

---

---

**Intelligent transport systems (ITS) —  
Urban mobility applications via  
nomadic device for green transport  
management —**

Part 1:

**General requirements for data  
exchange between ITS stations**  
(standards.iteh.ai)

[ISO 18561-1:2020](https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364babc70e/iso-18561-1-2020)

<https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364babc70e/iso-18561-1-2020>



**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 18561-1:2020

<https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364bab70e/iso-18561-1-2020>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2020

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](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>1</b>
3.1 Terms and definitions.....	1
3.2 Abbreviated terms.....	2
<b>4 Document overview and structure</b> .....	<b>2</b>
<b>5 Overview</b> .....	<b>3</b>
5.1 Purpose.....	3
5.1.1 General.....	3
5.1.2 Personal ITS station.....	3
5.1.3 Vehicle ITS station.....	3
5.1.4 Central ITS station.....	3
5.2 Overview of transport planning process.....	3
5.3 Overview of use case clusters.....	4
<b>6 Use cases overview and definitions</b> .....	<b>6</b>
6.1 Use cases overview.....	6
6.1.1 Basic principles for use cases.....	6
6.1.2 Use cases clusters.....	6
6.2 Use case definition.....	7
6.2.1 Use case cluster 1: Trip generation.....	7
6.2.2 Use case cluster 2: Network assignment.....	8
6.2.3 Use case cluster 3: Mode assignment.....	11
6.2.4 Use case cluster 4: Guidance and analysis.....	13
<b>Bibliography</b> .....	<b>17</b>

## 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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

A list of all parts in the ISO 18561 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 [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

The ISO 18561 series is intended to facilitate the development, promotion and standardization of the use of nomadic and portable devices to support intelligent transport systems (ITS) service provision and multimedia use, such as passenger information, automotive information, driver advisory and warning systems and entertainment system interfaces to ITS service providers and motor vehicle communication networks.

This document provides the application and specification for standardizing transportation management as a form of ITS in urban transportation networks to improve eco-mobility and sustainability. This document fosters the introduction of multimedia and telematics nomadic devices in the public transport and automotive world. These ITS technologies can increase operational efficiencies and unlock enhanced transportation safety and eco-mobility applications.

Via nomadic devices, the urban mobility applications build on existing transportation planning processes, including trip generation, trip distribution and modal choices with respect to extended measures of effectiveness (MOE) in transportation models, such as time effectiveness, cost effectiveness and green (eco)effectiveness.

In this document, the nomadic device is presented as a personal ITS station in order to communicate with the other stations, including vehicle, roadway infrastructures and centres for defining the requirements for interfaces between the stations in urban mobility applications to accommodate the specific needs of eco-mobility in a smart city.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 18561-1:2020](https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364bab70e/iso-18561-1-2020)

<https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364bab70e/iso-18561-1-2020>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 18561-1:2020

<https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364babc70e/iso-18561-1-2020>

# Intelligent transport systems (ITS) — Urban mobility applications via nomadic device for green transport management —

## Part 1: General requirements for data exchange between ITS stations

### 1 Scope

This document gives guidelines for providing mobility information according to user preference on demand, utilizing a variety of existing applications on nomadic devices related to different means of transport. This document defines an integrated mobility information platform as a service methodology to be integrated with a variety of mobile apps with respect to different transport modes.

This document defines the following urban mobility applications:

- guidance documents to facilitate the practical implementation of identified standards in the transportation planning process, including related use cases;
- provision of urban mobility information integrated with a variety of mobile apps on nomadic devices by multiple transport modes for collecting trip production and attraction data;
- modal choice data based on time effectiveness, cost effectiveness, and eco-effectiveness in the trip distribution from origins to destinations.

### 2 Normative references

There are no normative references in this document.

