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ITU-T Focus Group on Driver Distraction

**Report on Vehicle-to-Applications
Communications Interface**

Focus Group Technical Report



FOREWORD

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The procedures for establishment of focus groups are defined in Recommendation ITU-T A.7. The ITU-T Focus Group on Driver Distraction (FG Distraction) was established further to ITU-T TSAG agreement at its meeting in Geneva, 8-11 February 2011. ITU-T Study Group 12 is the parent group of FG Distraction.

Deliverables of focus groups can take the form of technical reports, specifications, etc. and aim to provide material for consideration by the parent group in its standardization activities. Deliverables of focus groups are not ITU-T Recommendations.

SERIES OF FG DISTRACTION TECHNICAL REPORTS

Final Report

Report on Use Cases

Report on User Interface Requirements for Automotive Applications

Report on Situational Awareness Management

Report on Vehicle-to-Applications Communications Interface

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ABSTRACT

The purpose of this report is to provide input to draft new Recommendation ITU-T G.V2A (Communications interface between external applications and a Vehicle Gateway Platform). It describes different approaches being used to enable external applications to communicate with a vehicle. These external applications could be running on a nomadic device, roadside infrastructure, or cloud-based server. Existing works and on-going activities related to G.V2A are also identified.

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1. Scope

This report considers different types of communications interfaces between non-commercial road vehicles and external applications. These external applications could be running on nomadic devices brought into the vehicle, roadside infrastructure, or cloud-based servers. Applications downloaded to the vehicle platform after the time of manufacture are also considered external applications since they may not be fully integrated into the Driver-Vehicle Interface (DVI) and require a communications interface. Advanced Driver Assistance Systems (ADAS) are considered out of scope.

2. References

- [1] Recommendation ITU-T E.800 (1994). *Terms and definitions related to quality of service and network performance including dependability*.
- [2] Adaptive Integrated Driver-vehicle Interface (AIDE) project (2008). <http://www.aide-eu.org/>
- [3] Car Connectivity Consortium Driver Distraction Guidelines. <http://www.mirrorlink.com/>
- [4] ETSI TR 102 762 V1.1.1 (2010): *Human Factors (HF); Intelligent Transport Systems (ITS); ICT in cars*. http://www.etsi.org/deliver/etsi_tr/102700_102799/102762/01.01.01_60/tr_102762v010101p.pdf
- [5] Ford SYNC platform. <http://www.syncmyride.com/Own/Modules/Developer/about.aspx>
- [6] HTML5 web technologies. <http://www.qnx.com/download/feature.html?programid=22989>
- [7] W3C Web & Automotive workshop. <http://www.w3.org/2012/08/web-and-automotive/>

3. Definitions

ADAS – Advanced Driver Assistance Systems are vehicle systems which have a primary function of helping the driver safely control the vehicle. Examples of such systems include lane departure warning systems and Adaptive Cruise Control (ACC).

Commercial road vehicle – a vehicle used by businesses or public transportation authorities which as a primary function other than personal transportation of individuals or small groups of individuals. Examples include tractor-trailers and buses. Such vehicles often require drivers to perform additional tasks while driving which may not have been adequately considered during the development of this report.

Driver-Vehicle Interface (DVI) – the integrated user interface in the vehicle. It includes visual displays, loudspeakers, microphones, manual input controls, etc.

External application/service – applications/services that were not integrated into the vehicle at the time of manufacture. Such applications/services include those that reside on a nomadic device brought into the vehicle, roadside station, or cloud-based server. Applications/services that do reside on the vehicle platform, but were not integrated at the time of manufacture (e.g., downloaded applications), are also considered “external applications/services” since they might not be fully integrated into the DVI.

Quality of Service (QoS) – the collective effect of service performances, which determine the degree of satisfaction of a user of the service [1].

4. Abbreviations

ADAS	Advanced Driver Assistance Systems
AIDE	Adaptive Integrated Driver-vehicle Interface
API	Application Programming Interface
CCC	Car Connectivity Consortium
DVI	Driver Vehicle Interface
ETSI	European Telecommunications Standards Institute

G.SAM	Draft new Recommendation ITU-T G.SAM
G.V2A	Draft new Recommendation ITU-T G.V2A
ICT	Information and Communications Technology
ISO	International Organization for Standardization
ITU-T	Standardization sector of the International Telecommunications Union
P.UIA	Draft new Recommendation ITU-T P.UIA
QoS	Quality of Service
UI	User Interface
VGP	Vehicle Gateway Platform

5. Introduction

Nomadic Information and Communications Technologies (ICTs) devices (e.g., mobile phones, portable navigation units, etc.) are currently being used within the automotive cockpit by drivers while operating their vehicle. Their small size, manual interface, unsecured/uncontrolled/arbitrary position within the vehicle, and uncontrolled interaction with the driver has the potential to reduce drivers' situational awareness and ability to effectively control their vehicle. It is unlikely that regulation and education alone will prevent usage of these devices within the cockpit. Therefore, technology-based solutions for safer interaction should also be pursued.

