
**Intelligent transport systems (ITS) —
Nomadic device service platform for
micro mobility —**

**Part 3:
Data structure and data exchange
procedures**

*Systèmes de transport intelligents (ITS) — Plate-forme de services via
appareils nomades pour la micro-mobilité —*

Partie 3: Structure des données et procédures d'échange de données

STANDARDSISO.COM : Click to view the full PDF of ISO 22085-3:2022



STANDARDSISO.COM : Click to view the full PDF of ISO 22085-3:2022



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

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.....	v
Introduction.....	vi
1 Scope.....	1
2 Normative references.....	1
3 Terms, definitions and abbreviated terms.....	1
3.1 Terms and definitions.....	1
3.2 Abbreviated terms.....	2
4 Overview.....	3
4.1 Introduction.....	3
4.2 Message overview.....	4
5 Data structure.....	5
5.1 Data structure for request-mm-status.....	5
5.2 Data structure for mm-status-response.....	5
5.3 Data structure for stop-notify-mm-status.....	6
5.4 Data structure for notify-mm-service.....	6
5.5 Data structure for stop-notify-mm-service.....	7
5.6 Data structure for charging-station-information.....	8
5.7 Data structure for parking-space-information.....	8
5.8 Data structure for reservation-information.....	9
5.9 Data structure for public-transit-schedule.....	10
5.10 Data structure for public-transit-reserved-information.....	10
5.11 Data structure for navigation-route-information.....	11
5.12 Data structure for traffic-information.....	11
5.13 Data structure for accident-information.....	12
5.14 Data structure for danger-zone-information.....	12
5.15 Data structure for warning-message.....	13
5.16 Data structure for toll-balance-information.....	14
5.17 Data structure for disconnection-warning-message.....	15
5.18 Data structure for return-information.....	16
5.19 Data structure for payment-information.....	17
5.20 request-public-transit-schedule.....	18
5.21 request-public-transit-reservation.....	18
6 Data exchange procedure.....	19
6.1 Overview.....	19
6.2 Pre-trip.....	19
6.2.1 General.....	19
6.2.2 UC 1.1 MM information providing service.....	19
6.2.3 UC 1.2 Navigation service-linked information on charging station.....	20
6.2.4 UC 1.3 Pre-scanning available parking space service.....	21
6.2.5 UC 1.4 MM sharing service.....	22
6.2.6 UC 1.5 MM as an integrated mobility service.....	23
6.3 En-route.....	24
6.3.1 General.....	24
6.3.2 UC 2.1 Traffic information providing service.....	24
6.3.3 UC 2.2 MM status monitoring service.....	25
6.3.4 UC 2.3 Mobile tolling service.....	26
6.3.5 UC 2.4 Adaptive route management service.....	27
6.3.6 UC 2.5 Searching available parking space service on the way.....	28
6.3.7 UC 2.6 Keyless go service for shared MM.....	29
6.3.8 UC 2.7 Interconnected transfer information providing service.....	30
6.4 Post-trip.....	31
6.4.1 General.....	31

6.4.2	UC 3.1 MM driving information providing service	31
6.4.3	UC 3.2 Charging station information service.....	32
6.4.4	UC 3.3 Parked MM position providing service	33
6.4.5	UC 3.4 Shared MM return service	34
Bibliography		36

STANDARDSISO.COM : Click to view the full PDF of ISO 22085-3:2022

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).

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).

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 204, *Intelligent transport systems*.

A list of all parts in the ISO 22085 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

Micro mobility can be defined as a small or compact-sized electric vehicle. Normally, it is designed to be used as a first-mile and last-mile service connecting public transit routes or to provide personal mobility with one or two passengers for a short-distance trip.

The nomadic device service platform aims to accommodate the specific needs of integrated mobility services for either urban or rural areas. The service platform focuses on the use of data exchange interface standards between micro mobility and nomadic devices to enable the development of cloud-based ITS using wireless networks.

This document fosters the introduction of nomadic devices in the public transport and automotive world. It specifies the data structure and data exchange procedure based on Data eXchange Messages (DXMs) at the application level regarding pre-trip, post-trip and while driving, in order to identify connectivity among a user's personal ITS station (P-ITS-S, for example nomadic devices), vehicle-ITS-station gateway (V-ITS-S) and central ITS station (C-ITS-S).

This document covers subjects related to mobility services using micro mobility, including micro mobility sharing, parcel delivery and first-mile and last-mile connections in urban areas. This DXM implementation describes how such mobility services based on micro mobility are provided using a P-ITS-S.

STANDARDSISO.COM : Click to view the full PDF of ISO 22085-3:2022

Intelligent transport systems (ITS) — Nomadic device service platform for micro mobility —

Part 3: Data structure and data exchange procedures

1 Scope

This document specifies the data structure and data exchange procedure related to micro mobility service applications utilizing a P-ITS-S (i.e. nomadic devices), including car sharing, parcel delivery and first-mile and last-mile connections. In addition, this document delivers related requirements for the development and operation of the service platform between nomadic devices and micro mobility with intelligent transport systems (ITS) technologies.

This document defines a data structure and data exchange procedure based on the datasets and messages which are defined in ISO 22085-2.

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 21217, *Intelligent transport systems — Station and communication architecture*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 21217 and the following apply.

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/>

3.1 Terms and definitions

3.1.1 central ITS station C-ITS-S

ITS station assuming a central role

3.1.2 personal ITS station P-ITS-S

implementation of an ITS station as a personal ITS subsystem (e.g. nomadic device or mobile device) which provides communication connectivity via a wireless communication network (3G, 4G, and 5G), mobile wireless broadband (WiMAX, HC-SDMA, etc.), WiFi and short-range links, such as Bluetooth, Zigbee, etc. to connect portable devices to the motor vehicle communications system network

3.1.3

micro mobility

MM

eco-friendly personal electric vehicle for one or two passengers

3.1.4

in mobility network

IMN

local network bus among electrical control units in *micro mobility* (3.1.3), providing diagnostics information to a *P-ITS-S* (3.1.2) through a *V-ITS-SG* (3.1.8)

3.1.5

micro mobility service provider

MMSP

service provider for *micro mobility* (3.1.3), including parking lot management service, public transit authority, charging station management service, tolling service authority, car sharing service and traffic information service, amongst others

3.1.6

micro mobility communication network

MMCN

communication network between *P-ITS-S* (3.1.2) and *C-ITS-S* (3.1.1)

3.1.7

public communication network

PCN

network between micro mobility cloud servers (MMCS) and *micro mobility service providers* (3.1.5) used to provide *micro mobility* (3.1.3) services information on, for example, charging stations, parking lots and traffic congestion

3.1.8

vehicle-ITS-station gateway

V-ITS-SG

ITS-S node used to interconnect two different OSI protocol stacks at layers 5 through to 7 between an *in mobility network* (3.1.4) and a *P-ITS-S* (3.1.2)

3.2 Abbreviated terms

C	conditional
DTC	diagnostic trouble code
DXM	data exchange message
EXE	executor
IMN	in mobility network
ITIPS	interconnected transfer information providing service
ITS	intelligent transport systems
ND	nomadic device
M	mandatory
MM	micro mobility
MMCS	micro mobility cloud server

- MMIMS Micro mobility as an integrated mobility service
- MMSRS micro mobility sharing service
- 0 optional
- SAPSS searching available parking space service
- SOC state of charge

4 Overview

4.1 Introduction

Conceptual aspects of the general use cases in ISO/TR 22085-1 are depicted in [Figure 1](#) and are summarized in [Table 1](#). Details of ITS-S (i.e. V-ITS-S, P-ITS-S, and C-ITS-S) are specified in ISO 21217.

