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

Part 1:
General requirements for data exchange between ITS stations

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Foreword

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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).

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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 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.

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.

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

3.2 Abbreviated terms

MOE   measure of effectiveness

WiFi   wireless fidelity

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[1]: 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.

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

— Part 3[2)]: 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.

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2) Under preparation. Stage at the time of publication: ISO/PWI 18561-3:2020.
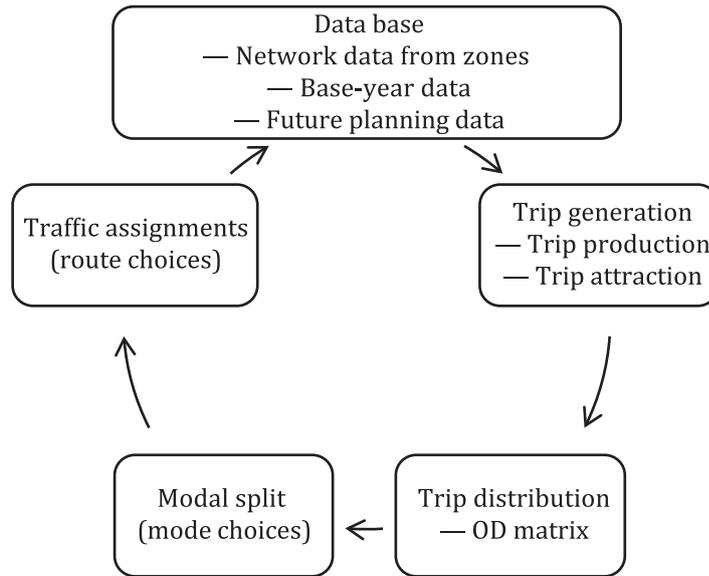
Figure 1 — General form of four step transportation planning and modelling

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.
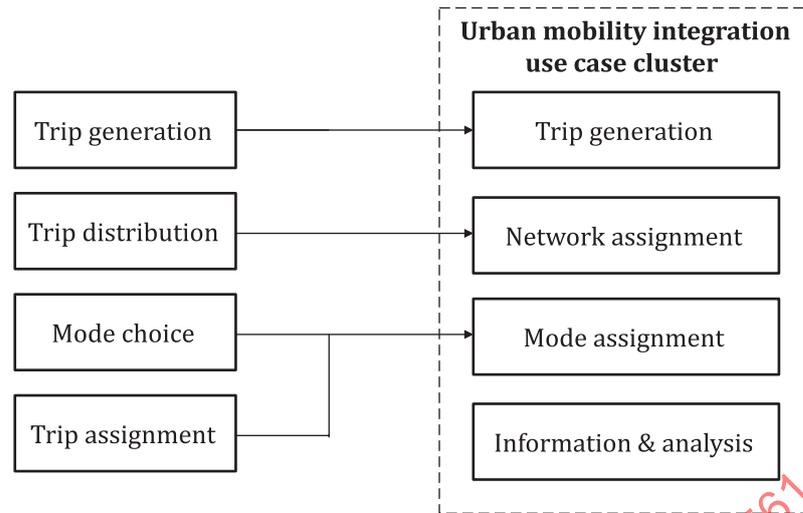
Figure 2 — Use case clusters

