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ITS Connect Systems

Inter-vehicle Communication Message Specifications

ITS Connect TD-001 Ver.1.1

English Translation

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ITS Connect Promotion Consortium

General Notes

This document is a translation of the “Security Standards” written in Japanese issued by the ITS Connect Promotion Consortium. In the unlikely event that there is doubt or inconsistency in content between the original Japanese version and this document, the Japanese version shall prevail.

Revision History

Ver.	Date	Chapter / Section	Reason	Revised Content
1.0	September 30 , 2015	Establishment	Newly established	
1.1	November 7, 2019	4.4, 5.2.2–5.2.9, 5.3, 6.12	reflects all adjustments by "ITS Forum RC-013.	The notation “ASN.1” was corrected. And added the description not to delete the bit field in case that optional information is not stored
		4.3–4.4, 5.3, 5.4, 6.9.5	Definitions clarified	Added the description related to handle the storage rule, compatibility, start position of free field, reserved values
		6.1.7	Definitions clarified and errors corrected	Extended optional flag operation was clarified
		6.8.5	Definitions clarified	Unavailable added.
		6.11.2	Allocation added	Vehicle information added
		Annex A		Appendix A on extension and change rules was added and this information was moved from the body. The content was also supplemented.

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ITS Connect Systems
Inter-vehicle Communication Message Specifications

Contents

Chapter 1 Overview

This document describes the message format to be commonly used in a system (or a service) for inter-vehicle communications that provides driving safety assistance with wireless communication. This document defines specifications for the message format and its configuration data (data frames, data elements) for inter-vehicle communications.

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Chapter 2 Reference

The following documents, in whole or in part, are normatively referenced in this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document applies. The document indicated as a cited reference is cited in this document.

[1] ASV-4 Project Basic Design Specifications for Communication Based Implementation Systems (2011)

[2] SAE J2735_200911 Dedicated short range communication (DSRC) message set dictionary (2009)

[3] ETSI TS 102 637-2 Intelligent Transport Systems (ITS) Vehicular Communications Basic Set of Applications Part 3: Specifications of Cooperative Awareness Basic Service (2013)

[4] ETSI TS 102 894-2 Intelligent Transport Systems (ITS) Users and Applications Requirements Part 2: Applications and Facilities Layer Common Data Dictionary (2013)

[5] ARIB STD-T109 700MHz Band Intelligent Transport Systems Standard

[6] ITS FORUM RC-010 700MHz Band Intelligent Transport Systems - Extended Functions Guideline

[7] ITS FORUM RC-013 700MHz Band Intelligent Transport Systems - Experimental Guideline for Inter-vehicle Communication Messages (2014, cited references)

[8] ITS Connect TD-002 ITS Connect Systems - Communication Parameter Specifications

[9] ITS Connect RE503, ITS ConnectSystems – Guideline for Individual Service Standard ID, ITS Connect Promotion Consortium

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Chapter 3 Terms and Abbreviations

ASN.1: Abstract Syntax Notation 1

Common service standard: A standard for a service (service system) defined by a standards/specifications developing organization (SDO) or similar.

Data element (DE): Smallest unit for message configuration data.

Data frame (DF): Unit for message configuration data. Consists of one or more data elements. May also consists of multiple data frames or data elements.

Individual application: Application software operating according to a individual service standard.

Individual service standard: A standard for a service (service system) defined by a individual company or a specific alliance or similar.

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Chapter 4 Messages

4.1. Application scope

Application data exchanged between the application (or the facility layer) and the communication protocol stack are called messages. This guideline applies to messages used for inter-vehicle communications. The relationship between the layer structure and messages is shown in Figure 4–1. Roadside–to–vehicle communication messages as well as other data exchanged between the same layers are outside the scope of this guideline.

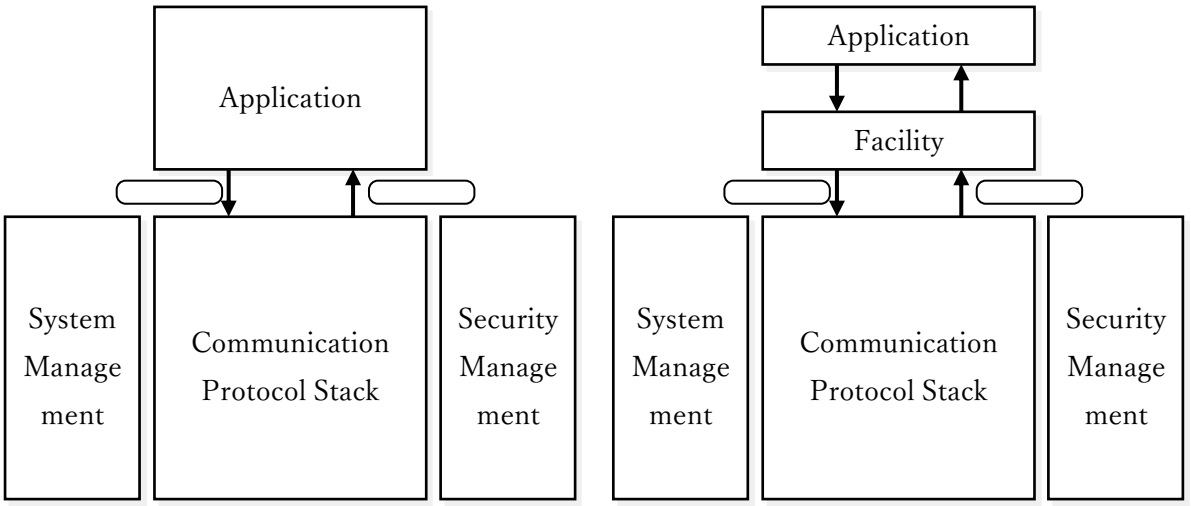
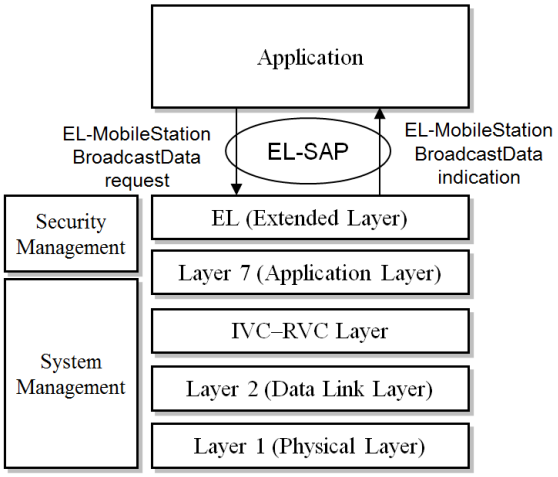


Figure 4–1 Relationship between layer structure and messages

The communication protocol when applying the 700 MHz Band Intelligent Transport Systems Standard ARIB STD–T109 and the Extended Functions Guideline ITS FORUM RC–010 is as follows. The relationship between the layer structure and messages in this case is shown in Figure 4–2. One of the parameters of the EL–MobileStationBroadcastData primitive exchanged by EL – SAP (Extended Layer – Service Access Point) between the application (or facility layer) and the EL (Extended Layer) is ApplicationData, which corresponds to messages handled by the onboard unit. An inter-vehicle communication message is defined as one of these messages. For details on primitive parameters other than ApplicationData, refer to Reference [5], [6] and [8].



