

Federal Communications Commission  
Office of Engineering and Technology  
Laboratory Division Public Draft Review

07/17/2013

## **Draft Laboratory Division Publications Report**

**Title:** Guidance for Performing T-Coil tests for Air Interfaces Supporting Voice over IP (e.g. LTE and Wi-Fi) to support CMRS based Telephone Services

**Short Title:** T-Coil testing for CMRS IP

**Reason:** Draft review for new attachment '*285076 D02 T-Coil testing for CMRS IP v01*'

**Publication:** 285076

**Keyword/Subject:** 20.19, Hearing Aid Compatibility, HAC

**First Category:** Licensed Service Rules and Procedures: 04/12/2013

**Second Category:** HAC Hearing Aid Compatibility (lic):04/12/2013

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**Question:** What are the equipment authorization requirements for hearing aid compatibility of mobile handsets?

**Answer:** The attached documents below:

- '*285076 D01 HAC Guidance v03r02*' provides equipment authorization guidance for mobile handsets subject to the requirements of Section 20.19 for hearing aid compatibility.
- '*285076 D02 T-Coil testing for CMRS IP v01*' provides guidance for T-Coil tests for voice-over-IP (e.g. LTE and Wi-Fi) CMRS based Telephone Services.

### **Attachment List:**

285076 D01 HAC Guidance v03r02 \* **Not under Draft review**

[285076 D02 T-Coil testing for CMRS IP v01](#)

07/17/2013

**Attachment: '285076 D02 T-Coil testing for CMRS IP v01'**

## **Guidance for Performing T-Coil tests for Air Interfaces Supporting Voice over IP (e.g. LTE and Wi-Fi) to support CMRS based Telephone Services**

### **1.0 Introduction**

The requirements for T-Coil signal test is defined in C63.19-2011 clause 7. This guidance provides additional guidance to help demonstrate HAC compliance for air interfaces that support Voice over IP transport and are not explicitly identified in Table 7.1 of C63.19-2011. Currently we expect this guidance to apply to LTE and Wi-Fi air interfaces when used to support Voice over IP transport for CMRS based Telephone Services.

### **2.0 Background**

HAC T-coil testing is a measurement of the intended magnetic field generated by a telephone handset and is detected by hearing aids that are equipped with T-coil magnetic pick-up coils. The magnetic field induces the far end telephone conversation directly into the hearing aid, bypassing the hearing aid's acoustic microphone. T-coil compliance testing includes three measurement parameters (1) the magnetic field intensity for a normal speech level; (2) the frequency response; and (3) the signal quality level.

In the HAC Order<sup>1</sup> the Commission recognized the need to permit a transition period where certain requirements were exempted:

- For one year, until July 17, 2013, C63.19-2007 can be used to show compliance even if the handset operates outside of the bands defined by C63.19-2007, but within the bands defined by C63.19-2011. This exclusion provision expired July 17, 2013.
- Extended the exclusion for testing T-coil for VoLTE air interfaces until such time OET issues measurement guidance and resolves other pending issues. Initially two issues were identified in the HAC Order:
  - Speech signal level to be used to make the measurement (level of average speech); and
  - The guidance for test configuration.

The standards committee C63<sup>®</sup> addressed the issue of the speech signal level to be used to make a measurement and has provided an interpretation that references the use of the 3GPP specification, to determine the average volume level to be used in making the VoLTE T-coil measurement.<sup>2</sup>

This document provides OET's initial guidance for test configurations to perform T-coil tests.

### **3.0 Instrumentation for T-coil testing for VoLTE and VoIP over Wi-Fi for CMRS**

T-Coil testing requires test instrumentation that can (1) establish a connection to the handset over the appropriate air-interface; (2) inject a specific set of test audio tones (defined in C63.19-2011) to simulate a conversation over the established connection; and (3) output the audio tones as compatible T-coil magnetic fields. The magnetic fields are detected by a calibrated probe and analyzed for compliance according to the C63.19-2011 requirements.

