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| **Title:** | The outcomes of the ITU Test event “Performance assessment of vehicle-mounted mobile phones in conjunction with Hands-free Terminals according to Recommendations ITU-T P.1100 and ITU-T P.1110” (12-16 May 2014) |

**Introduction**

This document provides relevant outcomes of the ITU Test event “Performance assessment of vehicle-mounted mobile phones in conjunction with Hands-free Terminals according to Recommendations ITU-T P.1100 and ITU-T P.1110”, which took place in Geneva on 12 – 16 May 2014.

**Background**

The most common means of enabling communication via headsets and hands-free terminals (HFT) is to use the short-range wireless (BluetoothTM) connection to a mobile phone to connect the mobile network and enable voice transmission. Here the mobile phone acts as an “audio gateway” and should provide fully transparent voice transmission in uplink and downlink. The relevant signal processing is performed solely by the vehicle’s hands-free system and mobile phone. Using the control commands (AT-commands), HFTs request mobile phones to disable an internal signal processing. This is an important requirement, because such signal processing is necessarily provided by the automotive hands-free implementation in order to avoid cascaded signal processing occurring in both the hands-free terminal (HFT) and mobile phones.

Experience has shown, however, that the internal signal processing in many mobile phones is often not disabled – despite the HFT sends the appropriate control command (AT command) to the mobile phone. In this situation, the mobile phone may significantly degrade the quality of the whole system, and car manufacturers have received complaints from customers having experienced speech quality shortfalls.

**ITU Test event**

ITU conducted the test event on 12-16 May 2014. The details of the test event are available at <http://itu.int/go/test-event>. Following a call for interest HEAD Acoustics was chosen as a Testing Laboratory which performs the tests.

In general, the test event was devoted to an evaluation of audio performance of mobile phones in conjunction with vehicle-mounted hands free terminals (HFT). All tests are based on the chapter 12 of Recommendations ITU-T P.1100/P.1110.

The outcomes of the test event provides important information for car manufacturers, HFT system suppliers, mobile network operators and mobile phone vendors on how to configure their products for greater interoperability and ultimately improve the performance and voice quality of vehicle-mounted hands-free phones. Results will also be fed back into ITU-T Study Group 12 with a view to refining Recommendations ITU-T P.1100 and ITU-T P.1110.

The press-release about the event is available at <http://www.itu.int/net/pressoffice/press_releases/2014/35.aspx#.U7vIlJR_vAl>

**Key outcomes**

In general, determined faults are related to:

* an incorrect behavior of the mobile phone in the wireless connection to a vehicle’s HFT;
* an unacceptable quality of a voice-call inside the car and outside the car for the conversational partner.

Following the results of the ITU Test event, the most important findings can be summarized as follows:

1. The statistics of testing
* 30 mobile phones;
* 40 tests (27 Narrowband and 13 Wideband);
* 30 % mobile phones comply with the requirements of this event;
* 30 % mobile phones have the values in the approximate range;
* 40 % mobile phones did not meet requirements of this event.
1. The common problems which have been determined at the test event:
* The phone does not react correctly to the specific commands of vehicle’s HFT. These commands request the phone to deactivate the following features:
* “Noise reduction”: “Noise reduction” is a feature which is used for reducing the level of background noise picked up by the microphone. From a customer point of view, this issue can cause a significant reduction of a voice-call level. Noise reduction is implemented in the vehicle’s HFT based on the measurements performed by the car system. This system is attuned to the specific acoustical environment in a car and depends on the car’s characteristics (e.g. number of HFT’s microphones, isolation level, etc.). This feature is expected to be deactivated in the phone when it is used inside of the car.
* “Echo canceller”: “Echo canceller” aims to avoid echo effect in a car. Similarly, Echo cancellation is implemented in the vehicle’s HFT and attuned to the specific acoustical environment in a car. Regardless that each mobile phone has this feature installed, this feature is expected to be deactivated when the mobile phone is used inside a car. If not, this may result in a poor conversational quality.
* Gain, attenuation or equalizers in both transmission directions of the phones overrule all efforts of car manufactures to tune the HFT systems in vehicles.
* The above problems have an impact on the listening speech quality and conversational quality in the car. Therefore the quality of service of voice-call gets reduced. From a customer point of view it means a bad sound in the car or for the conversational partner.

**Conclusion**

The key goal of this event is to raise attention of mobile phone vendors to these sort of issues and to improve the Recommendations ITU-T P.1100/P.1110.

A web page will be published, describing the existing issues, faults that have been determined at the test event and the audio samples showing the quality of voice in a car.

Contribution with proposed relevant changes to the Recommendations ITU-T P.1100/P.1110 will be submitted to the next ITU-T SG12 meeting (2-11 September 2014).

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