Primitive	Variables
EL–MobileStation BroadcastData request	・ControlInformation ・EL–SecurityClassification ・SecurityInformation ・ApplicationAssociatedInformation ・EL–ApplicationDataLength ・**ApplicationData** ・LinkAddress
EL–MobileStation BroadcastData indication	・EL–SecurityClassification ・SecurityInformation ・ApplicationAssociatedInformation ・EL–ApplicationDataLength ・**ApplicationData** ・LinkAddress ・DataAssociatedInformation

Figure 4–2 Relationship between messages in 700 MHz Band Intelligent Transport Systems

4.2. Message overview

Messages for inter-vehicle communications as specified in this guideline are of one type only, called Basic Message. The Basic Message is a common message sent from all onboard units. It includes basic information intended to support driving safety. All information items specified as mandatory in this guideline must be included in the basic information. In addition, the Basic Message may contain other information (such as information to be optionally used by an individual service or a specific onboard unit), provided unless the maximum message size is exceeded.

4.3. Configuration of Basic Message

The configuration of the Basic Message is shown in Table 4–1. The Basic Message is divided into two main sections, namely the common field from the top, followed by a free field. The common field shall be in the Basic Message sent from all onboard units, and the free field are optional. The common field is divided into the common application header field and the common application data field. The free field is divided into the free application header field and free application data field. Data frames (DF) are set in each header field and data field. In the common application header field, management information about the common application data field is set as DF_CommonFieldManagementInformation. In the common application data field, the driving safety assistance data frames (DF_TimeInformation, DF_PositionInformation, DF_VehicleStatusInformation and DF_VehicleAttributeInformation) are set. The values of these data frames shall be set. The common application data field also holds the data frames (DF_PositionOptionalInformation, DF_GNSSStatusOptionalInformation, DF_PositionAcquisitionOptionalInformation, DF_VehicleStatusOptionalInformation, DF_IntersectionInformation, and DF_ExtendedInformation). These data frames are optional. The

sequence for setting the frames when they are to be used is as shown in Table 4–1. In the free application header field, management information about the free field is set as DF_FreeFieldManagementInformation, and information about individual application data in the free application data field is set as the DF_IndividualAppDataManagementInformationSet. The free application data field holds individual application data. The number of individual application data and its storage location, data size etc. are as specified by DF_FreeFieldManagementInformation and DF_IndividualAppDataManagementInformationSet. The data format for individual application data depends on the application specifications and is not defined in this guideline.

Table 4–1 Configuration of Basic Message

Field	Data structure	DF	Size (bytes)		Remarks
Common field	Common application header field	DF_CommonFieldManagementInformation	8		Mandatory
	Common application data field	DF_TimeInformation	4	28	Mandatory. If no proper value is available, set the "unavailable" .
		DF_PositionInformation	11		
		DF_VehicleStatusInformation	9		
		DF_VehicleAttributeInformation	4		
		DF_PositionOptional Information (*)	2	0 to 26	Optional. Setting sequence may not be changed.
		DF_GNSSStatusOptional Information (*)	4		
		DF_PositionAcquisitionOptional Information (*)	2		
		DF_VehicleStatusOptional Information (*)	7		
		DF_IntersectionInformation (*)	10		
		DF_ExtendedInformation (*)	1		
Free field	Free application header field	DF_FreeFieldManagement Information	0 to 1	0 to 22	Use of the Free field is optional, but Free application header field must be filled with valid data if Free application data field are in use. Size of the header is depending on the application.
		DF_IndividualAppData ManagementInformationSet	0 to 21		
	Free application data field	(Not specified)	0 to 60		Use of the Free field is optional, but Free application header field must be filled with valid data if these fields are in use. Data order must match that specified in DF_IndividualAppDataManagementInformationSet
			Total 36 to 100		(*): Optional information (**): Optional field

The following notation of the Basic Message configuration follows ASN.1. This ASN.1 representation is for convenience of this document interpretation and reference only. Encoding or decoding processing of the ASN.1 format is not implemented. With the same purpose ASN.1 representations of data elements are in Chapter 5 and in Chapter 6.

ASN.1 Representation:

```
BasicMessage ::= SEQUENCE{
    comFieldInfo            CommonFieldManagementInformation,
    timeInfo                TimeInformation,
    posInfo                 PositionInformation,
    vStatInfo               VehicleStatusInformation,
    vAttribInfo             VehicleAttributeInformation,
    posOptInfo              PositionOptionalInformation                 OPTIONAL,
    gnssStatOptInfo         GNSSStatusOptionalInformation               OPTIONAL,
    posAcquOptInfo          PositionAcquisitionOptionalInformation      OPTIONAL,
    vStatOptInfo            VehicleStatusOptionalInformation        OPTIONAL,
    intersectInfo           IntersectionInformation                     OPTIONAL,
    extInfo                 ExtendedInformation                         OPTIONAL,
    freeFieldInfo           FreeFieldManagementInformation          OPTIONAL,
    indivAppDataInfoSet IndividualAppDataManagementInformationSet      OPTIONAL,
    indivAppData(#1)    OCTET STRING(SIZE(0..X))                        OPTIONAL,
    ...
    indivAppData(#N)    OCTET STRING(SIZE(0..X))                        OPTIONAL
 }
```

4.4. Storage rules

4.4.1. Basic rules

This section describes the basic rules for storing.

(1) The common field of the Basic Message, all mandatory field of the both common application header and the common application data field must be filled with valid data.
In case of the optional data field and the data element in the common application header and common application data field, it is assumed to be filled as much as possible.

(2) In Basic Message, the free fields are used only when there is individual application data and

the necessity depends on the corresponding service.

- If there is no individual application data, one shall remove the entire free field and set bit [7] of DE_OptionFlag (in the DF_common field management information) to 0.
- If there is individual application data, both the free application header field and free application data field must be filled

4.4.2. Data storage rules

This section describes the rules to store the data frames and data elements.

(1) Setting of common field data frames that must be set is as follows.

・It is assumed that the onboard unit has configuration and the functionality to fill an appropriate values in the mandatory data element of the data field. If the onboard unit could not get an appropriate value then the corresponding field of data element shall not be removed but filled with "unavailable".

・The same rule of mandate data element is applied, if the optional data element of the frame is filled with a value. If the data of data element is not available then the corresponding field of data element shall not be removed but filled with "unavailable".

(2) Setting optional data frames of common fields is as follows.

・if the data frame is not filled then remove entire field of the data frame and the corresponding bit of DE_OptionFlag must be set ot 0.

・When the data element of the [optional] data frame is used, one must fill the values in the data frame without removing data element. If there is a data element which is not in use then fill with "unavailable".

・It is assumed that the proper value shall always be filled if the data element in a data field does not have, contain (or allow) "unavailable". Example is that DF_ExtensionInformation.

(3) Setting free field data frames is as follows.

・When using the free field, all data frames and data elements in the free application header field and free application data field must be set according to the number of individual application data to be set.

・Do not use "unavailable" for the data element in free field. One shall always fill the correct (appropriate) value.

(4) Two's complement expression shall be used for minus number (ex. Integer).

(5) Each data element value shall be stored big–endian.

Chapter 5 Data Frames

This chapter describes the data frames that make up the Basic Message.

5.1. Common application header field

This section describes the configuration of the data frames that are set in the common application header field.

5.1.1. DF_CommonFieldManagementInformation

DF_CommonFieldManagementInformation provides basic management information for data set in the common field. This information shall be stored. The configuration of DF_CommonFieldManagementInformation is shown in Table 5–1. The data format of the common field, ID information for message type identification, and version information are set in the DE_CommonServiceStandardID, DE_MessageID, and DE_Version respectively. ID information for the transmitting vehicle is set in the DE_VehicleID, and message transmission sequence number information is set in the DE_IncrementCounter. Size information for the common application data field is indicated by the DE_CommonAppDataLength, and information about whether optional information is set or not is indicated by the DE_OptionFlag. The total data size is 8 bytes (= 64 bits).