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.
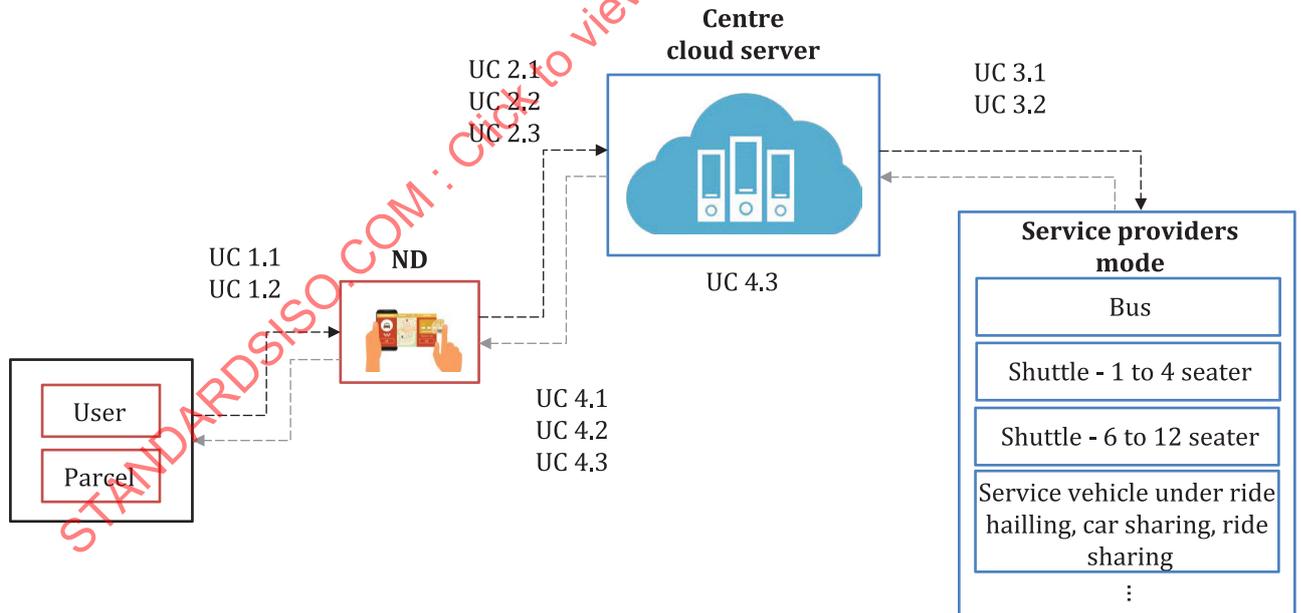
Figure 3 — Service framework architecture

6 Use cases overview and definitions

6.1 Use cases overview

6.1.1 Basic principles for use cases

The main purpose for adopting this document is modelling the urban mobility service platform with the defined use cases, utilizing limited resources of transport means or modes more effectively within a city transport network. The transport modes defined directly in this document include bus, shuttle of 1 to 4 seater size or of 6 to 12 seater size, and service vehicles under ride hailing, car sharing, ride sharing, etc. Other non-defined modes are considered indirectly in this document.

The urban mobility application services include the following groups of use cases.

— Trip generation: collection of trip demand or parcel delivery requests generated by NDs, and saving of the trip and parcel delivery demand information in the centre.

— Network assignment: monitoring of the OD of user or parcel, and assignment of the network by designating the core of trip OD according to zones to be clustered.

— Mode assignment: monitoring of mode (e.g. bus, shuttle) availability and assignment of route to the available modes, then assignment of the transport modes for the users or parcels.

— Information and analysis: to guide user or parcel trip information and analyse and evaluate the effectiveness of services.

6.1.2 Use cases clusters

Table 1 provides an overview of the different use case categories. The use cases are grouped into use case clusters.

Table 1 — Use case clusters and associated use case overview

Title of use case cluster	Brief description
1. Trip generation	This cluster specifies the detailed use cases of trip generation for urban mobility services. It includes 2 different use cases: — UC 1.1 – Trip demand information input of user — UC 1.2 – Delivery demand information input of parcel
2. Network assignment	This cluster specifies the detailed use cases of network assignment for urban mobility services. It includes 3 different use cases: — UC 2.1 – OD monitoring — UC 2.2 – Clustering core zones — UC 2.3 – Network assignment
3. Mode assignment	This cluster specifies the detailed use cases of mode assignment for urban mobility services. It includes 2 different use cases: — UC 3.1 – Monitoring modal availability — UC 3.2 – Mode assignment
4. Guidance and analysis	This cluster specifies the detailed use cases of guidance and analysis for urban mobility services. It includes 3 different use cases: — UC 4.1 – User trip guidance — UC 4.2 – Parcel delivery guidance — UC 4.3 – Effectiveness analysis and evaluation

6.2 Use case definition

6.2.1 Use case cluster 1: Trip generation

6.2.1.1 UC 1.1: Trip demand information input of user

Table 2 shows use case 1.1, Trip demand information input of user, in order to collect the user's real-time trip demand information by NDs.