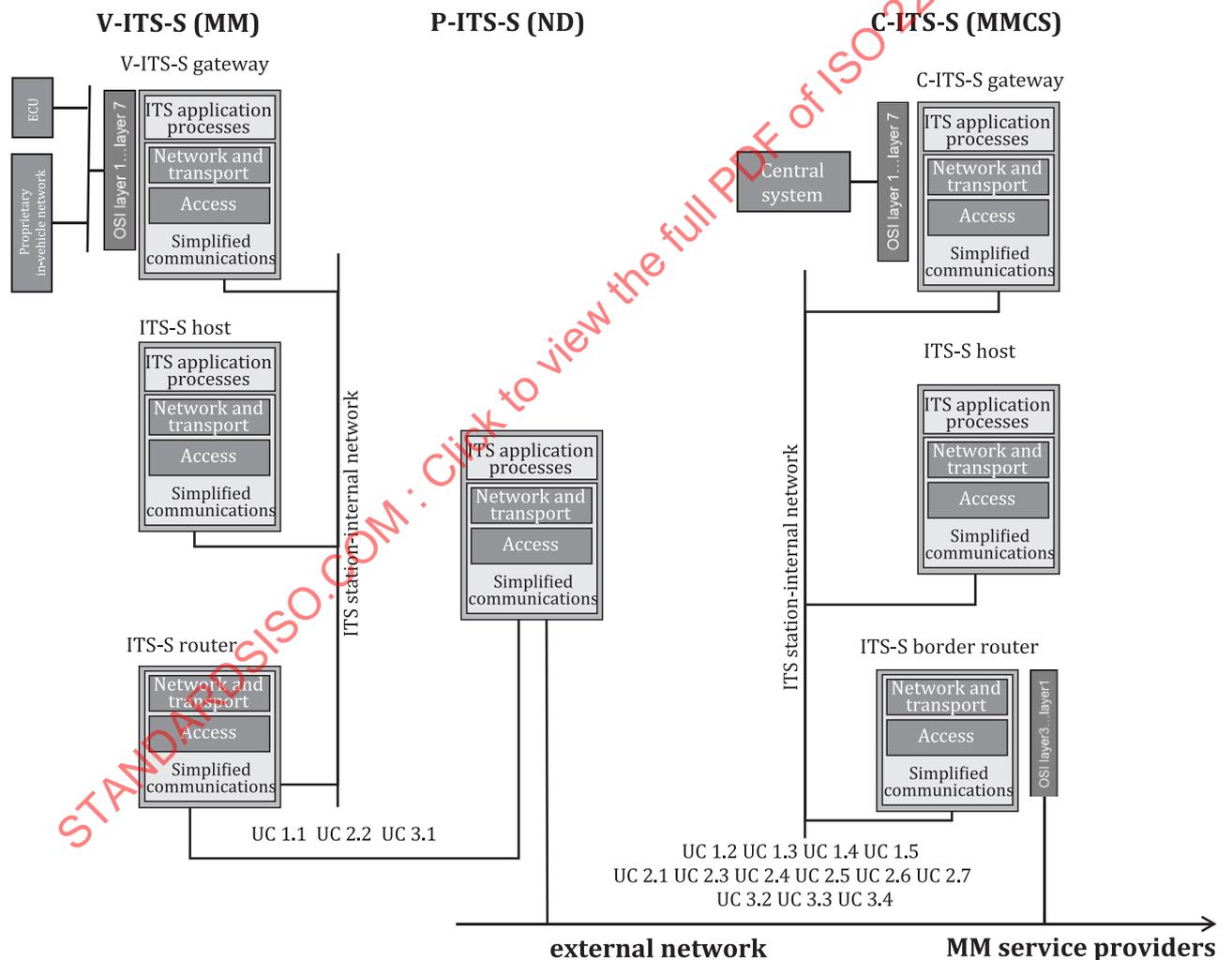


Figure 1 — Conceptual aspects of the general use cases

Table 1 — Use cases clusters and associated use cases overview

Title of use cases cluster	Brief description
1. Pre-trip	This cluster specifies the detailed use cases of pre-trip stage for MM. It includes 5 different use cases:

Table 1 (continued)

Title of use cases cluster	Brief description
	<ul style="list-style-type: none"> — UC 1.1 – MM information providing services — UC 1.2 – Navigation service linked information on charging station — UC 1.3 – Pre-scanning available parking space service — UC 1.4 – MM sharing service — UC 1.5 – MM as an integrated mobility service
2. En-route	<p>This cluster specifies the detailed use cases of the en-route stage for MM. It includes 7 different use cases.</p> <ul style="list-style-type: none"> — UC 2.1 – Traffic information providing service — UC 2.2 – MM status monitoring service — UC 2.3 – Mobile tolling service — UC 2.4 – Adaptive route management service — UC 2.5 – Searching available parking space service on the way — UC 2.6 – Keyless go service for shared micro-mobility — UC 2.7 – Interconnected transfer information providing service
3. Post-trip	<p>This cluster specifies the detailed use cases of post-trip stage for MM. It includes 4 different use cases.</p> <ul style="list-style-type: none"> — UC 3.1 – MM driving information providing service — UC 3.2 – Charging station information service — UC 3.3 – Parked MM position providing service — UC 3.4 – Sharing MM return service

4.2 Message overview

DXMs regarding the use cases defined in ISO/TR 22085-1 are summarized in [Table 2](#).

Table 2 — DXMs for mobility service using MM

ID	DXM name	Exe	Description
1	request-mm-status	P	Request V-ITS-S to notify MM status with SOC, DTC, mileage, V-ITS-S-ID.
2	mm-status-response	V	Send MM status information (V-ITS-S-ID, SOC, DTC, mileage) to P-ITS-S.
3	stop-notify-mm-status	P	Stop sending MM status information to P-ITS-S.
4	notify-mm-service	P	Send MM status information, V-ITS-S-ID, position and user information to C-ITS-S. After the first contact, send only the P-ITS-S position, MM status information and V-ITS-S-ID in a predefined time interval.
5	stop-notify-mm-service	P	Stop the communication to the C-ITS-S.
6	charging-station-information	C	Send charging station location to P-ITS-S.
7	parking-space-information	C	Send parking location information to P-ITS-S.

Table 2 (continued)

ID	DXM name	Exe	Description
8	reservation-information	C	Send sharing service reservation information to P-ITS-S.
9	public-transit-schedule	C	Send public transit information with arrival/departure time and transit type to P-ITS-S.
10	public-transit-reserved-information	C	Send reserved information to P-ITS-S.
11	navigation-route-information	C	Send navigation route information to P-ITS-S.
12	traffic-information	C	Send traffic information to ND (P-ITS-S) from server (C-ITS-S).
13	accident-information	C	Send accident information from server (C-ITS-S) to ND (P-ITS-S).
14	danger-zone-information	C	Send danger zone location information to P-ITS-S.
15	warning-message	C	Send warning message if DTC error has occurred.
16	toll-balance-information	C	Definition of toll-balance-information.
17	disconnection-warning-message	C	Send connection lost warning message where connection between V-ITS-S and P-ITS-S has been disconnected.
18	return-information	C	Send returning MM information.
19	payment-information	C	Send sharing service reservation information to P-ITS-S.
20	request-public-transit-schedule	P	Send public transit schedule request from ND (P-ITS-S) to server (C-ITS-S).
21	request-public-transit-reservation	P	Reserve public transit schedule from ND (P-ITS-S) to server (C-ITS-S).

5 Data structure

5.1 Data structure for request-mm-status

Table 3 shows the data structure for the DXM request-mm-status to request MM status information and V-ITS-S ID from the ND (P-ITS-S).

Table 3 — Data structure for request-mm-status

Msg	ID	1	Request that V-ITS-S notifies MM status with SOC, DTC, mileage and V-ITS-S-ID.
	name	request-mm-status	
	exec	P-ITS-S	
Data structure	<pre> graph TD A[request-mm-status] -- null --> B[No dataset] </pre>		

5.2 Data structure for mm-status-response

Table 4 shows the data structure for the DXM mm-status-response to send MM status information to the ND (P-ITS-S).

Table 4 — Data structure for mm-status-response

Msg	ID	2	Send MM status information (V-ITS-S-ID, SOC, DTC, mileage) to the P-ITS-S
	name	mm-status-response	
	exec	V-ITS-S	
Data structure	<pre> graph TD A[request-mm-status] -- textString --> B[V-ITS-S-ID] A -- group --> C[MM status] A -- numeric4 --> D[Mileage] C -- numeric2 --> E[SOC] C -- enumString --> F[DTC] </pre>		

5.3 Data structure for stop-notify-mm-status

Table 5 shows the data structure for the DXM stop-notify-mm-status to stop the communication from the vehicle (V-ITS-S).

Table 5 — Data structure for stop-notify-mm-status

Msg	ID	3	Stop sending MM status information to the P-ITS-S.
	name	stop-notify-mm-status	
	exec	P-ITS-S	
Data structure	<pre> graph TD A[stop-notify-mm-service] -- null --> B[No dataset] </pre>		

5.4 Data structure for notify-mm-service

Table 6 shows the data structure for the DXM notify-mm-service to send MM status information, V-ITS-S-ID, position, user information from the P-ITS-S to the C-ITS-S.

Table 6 — Data structure for notify-mm-service

Msg	ID	4	Send MM status information, V-ITS-S-ID, position and user information to the C-ITS-S. After the first contact, send only the P-ITS-S position, MM status information and V-ITS-S-ID in a predefined time interval.
	name	notify-mm-service	
	exec	P-ITS-S	
Data structure			

5.5 Data structure for stop-notify-mm-service

Table 8 shows the data structure for the DXM stop-notify-mm-service to send MM status information, V-ITS-S-ID, position and user information from the P-ITS-S to the C-ITS-S.

Table 7 — Data structure for stop-notify-mm-service

Msg	ID	5	Stop the communication to the C-ITS-S.
	name	stop-notify-mm-service	
	exec	P-ITS-S	
Data structure	<pre> graph TD A[stop-notify-mm-status] -- null --> B[No dataset] </pre>		

5.6 Data structure for charging-station-information

Table 8 shows the data structure for the DXM charging-station-information to send charging station location information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 8 — Data structure for charging-station-information

Msg	ID	6	Send charging station location to P-ITS-S.
	name	charging-station-information	
	exec	C-ITS-S	
Data structure	<pre> graph TD A[charging-station-information] -- group --> B[Station Location] B -- numeric4 --> C[Latitude] B -- numeric4 --> D[Longitude] B -- numeric2 --> E[Elevation] </pre>		

5.7 Data structure for parking-space-information

Table 9 shows the data structure for the DXM parking-space-information to send available parking space information from the server (C-ITS-S) to the nomadic device (P-ITS-S).

Table 9 — Data structure for parking-space-information

Msg	ID	7	Send parking location information to the P-ITS-S.
	name	parking-space-information	
	exec	C-ITS-S	
Data structure			
	<p>Parking-space-information</p>		
	<p>group → Parking Location</p>		
	<p>numeric4 → Latitude</p>		
	<p>numeric4 → Longitude</p>		
<p>numeric2 → Elevation</p>			

5.8 Data structure for reservation-information

Table 10 shows the data structure for the DXM reservation-information to send MM sharing service reservation information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 10 — Data structure for reservation-information

Msg	ID	8	Send sharing service reservation information to the P-ITS-S.
	name	reservation-information	
	exec	C-ITS-S	
Data structure			
	<p>reservation-information</p>		
	<p>group → User information</p>		
	<p>enumString → ID</p>		
	<p>enumString → Account number</p>		
	<p>numeric2 → Valid year</p>		
	<p>numeric2 → Valid month</p>		
<p>enumString → Security number</p>			

5.9 Data structure for public-transit-schedule

Table 11 shows the data structure for the DXM public-transit-schedule to send public transit schedule information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 11 — Data structure for public-transit-schedule

Msg	ID	9	Send public transit information with arrival/departure time and transit type to the P-ITS-S.
	name	public-transit-schedule	
	exec	C-ITS-S	
Data structure	<pre> graph TD Root[public-transit-schedule] -- group --> G1[Public-transit-station-location] Root -- group --> G2[Public-transit-schedule] G1 -- numeric4 --> L[Latitude] G1 -- numeric4 --> Lon[Longitude] G1 -- numeric2 --> E[Elevation] G2 -- textString --> AT[Arrival time] G2 -- textString --> DT[Departure time] </pre>		

5.10 Data structure for public-transit-reserved-information

Table 12 shows the data structure for the DXM public-transit-reserved-information to send public transit reservation information from the ND (P-ITS-S) to the server (C-ITS-S).