Table 5–1 Configuration of DF_CommonFieldManagementInformation

Data Frame/Data Element		Size	Remarks
DF_CommonFieldManagementInformation		64 bits	Mandatory
	DE_CommonServiceStandardID	3 bits	Mandatory
	DE_MessageID	2 bits	Mandatory
	DE_Version	3 bits	Mandatory
	DE_VehicleID	32 bits	Mandatory
	DE_IncrementCounter	8 bits	Mandatory
	DE_CommonAppDataLength	8 bits	Mandatory
	DE_OptionFlag	8 bits	Mandatory

```
ASN.1 Representation:
CommonFieldManagementInformation ::= SEQUENCE{
    comServStdID        CommonServiceStandardID,
    msgID               MessageID,
 ver                 Version,
    vID                 VehicleID,
    increCount          IncrementCounter,
    comAppDataLen       CommonAppDataLength,
    optFlg              OptionFlag
}
```

5.2. Common application data field

This section describes the configuration of the data frames that are set in the common application data field.

5.2.1. DF_TimeInformation

The DF_TimeInformation indicates the time when the content of the transmitted message was finalized. This is a mandatory data frame. The configuration of DF_TimeInformation is shown in Table 5–2. The DE_LeapSecondsCorrectionAvailability indicates whether a leap second correction function is used. The DE_Hour, DE_Minute, and DE_Second indicates the exact time of the content of the transmitting message is finalized. (For seconds, the unit is milliseconds.) The total data size is 4 bytes (= 32 bits).

Table 5–2 Configuration of DF_TimeInformation

Data Frame/Data Element		Size	Remarks
DF_TimeInformation		32 bits	Mandatory
	DE_LeapSecondsCorrectionAvailability	1 bit	Mandatory
	DE_Hour	7 bits	Mandatory. UTC "Hours" + 9 hours
	DE_Minute	8 bits	Mandatory. UTC "Minutes"
	DE_Second	16 bits	Mandatory. UTC "Milliseconds"

```
ASN.1 Representation:
TimeInformation ::= SEQUENCE{
    tLeap       LeapSecondsCorrectionAvailability,
    tHour       Hour,
    tMin        Minute,
    tSec        Second
}
```

5.2.2. DF_PositionInformation

The DF_PositionInformation indicates vehicle location information and its confidence information. This is a mandatory data frame. The configuration of DF_PositionInformation is shown in Table 5–3. Position information obtained from a GNSS or similar is set in DE_Latitude, DE_Longitude, and DE_Elevation. Information about the positioning system used to obtain the location information is set in the DE_PositionConfidence and DE_ElevationConfidence. The total data size is 11 bytes (= 88 bits). In case of an equipment configuration that does not support obtaining data for DE_Elevation and DE_ElevationConfidence, the "unavailable" shall be set for these without deleting the field.

Table 5–3 Configuration of DF_PositionInformation

Data Frame/Data Element		Size	Remarks
DF_PositionInformation		88 bits	Mandatory
	DE_Latitude	32 bits	Mandatory
	DE_Longitude	32 bits	Mandatory
	DE_Elevation	16 bits	
	DE_PositionConfidence	4 bits	Mandatory
	DE_ElevationConfidence	4 bits	

```
ASN.1 Representation:
PositionInformation ::= SEQUENCE{
    lat         Latitude,
    long        Longitude,
    elev        Elevation,
    posConf     PositionConfidence,
    eleConf     ElevationConfidence
}
```

5.2.3. DF_VehicleStatusInformation

The DF_VehicleStatusInformation provides information about the vehicle such as its speed and heading. This is a mandatory data frame. The configuration of DF_VehicleStatusInformation is shown in Table 5–4. Information about vehicle speed, vehicle heading, and longitudinal acceleration is set in the DE_Speed, DE_Heading, and DE_Acceleration respectively. Information about the onboard sensors used to obtain the former data is set in the DE_SpeedConfidence, DE_HeadingConfidence, and DE_AccelerationConfidence. Information about transmission position and steering wheel angle is set in the DE_TransmissionState and DE_SteeringWheelAngle respectively. The total data size is 9 bytes (= 72 bits). In case of an equipment configuration that does not support obtaining data for DE_TransmissionState and DE_SteeringWheelAngle, the "unavailable" shall be set for these data elements without deleting the field.

Table 5–4 Configuration of DF_VehicleStatusInformation

Data Frame/Data Element		Size	Remarks
DF_VehicleStatusInformation		72 bits	Mandatory
	DE_Speed	16 bits	Mandatory
	DE_Heading	16 bits	Mandatory
	DE_Acceleration	16 bits	Mandatory
	DE_SpeedConfidence	3 bits	Mandatory
	DE_HeadingConfidence	3 bits	Mandatory
	DE_AccelerationConfidence	3 bits	Mandatory
	DE_TransmissionState	3 bits	
	DE_SteeringWheelAngle	12 bits	

ASN.1 Representation:

```
VehicleStatusInformation ::= SEQUENCE{
    speed           Speed,
    head            Heading,
    accel           Acceleration,
    speedConf       SpeedConfidence,
    headConf        HeadingConfidence,
    accelConf       AccelerationConfidence,
    transStat       TransmissionState,
  steerAngle      SteeringWheelAngle
}
```

5.2.4. DF_VehicleAttributeInformation

The DF_VehicleAttributeInformation provides information about the vehicle such as type and size. This is a mandatory data frame. The configuration of DF_VehicleAttributeInformation is shown in Table 5–5. The DE_VehicleSizeClassification sets information about the vehicle type, such as large vehicle, normal size vehicle, motorcycle, etc. The DE_VehicleRoleClassification sets information about the use of the vehicle, such as private vehicle, emergency vehicle, road work vehicle, etc. The DE_VehicleWidth and DE_VehicleLength set information about the vehicle overall width and overall length respectively. The total data size is 4 bytes (= 32 bits). In case of an equipment configuration that does not support obtaining data for DE_VehicleWidth and DE_VehicleLength, the "unavailable" shall be set for these data elements without deleting the field.

Table 5–5 Configuration of DF_VehicleAttributeInformation

Data Frame/Data Element		Size	Remarks
DF_VehicleAttributeInformation		32 bits	Mandatory
	DE_VehicleSizeClassification	4 bits	Mandatory
	DE_VehicleRoleClassification	4 bits	Mandatory
	DE_VehicleWidth	10 bits	
	DE_VehicleLength	14 bits	

ASN.1 Representation:

```
VehicleAttributeInformation ::= SEQUENCE{
    vSizeClass      VehicleSizeClassification,
    vRoleClass      VehicleRoleClassification,
    vWid            VehicleWidth,
    vLen            VehicleLength
}
```

5.2.5. DF_PositionOptionalInformation

The DF_PositionOptionalInformation is designed for setting detailed or additional information pertaining to the DF_PositionInformation. This data frame is optional. The configuration of DF_PositionOptionalInformation is shown in Table 5–6. The DE_PositionDelay sets the update interval of position measurement data, and the DE_RevisionCounter sets the number of frames with identical data since the GNSS reception time point. The DE_RoadFacilities sets information such as whether the vehicle is currently driving on the road or is in a rest area. The DE_RoadClassification sets information such as whether the road on which the vehicle is driving is an express way, a national/prefectural road etc. The total data size is 2 bytes (= 16 bits). Setting of

DF_PositionOptionalInformation is optional, but if used, values for all four data elements must be set in the prescribed order. In case of an equipment configuration that does not support obtaining data for a data element, the "unavailable" shall be set for that data element without deleting the field.

