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Infotainment services for public vehicles (PVIS) - Part 2: Requirements

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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Infotainment services for public vehicles (PVIS) - Part 2: Requirements

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The text of this International Standard is based on the following documents:

Draft	Report on voting
100/4261/CDV	100/4346/RVC

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 International Standard is English.

A list of all parts in the IEC 63479 series, published under the general title *Infotainment services for public vehicles (PVIS)*, 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/publications.

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INTRODUCTION

It is noted that the markets and industries on infotainment services for vehicles (as known as in-vehicle infotainment services) have been growing rapidly. It is envisioned that a variety of infotainment (or multimedia) devices and services will be newly developed for personal and public vehicles in the future. Such devices include navigations, cameras, speakers, headrest displays, air-conditioners, thermometers and heated seats, and lights.

A set of standards have so far been developed on configurable car infotainment services (CCIS) in the form of the IEC 63246 series. However, the CCIS standards have been basically designed for personal users, such as car owners. In the meantime, there is also a crucial need to provide a variety of infotainment services for public vehicles (PVIS) such as buses or trains.

PVIS services have different requirements and features from CCIS services. For user type, CCIS is targeted for one or two users (such as car owners), whereas PVIS is for a large number of guests or passengers within the public vehicle. For device type, CCIS deals with the personal devices (property or belonging) in the car, whereas PVIS will be targeted for a variety of public devices that are contained in a public vehicle. Some PVIS services can be provisioned by interworking with the external networks, as shown in the bus information service. For service duration, CCIS usually provide long-term services, whereas PVIS may provide short-term service during which a guest stays within a public vehicle.

From these observations, it is noted that there are many different features and requirements when comparing CCIS and PVIS. Accordingly, there is a need for standardization on PVIS. In particular, PVIS must employ a set of agents to effectively manage a large number of users or devices.

The PVIS series (IEC 63479) describes infotainment (multimedia) services for terrestrial public vehicles, such as bus, train, or subway. It is not applicable to public vehicles, such as airplanes or ships. For this purpose, the following issues are addressed: 1) identify a variety of functional requirements for provisioning of PVIS, 2) design the PVIS framework, based on the identified requirements. The PVIS IEC 63479 series is expected to provide guidelines on PVIS services for a large number of users or devices, and to encourage development of new (enhanced) PVIS services (possibly by interworking with the external systems).

The IEC 63479 series consists of the following parts:

– IEC TR 63479-1: general,

– IEC 63479-2: requirements, and

– IEC 63479-2: framework.

IEC TR 63479-1 (Technical Report) describes general considerations and a system model for PVIS, with some examples of PVIS services.

IEC 63479-2, i.e. this document (International Standard), describes the functional requirements for PVIS.

IEC 63479-3 (International Standard) describes the framework, including the functional information flows between functional entities.

1 Scope

This part of IEC 63479 describes the functional requirements for infotainment services for public vehicles (PVIS).

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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 Overview

In public transportation, passengers often access multimedia on their own personal devices. PVIS is designed to help to enhance this experience by using built-in vehicle resources, allowing passengers to access a wider range of media content at reduced costs on much larger screens. For instance, PVIS allow users to access multimedia content that they did not subscribe to, at reduced costs while traveling, offering a better viewing experience on larger traditional screens. PVIS systems aim to provide high-quality infotainment services to passengers in public vehicles.

To achieve this goal, it is necessary to design PVIS systems based on specific requirements that ensure stable and robust infotainment services. The purpose of this document is to identify the essential requirements for PVIS services and functional entities in terms of functionality and management.

To provide effective PVIS services, the following management functions are required:

a) device management, which includes device registration, device profile management, device monitoring, and device control;

b) content management, which includes interworking with content providers, content profile management, and content delivery to passengers;

c) connectivity management, which includes connection establishment and maintenance, quality of service (QoS) control, and load balancing;

d) passenger profile management; and

e) authentication and authorization management.

Some of these functional requirements are mandatory, while others can be optionally used for enhanced provisioning of PVIS services.

