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TECHNICAL REPORT

Configurable car infotainment services (CCIS) – Part 4: Protocol

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CONTENTS

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Part 4: Protocol

FOREWORD

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IEC TR 63246 has been prepared by the technical area 17: Multimedia systems and equipment for vehicles, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is a Technical Report.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
100/3638/DTR	100/3823/RVDTR

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

A list of all parts in the IEC 63246 series, published under the general title *Configurable car infotainment services (CCIS)*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The market for car infotainment services (also known as "in-vehicle infotainment systems") has been growing rapidly, as reflected by the growth of the associated industries. It is expected that a variety of car infotainment (or multimedia) devices and services will be developed in the future. Such devices include navigation, cameras, speakers, headrest displays, air-conditioners, thermometers, heated seats, and lights. It is also expected that some devices will be developed to provide 4-dimensional experiences for users.

Car infotainment systems typically include A/V features (such as standard radio and CD players), and two-way communications tools, as well as hands-free phone connections, vehicle voice commands, and other types of interactive audios or videos. Car infotainment systems have evolved to allow passengers to watch movies and other visual media (for example, DVD players installed on the rear seats). Another distinctive feature of future car infotainment systems is mobile device connectivity. Newer vehicles provide a wide range of systems that allow devices (e.g. smartphones and laptops) to be connected to a variety of services embedded in the vehicle.

From this observation, there is a crucial need for standardization to provide car infotainment users with more enhanced services so as to easily manage and control infotainment devices as well as content within a car.

The purpose of the IEC 63246 series is to specify the general considerations, requirements, framework, and protocols to provide car users with the functionality of managing and controlling device and content resources within a car.

The IEC 63246 series consists of the following parts:

– Part 1: General;
– Part 2: Requirements;
– Part 3: Framework; and
– Part 4: Protocol.

IEC 63246-1 describes the general considerations of CCIS, which includes the CCIS system model and the types of CCIS users with the associated service flows.

IEC 63246-2 describes the requirements for CCIS, which include the CCIS functional entities, the communication model, and the functional requirements.

IEC 63246-3 describes the CCIS framework, which includes the information flows between functional entities and the CCIS operations, such as registration, device monitoring and control, and data transfer.

IEC 63246-4 describes the CCIS protocol, which includes the protocol messages and parameters, protocol procedures, implementation guidelines, etc.

CONFIGURABLE CAR INFOTAINMENT SERVICES (CCIS) –

Part 4: Protocol

1 Scope

This part of IEC 63246 describes the CCIS protocol, which includes the protocol messages, parameters and procedures performed by protocol entities. This part is informative; its intent is to provide information that can be considered in order to implement the CCIS protocol.

2 Normative references

The following document is referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 63246-1, *Configurable Car Infotainment Services (CCIS) – Part 1: General*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 63246-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

4 General

The CCIS services are provided in collaboration with the protocol entities: CCIS users, CCIS master, and CCIS devices. CCIS master manages and controls the CCIS services by interaction with CCIS users and devices. CCIS devices can support multimedia contents for CCIS services.

To provide CCIS services, a set of CCIS functional operations are performed by the protocol entities, which include registration, authentication, device control, device monitoring, profile management, and content delivery. These functional operation flows are described in IEC 63246-3. This document describes the protocol for CCIS services (represented as the CCIS protocol), which are based on the other parts of CCIS (IEC 63246-1, IEC 63246-2 and IEC 63246-3).

Figure 1 describes a reference protocol stack for CCIS among the protocol entities. The CCIS protocol is an application-layer protocol that can be used to provide the CCIS services. The well-known Transmission Control Protocol (TCP) and Internet Protocol (IP) can be used as the underlying protocol for delivery of CCIS messages in the networks. Any other transport protocol can be used for delivery of CCIS messages, instead of TCP/IP. For example, a low-power CCIS device can use its own dedicated protocol for message delivery, or it can deliver the CCIS message by using the lower-layer protocol, without using the TCP/IP protocols. As for the lower-layer protocols, any kinds of Medium Access Control (MAC) and Physical layer protocol (PHY) can be used, which can typically include the IEEE 802.11 Wireless Local Area Network (WLAN) and the IEEE 802.15 Wireless Personal Area Network (WPAN) technologies.

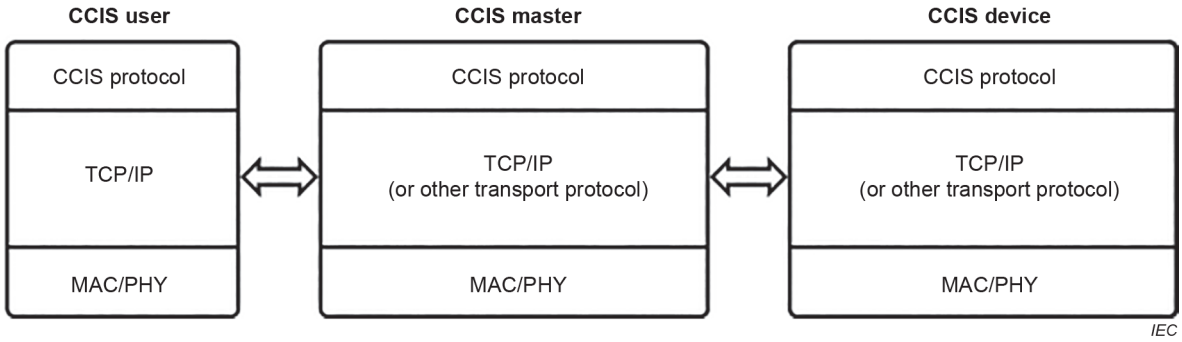

Figure 1 – Protocol stack for CCIS

This Technical Report describes information that can be referred to for implementation of the CCIS protocol. The CCIS protocol or its implementation can depend on the choice of the CCIS service providers.