Table 2 — Definition of UC 1.1: Trip demand information input of user

Use case name	Trip demand information input of user
Actor	Centre, ND, cloud server, user, service provider
Goal	Collecting user's trip demand information
Use case input	Input user's trip information by ND
Use case output	Collecting user's trip information to centre
Brief description	In order to identify trip demand, trip demand information of users is input through NDs and stored in a centre. This information shall include: — Trip demand generation identification — Departure location and time — Desired arrival time
Data required	1) User identification 2) User departure information (latitude/longitude, time) 3) User desired arrival information (latitude/longitude, time)

Table 3 shows the size and description of the dataset required for use case 1.1.

Table 3 — Size and description of dataset required for use case 1.1

No.	Name	Data type (Unit)	M/O[a]	Description
1	User identification	UTF8String	M	User ID
2	Departure latitude	REAL	M	User's departure latitude
3	Departure longitude	REAL	M	User's departure longitude
4	Desired departure time	GeneralizedTime	M	Desired departure time, YYYYMMDDHH24MISS
5	Desired arrival time	GeneralizedTime	M	Desired arrival time, YYYYMMDDHH24MISS
6	Desired arrival latitude	REAL	M	Desired arrival latitude
7	Desired arrival longitude	REAL	M	Desired arrival longitude
[a]	M = Mandatory, O = Optional.			

6.2.1.2 UC 1.2: Delivery demand information input of parcel

Table 4 shows use case 1.2, Delivery demand information input of parcel, in order to collect the parcel's real-time delivery demand information by NDs.

Table 4 — Definition of UC 1.2: Delivery demand information input of parcel

Use case name	Delivery demand information input of parcel
Actor	Centre, ND, cloud server, sender, receiver, service provider
Goal	Collecting parcel delivery demand information
Use case input	Input parcel delivery information by ND

Table 4 *(continued)*

Use case output	Collecting parcel delivery information to centre
Brief description	In order to identify delivery demand, delivery demand information of parcels is input through NDs and stored in a centre. This information shall include: — Delivery demand generation identification — Origin and destination location — Delivery time to receive parcel
Data required	1) Parcel identification 2) Parcel departure information (latitude/longitude, time) 3) Parcel delivery desired arrival information (latitude/longitude, time)

Table 5 shows the size and description of the dataset required for use case 1.2.

Table 5 — Size and description of dataset required for use case 1.2

No.	Name	Data type (Unit)	M/O[a]	Description
1	Parcel identification	UTF8String	M	Parcel(Sender) ID
2	Departure latitude	REAL	M	Parcel(sender)'s departure latitude
3	Departure longitude	REAL	M	Parcel(sender)'s departure longitude
4	Desired departure time	GeneralizedTime	M	Desired departure time, YYYYMMDDHH24MISS
5	Desired arrival time	GeneralizedTime	M	Desired arrival time, YYYYMMDDHH24MISS
6	Desired arrival latitude	REAL	M	Desired arrival (receiver) latitude
7	Desired arrival longitude	REAL	M	Desired arrival (receiver) longitude
[a] M = Mandatory, O = Optional.				

6.2.2   Use case cluster 2: Network assignment

6.2.2.1   UC 2.1: OD monitoring

Table 6 shows use case 2.1, OD monitoring, in order to monitor the user's real-time trip demand information collected by NDs.