Table 5–6 Configuration of DF_PositionOptionalInformation

Data Frame/Data Element		Size	Remarks
DF_PositionOptionalInformation		16 bits	Optional
	DE_PositionDelay	5 bits	
	DE_RevisionCounter	5 bits	
	DE_RoadFacilities	3 bits	
	DE_RoadClassification	3 bits	

ASN.1 Representation:

```
PositionOptionalInformation ::= SEQUENCE{
    posDelay        PositionDelay,
    revCount        RevisionCounter,
    roadFacil       RoadFacilities,
    roadClass       RoadClassification,
  }
```

5.2.6. DF_GNSSStatusOptionalInformation

The DF_GNSSStatusOptionalInformation is designed for setting detailed or additional information pertaining to the DF_PositionInformation. This data frame is optional. The configuration of DF_GNSSStatusOptionalInformation is shown in Table 5–7. Three data elements indicating the reliability index (horizontal error ellipse) of the position information obtained from the GNSS are available: DE_SemiMajorAxisOfPositionalErrorEllipse, DE_SemiMinorAxisOfPositionalErrorEllipse, and DE_SemiMajorAxisOrientationOfPositionalErrorEllipse. The total data size is 4 bytes (= 32 bits). Setting of DF_GNSSStatusOptionalInformation is optional, but if used, values for all three data elements must be set in the prescribed order. In case of an equipment configuration that does not support obtaining data for a data element, the "unavailable" shall be set for that data element without deleting the field.

Table 5–7 Configuration of DF_GNSSStatusOptionalInformation

Data Frame/Data Element	Size	Remarks
DF_GNSSStatusOptionalInformation	32 bits	Optional
DE_SemiMajorAxisOfPositionalErrorEllipse	8 bits	
DE_SemiMinorAxisOfPositionalErrorEllipse	8 bits	
DE_SemiMajorAxisOrientationOfPositionalErrorEllipse	16 bits	

ASN.1 Representation:

```
GNSSStatusOptionalInformation ::= SEQUENCE{
    majorAxis       SemiMajorAxisOfPositionalErrorEllipse,
    minorAxis       SemiMinorAxisOfPositionalErrorEllipse,
    axisOrien       SemiMajorAxisOrientationOfPositionalErrorEllipse,
}
```

5.2.7. DF_PositionAcquisitionOptionalInformation

The DF_PositionAcquisitionOptionalInformation is designed for setting detailed or additional information pertaining to the DF_PositionInformation. This data frame is optional. The configuration of DF_PositionAcquisitionOptionalInformation is shown in Table 5–8. Three data elements for status information are available: DE_GNSSPositioningMode for positioning dimension information, DE_GNSSPDOP for positional dilution of precision, and DE_NumberOfGNSSSatellitesInUse for number of satellites being tracked. In addition, three data elements for information about positioning related functions are available: DE_GNSSMultiPathDetection for GNSS multipath detection information, DE_DeadReckoningAvailability for indicating the presence/absence of a dead reckoning function, and DE_MapMatchingAvailability for indicating the presence/absence of a map matching function. The total data size is 2 bytes (= 16 bits). Setting of DF_PositionAcquisitionOptionalInformation is optional, but if used, values for all six data elements must be set in the prescribed order. In case of an equipment configuration that does not support obtaining data for a data element, the "unavailable" shall be set for that data element without deleting the field.

Table 5–8 Configuration of DF_PositionAcquisitionOptionalInformation

Data Frame/Data Element	Size	Remarks
DF_PositionAcquisitionOptionalInformation	16 bits	Optional
DE_GNSSPositioningMode	2 bits	
DE_GNSSPDOP	6 bits	
DE_NumberOfGNSSSatellitesInUse	4 bits	
DE_GNSSMultiPathDetection	2 bits	
DE_DeadReckoningAvailability	1 bit	
DE_MapMatchingAvailability	1 bit	

ASN.1 Representation:

```
PositionAcquisitionOptionalInformation ::= SEQUENCE{
    gnssPosMode         GNSSPositioningMode,
    gnssPDOP            GNSSPDOP,
    numGNSSSat          NumberOfGNSSSatellitesInUse,
    gnssMPath           GNSSMultiPathDetection,
    dRAvail             DeadReckoningAvailability,
    mapMatAvail         MapMatchingAvailability
}
```

5.2.8. DF_VehicleStatusOptionalInformation

The DF_VehicleStatusOptionalInformation is designed for setting additional information pertaining to the DF_VehicleStatusInformation. This data frame is optional. The configuration of DF_VehicleStatusOptionalInformation is shown in Table 5–9. The DE_YawRate indicates the angular velocity versus the turning direction, DE_BrakeAppliedStatus indicates the brake status, DE_AuxiliaryBrakeAppliedStatus indicates the auxiliary brake status, and DE_ThrottlePosition indicates the accelerator pedal position. Information about the headlights and turn lights is set to the DE_ExteriorLights. The operation condition of an adaptive cruise control (ACC) or other control systems in the vehicle set in a total of eight data elements starting with DE_AdaptiveCruiseControlStatus. The total data size is 7 bytes (= 56 bits). Setting of DF_VehicleStatusOptionalInformation is optional, but if used, values for all 13 data elements must be set in the prescribed order. In case of an equipment configuration that does not support obtaining data for a data element, the "unavailable" shall be set for that data element without deleting the field.

Table 5–9 Configuration of DF_VehicleStatusOptionalInformation

Data Frame/Data Element	Size	Remarks
DF_VehicleStatusOptionalInformation	56 bits	Optional
DE_YawRate	16 bits	
DE_BrakeAppliedStatus	6 bits	
DE_AuxiliaryBrakeAppliedStatus	2 bits	
DE_ThrottlePosition	8 bits	
DE_ExteriorLights	8 bits	
DE_AdaptiveCruiseControlStatus	2 bits	ACC is the abbreviation of Adaptive Cruise Control System
DE_CooperativeAdaptiveCruiseControlStatus	2 bits	C–ACC is the abbreviation of Cooperative Adaptive Cruise Control System
DE_PreCrashSafetyStatus	2 bits	PCS is the abbreviation of Pre–Crash Safety System
DE_AntilockBrakeStatus	2 bits	ABS is the abbreviation of Antilock Brake System
DE_TractionControlStatus	2 bits	TRC is the abbreviation of Traction Control System
DE_ElectronicStabilityControlStatus	2 bits	ESC is the abbreviation of Electronic Stability Control System
DE_LaneKeepingAssistStatus	2 bits	LKA is the abbreviation of Lane Keeping Assist System
DE_LaneDepartureWarningStatus	2 bits	LDW is the abbreviation of Lane Departure Warning System

```
ASN.1 Representation:
VehicleStatusOptionalInformation ::= SEQUENCE{
    yaw                 YawRate,
    brakeStat           BrakeAppliedStatus,
 auxBrakeStat       AuxiliaryBrakeAppliedStatus,
    throtPos            ThrottlePosition,
    extLight            ExteriorLights,
    aCCStat             AdaptiveCruiseControlStatus,
    cACCStat            CooperativeAdaptiveCruiseControlStatus,
    pCSStat             PreCrashSafetyStatus,
    aBSStat             AntilockBrakeStatus,
    tRCStat             TractionControlStatus,
    eSCStat             ElectronicStabilityControlStatus,
    lKAStat             LaneKeepingAssistStatus,
    lDWStat             LaneDepartureWarningStatus
}
```

5.2.9. DF_IntersectionInformation

The DF_IntersectionInformation is designed for setting information pertaining to an upcoming intersection in the forward direction. This data frame is optional. The configuration of DF_IntersectionInformation is shown in Table 5–10. The DE_IntersectionDistanceInformationAvailability and DE_IntersectionDistance set information about the distance acquiry source and the distance to the intersection respectively. The DE_IntersectionPositionInformationAvailability, DE_IntersectionLatitude, and DE_IntersectionLongitude set information about the position acquiry source and the latitude and longitude of the intersection respectively. The total data size is 10 bytes (= 80 bits). Setting of DF_IntersectionInformation is optional, but if used, values for all five data elements must be set in the prescribed order. In case of an equipment configuration that does not support obtaining data for a data element, the "unavailable" shall be set for that data element without deleting the field.