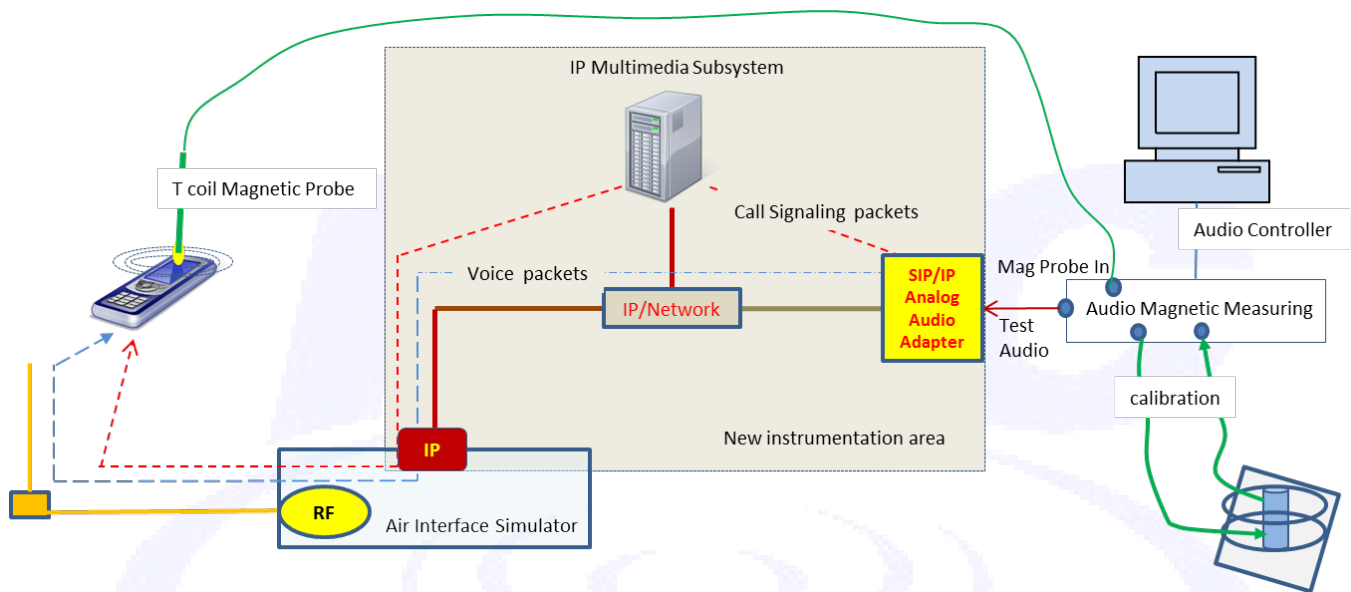
<sup>1</sup> Third Report and Order (DA 12-550, April 9, 2012) adopted the use of ANSI C63.19-2011 for HAC testing became effective August 18, 2012 (HAC Order).

<sup>2</sup> See MIF and operating mode for LTE interpretation, [http://c63.org/documents/misc/posting/new\\_interpretations.htm](http://c63.org/documents/misc/posting/new_interpretations.htm)

07/17/2013

Air interfaces specified in Table 7.1 of C63.19-2011 are currently well supported by base station simulators with the normal speech input levels for the audio tones defined in the standards and can be easily configured.

Certain air interfaces that support CMRS voice services like LTE and Wi-Fi, require additional capabilities either in the base station simulators or adjunct instrumentations. It is necessary (1) for the system to be able to establish an IP call from/to the phone: (2) through an IP Multimedia Subsystem or a simulated protocol (SIP/IP) server; (3) to an analog audio adapter containing the permissible set of codecs used by the device under test and (4) inject the necessary C63.19 test tones at the average speech level for the measurement.



### 3.1 VoLTE as defined in 3GPP standard

Currently, the only IP based telephone service for a mobile phone that appears to be specified is 3GPP VoLTE (Voice over LTE), as defined by GSMA in PRD IR.92. It defines signaling based on an IMS Core utilizing basic set of AMR-NB codec (narrow band) and Adaptive Multi-Rate Wideband (also known as HD Voice) codecs. The manufacturer is responsible to define the CMRS supported codecs that are used and/or negotiated by their device. In this case it is also necessary to have appropriate test modes in the handsets that ensure that the appropriate protocol stack is used for transmission of control signal and voice path.