Table 6 — Definition of UC 2.1: OD monitoring

Use case name	OD monitoring
Actor	Centre, ND, cloud server, user, sender, receiver, service provider
Goal	Monitoring user's origin and destination information
Use case input	Request origin and destination information from users
Use case output	Origin and destination information from users
Brief description	The centre server monitors the urban mobility demand information based on the OD information of trip and parcel delivery provided by the users. This information shall include: — Trip generation identification — Origin and destination location

Table 6 *(continued)*

Data required	1) Authorized key
	2) User or parcel identification
	3) User or parcel departure information (latitude/longitude, time)
	4) User or parcel desired arrival information (latitude/longitude, time)

Table 7 shows the size and description of the dataset required for use case 2.1.

Table 7 — Size and description of dataset required for use case 2.1

No.	Name	Data type (Unit)	M/O[a]	Description
1	Authorized key	UTF8String	M	Access ID to OD database
2	User identification	UTF8String	M	User identification, if applicable
3	Parcel identification	UTF8String	M	Parcel(sender) identification, if applicable
4	Departure latitude	REAL	M	Departure latitude of user or parcel
5	Departure longitude	REAL	M	Departure longitude of user or parcel
6	Desired departure time	GeneralizedTime	M	Desired departure time, YYYYMMDDHH24MISS
7	Desired arrival time	GeneralizedTime	M	Desired arrival time, YYYYMMDDHH24MISS
8	Desired arrival latitude	REAL	M	Desired arrival latitude
9	Desired arrival longitude	REAL	M	Desired arrival longitude
[a]	M = Mandatory, O = Optional.			

6.2.2.2 UC 2.2: Clustering core zones

Table 8 shows use case 2.2, Clustering core zones, in order to group core zones by users' mobility demand, depending on destinations requested.

Table 8 — Definition of UC 2.2: Clustering core zones

Use case name	Clustering core zones
Actor	Centre, ND cloud server
Goal	Clustering core zones by grouping destinations requested by users
Use case input	OD information provided by the users
Use case output	Core zones clustered in the network
Brief description	A group of core zones is clustered based on destinations chosen by users' mobility demand, where a zone is designated as smaller than a village area in cases with a higher amount of demand than as usual.
	This information shall include:
	— OD database requested by the users
	— Destination information
	— Core zones clustered
Data required	1) Authorized Key
	2) Arrival information (latitude/longitude)
	3) Core zone information (latitude/longitude)

Table 9 shows the size and description of the dataset required for use case 2.2.

Table 9 — Size and description of dataset required for use case 2.2

No.	Name	Data type (Unit)	M/O[a]	Description
1	Authorized key	UTF8String	M	Access ID to OD database
2	Desired arrival latitude	REAL	M	Desired arrival latitude
3	Desired arrival longitude	REAL	M	Desired arrival longitude
4	Core zone latitude	REAL	M	Latitude of the centroid of the unit core zone
5	Core zone longitude	REAL	M	Longitude of the centroid of the unit core zone
[a] M = Mandatory, O = Optional.				

6.2.2.3 UC 2.3: Network assignment

Table 10 shows the use case 2.3, Network assignment, in order to assign networks based on mobility demand between zones by real time OD database individual request.

Table 10 — Definition of UC 2.3: Network assignment

Use case name	Network assignment
Actor	Centre, ND, cloud server
Goal	Network assignment between zones
Use case input	OD database, core zones information
Use case output	Network assignment output
Brief description	A network is assigned by the amount of inbound and outbound trips between core zones determined based on an OD database in a centre. This information shall include: — OD database — Core zone information — Inbound and outbound trips between core zones — Network assignment information (Trip distribution)
Data required	1) Authorized Key 2) Core zone information (longitude/latitude) 3) Inbound information (number of trip, arrival time) 4) Outbound information (number of trip, departure time) 5) Trip route information (capacity, number of trip route, latitude/longitude)

Table 11 shows the size and description of the dataset required for use case 2.3.