There is also a need to enable safer interaction with applications running on roadside infrastructure and cloud-based servers.

Draft new Recommendation ITU-T G.V2A will define a communications interface between external applications and a Vehicle Gateway Platform (VGP). The communications interface will allow external applications to leverage the user interface of the vehicle platform. It will also enable the vehicle platform to control the timing and format of all application messages to the driver – not just those integrated at the time of vehicle manufacture.

The purpose of this report is to provide input to G.V2A. Section 3 describes existing communications interface approaches. Section 4 lists some existing works and on-going activities that may be helpful in G.V2A standardization work.

6. Existing approaches for Vehicle-to-Application (V2A) communications interfaces

There are at least a few different approaches that are currently being used to provide a communications interface between the vehicle and external applications. These are described in the next 3 subsections. Subsection 3.4 discusses requirements for the communications interface.

6.1 Remote UI approach

In this approach the vehicle acts as a remote User Interface (UI). It simply passes driver input registered on vehicle controls to external applications, and delivers output received from external applications to the vehicle's visual displays and loudspeakers with minimal, if any, modification.

Examples of this approach include iPod out and MirrorLink.

6.2 Automotive API approach

In this approach the vehicle acts as a thick client. It exposes user interface services to external applications using an Application Programming Interface (API). For example, speech recognition services can be running locally on the vehicle and allow external applications to get speech input from the driver via API calls to the vehicle.

For example, this approach is being used by the Ford Sync system.

6.3 Hybrid approach

In this approach there is no clear client or server role that the vehicle plays. The vehicle may act as a client by simply passing driver input to the application and displaying out received from the application. Other times it may also act more like a server and provide services to the application.

An example of this approach can be found in some HTML5 based implementations.

6.4 Communications interface requirements for G.V2A

The communications interface to be standardized in G.V2A will need to be capable of supporting the requirements of P.UIA and G.SAM.

P.UIA will specify design and performance requirements for the Driver-Application system. It is possible that some of these requirements may impose requirements on the communications interface defined in G.V2A.

G.SAM will specify functional requirements for the Driver-Application system. For example, it is expected that there will be a mechanism that allows the vehicle to suspend/resume interaction with an external application. The communications interface of G.V2A must be able to support the operation of this mechanism. It may also make sense for some of the G.SAM mechanisms to be built-in to this communications interface.

7. Existing works and related on-going activities

There are several existing works and on-going activities that should be considered during the standardization of G.V2A. The following subsections list some relevant existing works and on-going activities.

7.1 Existing works

Below are some existing works that should be considered during the development of G.V2A:

- **Adaptive Integrated Driver-vehicle InterfacE (AIDE)** [2] – This European project used a centralized communications interface that enabled both local and external applications to interact with the driver in a controlled way.
- **Car Connectivity Consortium’s MirrorLink** [3] – MirrorLink is a communications interface for nomadic devices.
- **ETSI report on ICT in cars** [4] – this ETSI technical report provides some discussion of communications interfaces.
- **Ford SYNC platform** [5] – the Ford SYNC platform serves as an example of the Automotive API approach.
- **HTML5 web technologies** [6] – HTML5 serves as an example of the hybrid approach.
- **W3C Web & Automotive workshop** [7] – this workshop explored the role web technologies could play in an automotive environment.

7.2 On-going activities

Below are some on-going activities that should be considered during the development of G.V2A:

- **Car Connectivity Consortium’s MirrorLink** – the communications interface specified in the MirrorLink specification may continue to evolve. The impact of any such changes on G.V2A should be assessed. More information can be found at: <http://www.mirrorlink.com/>.
- **ISO TC 204/WG 17** – a communications interface for nomadic devices is within scope of this group. Previous attempts to communicate with this group through liaison statements have been unsuccessful. However, efforts to co-ordinate the work of G.V2A should continue. More information can be found at: http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=552802.
- **W3C Automotive and Web Platform Business Group** – future work may include developing a communications interface to the vehicle for external applications/services based on web technologies. More information can be found at: <http://www.w3.org/community/autowebplatform/>.