Table 5–10 Configuration of DF_IntersectionInformation

Data Frame/Data Element		Size	Remarks
DF_IntersectionInformation		80bits	Optional
	DE_IntersectionDistanceInformationAvailability	3 bits	
	DE_IntersectionDistance	10 bits	
	DE_IntersectionPositionInformationAvailability	3 bits	
	DE_IntersectionLatitude	32 bits	
	DE_IntersectionLongitude	32 bits	

```
ASN.1 Representation:
IntersectionInformation ::= SEQUENCE{
    intersectDistAvail      IntersectionDistanceInformationAvailability,
    intersectDist           IntersectionDistance,
    intersectPosAvail       IntersectionPositionInformationAvailability,
    intersectLat  IntersectionLatitude,
    intersectLong           IntersectionLongitude
}
```

5.2.10. DF_ExtendedInformation

The DF_ExtendedInformation is designed for setting information pertaining to the operation status of emergency vehicles, work status of road work vehicles, etc. This data frame is optional. The configuration of DF_ExtendedInformation is shown. Depending on the DE_VehicleRoleClassification value in the DF_VehicleAttributeInformation, one of the following data elements is set in the DF_ExtendedInformation: DE_ExtendedInformationForPrivateVehicle, DE_ExtendedInformationForEmergencyVehicle, DE_ExtendedInformationForRoadWorkVehicle, DE_ExtendedInformationForPassengerTransportationVehicle, DE_ExtendedInformationForFreightTransportationVehicle, DE_ExtendedInformationForSpecialVehicle, or DE_ExtendedInformationForOthers. The total data size is 1 byte (= 8 bits).

Table 5–11 Configuration of DF_ExtendedInformation

Data Frame/Data Element	Size	Remarks
DF_ExtendedInformation	8 bits	Optional
DE_ExtendedInformationForPrivateVehicle	8 bits	Select suitable DE according to DE_VehicleRoleClassification value.
or		
DE_ExtendedInformationForEmergencyVehicle	8 bits	
or		
DE_ExtendedInformationForRoadWorkVehicle	8 bits	
or		
DE_ExtendedInformationForPassengerTransportationVehicle	8 bits	
or		
DE_ExtendedInformationForFreightTransportationVehicle	8 bits	
or		
DE_ExtendedInformationForSpecialVehicle	8 bits	
or		
DE_ExtendedInformationForOthers	8 bits	

ASN.1 Representation:

```
ExtendedInformation ::= CHOICE{
    extInfoPrivate          ExtendedInformationForPrivateVehicle,
    extInfoEmergen          ExtendedInformationForEmergencyVehicle,
    extInfoRoadWork         ExtendedInformationForRoadWorkVehicle,
    extInfoPassenTrans      ExtendedInformationForPassengerTransportationVehicle,
    extInfoFreightTrans     ExtendedInformationForFreightTransportationVehicle,
    extInfoSpecial          ExtendedInformationForSpecialVehicle,
    extInfoOther            ExtendedInformationForOthers
}
```

5.3. Free application header field

This section describes the configuration of the data frames that are set in the free application header field. When the free field is used for setting individual application data, the following two data frames

must be set. Further, when the individual application data are not set using the free field, the following two data frames are not set.

The DF_FreeFieldManagementInformation, which is the starting point of the free field, changes according to the data length of the common field, and the DE_CommonAppDataLength of the DF_CommonFieldManagementInformation can be confirmed for each message.

5.3.1. DF_FreeFieldManagementInformation

DF_FreeFieldManagementInformation provides basic management information for data set in the free field. The configuration of DF_FreeFieldManagementInformation is shown in Table 5–12. Information about the size of the free application header field is set in DE_IndividualAppHeaderLength, and N, the number of individual application data set in the free application data field, is set in DE_NumberOfIndividualAppData. The total data size is 1 byte (= 8 bits). If individual application data are set in the free field, this information shall be set.

Table 5–12 Configuration of DF_FreeFieldManagementInformation

Data Frame/Data Element		Size	Remarks
DF_FreeFieldManagementInformation		8 bits	
	DE_IndividualAppHeaderLength	5 bits	
	DE_NumberOfIndividualAppData	3 bits	(=N)

```
ASN.1 Representation:
FreeFieldManagementInformation ::= SEQUENCE{
    indivAppHeaderLen       IndividualAppHeaderLength,
    numIndivAppData         NumberOfIndividualAppData
}
```

5.3.2. DF_IndividualAppDataManagementInformationSet

DF_IndividualAppDataManagementInformationSet is a set of DF_IndividualAppDataManagementInformation. The configuration of DF_IndividualAppDataManagementInformationSet is shown in Table 5–13. A DF_IndividualAppDataManagementInformationSet consists of one or more DF_IndividualAppDataManagementInformation. The data size of one DF_IndividualAppDataManagementInformation frame is 3 bytes (= 24 bits). The number of frames is determined by the number N of individual application data set in the free application data field. Therefore the data size of the DF_IndividualAppDataManagementInformationSet is 3 x N bytes (=

24 x N bits). The value of N is set in the DE_NumberOfIndividualAppData of the DF_FreeFieldManagementInformation. The range is 1 to 7. If individual application data is set using the free field, setting according to the number of individual application data (number of DF_IndividualAppDataManagementInformationSet) to be set is mandatory.

Table 5–13 Configuration of DF_IndividualAppDataManagementInformationSet

Data Frame/Data Element	Size	Remarks
DF_IndividualAppDataManagementInformationSet	24xN bits	
DF_IndividualAppDataManagementInformation(#1)	24 bits	
DF_IndividualAppDataManagementInformation(#2)	24 bits	
・・・		
DF_IndividualAppDataManagementInformation(#N)	24 bits	

ASN.1 Representation:

IndividualAppDataManagementInformationSet ::= SEQUENCE(SIZE(1..7)) OF IndividualAppDataManagementInformation

5.3.3. DF_IndividualAppDataManagementInformation

DF_IndividualAppDataManagementInformation provides basic management information for individual application data set in the free application data field. The configuration of DF_IndividualAppDataManagementInformation is shown in Table 5–14. ID information for identification of the data format of the individual application data is set in the DE_IndividualServiceStandardID. Information indicating the storage location of individual application data in the free application data field is set in the DE_IndividualAppDataAddress and the DE_IndividualAppDataLength. The data size is 3 bytes (= 24 bits). If individual application data is set using the free field, this information shall be set according to the number of individual application data to be set.

Table 5–14 Configuration of DF_IndividualAppDataManagementInformation

Data Frame/Data Element		Size	Remarks
DF_IndividualAppDataManagementInformation		24 bits	
	DE_IndividualServiceStandardID	8 bits	
	DE_IndividualAppDataAddress	8 bits	
	DE_IndividualAppDataLength	8 bits	

```
ASN.1 Representation:
IndividualAppDataManagementInformation ::= SEQUENCE{
    indivServStdID          IndividualServiceStandardID,
    indivAppDataAddress     IndividualAppDataAddress,
    indivAppDataLen         IndividualAppDataLength
}
```

5.4. Free application data field

The data frames set in the free application data field depend on the specifications of the respective individual applications and are therefore not defined in this guideline. However, the storage sequence of individual application data depends on the storage sequence in which DF_IndividualAppDataManagementInformation are set in the DF_IndividualAppDataManagementInformationSet in the free application header field, and the size of application data for each individual application depends on the DE_IndividualAppDataLength in the corresponding DF_IndividualAppDataManagementInformation. No upper limit is specified for the size of data set in the free application data field, but the total size together with other fields may not exceed 100 bytes. If individual application data is set using the free field, setting according to the

number of individual application data to be set is mandatory. The configuration of the free application data field is shown in Table 5–15.

Table 5–15 Configuration of free application data field

Data Frame/Data Element	Size	Remarks
Individual application data (#1)	Not specified	Not specified.
Individual application data (#2)	Not specified	Not specified.
・・・	・・・	・・・
Individual application data (#N)	Not specified	Not specified.