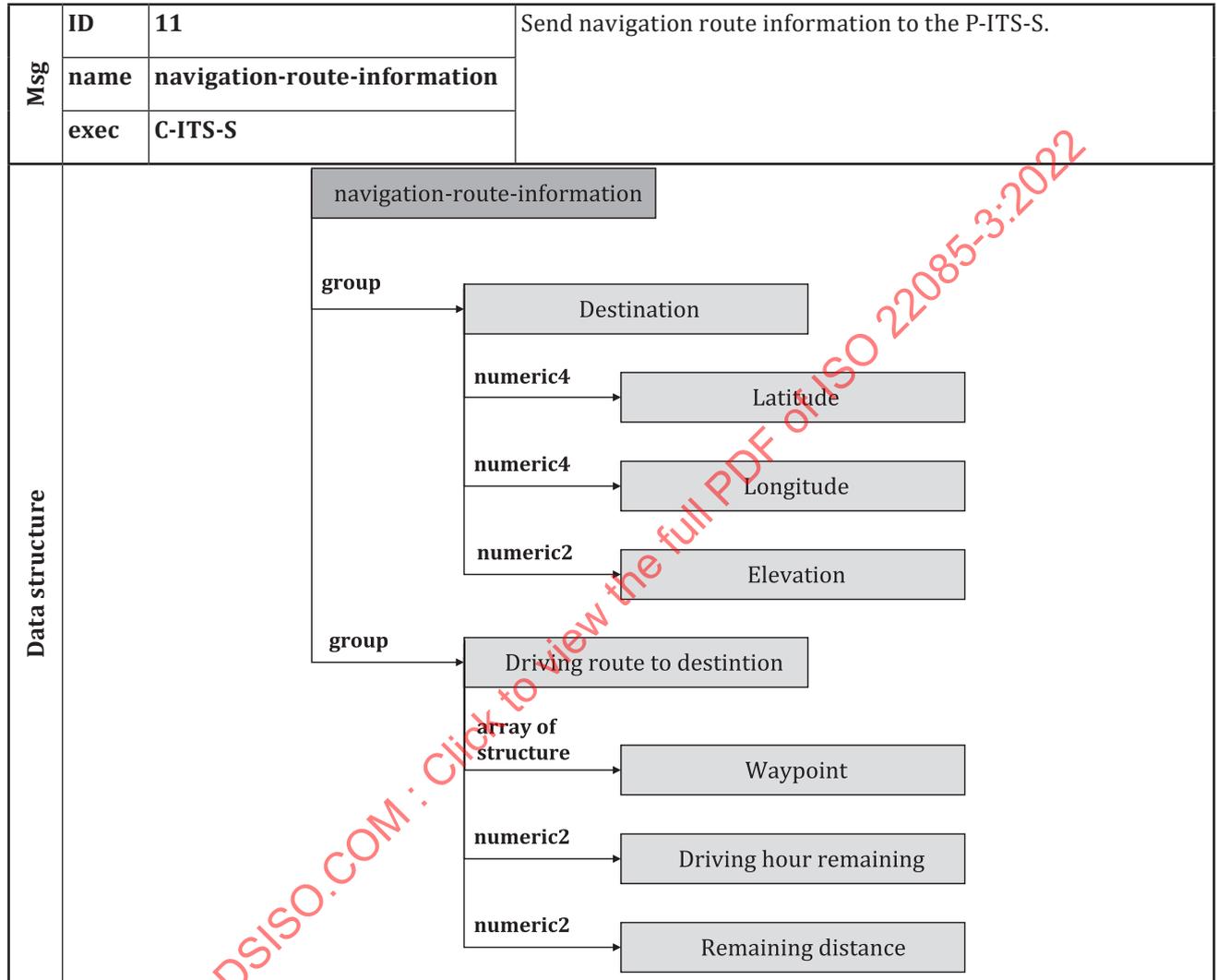
Table 12 — Data structure for public-transit-reserved-information

Msg	ID	10	Send transit reserved information to the P-ITS-S.
	name	public-transit-reserved-information	
	exec	C-ITS-S	
Data structure	<pre> graph TD Root[public-transit-reserved-information] -- null --> NoDataset[No dataset] </pre>		

5.11 Data structure for navigation-route-information

Table 13 shows the data structure for the DXM navigation-route-information to send navigation route information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 13 — Data structure for public-transit-reservation



5.12 Data structure for traffic-information

Table 14 shows the data structure for the DXM traffic-information to send traffic information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 14 — Data structure for traffic-information

Msg	ID	12	Send traffic information to the ND (P-ITS-S) from the server (C-ITS-S).
	name	traffic-information	
	exec	C-ITS-S	
Data structure	<pre> graph TD TI[traffic-information] -- group --> TI2[Traffic information] TI2 -- BitString --> LI[Link ID] TI2 -- numeric2 --> TS[Traffic speed] TI2 -- numeric2 --> TV[Traffic volume] TI2 -- numeric2 --> TD[Traffic density] </pre>		

5.13 Data structure for accident-information

Table 15 shows the data structure for the DXM accident-information to send accident information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 15 — Data structure for accident-information

Msg	ID	13	Send accident information from the server (C-ITS-S) to the ND (P-ITS-S).
	name	accident-information	
	exec	C-ITS-S	
Data structure	<pre> graph TD AI[accident-information] -- group --> AL[Accident location] AL -- numeric4 --> L[Latitude] AL -- numeric4 --> LO[Longitude] AL -- numeric2 --> E[Elevation] </pre>		

5.14 Data structure for danger-zone-information

Table 16 shows the data structure for the DXM danger-zone-information to send danger zone information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 16 — Data structure for danger-zone-information

Msg	ID	14	Send danger zone information from server (C-ITS-S) to the ND (P-ITS-S).
	name	danger-zone-information	
	exec	C-ITS-S	
Data structure	<pre> graph TD A[danger-zone-information] -- group --> B[Danger zone] B -- numeric4 --> C[Latitude] B -- numeric4 --> D[Longitude] B -- numeric2 --> E[Elevation] </pre>		

5.15 Data structure for warning-message

[Table 17](#) shows the data structure for the DXM warning-message to send a warning message from the server (C-ITS-S) to the ND (P-ITS-S).

STANDARDSISO.COM : Click to view the full PDF of ISO 22085-3:2022

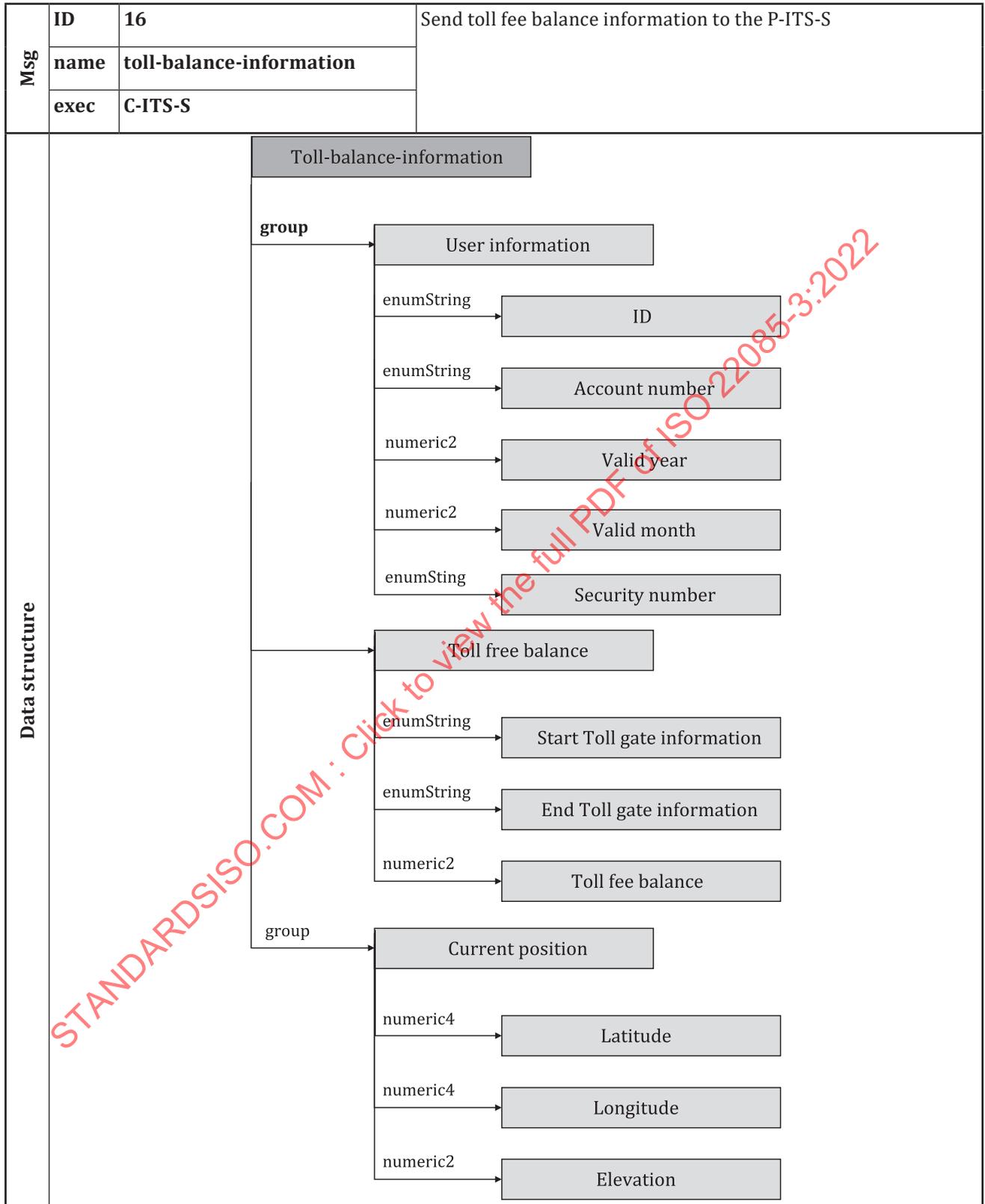
Table 17 — Data structure for warning-message

