International Standard

ISO 16499-1

First edition
2025-09

Sustainable mobility and transportation — Automated mobility using physical and digital infrastructure —

Part 1: Service role architecture

Mobilité et transport durables — Mobilité automatisée utilisant des infrastructures physiques et numériques —

Partie 1: Architecture des rôles de service

Reference number
ISO 16499-1:2025(en)

© ISO 2025



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Abbreviated terms ... **2**
5 Automated mobility service classification and service evolution ... **2**
5.1 General ... 2
5.2 Service classification of automated mobility service ... 2
5.3 Service evolution of automated mobility service ... 2
6 Infrastructure support for AM service role and functional model ... **3**
7 Role and function model ... **4**
7.1 General ... 4
7.2 National variations ... 4
7.3 Basic role model architecture ... 4
7.3.1 General ... 4
7.3.2 Smart city sensor data ... 4
7.3.3 3D HD point cloud map ... 5
7.3.4 Digital infrastructure ... 5
7.3.5 Mobility supporting facility ... 5
7.3.6 Physical infrastructure ... 5
7.3.7 Automated mobility service provider ... 6
7.3.8 Communication ... 6
7.3.9 Mobility users ... 6
7.4 Application layer role and functional model for AM system ... 6
7.4.1 General ... 6
7.4.2 Role and functional model options ... 8
7.4.3 Certification of service providers ... 8
7.5 AM system service role and functional model ... 8
7.5.1 General ... 8
7.5.2 AM system service control centre ... 8
7.5.3 AM service user with nomadic device ... 9
7.5.4 AM transport provider ... 9
7.5.5 AM system service vehicle ... 9
7.5.6 AM system service mobility recorder ... 9
7.5.7 AM system service vehicle owner ... 9
7.5.8 AM system vehicle inspection/certification authority ... 9
7.5.9 First responders (Police/Fire fighters) ... 9
7.5.10 AM system service supporting infrastructure facilities (Physical and digital) ... 9
7.5.11 Regulator ... 10
7.5.12 Regional transport authority ... 10
7.5.13 SCMS (security credential management system) ... 10
7.5.14 Traffic management centre ... 10

© ISO 2025 – All rights reserved

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*, Subcommittee SC 2, *Sustainable mobility and transportation*.

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 www.iso.org/members.html.

© ISO 2025 – All rights reserved

Introduction

The role of ISO/TC 268/SC 2 is to develop International Standards to create, implement, manage, operate and maintain efficient sustainable mobility and transportation for smart city and communities. It does this by utilizing International Standards which have already been developed by ISO/TC 22/TC 204/TC 269 and IEC/TC 9. The work of ISO/TC 268/SC 2 does not supersede, but rather complements, those existing International Standards by filling in gaps,

Standardization of the service role and functional model is necessary for the introduction of the overall automated mobility services to support land/water/air mobility users. Those users utilize automated mobility services as a means of moving people, goods and services in smart cities and communities, including urban and rural areas, on land (road and guided way), on water and in the air.

Several International Standards describe automated mobility services. However, none of these have discussed overall service role and functional model.

This document describes common service role and functional model presentation. Future emerging business use cases can refer this document as baseline document. This document does not hinder the development of future business cases but assists them.

Systems such as autonomous metro systems are not included in this document.

© ISO 2025 – All rights reserved

Sustainable mobility and transportation — Automated mobility using physical and digital infrastructure —

Part 1: Service role architecture

1 Scope

This document establishes a basic role model, as a common platform for smart city instantiation, of smart city automated mobility services. It provides a paradigm describing:

a) a framework architecture for the provision of an automated mobility service;

b) a description of the concept of operations, and the role models;

c) a conceptual architecture between actors involved in the provision/receipt of automated mobility service applications;

d) references for the key documents on which the architecture is based;

e) a taxonomy of the organization of generic procedures.

In-vehicle control system is not in the scope of this document.

The scope of this document is limited to automated mobility services using physical and digital infrastructure.

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/TR 4445, *Intelligent transport systems — Mobility integration — Role model of ITS service application in smart cities*

ISO 4448 (all parts), *Intelligent transport systems — Public-area mobile robots (PMR)*

ISO 24315 (all parts), *Intelligent transport systems — Management of electronic traffic regulations (METR)*

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

© ISO 2025 – All rights reserved