Table 11 — Size and description of dataset required for use case 2.3

No.	Name	Data type (Unit)	M/O[a]	Description
1	Authorized key	UTF8String	M	Access ID to OD database
2	Core zone latitude	REAL	M	Latitude of the centroid of the unit zone
3	Core zone longitude	REAL	M	Longitude of the centroid of the unit zone
4	Number of inbound trip	UTF8String	M	Number of inbound trip into the zone
5	Arrival time of inbound trip	UTF8String	M	Arrival time of inbound trip to the zone
6	Number of outbound trip	UTF8String	M	Number of outbound trip from the zone
7	Departure time of outbound trip	UTF8String	M	Departure time of outbound trip from the zone
8	Network capacity	UTF8String	M	Network capacity between the zones
[a] M = Mandatory, O = Optional.				

Table 11 *(continued)*

No.	Name	Data type (Unit)	M/O[a]	Description
9	Number of trip route	UTF8String	M	Number of trip routes between the zone
10	Trip route_latitude	REAL	M	Trip route_latitude
11	Trip route_longitude	REAL	M	Trip route_longitude
[a]	M = Mandatory, O = Optional.			

6.2.3   Use case cluster 3: Mode assignment

6.2.3.1   UC 3.1: Monitoring modal availability

Table 12 shows the use case 3.1, Monitoring modal availability, in order to check the available transport modes in real time which could be limited upon mobility demand in current urban networks according to the results of traffic assignment.

Table 12 — Definition of UC 3.1: Monitoring modal availability

Use case name	Monitoring modal availability
Actor	Centre, ND, cloud server, service provider
Goal	Available mode information
Use case input	Network assignment information
Use case output	Information of currently available modes in demand
Brief description	Current available modes are monitored and informed to users as a type and number of modes to be assigned with respect to time of demand requested. This information shall include: — Time, location, and size of demand requested — Type and number of available modes to be assigned
Data required	1) Authorized Key 2) User or parcel identification 3) User or parcel departure information (latitude/longitude, time) 4) User or parcel desired arrival information (latitude/longitude, time) 5) Mode information (type, capacity, occupancy, departure time)

Table 13 shows the size and description of the dataset required for use case 3.1.

Table 13 — Size and description of dataset required for use case 3.1

No.	Name	Data type (Unit)	M/O[a]	Description
1	Authorized Key	UTF8String	M	Access ID to OD database
2	User identification	UTF8String	M	User identification, if applicable
3	Parcel identification	UTF8String	M	Parcel(sender) identification, if applicable
4	Departure latitude	REAL	M	Departure latitude of user or parcel
5	Departure longitude	REAL	M	Departure longitude of user or parcel
6	Desired departure time	GeneralizedTime	M	Desired departure time, YYYYMMDDHH24MISS
7	Desired arrival time	GeneralizedTime	M	Desired arrival time, YYYYMMDDHH24MISS
8	Desired arrival latitude	REAL	M	Desired arrival latitude
9	Desired arrival longitude	REAL	M	Desired arrival longitude
10	Mode type	UTF8String	M	Mode type (bus, shuttle, car sharing, bike, etc.)
[a]	M = Mandatory, O = Optional.			

Table 13 *(continued)*

No.	Name	Data type (Unit)	M/O[a]	Description
11	Mode capacity	UTF8String	M	Mode capacity (number of passenger seats)
12	Mode occupancy	UTF8String	M	Mode occupancy
13	Mode departure time	GeneralizedTime	M	Mode departure time, YYYYMMDDHH24MISS
[a] M = Mandatory, O = Optional.				

6.2.3.2   UC 3.2: Mode assignment

Table 14 shows the use case 3.2, Mode assignment, in order to assign trip or delivery modes which have been monitored and optimized on the assigned route based on mobility demand of the user or parcel in the transport network, including designated zones by real time OD database.