Chapter 6 Data Elements

This chapter describes the various data elements that make up the data frames.

6.1. DF_CommonFieldManagementInformation

Definitions for each of the data elements that make up the DF_CommonFieldManagementInformation are given below.

6.1.1. DE_CommonServiceStandardID

No.	1–1
Data name	DE_CommonServiceStandardID
Definition	ID information for common service standard (standard supported by this message). For inter-vehicle communications common service standard, set the value to 1.
Data size	3 bits
Date type	Enumerated
Allocation	0: Reserved 1: Inter-vehicle common service standard 2 to 7: Reserved (allocated to other service standards)

ASN.1 Representation:

```
CommonServiceStandardID ::= ENUMERATED{
    reserved                                (0),
    V2VCommonServiceStandard (1),
 ...   -- values 2 to 7 reserved for other service standard
}
```

6.1.2. DE_MessageID

No.	1–2
Data name	DE_MessageID
Definition	ID information for message identification. For inter-vehicle communications Basic Message, set the value to 1.
Data size	2 bits
Date type	Enumerated
Allocation	0: Reserved 1: Basic Message 2 to 3: Reserved

ASN.1 Representation:

```
MessageID ::= ENUMERATED{
    reserved        (0),
    Basic Message   (1),
    reserved        (2),
    reserved        (3)
}
```

6.1.3. DE_Version

No.	1–3
Data name	DE_Version
Definition	Message version information. As current specifications are Version 1, set the value to 1.
Data size	3 bits
Date type	Enumerated
Allocation	0: Reserved 1: Version 1 2 to 7: Reserved

```
ASN.1 Representation:
Version ::= ENUMERATED{
    reserved    (0),
    version1    (1),
    ... -- values 2 to 7 reserved
}
```

6.1.4. DE_VehicleID

No.	1–4
Data name	DE_VehicleID
Definition	Temporary ID information for individual vehicle. Automatically set to a random value when onboard unit powers up.
Data size	32 bits
Date type	Unsigned integer
Expression range	0 to 4,294,967,295
Resolution	1

```
ASN.1 Representation:
VehicleID ::= INTEGER(0..4294967295)
```

6.1.5. DE_IncrementCounter

No.	1–5
Data name	DE_IncrementCounter
Definition	Counter indicating data transmission sequence. Incremented with each transmission. Reverts back to 0 after 255.
Data size	8 bits
Date type	Unsigned integer
Expression range	0 to 255
Resolution	1

```
ASN.1 Representation:
IncrementCounter ::= INTEGER(0..255)
```

6.1.6. DE_CommonAppDataLength

No.	1–6
Data name	DE_CommonAppDataLength
Definition	Data size information for common application data field. The unit is bytes.
Data size	8 bits
Date type	Unsigned integer
Expression range	28 to 54 bytes
Resolution	1 byte
Remarks	The above expression range may be changed if new data elements or data frames are added to the common application data field in case of version upgrading of message specifications.

```
ASN.1 Representation:
CommonAppDataLength ::= INTEGER(0..255)
-- units of 1 byte
-- available range (28..54) in version1
```

6.1.7. DE_OptionFlag

No.	1–7
Data name	DE_OptionFlag
Definition	Flag for indicating presence of option information. Set option flag bit for applicable option information to 1. When option flag is extended, set extended option flag bit [6] to 1. Extended option flag bit [6] of messages under this version of these Specifications is set to 0.
Data size	8 bits
Date type	Bit string
Allocation	[0]: DF_PositionOptionalInformationAvailability [1]: DF_GNSSStatusOptionalInformationAvailability [2]: DF_PositionAcquisitionOptionalInformationAvailability [3]: DF_VehicleStatusOptionalInformationAvailability [4]: DF_IntersectionInformationAvailability [5]: DF_ExtendedInformationAvailability [6]: ExtendedOptionalFlagAvailability [7]: FreeFieldAvailability

```
ASN.1 Representation:
OptionFlag ::= BITSTRING{
    positionOptionalInformationAvailability                (0),
    gnssStatusOptionalInformationAvailability              (1),
    positionAcquisitionOptionalInformationAvailability     (2),
    vehicleStatusOptionalInformationAvailability           (3),
    intersectionInformationAvailability                    (4),
    extendedInformationAvailability                        (5),
    extendedOptionalFlagAvailability                       (6),
    freeFieldAvailability                                  (7)
}
```

6.2. DF_TimeInformation

Definitions for each of the data elements that make up the DF_TimeInformation are given below.

6.2.1. DE_LeapSecondsCorrectionAvailability

No.	2–1
Data name	DE_LeapSecondsCorrectionAvailability
Definition	Information indicating whether time value reflects leap second correction.
Data size	1 bit
Date type	Boolean
Allocation	0: No correction function available 1: Correction function available

```
ASN.1 Representation:
LeapSecondsCorrectionAvailability ::= BOOLEAN
  -- unavailable        (0)
  -- available          (1)
```

6.2.2. DE_Hour

No.	2–2
Data name	DE_Hour
Definition	Time (hours) information indicates the exact time of the content of the transmitting message is finalized. Set as UTC hour + 9, based on the time information obtained from GNSS. If time delay correction for GNSS etc. is performed, set the value after correction. If unavailable, set the value to 127 (0x7F).
Data size	7 bits
Date type	Unsigned integer
Expression range	0 to 23 hours
Resolution	1 hour

```
ASN.1 Representation:
Hour ::= INTEGER(0..127)
  -- units of 1 hour
  -- available range (0..23)
 -- unavailable (127)
```

6.2.3. DE_Minute

No.	2–3
Data name	DE_Minute
Definition	Time (minutes) information indicates the exact time of the content of the transmitting message is finalized. Set it based on the time information obtained from GNSS. If time delay correction for GNSS etc. is performed, set the value after correction. If unavailable, set the value to 255 (0xFF).
Data size	8 bits
Date type	Unsigned integer
Expression range	0 to 59 minutes
Resolution	1 minute

```
ASN.1 Representation:
Minute ::= INTEGER(0..255)
  -- units of 1 minute
  -- available range (0..59)
-- unavailable (255)
```

6.2.4. DE_Second

No.	2–4
Data name	DE_Second
Definition	Time (seconds) information indicates the exact time of the content of the transmitting message is finalized. Set it based on the time information obtained from GNSS. If time delay correction for GNSS etc. is performed, set the value after correction. If unavailable, set the value to 65535 (0xFFFF).
Data size	16 bits
Date type	Unsigned integer
Expression range	0 to 60.999 seconds
Resolution	0.001 second

```
ASN.1 Representation:
Second ::= INTEGER(0..65535)
  -- units of 1 millisecond
  -- available range with leap second (0..60999)
-- unavailable (65535)
```

6.3. DF_PositionInformation

Definitions for each of the data elements that make up the DF_PositionInformation are given below.