### 3 Terms, definitions and abbreviated terms

#### 3.1 Terms and definitions

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

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

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

##### 3.1.1

##### **nomadic device**

##### **ND**

implementation of a *personal ITS station* (3.1.2) which provides communication connectivity via equipment such as cellular telephones, mobile wireless broadband (WIMAX, HC-SDMA, etc.) or WiFi, and includes short range links, such as Bluetooth or Zigbee to connect portable devices to the motor vehicle communications system network

3.1.2

**personal ITS station**

**P-ITS-S**

implementation of an ITS station in a personal ITS subsystem

3.1.3

**roadside ITS station**

**R-ITS-S**

system installed at the road side that receives and processes vehicular and pedestrian information within a certain zone and determines the situation in order to provide safety warnings and parking guidance to vehicles and pedestrians

3.1.4

**green ITS**

**G-ITS**

a new-concept transportation system, expected to arise following the paradigm shift towards eco-friendly, low-carbon green growth in the transportation sector, as global policies

3.1.5

**eco-mobility**

ecological transport systems and services based on eco-vehicles and their related facilities

3.1.6

**central ITS station**

ITS station assuming a central role

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

3.2 Abbreviated terms

MOE	measure of effectiveness	<a href="https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364bab70e/iso-18561-1-2020">ISO 18561-1:2020</a>
WiFi	wireless fidelity	<a href="https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364bab70e/iso-18561-1-2020">https://standards.iteh.ai/catalog/standards/sist/c6ef6458-ba6c-460b-873e-b3364bab70e/iso-18561-1-2020</a>
WIMAX	worldwide interoperability for microwave access	
HC-SDMA	high capacity spatial division multiple access	
OD	origin - destination	

4 Document overview and structure

The ISO 18561 series provides details of all documents and references required to support the application of conventional transportation planning processes in transportation management with respect to eco-effective measures to improve urban mobility by utilizing the data collected by NDs. The ISO 18561 series is comprised of the following documents.

- Part 1 (this document): General requirements for data exchange between ITS stations  
This part specifies the general requirements of data exchanges between ITS stations collected by NDs in urban mobility applications based on the structure along with the use cases definition and common set of resources (definitions, references) in green transportation management.
- Part 2<sup>1)</sup>: Trip and modal choice applications and specification  
This part specifies all technical requirements related to the trip and modal choice applications for the transportation planning process in green transportation management utilizing NDs to be used on the personal ITS station and to be interfaced with a central ITS station, vehicle ITS station and roadside ITS station.

1) Under preparation. Stage at the time of publication: ISO/CD 18561-2:2020.



- Part 3<sup>2)</sup>: Mobility integration service applications using hybrid V2X

This part specifies not only the mobility-as-a-service applications functioning in connection with multiple transportation modes, but also the safety enhancement services using hybrid V2X including dedicated short range communication (DSRC) and cellular V2X.

## 5 Overview

### 5.1 Purpose

#### 5.1.1 General

This document addresses two major areas:

- identifying the method for describing the general information for all subjects and use cases related to green transport management services according to the transportation planning process in urban mobility utilizing NDs; and
- identifying the general requirements of data exchanges utilizing NDs as the personal ITS station interfaced with the central ITS station, vehicle ITS station, and roadside ITS station.

#### 5.1.2 Personal ITS station

Smart mobility services on demand by the user preference to be an integrated app on mobile devices utilizing personalized data with respect to trip distance, trip schedule, personal eco mileages, weather, etc. by means of different transport modes.

#### 5.1.3 Vehicle ITS station

Vehicle information to be utilized by users as a mobility service, which includes electric passenger vehicles, public transport with bus and/or metro, shared mobility with car sharing, ride sharing, bike sharing, etc.