Msg	ID	15	Send warning message if DTC error has occurred.
	name	warning-message	
	exec	C-ITS-S	
Data structure	<pre> graph TD A[warning-message] -- enumString --> B[messageType] A -- textString --> C[V-ITS-S-ID] A -- DtcBase --> D[DTC] A -- group --> E[Event position] E -- numeric4 --> F[Latitude] E -- numeric4 --> G[Longitude] E -- numeric2 --> H[Elevation] </pre>		

5.16 Data structure for toll-balance-information

Table 18 shows the data structure for the DXM toll-balance-information to send toll balance information from the server (C-ITS-S) to the ND (P-ITS-S).

Table 18 — Data structure for toll-balance



5.17 Data structure for disconnection-warning-message

[Table 19](#) shows the data structure for the DXM disconnection-warning-message to send a connection lost warning message from the server (C-ITS-S) to the ND (P-ITS-S).

Table 19 — Data structure for connection-lost-warning

Msg	ID	17	Send a connection lost warning message where the connection between the V-ITS-S and the P-ITS-S has been disconnected.
	name	disconnection-warning-message	
	exec	P-ITS-S	
Data structure	<pre> graph TD Root[disconnection-warning-message] -- enumString --> MT[messageType] Root -- textString --> VITS[V-ITS-S-ID] Root -- group --> DisPos[Disconnected position] DisPos -- numeric4 --> Lat[Latitude] DisPos -- numeric4 --> Long[Longitude] DisPos -- numeric2 --> Elev[Elevation] </pre>		

5.18 Data structure for return-information

Table 20 shows the data structure for the DXM return-information to send information of returning MM from the server (C-ITS-S) to the ND (P-ITS-S).

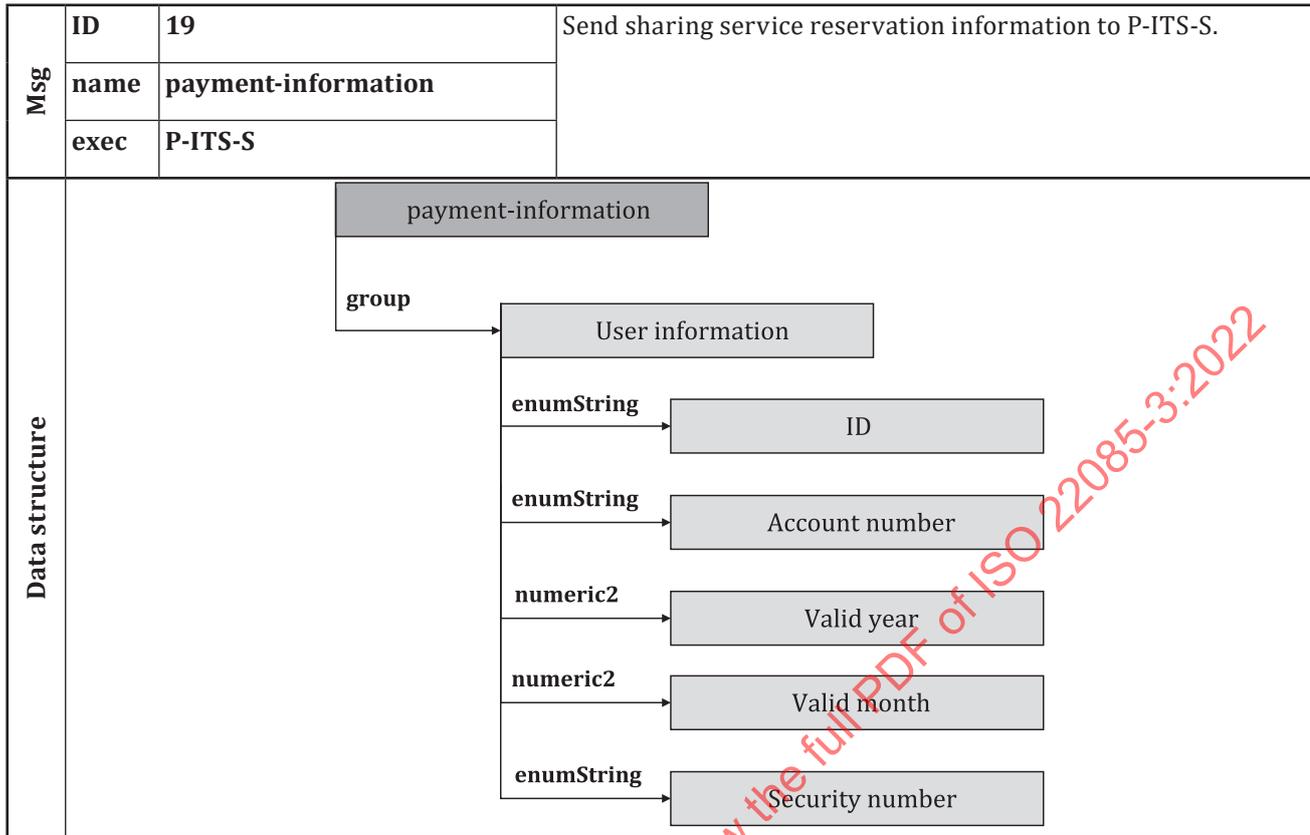
Table 20 — Data structure for connection-lost-warning

Msg	ID	18	Send returning MM information.
	name	return-information	
	exec	C-ITS-S	
Data structure	<pre> graph TD RI[return-information] -- enumString --> MT[messageType] RI -- textString --> VITS[V-ITS-S-ID] RI -- group --> MM[MM return information] RI -- group --> RP[Returned position] MM -- numeric2 --> GMP[Green mileage point] MM -- numeric4 --> DH[Driven hour] MM -- numeric2 --> DM[Driven mileage] RP -- numeric4 --> LAT[Latitude] RP -- numeric4 --> LONG[Longitude] RP -- numeric2 --> ELEV[Elevation] </pre>		

5.19 Data structure for payment-information

Table 21 shows the data structure for the DXM payment-information to send user payment information from the device (P-ITS-S) to the server (C-ITS-S).

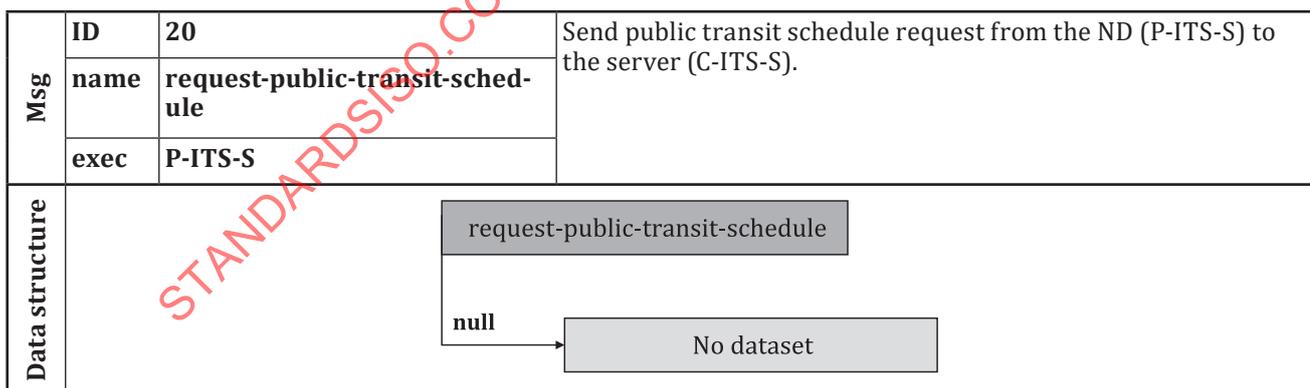
Table 21 — Data structure for payment-information



5.20 request-public-transit-schedule

Table 22 shows the data structure for the DXM request-public-transit-schedule to send a public transit schedule request from the ND (P-ITS-S) to the server (C-ITS-S).

Table 22 — Data structure for request-public-transit-schedule



5.21 request-public-transit-reservation

Table 23 shows the data structure for the DXM request-public-transit-reservation to send a public transit schedule request from the ND (P-ITS-S) to the server (C-ITS-S).

Table 23 — Data structure for request-public-transit-reservation

Msg	ID	21	Reserve public transit schedule from the ND (P-ITS-S) to the server (C-ITS-S).
	name	request-public-transit-reservation	
	exec	P-ITS-S	
Data structure	<pre> graph TD A[request-public-transit-reservation] -- null --> B[No dataset] </pre>		

6 Data exchange procedure

6.1 Overview

This document provides data exchange procedures using a DXM for each use case defined in ISO/TR 22085-1, to provide integrated mobility or postal delivery services using MM.