6.3.1. DE_Latitude

No.	3–1
Data name	DE_Latitude
Definition	Position latitude information. Geodetic datum is WGS84 (or equivalent). Positive values indicate north latitude, and negative values indicate south latitude. If unavailable, set the value to –2147483648 (0x80000000).
Data size	32 bits
Date type	Integer
Expression range	–90 to 90 degrees
Resolution	0.0000001 degree

ASN.1 Representation:

```
Latitude ::= INTEGER(-2147483648..2147483647)
  -- units of 0.1 micro degree
  -- available range (-900000000..900000000)
 -- unavailable (-2147483648)
```

6.3.2. DE_Longitude

No.	3–2
Data name	DE_Longitude
Definition	Position longitude information. Geodetic datum is WGS84 (or equivalent). Positive values indicate east longitude, and negative values indicate west longitude. If unavailable, set the value to –2147483648 (0x80000000).
Data size	32 bits
Date type	Integer
Expression range	–180 to 180 degrees
Resolution	0.0000001 degree

```
ASN.1 Representation:
Longitude ::= INTEGER(-2147483648..2147483647)
  -- units of 0.1 micro degree
  -- available range (-1800000000..1800000000)
  -- unavailable (-2147483648)
```

6.3.3. DE_Elevation

No.	3–3
Data name	DE_Elevation
Definition	Elevation information from reference level. Range from -409.5 to –0.1 m is expressed as 0xF001 to 0xFFFF, and range from 0 to 6143.9 m as 0x0000 to 0xEFFF. For elevations above 6143.9 m, set the value to 0xEFFF. If unavailable, set the value to 0xF000.
Data size	16 bits
Date type	Integer
Expression range	–409.5 to 6143.9 m
Resolution	0.1 m

```
ASN.1 Representation:
Elevation ::= OCTET STRING(SIZE(2))
  -- units of 0.1m
  -- encode elevations from 0 to 6143.9 meters
  -- above the reference ellipsoid as 0x0000 to 0xEFFF
  -- encode elevations from -409.5 to -0.1 meters
  -- below the reference ellipsoid as 0xF001 to 0xFFFF
-- unavailable as 0xF000
```

6.3.4. DE_PositionConfidence

No.	3–4
Data name	DE_PositionConfidence
Definition	Information indicating the reliability of horizontal position (DE_Latitude, DE_Longitude) data. Set the value corresponding to the class of the positioning system in use. The value may also be dynamically varied according to the GNSS reception condition etc.

Data size	4 bits
Date type	Enumerated
Allocation	0: Unavailable 1: More than 100 m class 2: 100 m class 3: 75 m class 4: 50 m class 5: 40 m class 6: 30 m class 7: 25 m class 8: 20 m class 9: 15 m class 10: 10 m class 11: 7.5 m class 12: 5 m class 13: 2.5 m class 14: 1 m class 15: 0.1 m or less class

ASN.1 Representation:

```
PositionConfidence ::= ENUMERATED{
    unavailable                 (0),
    more than 100m class(1),
    100m class                  (2),
    75m class                   (3),
    50m class                   (4),
    40m class                   (5),
    30m class                   (6),
    25m class                   (7),
    20m class                   (8),
    15m class                   (9),
    10m class                   (10),
    7.5m class                  (11),
    5m class                    (12),
    2.5m class                  (13),
    1m class                    (14),
    0.1m or less class          (15)
}
```

6.3.5. DE_ElevationConfidence

No.	3–5
Data name	DE_ElevationConfidence
Definition	Information indicating the reliability of elevation (DE_Elevation) data. Set the value corresponding to the class of the elevation measurement system in use. The value may also be dynamically varied according to the GNSS reception condition etc.
Data size	4 bits
Date type	Enumerated
Allocation	0: Unavailable 1: More than 100 m class 2: 100 m class 3: 75 m class 4: 50 m class 5: 40 m class 6: 30 m class 7: 25 m class 8: 20 m class 9: 15 m class 10: 10 m class 11: 7.5 m class 12: 5 m class 13: 2.5 m class 14: 1 m class 15: 0.1 m or less class

```
ASN.1 Representation:
ElevationConfidence ::= ENUMERATED{
    unavailable                 (0),
    more than 100m class(1),
    100m class                  (2),
 75m class                  (3),
    50m class                   (4),
    40m class                   (5),
    30m class                   (6),
    25m class                   (7),
    20m class                   (8),
    15m class                   (9),
    10m class                   (10),
    7.5m class                  (11),
    5m class                    (12),
    2.5m class                  (13),
    1m class                    (14),
    0.1m or less class          (15)
}
```

6.4. DF_VehicleStatusInformation

Definitions for each of the data elements that make up the DF_VehicleStatusInformation are given below.

6.4.1. DE_Speed

No.	4–1
Data name	DE_Speed
Definition	Vehicle velocity information. If unavailable, set the value to 65535 (0xFFFF).
Data size	16 bits
Date type	Unsigned integer
Expression range	0 to 163.83 m/s
Resolution	0.01 m/s

ASN.1 Representation:

```
Speed ::= INTEGER(0..65535)
  -- units of 0.01 m/s
  -- available range (0..16383)
  -- unavailable (65535)
```

6.4.2. DE_Heading

No.	4–2
Data name	DE_Heading
Definition	Information about the direction in which the vehicle is moving. Using due north as 0 degrees, set the value to the angular heading in clockwise direction. If unavailable, set the value to 65535 (0xFFFF).
Data size	16 bits
Date type	Unsigned integer
Expression range	0 to 359.9875 degrees
Resolution	0.0125 degrees

ASN.1 Representation:

```
Heading ::= INTEGER(0..65535)
  -- units of 0.0125 degrees from North
  -- available range (0..28799)
  -- North (0)
  -- East (7200)
  -- South (14400)
  -- West (21600)
  -- unavailable (65535)
```

6.4.3. DE_Acceleration

No.	4–3
Data name	DE_Acceleration
Definition	Information about vehicle acceleration in the longitudinal direction. If unavailable, set the value to –32768 (0x8000).
Data size	16 bits
Date type	Integer
Expression range	–20 to 20 m/s^2
Resolution	0.01 m/s^2

ASN.1 Representation:

```
Acceleration ::= INTEGER(-32768..32767)
  -- units of 0.01 m/s^2
  -- available range (-32767..32767)
-- unavailable (-32768)
```

6.4.4. DE_SpeedConfidence

No.	4–4
Data name	DE_SpeedConfidence (DE_SpeedConfidence)
Definition	Information indicating the reliability of vehicle speed (DE_Speed) data. Set the value corresponding to the class of the speed measurement system in use.
Data size	3 bits
Date type	Enumerated
Allocation	0: Unavailable 1: More than 10 m/s class 2: 10 m/s class 3: 5 m/s class 4: 1 m/s class 5: 0.5 m/s class 6: 0.1 m/s class 7: 0.05 m/s or less class

```
ASN.1 Representation:
SpeedConfidence ::= ENUMERATED{
    unavailable                 (0),
    more than 10m/s class       (1),
    10m/s class                 (2),
    5m/s class                  (3),
    1m/s class                  (4),
    0.5m/s class                (5),
    0.1m/s class        (6),
    0.05m/s or less class       (7)
}
```

6.4.5. DE_HeadingConfidence

No.	4–5
Data name	DE_HeadingConfidence
Definition	Information indicating the reliability of vehicle moving (DE_Heading) data. Set the value corresponding to the class of the moving measurement system in use.
Data size	3 bits
Date type	Enumerated
Allocation	0: Unavailable 1: More than 30 degrees class 2: 30 degrees class 3: 20 degrees class 4: 10 degrees class 5: 5 degrees class 6: 1 degree class 7: 0.5 degrees and less class

```
ASN.1 Representation:
HeadingConfidence ::= ENUMERATED{
    unavailable                 (0),
    more than 30degrees class   (1),
    30degrees class             (2),
    20degrees class             (3),
    10degrees class             (4),
    5degrees class              (5),
    1degrees class              (6),
    0.5degrees or less class    (7)
}
```

6.4.6. DE_AccelerationConfidence

No.	4–6
Data name	DE_AccelerationConfidence
Definition	Information indicating the reliability of vehicle longitudinal acceleration (DE_Acceleration) data. Set the value corresponding to the class of the longitudinal acceleration measurement system in use.
Data size	3 bits
Date type	Enumerated
Allocation	0: Unavailable 1: More than 5 m/s^2 class 2: 5 m/s^2 class 3: 2.5 m/s^2 class 4: 1 m/s^2 class 5: 0.5 m/s^2 class 6: 0.1 m/s^2 class 7: 0.05 m/s^2 or less class

```
ASN.1 Representation:
AccelerationConfidence ::= ENUMERATED{
    unavailable                 (0),
    more than 5m/s^2 class      (1),
    5m/s^2 class                (2),
    2.5m/s^2 class              (3),
    1m/s^2 class                (4),
    0.5m/s^2 class              (5),
    0.1m/s^2 class              (6),
    0.05m/s^2 or less class     (7)
}
```

