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ISO 17215-1

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Road vehicles — Video communication interface for cameras (VCIC) —

Part 1: General information and use case definition

Véhicules routiers — Interface de communication vidéo pour caméras (ICVC) —

Partie 1: Informations générales et définition de cas d'utilisation

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 17215 consists of the following parts, under the general title *Road vehicles — Video communication interface for cameras (VCIC)*:

— *Part 1: General information and use case definition*

— *Part 2: Service discovery and control*

— *Part 3: Camera message dictionary*

— *Part 4: Implementation of communication requirements*

Introduction

Driver assistance systems are more and more common in road vehicles. From the beginning, cameras were part of this trend. Analogue cameras were used in the beginning, because of lower complexity of the first systems. With increasing demand for more advanced functionality, digital image processing has been introduced. So-called one box design cameras (combining a digital image sensor and a processing unit) appeared in the vehicles.

Currently, the market demands such systems with multiple functions. Even different viewing directions are in use. It seems to be common sense that six up to 12 cameras in a single vehicle will be seen in the next future. Out of this and the limitation in size, power consumption, etc. it will lead to designs where the cameras are separated from the processing unit. Therefore, a high performance digital interface between camera and processing unit is necessary.

This International Standard has been established in order to define the use cases, the communication protocol, and the physical layer requirements of a video communication interface for cameras which covers the needs of driver assistance applications.

The video communication interface for cameras

— incorporates the needs of the whole life cycle of an automotive grade digital camera,

— utilizes existing standards to define a long-term stable state-of-art video communication interface for cameras usable for operating and diagnosis purpose,

— can be easily adapted to new physical data link layers including wired and wireless connections by using existing adaption layers, and

— is compatible with AUTOSAR.

This part of ISO 17215 is related to the general information and use case definition. This is a general overview document which is not related to the OSI model.

To achieve this, it is based on the Open Systems Interconnection (OSI) basic reference model specified in ISO/IEC 7498-1 and ISO/IEC 10731 which structures communication systems into seven layers. When mapped on this model, the protocol and physical layer requirements specified by this International Standard, in accordance with Table 1, are broken into following layers:

— application (layer 7), specified in ISO 17215-3;

— presentation layer (layer 6), specified in ISO 17215-2;

— session layer (layer 5), specified in ISO 17215-2;

— transport protocol (layer 4), specified in ISO 17215-4, ISO 13400-2;

— network layer (layer 3), specified in ISO 17215-4, ISO 13400-2;

— data link layer (layer 2), specified in ISO 17215-4, ISO 13400-3;

— physical layer (layer 1), specified in ISO 17215-4, ISO 13400-3.

Table 1 — Specifications applicable to the OSI layers

Applicability	OSI 7 layers	Video communication interface for cameras		Camera diagnostics
Seven layers according to ISO/IEC 7498-1 and ISO/IEC 10731	Application (layer 7)	ISO 17215-3		
	Presentation (layer 6)	ISO 17215-2		
	Session (layer 5)	ISO 17215-2		
	Transport (layer 4)	ISO 17215-4	Other future interface standards	ISO 13400-2
	Network (layer 3)			
	Data link (layer 2)	ISO 17215-4		ISO 13400-3
	Physical (layer 1)			

ISO 17215-1 has been established in order to define the use cases for vehicle communication systems implemented on a video communication interface for cameras; it is an overall document not related to the OSI model.

ISO 17215-3 covers the application layer implementation of the video communication interface for cameras; it includes the API.

ISO 17215-2 covers the presentation layer implementation of the video communication interface for cameras.

ISO 17215-4, being the common standard for the OSI layers 1 to 4 for video communication interface for cameras, complements ISO 13400-2 and ISO 13400-3 and adds the requirement for video transmission over Ethernet.

ISO 17215-2 and ISO 17215-3 (OSI layers 5 to 7) services have been defined to be independent of the ISO 17215-4 (OSI layers 1 to 4) implementation. Therefore, ISO 17215-4 could be replaced by other future communication standards.

Road vehicles — Video communication interface for cameras (VCIC) —

Part 1: General information and use case definition

1 Scope

This International Standard describes the general use cases and communication scenarios, for a video communication interface for cameras used in video-based driver assistant systems.

This part of ISO 17215 gives an overview of the structure and the partitioning of this International Standard and shows the relation between the different parts (see Figure 1).