6.2 Pre-trip

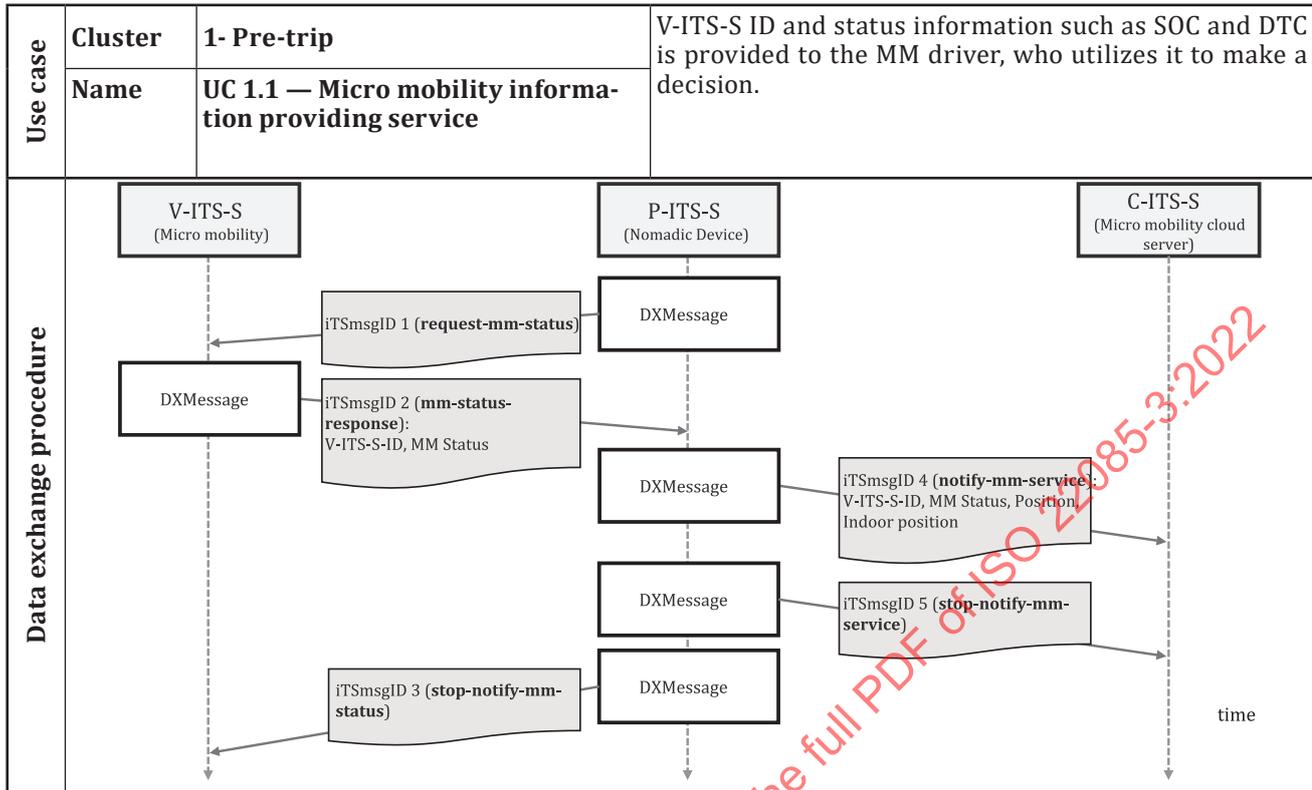
6.2.1 General

A dataset in the pre-trip phase is defined which includes information on vehicle identification, location and status. It is provided to an MM driver through a P-ITS-S.

6.2.2 UC 1.1 MM information providing service

Use case 1.1 requires containing the status information of the MM. When the MM is chosen, the V-ITS-S-ID and status information of the MM and a MM driver's P-ITS-S identification is transferred to a C-ITS-S (or MMCS) for providing the services in use case 1.1. [Table 24](#) shows the data exchange procedure required for use case 1.1.

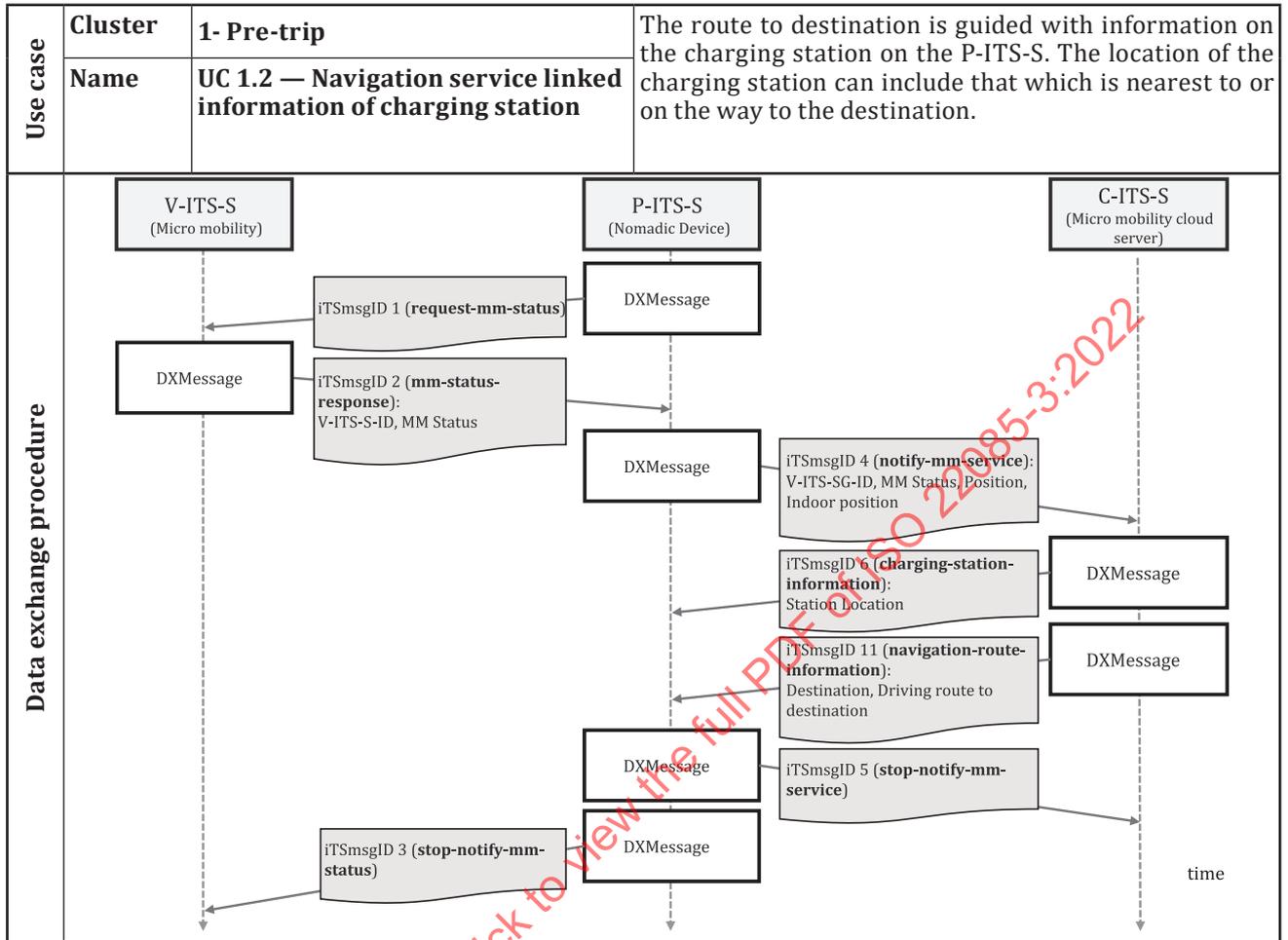
Table 24 — Data exchange procedure for use case 1.1



6.2.3 UC 1.2 Navigation service-linked information on charging station

Use case 1.2 requires a DXM to provide route-linked information on a charging station to an MM driver. When a destination is set, a C-ITS-S (or MMCS) collects information on expected routes for the MM and locations of charging stations. After that, the C-ITS-S (or MMCS) transfers them to the P-ITS-S. Information on locations of charging stations includes charging stations on the route or nearest to the destination. [Table 25](#) shows the data exchange procedure required for use case 1.2.

