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ISO TC 204/WG 18

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Secretariat: ANS

Intelligent transport systems — Automated valet parking systems (AVPS) — Part 2: Security integration for type 3 AVP

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Phone: +41 22 749 01 11

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#### 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 <a href="https://www.iso.org/directives/">www.iso.org/directives/</a>. (see <a href="https://www.iso.org/directives/">www.iso.org/directives/</a>).

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This document was prepared by Technical Committee ISO/TC—204, Intelligent Transport Systemstransport systems.

A list of all parts in the ISO 23374 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at <a href="https://www.iso.org/members.html">www.iso.org/members.html</a>

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#### Introduction

The "Automated Valet Parking System" An automated valet parking system (AVPS) automatically operates unoccupied vehicles from the drop off area where the driver and passengers leave the vehicle, and returns the vehicle to a pickup area upon the user's request to retrieve the vehicle.

Beside enhanced user experiences, the AVPS is expected to contribute to accident:

- enhanced user experience,
- <u>a</u> reduction, in accidents.
- the lowering of energy consumption and CO<sub>2</sub> emission of emissions whilst vehicles searchingsearch for available parking spaces, and effectively utilize
- <u>the effective use of land bythrough</u> parking <u>of vehicles</u> in dense spaces.

AVPS, asAs for any kind of automated traffic, AVPS is susceptible to attacks and malfunctioning, which maycan affect the safety of human life and other properties. Thus, security is an essential prerequisite for deployment of AVPS. Further on, Furthermore, it is essential to avoid the proliferation of security means must be avoided in order to keepensure that the overall C-ITS //CCAM (cooperative, connected and automated mobility) security systems remain manageable, and to ensure interoperability.

The aim of this document is to contribute to the realization of secure level 4 driverless operation of vehicles within parking facilities, and to support a fast and smooth market introduction by achieving interoperability among vehicles provided by different manufactures and within different parking facilities.

Clause-6 of this document addresses specifications of basic security requirements for AVPS related to identified operation interfaces and management interfaces. This is complemented by the informative information in Clause-5 and three informative Annexes.

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annexes.

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# Intelligent transport systems — Automated valet parking systems (AVPS) — Part 2: Security integration for type 3 AVP

#### 1 Scope

This document specifies security means and procedures for AVPS Type 3 as specified in ISO 23374-1 and It focuses on the operation interfaces and management interfaces as defined in ISO 23374-1.

#### 2 Normative references

The following documents are 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.

ISO 23374-11:—,1 Intelligent transport systems — Automated valet parking systems (AVPS) — Part 1.

System framework, requirements for automated driving, and communication interface

ISO/SAE-21434, Road vehicles — Cybersecurity engineering

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 23374-1 and the following apply.

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

- ISO Online browsing platform: available at <a href="https://www.iso.org/obp">https://www.iso.org/obp</a>
- \_\_ IEC Electropedia: available at <a href="https://www.electropedia.org/">https://www.electropedia.org/</a>,

# 3.1

#### subject vehicle

SV

light vehicle which is equipped with the vehicle operation sub-\_system of an automated valet parkin system [AVPS, and subject to this document]

[SOURCE: ISO/DIS 23374-1;:-,2 3.1]-4]

#### 3.2

# parking facility

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 $<sup>\</sup>underline{^{1}\, Under\, preparation.\, Stage\,\, at\,\, the\,\, time\,\, of\,\, publication:\, ISO/FDIS\,\, 23374-1:2023.}$ 

<sup>&</sup>lt;sup>2</sup> Under preparation. Stage at the time of publication: ISO/FDIS 23374-1:2023.

public or private car park eapable of in which an automated valet parking system (AVPS and subject to this document) is available

Note 1 to entry: The entire facility An AVPS does not necessarily have to be capable of AVPS in being compliant available in the entire favility in order to achieve conformance to this document. For example, it is possible  $\underline{\text{for only}} \text{ a certain floor within a multi-story parking facility } \underline{\text{may}\underline{\text{to}}} \text{ be dedicated } \underline{\text{for}\underline{\text{to an}}} \text{ AVPS.}$ 

[SOURCE: ISO/DIS 23374-1-..., 3.5, modified — Note 2] to entry removed.]

#### operation zone

single or multiple geographical boundaries of the area(s) within a parking facility where parking automationautomated driving can be performed by an automated valet parking system (AVPS)

[SOURCE: JSO/DIS 23374-17:—, 3.3]6, modified — Notes 1 and 2 to entry removed.]

#### 3.4

#### drop-off area

location within the operation zone where the driveruser leaves the subject vehicle (SV) and AVPS receives the dispatchinghands over authority to the service provider

[SOURCE: ISO/DIS 23374-17:-..., 3.4]7, modified — Notes 1 and 2 to entry removed.]

#### 3.5

#### pick-up area

location in within the operation zone where AVPS places the SV for service provider sends the user subject vehicle (SV) to board the vehicleuser for boarding and retains hands over authority

[SOURCE: ISO/DIS 23374-1;-\_\_, 3.5]8, modified — Notes 1 and 2 to entry removed.]

#### 3.6 destination

location within the operation zone to transfer a which the subject vehicle (SV-to, determined by AVPS-) is transferred

Note 1 to entry: For example, parking slots delineated by line markers, service bays (e.g. location beside an electric vehicle charging stations), or a pick-up area can be a destination.