This Technical Report specifies the CCIS protocol that is an application-layer protocol used to provide CCIS services between the CCIS user and the CCIS master, or between the CCIS master and CCIS devices. For this purpose, the messages for the CCIS protocol are described in Clause 5, which includes the message format, the types of messages, and the parameters associated with the messages. Based on the messages, the protocol procedures are described in Clause 6, which includes the protocol operations that will be performed by each protocol entity: user, master, and device. The overall operational flows for CCIS operations are described in IEC 63246-3.

5 Message

5.1 Message format

5.1.1 General

Each CCIS protocol message consists of the 12-byte header and the data payload of variable length, as shown in Figure 2. The 12-byte header consists of the following fields: version (4 bits), message type (12 bits), payload length (16 bits), sequence number (32 bits), and cookie (32 bits).

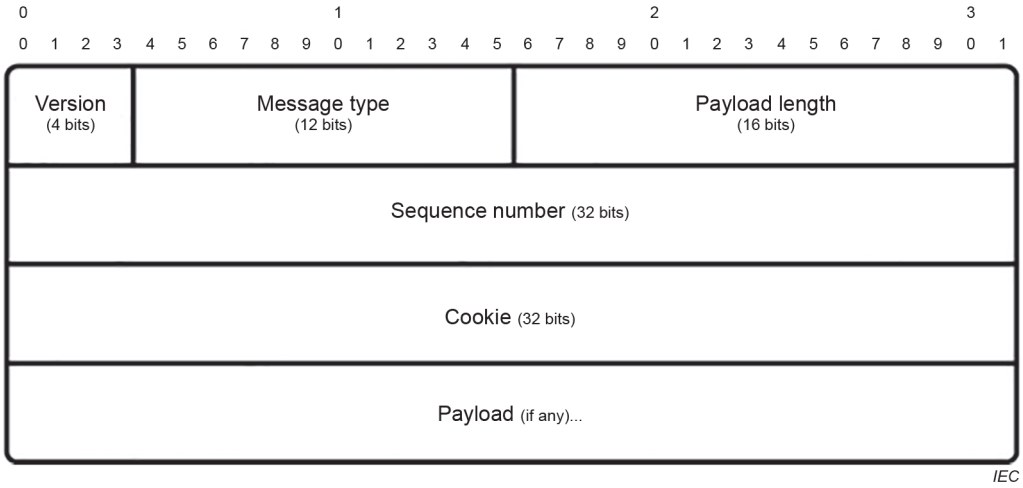

Figure 2 – Message format of CCIS protocol

5.1.2 Version

A 4-bit unsigned integer is used to indicate the version number of this CCIS protocol. The current version of this specification shall be set to 1 (0x01). Other values are reserved for future use.

5.1.3 Message type

A 12-bit unsigned integer is used to indicate the type of this message, which is described in 5.2.

5.1.4 Payload length

A 16-bit unsigned integer is used to indicate the length (in byte) of the payload contained in this message, except the 12-byte header.

5.1.5 Sequence number

A 32-bit unsigned integer is used to indicate the sequence number of this message. This field can be used to detect the message loss or duplication during message transmission. This field initially begins with 1 and increases by 1, whenever a new message is generated. When the sequence number reaches $2^{32} - 1$, its subsequent sequence value will be 0.

5.1.6 Cookie

A 32-bit unsigned integer is used to indicate a cookie. This cookie information is used to determine whether a pair of messages corresponds to the same transaction flow (request-response). For example, a request message and its corresponding response message must have the same cookie value. A cookie value (other than 0) is randomly generated by the requester of the concerned messages.

The cookie value 0 represents that no response is needed for the requesting message. For example, the periodically or repeatedly messages can have the cookie value of 0.

5.1.7 Payload

This variable-length field is used to represent the data payload information, which depends on the message type.

5.2 Message type

5.2.1 Format

The message type is determined by combination the three 4-bit subfields: service, class, and operation. Figure 3 shows the format of message type.

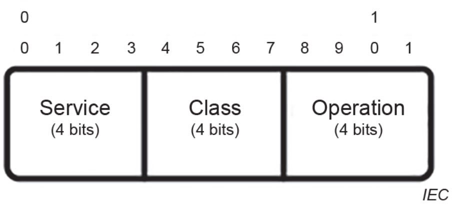

Figure 3 – Format of message type field

5.2.2 Service

The service field, a 4-bit unsigned integer, is used to represent the associated service operations: broadcasting (0), authentication and certification (1), client registration (2), device registration (3), device control (4), device monitoring (5), or content delivery (6).