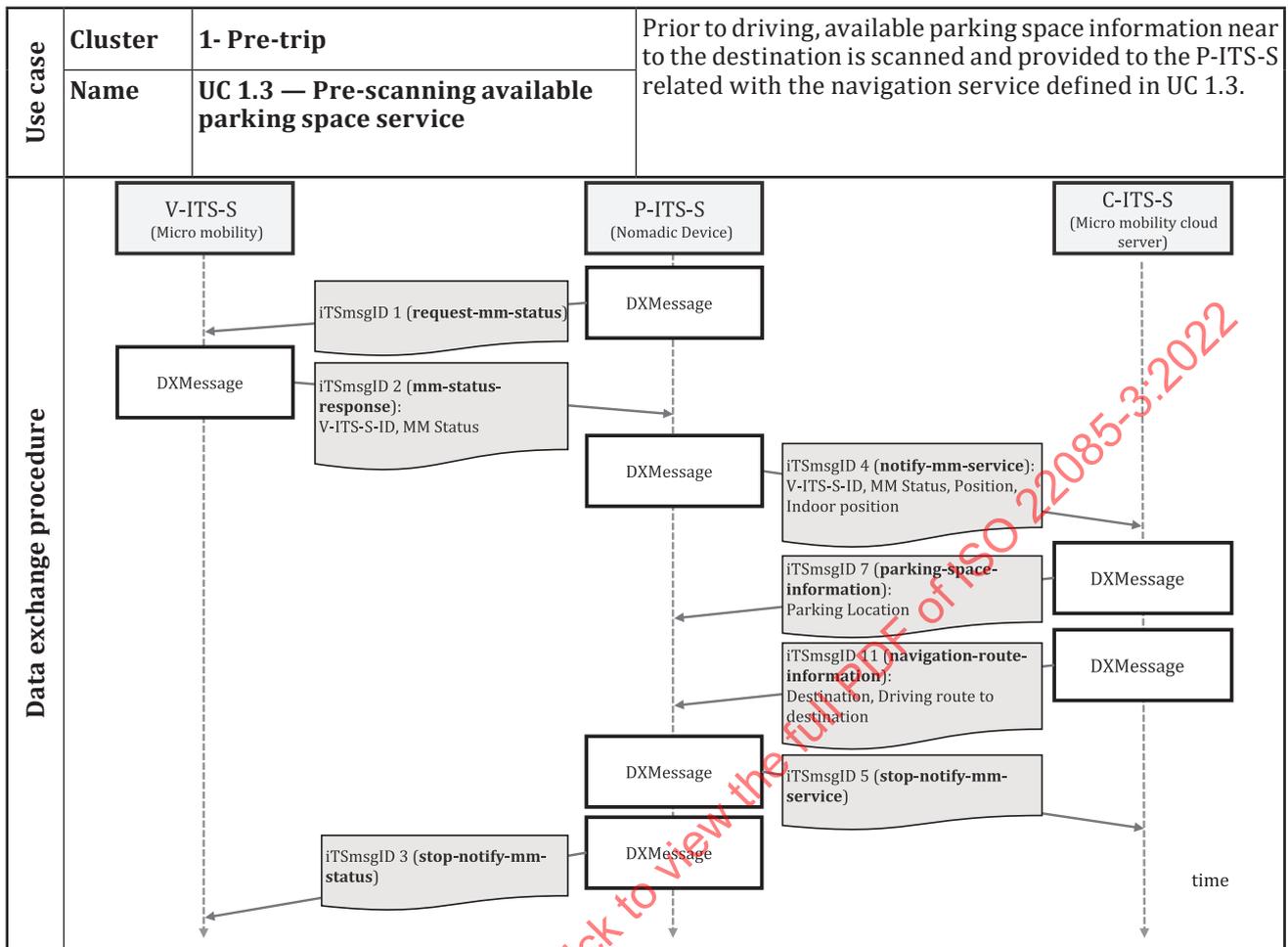
Table 25 — Data exchange procedure for use case 1.2



6.2.4 UC 1.3 Pre-scanning available parking space service

Use case 1.3 requires a DXM for providing information on available parking spaces nearby the destination to an MM driver in the pre-trip phase. A C-ITS-S (or MMCS) transfers the information on available parking spaces nearby the destination to the P-ITS-S. [Table 26](#) shows the data exchange procedure required for use case 1.3.

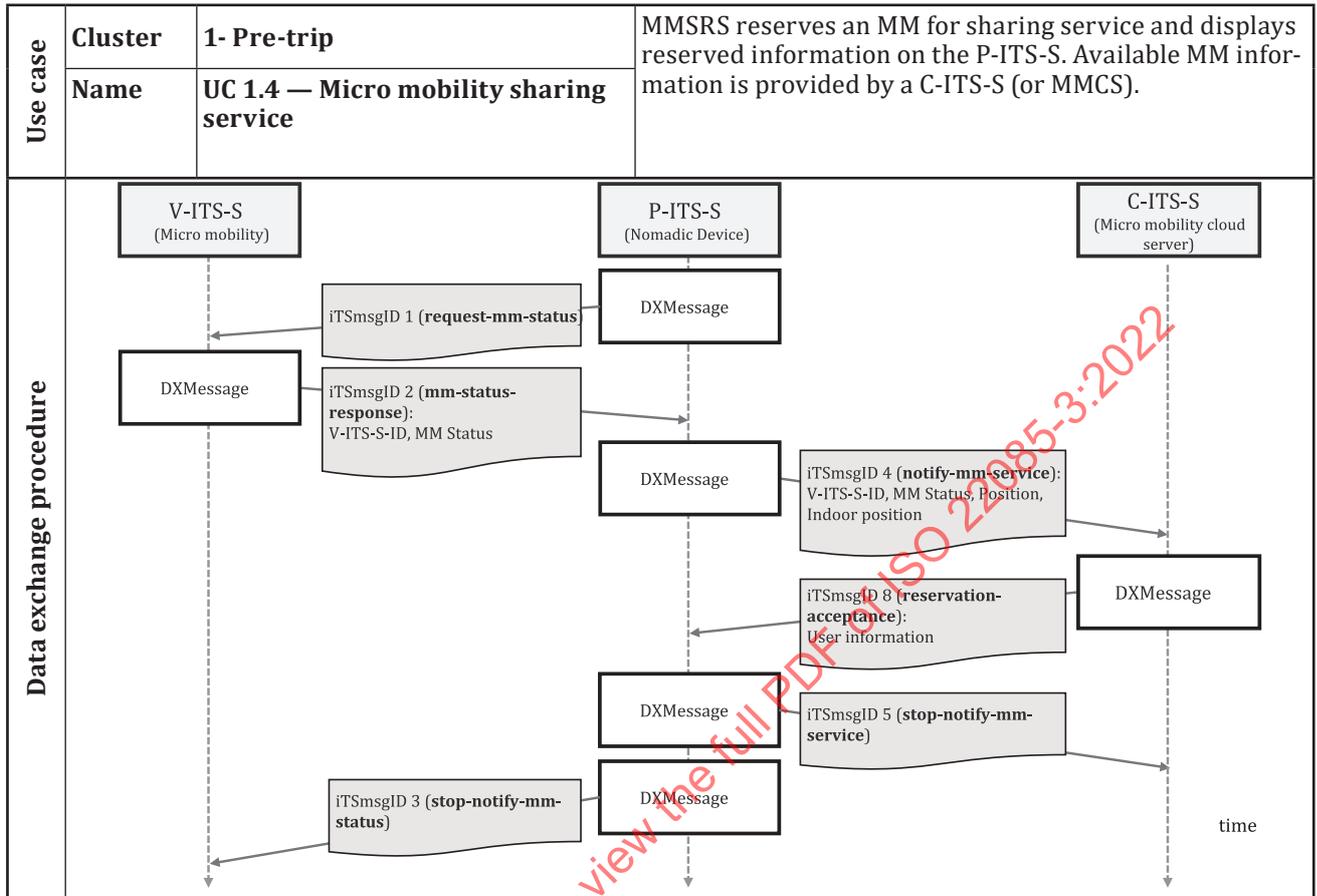
Table 26 — Data exchange procedure for use case 1.3



6.2.5 UC 1.4 MM sharing service

Use case 1.4 requires a DXM to provide information related to an MM sharing service. Information related to searching available MM, reservation and payment is transferred to a C-ITS-S (or MMCS). [Table 27](#) shows the data exchange procedure required for use case 1.4.

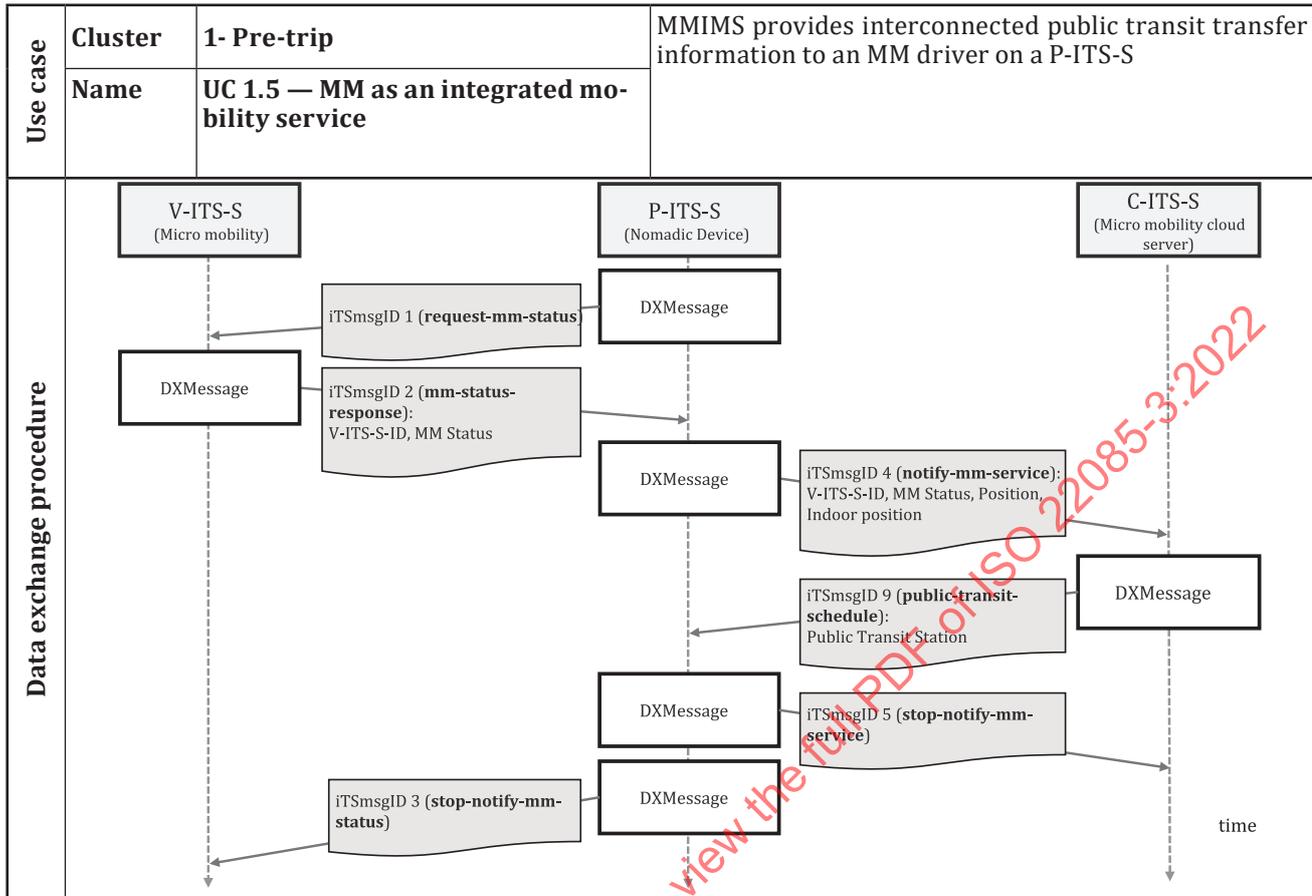
Table 27 — Data exchange procedure for use case 1.4