#### 5.1.4 Central ITS station

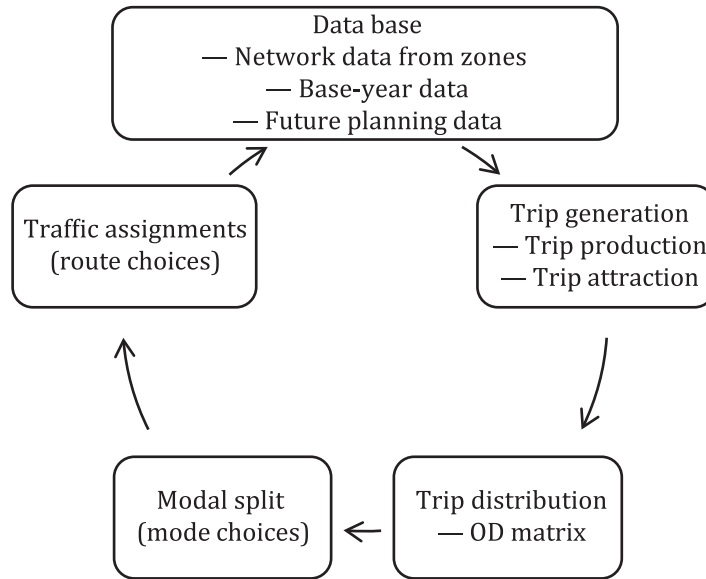
Transportation management services to be provided to users as a variety of service apps on mobile devices by national authorities, local municipalities and/or private companies for eco-mobility management and information such as carbon free zones, electric vehicles, etc.

### 5.2 Overview of transport planning process

Conceptual aspects of the general process for four step transportation planning and modelling are illustrated in [Figure 1](#).

---

2) Under preparation. Stage at the time of publication: ISO/PWI 18561-3:2020.



**Figure 1 — General form of four step transportation planning and modelling**

Trip generation as the first stage of the classical transportation demand planning and modelling is the analysis and model building phase in the conventional transportation planning process. It is a general term used in the transportation planning process to cover the number of trip ends in given areas. Trip generation is classified in production and attraction. Production from an origin means number of trip ends which have originated in a given zone, i.e. zone-i. Attraction to a destination means number of trip ends attracted to another zone, such as zone-j.

The decision to travel for a given purpose is called trip generation. The decision to choose a destination from an origin is called directional distribution of trips. This forms the second stage of travel demand modelling in the transportation planning process. Trip distribution is determined by the number of trip ends originated in zone-i to the number of trip ends attracted to zone-j, which can be understood by the matrix between zones, i.e. the origin - destination (OD) matrix.

The third stage in travel demand modelling is modal split, which is determined by the number of trips by individuals processed by the different modes of travel. Modal split of travel demand modelling is used to distribute the total travel demand into two or more mode categories, including public transport riders and personal and/or private vehicle riders. The demand can be split into different modes with respect to the socio-economic demand variables used to explain mode choice behaviour, including income, vehicle ownership, household size, residence location, etc. The supply variables are in vehicle time, waiting time, travel time, travel cost, transfer time, etc.

Trip assignment is the fourth and final phase of the four-step transportation planning process. Travellers choose the route which will take the minimum travel time and minimum travel distance dependent on the traffic volume on the road.

### 5.3 Overview of use case clusters

Urban mobility applications provide individual users with mobility information services according to user preference on demand, recognized by NDs via personal OD trip data, which come up with network OD matrix databases. The use cases for urban mobility applications are categorized as trip generation, network assignment, mode assignment, and information and analysis, based on a similar pattern of conventional four step transportation planning and modelling process, including trip generation, trip distribution, modal choices and trip assignment; see [Figure 2](#).