5 Functional requirements

5.1 General

To provide robust and satisfactory infotainment services for public vehicles, the PVIS system shall provide the following management functions: device management, content management, connectivity management, passenger profile management, and authentication and authorization management. Device management can be divided into the following subfunctions: device registration, device profile management, device monitoring, and device control. The content management function can be divided into the following subfunctions: interworking with content provider, content profile management, and content delivery to passenger. The connectivity management function can be divided into connection establishment and maintenance, and QoS control and load balancing.

Table 1 summarizes the function requirements for PVIS systems and services. Some functions, which are intrinsically required for system and service management, shall be provided as mandatory, whereas the other functions may be optionally used for enhanced PVIS service.

Table 1 – Functional requirements for PVIS

Function	Subfunction	Mandatory or Optional
Device management	Device registration	Mandatory
	Device profile management	Optional
	Device monitoring	Optional
	Device control	Mandatory
Content management	Interworking with content provider	Optional
	Content profile management	Mandatory
	Content delivery to passenger	Mandatory
Connectivity management	Connection Establishment and maintenance	Mandatory
	QoS control and load balancing	Optional
Passenger profile management	-	Optional
Authentication and authorization management	-	Mandatory

5.2 Device management

5.2.1 General

In PVIS, a variety of infotainment services can be provided using numerous devices such as gateway and content players. Effective management of all devices in the public vehicle is crucial to provide PVIS services. To achieve this, the PVIS system shall meet the following functional requirements:

– PVIS system shall provide the device registration function, in which all devices in the public vehicle are registered to the PVIS master (see 5.2.2);

– PVIS system can provide the device profile management function, in which the profile information of each device can be managed by the PVIS master (see 5.2.3);

– PVIS system can provide the device monitoring function, with which the PVIS master can identify the status of each device in the public vehicle (see 5.2.4); and

– PVIS system shall provide the device control function, with which the PVIS master can configure or change the status of each device in the public vehicle (see 5.2.5).

5.2.2 Device registration

To ensure effective management, all PVIS agents and devices shall be registered with the PVIS master and assigned unique identifiers. A secure mechanism is necessary to onboard and register new devices, assign unique identifiers, and store their metadata. This mechanism should provide a way for device discovery, user consent, unique identifier assignment, and device metadata storage.

The device registration process begins by discovering new devices entering the vehicle and initiating the registration process. Various methods can be employed, such as universally unique identifier (UUID) broadcasting or QR codes. During this process, specifications of discovered devices are exchanged to ensure that each device is correctly identified and configured for PVIS.

To ensure safe and secure services in the public environment, obtaining consent from the PVIS manager for all registration processes is essential. This step can help prevent unauthorized access to the PVIS and ensure that all devices are appropriately managed and configured for PVIS use.

5.2.3 Device profile management

To effectively manage PVIS services and provide infotainment to users, the profiles and information of all registered devices shall be stored on the PVIS master. This ensures an up-to-date list of services that can be offered to users and enables efficient updating of device software, including firmware.

The PVIS master should provide a mechanism for modifying and deleting stored information with the approval of the PVIS manager. This feature ensures that device information is accurate and up-to-date, enabling smooth operation of PVIS services.

By maintaining accurate and up-to-date device information, the PVIS system can provide a high-quality infotainment service to passengers in public vehicles, enhancing their overall travel experience.

5.2.4 Device monitoring

To ensure the smooth functioning of PVIS services, all devices shall be monitored in real-time. Regular reporting of the status of each device to the PVIS master shall be carried out, which can provide an up-to-date overview of device health. In addition, a system for sending real-time alerts and notifications, based on predefined rules, device status, or other events, should be in place to allow for timely responses to critical issues or incidents. However, in large-scale public environments with numerous devices, managing a large number of devices can place significant load on the system, necessitating a well-designed approach for distributing and managing devices.

5.2.5 Device control

The device control function is crucial to ensure that users have control over the use of services on authorized devices in the PVIS. To achieve this, the PVIS system shall provide users with accurate information on the devices available for their use, using user identifiers or access tokens to ensure proper identification and authorization. Furthermore, the PVIS system should be capable of performing various actions based on the user's requests, such as configuring devices for use with specific services, managing device settings and preferences, and enabling or disabling specific features as needed. This enables users to have better control over the PVIS devices and services, enhancing their overall user experience.