6.2.6 UC 1.5 MM as an integrated mobility service

Use case 1.5 requires a DXM to provide information to an MM driver, which is related to transferring to public transportation before or after using MM. A C-ITS-S (or MMCS) transfers information to the P-ITS-S on transferable public transportation and available stations related to the MM driver’s destination. [Table 28](#) shows the data exchange procedure required for use case 1.5.

Table 28 — Data exchange procedure for use case 1.5



6.3 En-route

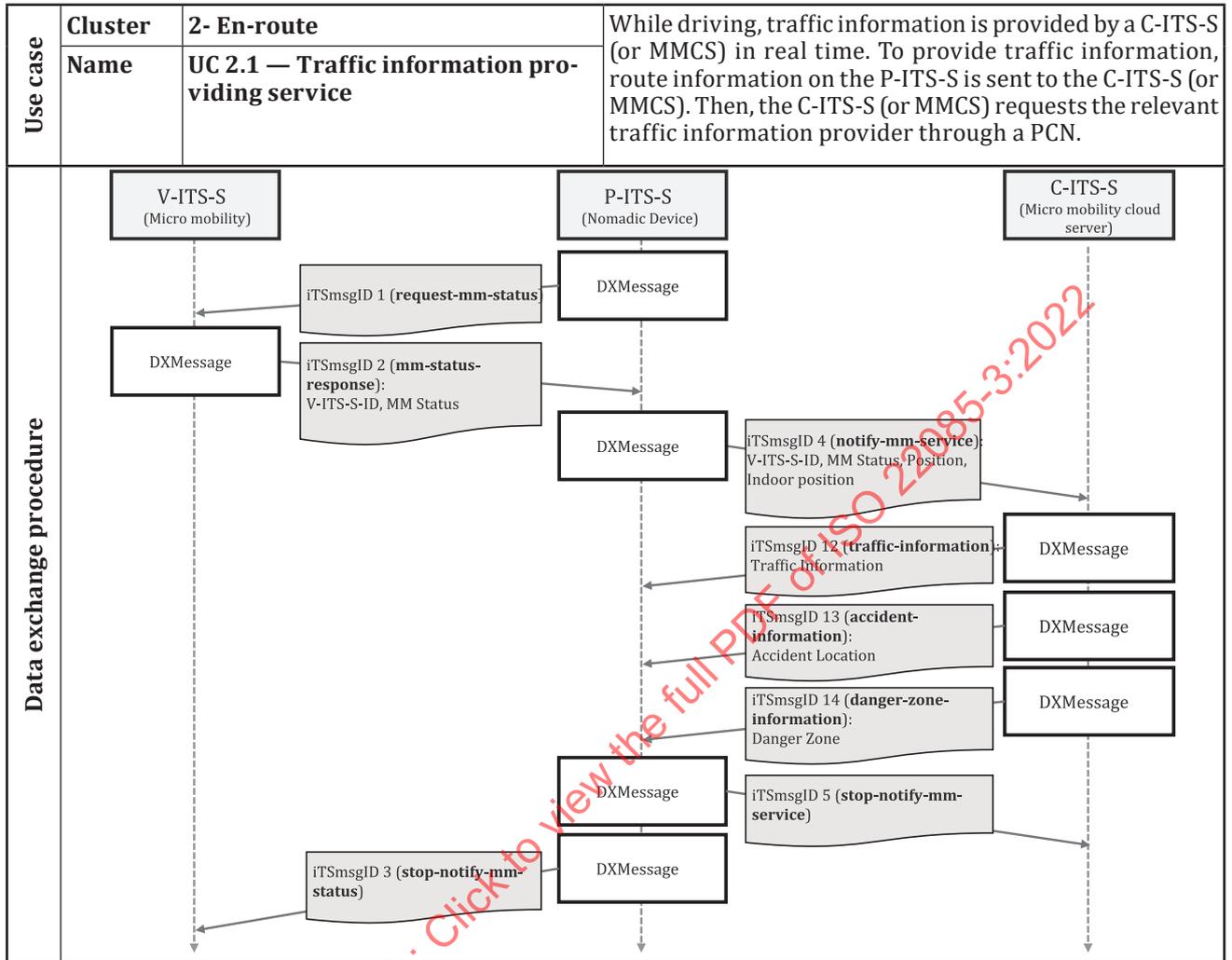
6.3.1 General

A DXM in the en-route phase is defined including information on MM operation and surrounding traffic. It is provided to an MM driver and a C-ITS-S (or MMCS) through a P-ITS-S.

6.3.2 UC 2.1 Traffic information providing service

Use case 2.1 requires a DXM to provide information to an MM driver on surrounding traffic in relation to the MM while driving. A P-ITS-S transfers route information to a C-ITS-S (or MMCS). After that, the C-ITS-S (or MMCS) transfers traffic information on the route to an MM driver through the P-ITS-S. [Table 29](#) shows the data exchange procedure required for use case 2.1.

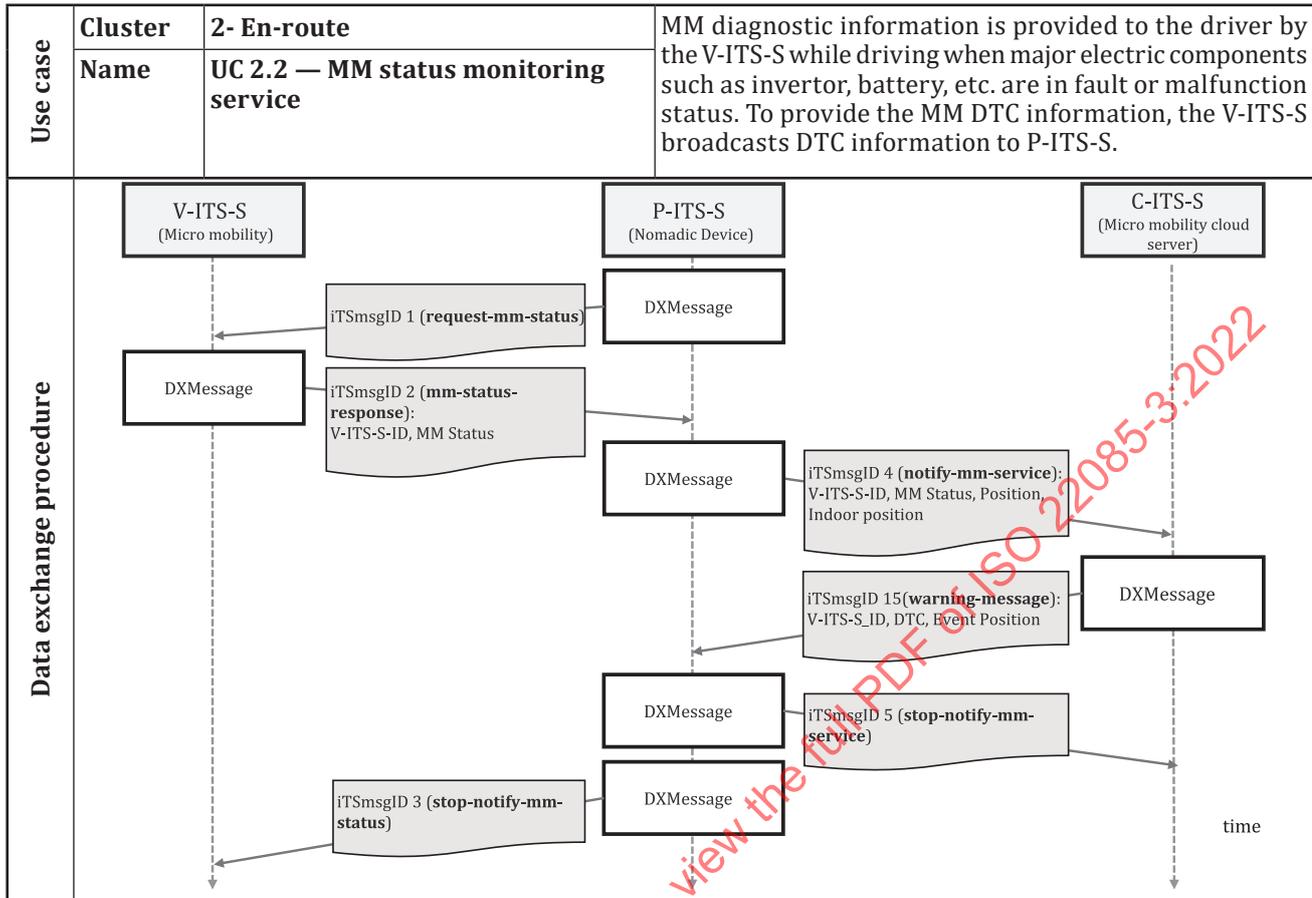
Table 29 — Data exchange procedure for use case 2.1



6.3.3 UC 2.2 MM status monitoring service

Use case 2.2 requires a DXM to provide information to an MM driver when a fault or a malfunction occurs in an MM while driving. The V-ITS-S transfers information to the P-ITS-S when there is a malfunction in the MM. Table 30 shows the data exchange procedure required for use case 2.2.