[SOURCE: ISO/ DIS 23374-17: \_\_\_, 3.6]11, modified — Original Note 1 to entry removed. New Note 1 to entry added.]

#### 3.7

## parking area

area within the operation zone consisting of multiple parking locations spots

[SOURCE: ISO/DIS 23374-1;:—, 3.7]10, modified — Note 1 to entry removed.]

#### 3.8

#### parking facility equipment

PFE,

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physical equipment installed in the parking facility for providing supporting an automated valet parking system [AVPS]

Note 1 to entry: For example, communication <u>EXAMPLE Communication</u> devices and detection sensors are <u>PFE</u>s.

[SOURCE: ISO/ DIS 23374-1-:\_\_, 3.9-15, modified — Preferred term changed from "automated valet parking facility equipment" to "parking facility equipment".]

#### 3.9

#### designed speed

physical speed of a <u>subject vehicle (SV)</u> which changes dynamically under the given circumstances that <u>under which an automated valet parking system (AVPS)</u> intends to operate at while performing automated driving

Note 1 to entry: For example, the AVPS will adjust the SV's operating speed when traveling travelling towards a corner with limited visibility due to occlusion by a wall. This speed depends on the system design, thus, For this reason, most of the test procedures in this document do not specify a specific value and only refer to the "designed speed.".

[SOURCE: ISO/DIS 23374-1, 3.10]

#### 3.10

#### designed distance

physical distance from the <u>subject vehicle (SV)</u> to an object that <u>an automated valet parking system (AVPS)</u> intends to <u>keepmaintain</u> under the given circumstances while performing automated driving

[SOURCE: ISO/DIS 23374-1, 3.11]

[SOURCE: ISO 23374-1:—, 3.19, modified — "Situation-specific" removed from the beginning of the definition; "other facility users, objects or structures" replaced by "an object"; Note 1 to entry removed.

#### 3.11

#### sub-system

component of an automated valet parking system (AVPS) at a logical composition of AVPS level which carries includes one or more functions

[SOURCE: ISO/DIS\_23374-1-:-\_,3.12]21, modified — Note 1 to entry removed.]

#### 3 12

# function

smallest composition of an automated valet parking system (AVPS) described in this document which contributes to the system outputs

[SOURCE: ISO/DIS 23374-1, 3.13]

#### 3.13

## (system)-state

<system> mutually exclusive condition that each vehicle managed by an automated valet parking system [AVPS] is in

[SOURCE: ISO/DIS 23374-1, 3.14]

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#### 3.14

#### reservation ID

unique identifier for an established agreement between a user and a service provider to handoverhand over the SV'ssubject vehicle (SV)'s authority to an automated valet parking system (AVPS) within a specific parking facility

Note 1 to entry: A single reservation ID could be used over a period of time, or could be destroyed each time it is

[SOURCE: ISO/DIS 23374-1, 3.15]

#### 3.15

#### session ID

unique identifier given each time an authority handover occurs, and destroyed when authority handback

[SOURCE: ISO/DIS 23374-1, 3.???]

#### 3.16

#### mission ID

unique identifier given each time when an a subject vehicle (SV) is given a new destination

[SOURCE: ISO/DIS 23374-1, 3.17]

#### 4 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO 23374-1 and the following apply.

AVP automated valet parking

AVPS AVPautomated valet parking system (eh. ai/catalog/standards/sist/05670d

**CCAM** cooperative, connected and automated mobility 7 d 13 a 3 2 c 1 /1 s o - d (s - 23 3 7 4 - 2)

DoS denial of service

DTSLDTLS datagram transport layer security ESP encapsulating security payload

head-of-line <u>HoL</u>

IKE Internet internet key exchange

OB operator backend

OEDR object and event detection and response

OEM original equipment manufacturer

 $\frac{\mathsf{OEM\_ID}\mathsf{PFE}}{\mathsf{PFE}}$ parking facility equipment

PKI public key infrastructure

**QUICRSU** name of a protocol specified in RFC 9000 - this is not an abbreviated term.roadside

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SA security association
SV\_ID subject vehicle

TCP Transport Control Protocol
TLS transport layer security

UB user backend

<u>UDP</u> <u>User Datagram Protocol</u>

VB vehicle backend

<u>VIN</u> <u>vehicle identification number</u>

<u>VMC</u> <u>vehicle motion control</u>

WAVE wireless access in vehicular environments

<u>WMI</u> <u>world manufacturer identifier</u>

#### 5 General

#### 5.1 Basic operation model of AVPS

#### 5.1.1 Basic functionalities

The basic functionalities of AVPS can be described as the operation functions of an automated vehicle and the management functions of system participants. <u>Table 1 Table 1</u> describes these basic functionalities of AVPS.

- Performance requirements associated with the operation functions are specified in ISO 23374-1;
   Clause 6-of ISO 23374-1.
- \_\_\_General requirements associated with the management functions are specified in <u>ISO 23374</u> 1:—\_\_Clause 7-of ISO 23374 1.

 $Table \hbox{$\frac{1-}{2}$} Basic functionalities \hbox{$\frac{of\ AVPS}{2}$} and their\ description$ 

Basic functionalities	Description
<b>Operation functions</b> of an automated vehicle	<ul> <li>— Determine a destination and route</li> <li>— Perform level 4 automated driving</li> <li>— Respond to commands of the system management functionalities</li> </ul>
Management functions of system participants	Manage environmental conditions    Check the compatibility between vehicles and facilities

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