Table 14 — Definition of UC 3.2: Mode assignment

Use case name	Mode assignment
Actor	Centre, ND, cloud server
Goal	Assigning trip or delivery modes according to the demand of user or parcel
Use case input	Network assignment information, user OD demand, parcel OD demand
Use case output	Mode assignment information
Brief description	An appropriate mode is to be assigned to the user or parcel delivery based on the modes monitored on the network available in real time according to the demand of the user OD or parcel delivery. This information shall include: — Routes of available modes and trip information — Mode assignment information (for user or parcel)
Data required	1) Authorized key 2) User or parcel identification 3) User or parcel departure information (latitude/longitude, time) 4) User or parcel departure/arrival time 5) User or parcel arrival information (latitude/longitude, time) 6) Trip route information 7) Mode information (type, capacity, occupancy, departure time)

Table 15 shows the size and description of the dataset required for use case 3.2.

Table 15 — Size and description of dataset required for use case 3.2

No.	Name	Data type (Unit)	M/O[a]	Description
1	Authorized Key	UTF8String	M	Access ID to OD database
2	User identification	UTF8String	O	User identification, if applicable
3	Parcel identification	UTF8String	O	Parcel identification, if applicable
4	Departure latitude	REAL	M	Departure latitude of user or parcel
5	Departure longitude	REAL	M	Departure longitude of user or parcel
6	Departure time	GeneralizedTime	M	Departure time, YYYYMMDDHH24MISS
7	Predicted arrival time	GeneralizedTime	M	Predicted arrival time, YYYYMMDDHH24MISS
8	Arrival latitude	REAL	M	Arrival latitude
9	Arrival longitude	REAL	M	Arrival longitude
[a] M = Mandatory, O = Optional.				

Table 15 *(continued)*

No.	Name	Data type (Unit)	M/O[a]	Description
10	Trip route_latitude	REAL	M	Trip route_latitude
11	Trip route_longitude	REAL	M	Trip route_longitude
12	Mode type	UTF8String	M	Trip modes (bus, shuttle, car sharing, bike, etc.)
13	Mode capacity	UTF8String	O	Mode capacity (number of passenger seats)
14	Mode occupancy	UTF8String	O	Mode occupancy
15	Mode departure time	GeneralizedTime	M	Mode departure time, YYYYMMDDHH24MISS
[a] M = Mandatory, O = Optional.				

6.2.4 Use case cluster 4: Guidance and analysis

6.2.4.1 UC 4.1: User trip guidance

Table 16 shows the use case 4.1, User trip guidance, in order to provide trip guidance information to users which is optimized with the route and mode assignments, based on the mobility demand of the user in the transport network, including designated zones by real time OD database.

Table 16 — Definition of UC 4.1: User trip guidance

Use case name	User trip guidance
Actor	Centre, ND, cloud server, user
Goal	Providing trip guidance information to user from centre
Use case input	Trip demand from user
Use case output	Trip guidance information to user
Brief description	Optimized trip guidance information is provided to the user according to the trip demand request from user. This information shall include: — User mode choice option — Trip guidance with modes and route (including visualized information)
Data required	1) Authorized key 2) User identification 3) User information (departure/arrival location, departure/arrival time) 4) Mode information (type, capacity, departure/arrival time) 5) Network information (core zone, trip route)

Table 17 shows the size and description of the dataset required for use case 4.1.

Table 17 — Size and description of dataset required for use case 4.1

No.	Name	Data type (Unit)	M/O[a]	Description
1	Authorized Key	UTF8String	M	Access ID to OD database
2	User identification	UTF8String	M	User identification
3	Departure latitude	REAL	M	User's departure latitude
4	Departure longitude	REAL	M	User's departure longitude
5	Departure time	GeneralizedTime	M	User's departure time, YYYYMMDDHH24MISS
6	Arrival time	GeneralizedTime	M	(Predicted) User's arrival time, YYYYMMDDHH24MISS
[a] M = Mandatory, O = Optional.				