be used for background noise simulation. 3PASS lab is recommended.

2) Alternatively, HHP III.1 (Code 1403) can be used.

3) If available, respective HMS systems and HMS accessories of the previous generation can be used alternatively.