07/17/2013

## 3.2 CMRS<sup>3</sup> Wi-Fi/ VoIP<sup>4</sup>

VoLTE specification also permits CMRS Voice service with Wi-Fi hand-off: VoLTE subscribers may be able to use their handsets to make calls using private home Wi-Fi, or Wi-Fi hotspots by authenticating through an Intra-Radio Access Technologies (RAT) for connecting to their carriers SIP-IMS network. VoLTE is expected to eventually provide seamless hand-off to other network through a network upgrade. In this case it is also necessary to have appropriate test modes in the handsets that ensure that the proper protocol stack is used for transmission of control signals and voice.

## 4.0 Equipment Authorization for devices using C63.19-2011 standard

At the present time the Commission recognizes that instrumentation necessary to perform the above tests may not be readily available. For the near term the applicants can continue to exclude tests for VoLTE or VoIP over Wi-Fi for CMRS air interfaces with an attestation or declaration in the test report stating that instrumentation for testing VoLTE was not available for T-Coil testing at the time testing was done and when they expect to have operational test instrumentation. In addition, appropriate declarations must be included in the User's manual.

In the event an applicant performs and intends to submit T-coil tests to obtain T ratings for devices that either support VoLTE or VoIP over Wi-Fi for CMRS using this guidance, the following information is required when submitting an application for review<sup>5</sup>

### 4.1 Submitting T-Coil Test Reports for VoLTE

- a. When the handset is intended for 3GPP VoLTE CMRS service, the grantee must clearly specify this in the test report by including it in the list of all the supported air interfaces. This should be indicated in the air interface matrix table with a note to indicate the CMRS service. Since, 3GPP VoLTE is well defined by GSMA in PRD IR.92, a note to this effect is sufficient.
- b. For 3GPP VoLTE interim specifications and other CMRS telephone services, the note must reference an attestation defining the specific details of the service. However, the details only need to briefly describe the service; the simulated connections used to make the measurement; and the set of codecs tested.

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<sup>3</sup> Section 20.19 hearing aid compatibility regulates portable handsets: that can be used for commercial telephone service (interconnected with the public switched telephone network) that has the network means to permit wireless wide area mobility to initiate and receive telephone calls over licensed or unlicensed wireless networks interconnected with a licensed wireless CMRS carrier. CMRS telephone services are associated with traditional in-bound, out-bound, 911, 411 dialing and call detail billing records. This does not include over-the-top aftermarket (OTT) services not established by CMRS carriers, such as Skype and Google Talk voice. Compliance for OTT providers may be a subject for future rule making procedures.

<sup>4</sup> Voice-over-IP (VoIP) and/or Wi-Fi is a technology that has a plethora of options, protocols and configurations and does not represent a carrier's product as telephone service. The carrier's telephone service may be built on and have features for VoIP and Wi-Fi technology but also requires established engineered definitions of the specific options, protocols, configurations, billing, etc. Hearing aid compatibility testing must be based on simulating a call, like the carrier's telephone service. Therefore, there is no meaning to the question "testing HAC over Wi-Fi or VoIP". Wi-Fi and VoIP are just parts that go into the service.

<sup>5</sup> All authorization applications for HAC under C63.19-2011 will continue to be approved using the Permit but Ask (PBA) procedure.

07/17/2013

- c. If the device supports non CMRS services (Over the Top (OTT)) state whether the air interface is intended for CMRS services.
- d. The following information shall be included in the PBA request:
  - i. A description of the VoLTE T-coil test set up.
  - ii. Specify all the test equipment used, including manufacturer and model numbers.
  - iii. Software used to simulate servers.
  - iv. Voice Codecs tested and how they relate to the targeted telephone service. If certain codecs are not tested include a justification.
  - v. Soft code imbedded, soft code API, hardware, etc.

Note: 3GPP VoLTE interim specifications and other CMRS telephone services not defined in Table 7.1 of C63.19-2011 will be handled on a case-by-case basis. Applicants should use the KDB inquiry system to define these services, once the CMRS telephone service is defined, it may be added to list of CMRS telephone services on a case-by-case basis.