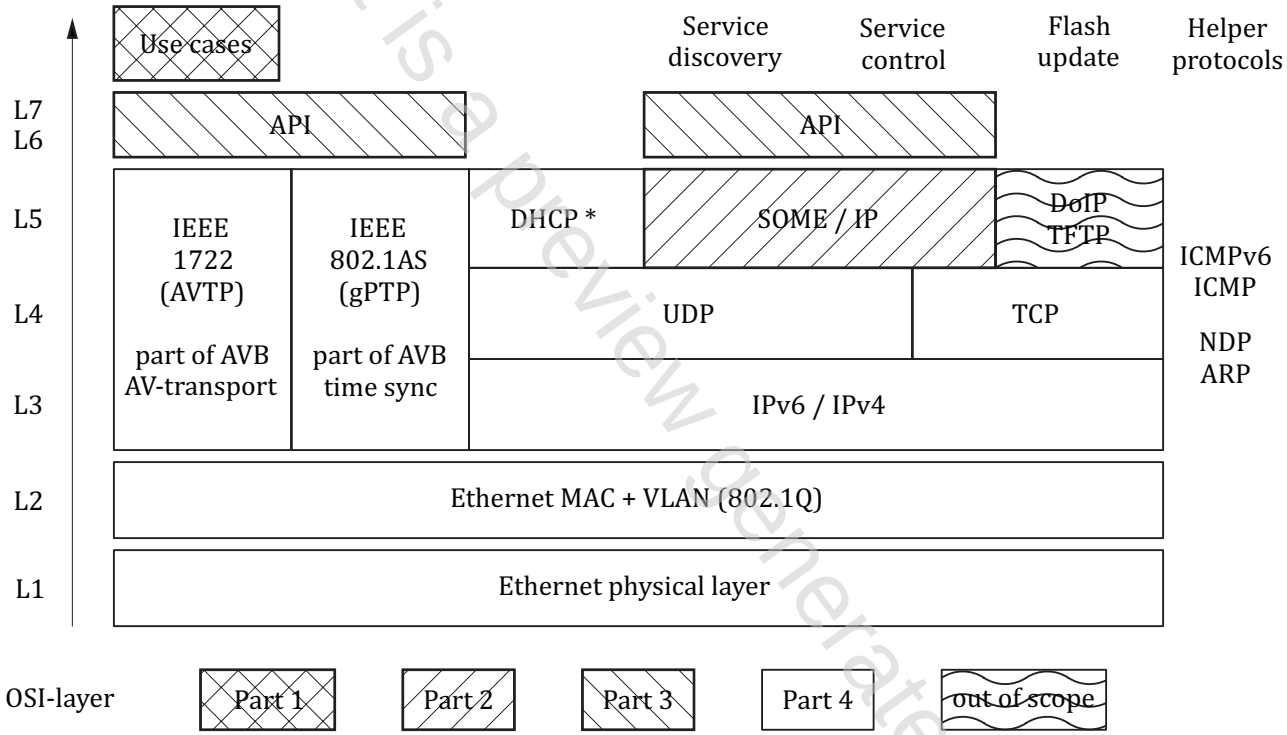

Figure 1 — Overview of ISO 17215

This part of ISO 17215 serves as communication infrastructure for driver assistant applications that could be

— presenting video images to the driver,

— presenting warnings to the driver (e.g. using an HMI), or

— interacting with the vehicle (e.g. emergency breaking).

The terminology defined in this part of ISO 17215 is common for all video communication interfaces for cameras communication systems and is used throughout all parts of this International Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 7498-1, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model — Part 1*

ISO/IEC 10731, *Information technology — Open Systems Interconnection — Basic Reference Model — Conventions for the definition of OSI services*

ISO 17215 (all parts), *Road vehicles — Video communication interface for cameras (VCIC)*

ISO 13400-2, *Road vehicles - Diagnostic communication over Internet Protocol (DoIP) — Part 2: Transport protocol and network layer services*

ISO 13400-3, *Road vehicles — Diagnostic communication over Internet Protocol (DoIP) — Part 3: Wired vehicle interface based on IEEE 802.3*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
camera configuration
setup and installation of the camera

3.1.2
extrinsic auto calibration
extrinsic parameters will denote the coordinate system transformations from 3D world (vehicle) coordinates (m,°) to 3D camera coordinates (m,°)

3.1.3
firmware
program code and data stored in electronic unit

3.1.4
histogram
graphical representation of the tonal distribution in a digital image

3.2 Abbreviated terms

Term	Description
API	Application Programming Interface
AUTOSAR	Automotive Open System Architecture
AVTP	Audio Video Transport Protocol
DAS	Driver Assistance System
DHCP	Dynamic Host Configuration Protocol
ECU	Electronic Control Unit