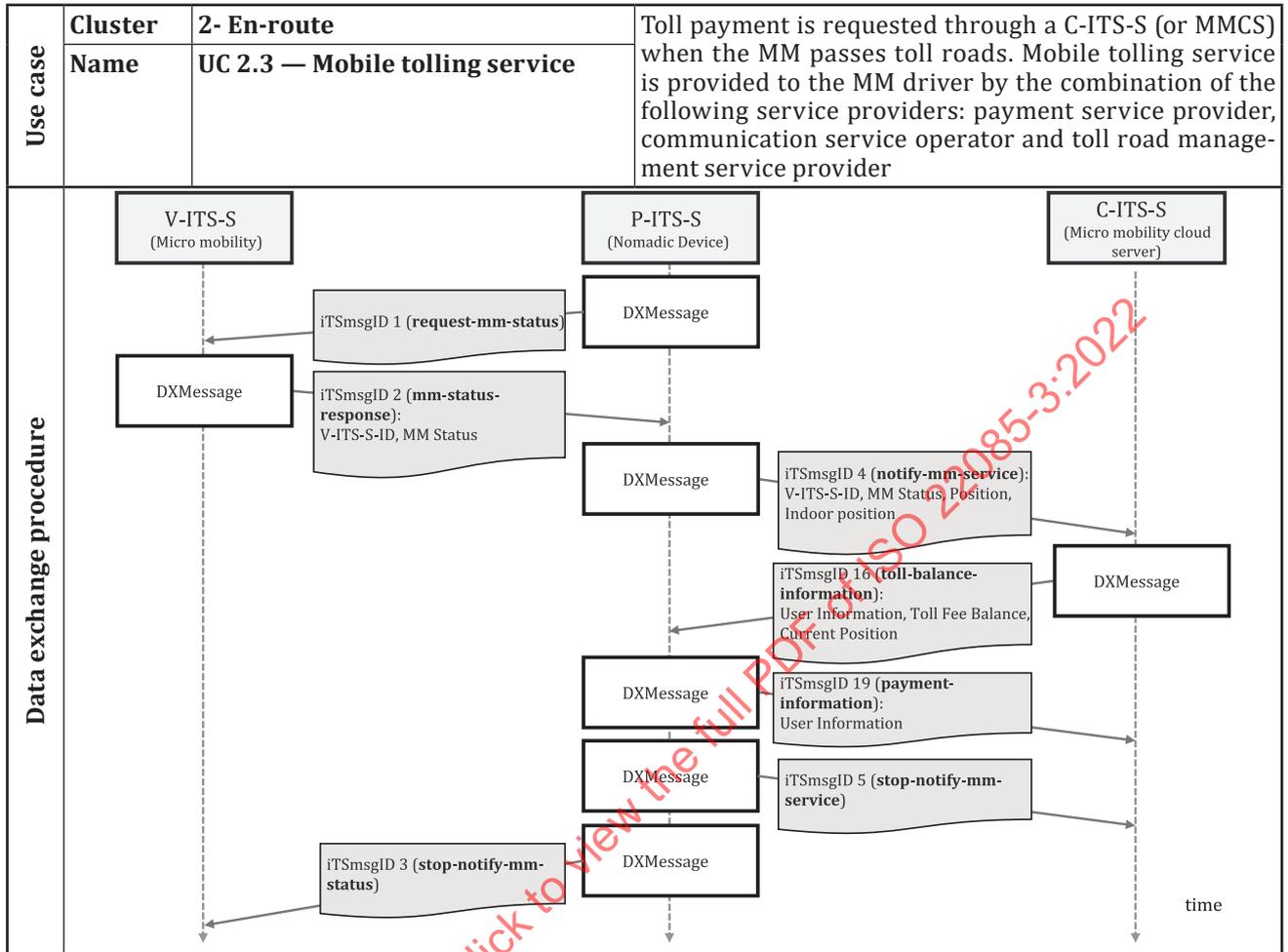
Table 30 — Data exchange procedure for use case 2.2



6.3.4 UC 2.3 Mobile tolling service

Use case 2.3 requires a DXM to provide toll payment information to an MM driver when an MM drives through a toll gate. A toll service provider and a payment service provider transfers the payment information to the P-ITS-S. [Table 31](#) shows the data exchange procedure required for use case 2.3.

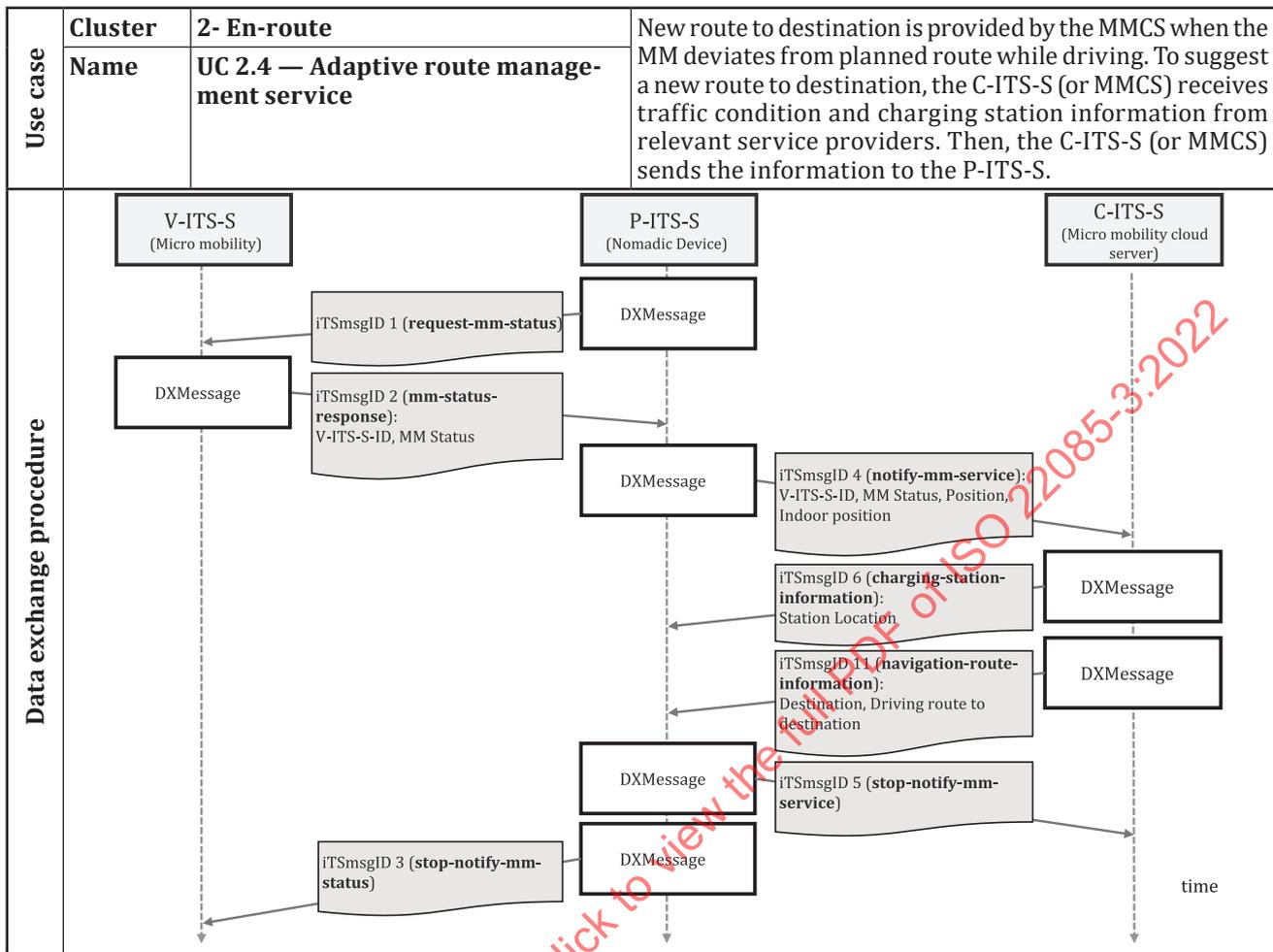
Table 31 — Data exchange procedure for use case 2.3



6.3.5 UC 2.4 Adaptive route management service

Use case 2.4 requires a DXM to provide new route information to an MM driver when an MM deviates from a route set in a pre-trip phase. P-ITS-S transfers information related to the MM’s current location to C-ITS-S (or MMCS). After that, the C-ITS-S (or MMCS) transfers new route information to the P-ITS-S, considering surrounding traffic and locations of charging stations. [Table 32](#) shows the data exchange procedure required for use case 2.4.

Table 32 — Data exchange procedure for use case 2.4



6.3.6 UC 2.5 Searching available parking space service on the way

Before a MM arrives at a destination, use case 2.5 requires a DXM to provide information on available parking spaces nearby to an MM driver. A driving route can be recalculated if necessary. A C-ITS-S (or MMCS) transfers information on available parking spaces nearby a destination to the P-ITS-S automatically. [Table 33](#) shows the data exchange procedure required for use case 2.5.