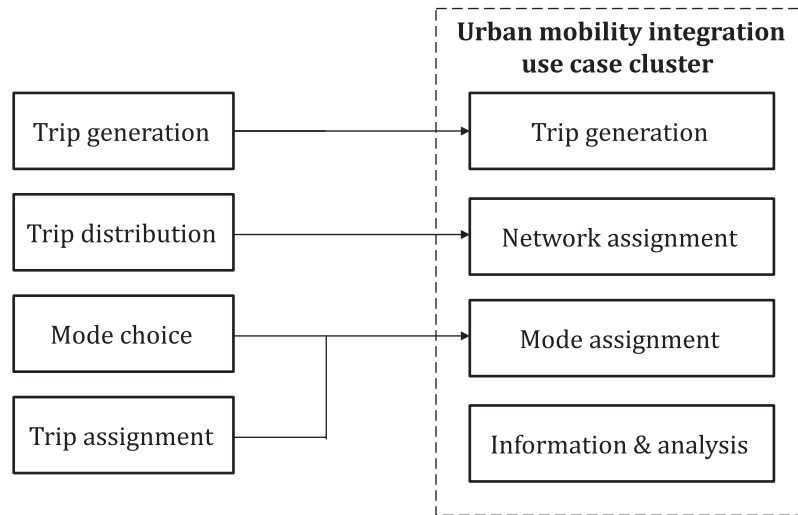


Figure 2 — Use case clusters

This document defines urban mobility use cases and data interfaces with specifications so that central and/or local mobility service providers are able to plan and operate mobility integration managements based on their conventional transportation planning process. Examples include the delivery and management of ITS services using big data collected by personal NDs in transportation networks, as well as the use of smartphone apps for public transit modes and routes planning by traffic management centres. See [Figure 3](#) for the service framework architecture.

— The meaning of use cases presented in [Figure 1](#) is explained in [Table 1](#).

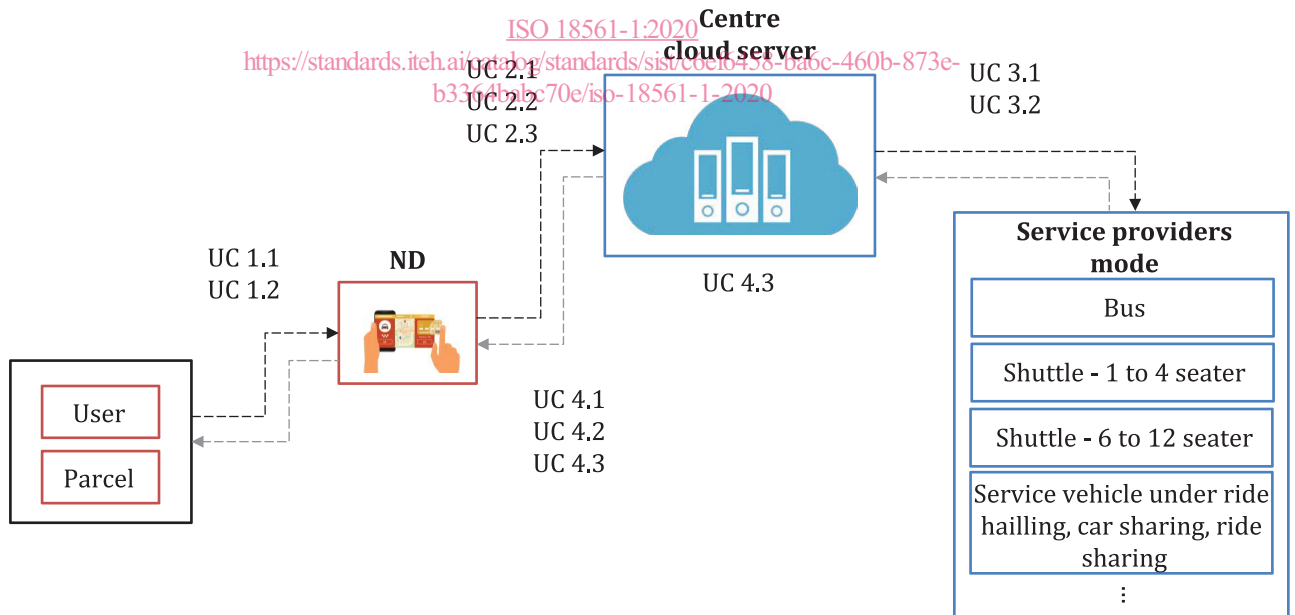


Figure 3 — Service framework architecture