6.4.7. DE_TransmissionState

No.	4–7
Data name	DE_TransmissionState
Definition	Information about the transmission position of the vehicle. For vehicles with manual transmission or with continuously variable transmission, set the "Drive" value for all forward positions.
Data size	3 bits
Date type	Enumerated
Allocation	0: Neutral 1: Parking 2: Forward Gears 3: Reverse Gears 4 to 6: Reserved 7: Unavailable

```
ASN.1 Representation:
TransmissionState ::= ENUMERATED{
    neutral          (0),
    park             (1),
    forwardGears     (2),
    reverseGears     (3),
    reserved         (4),
    reserved         (5),
    reserved         (6),
    unavailable      (7)
}
```

6.4.8. DE_SteeringWheelAngle

No.	4–8
Data name	DE_SteeringWheelAngle
Definition	Information about the steering wheel position of the vehicle. Positive values indicate clockwise rotation. If unavailable, set the value to –2048 (0x800).
Data size	12 bits
Date type	Integer
Expression range	–3070.5 to 3070.5 degrees
Resolution	1.5 degrees

```
ASN.1 Representation:
SteeringWheelAngle ::= INTEGER(-2048..2047)
  -- units of 1.5 degrees
  -- available range (-2047..2047)
 -- unavailable (-2048)
```

6.5. DF_VehicleAttributeInformation

Definitions for each of the data elements that make up the DF_VehicleAttributeInformation are given below.

6.5.1. DE_VehicleSizeClassification

No.	5–1
Data name	DE_VehicleSizeClassification
Definition	Information about the vehicle size.
Data size	4 bits
Date type	Enumerated
Allocation	0: Large motor vehicle (incl. special large motor vehicle) 1: Semi–large motor vehicle 2: Normal motor vehicle (incl. small special motor vehicle, light motor vehicle [4–wheeled]) 3: Motorcycle (incl. large motorcycle and motorized bicycle) 4: Bicycle 5: Non–motorized light vehicle (e.g. cart, rickshaw, etc.) 6: Pedestrian (incl. wheelchair and mobility scooter) 7: Tram 8 to 14: Reserved 15: Others, Unknown

```
ASN.1 Representation:
VehicleSizeClassification ::= ENUMERATED{
        large size vehicle          (0),
        semi-large size vehicle     (1),
        normal size vehicle (2),
        motorcycle                  (3),
        bicycle                     (4),
        light vehicle               (5), -- without bicycle
        pedestrian                  (6),
        tram                        (7),
          -- values 8 to 14 reserved
        others                      (15)
}
```

6.5.2. DE_VehicleRoleClassification

No.	5–2
Data name	DE_VehicleRoleClassification
Definition	Information about the vehicle usage type.
Data size	4 bits
Date type	Enumerated
Allocation	0: Private vehicle 1: Emergency vehicle 2: Road work vehicle 3: Passenger transportation vehicle 4: Freight transportation vehicle 5: Special vehicle (excl. road work vehicle) 6 to 14: Reserved 15: Other, Unknown

ASN.1 Representation:

```
VehicleRoleClassification ::= ENUMERATED{
        private vehicle                 (0),
        emergency vehicle               (1),
        road work vehicle               (2),
        passenger transportation vehicle (3),
        freight transportation vehicle  (4),
        special vehicle                 (5), -- without road work vehicle
          -- values 6 to 14 reserved
        others                          (15)
}
```

6.5.3. DE_VehicleWidth

No.	5–3
Data name	DE_VehicleWidth
Definition	Information about the overall width of the vehicle. For pedestrians or vehicles with unknown width, set the value to 1023 (0x3FF).
Data size	10 bits
Date type	Unsigned integer
Expression range	0.01 to 10.22 m
Resolution	0.01 m

ASN.1 Representation:

```
VehicleWidth ::= INTEGER(0..1023)
  -- units of 0.01m
  -- available range (1..1022)
  -- unavailable (1023)
```

6.5.4. DE_VehicleLength

No.	5–4
Data name	DE_VehicleLength
Definition	Information about the overall length of the vehicle. For pedestrians or vehicles with unknown length, set the value to 16383 (0x3FFF).
Data size	14 bits
Date type	Unsigned integer
Expression range	0.01 to 163.82 m
Resolution	0.01 m

ASN.1 Representation:

```
VehicleLength ::= INTEGER(0..16383)
  -- units of 0.01m
  -- available range (1..16382)
  -- unavailable (16383)
```

6.6. DF_PositionOptionalInformation

Definitions for each of the data elements that make up the DF_PositionOptionalInformation are given below.

6.6.1. DE_PositionDelay

No.	6–1
Data name	DE_PositionDelay
Definition	Information about the position data update interval. If 100 ms or less, set the value to 1. If 3000 ms or more, set the value to 30. If unavailable, set the value to 31 (0x1F).
Data size	5 bits
Date type	Unsigned integer
Expression range	100 to 3000 ms
Resolution	100 ms

```
ASN.1 Representation:
PositionDelay ::= INTEGER(0..31)
  -- units of 100ms
  -- available range (1..30)
  -- 100ms or less (1)
  -- 3000ms or more (30)
-- unavailable (31)
```

6.6.2. DE_RevisionCounter

No.	6–2
Data name	DE_RevisionCounter
Definition	Information about the count of message transmission with the same position and vehicle data since the last position fix. If 100 ms or less, set the value to 1. If 3000 ms or more, set the value to 30. When sending interpolation data, or if the period is not known, set the value to 31 (0x1F).
Data size	5 bits
Date type	Unsigned integer
Expression range	100 to 3000 ms
Resolution	100 ms

```
ASN.1 Representation:
RevisionCounter ::= INTEGER(0..31)
  -- units of 100ms
  -- available range (1..30)
  -- 100ms or less (1)
  -- 3000ms or more (30)
-- unavailable (31)
```

6.6.3. DE_RoadFacilities

No.	6–3
Data name	DE_RoadFacilities
Definition	Information about road facilities at the location where the vehicle is traveling or stopped.
Data size	3 bits
Date type	Enumerated
Allocation	0: Unavailable 1: On road 2: Rest area or parking area 3: Interchange (incl. smart interchange) 4: Junction 5: Reserved 6: Reserved 7: Others

ASN.1 Representation:

```
RoadFacilities ::= ENUMERATED{
        unavailable                     (0),
        on road                         (1),
        service area or parking area  (2),
        interchange                     (3),
        junction                        (4),
        reserved                        (5),
        reserved                        (6),
        others                          (7),
}
```

6.6.4. DE_RoadClassification

No.	6–4
Data name	DE_RoadClassification
Definition	Information about the category of the road on which the vehicle is traveling.
Data size	3 bits
Date type	Enumerated
Allocation	0: Unavailable 1: Express way (excl. urban express way) 2: Urban express way 3: National road or prefectural road 4: Other roads (minor street etc.) 5: Walkway 6: Off–road 7: Reserved

ASN.1 Representation:

```
RoadClassification ::= ENUMERATED{
        unavailable                         (0),
        express way                         (1),
        urban express way           (2),
        national road or prefectural road   (3),
        other roads                         (4), -- minor street etc.
        walkway                             (5),
        off-road                            (6),
        reserved                            (7)
}
```

6.7. DF_GNSSStatusOptionalInformation

Definitions for each of the data elements that make up the DF_GNSSStatusOptionalInformation are given below.

6.7.1. DE_SemiMajorAxisOfPositionalErrorEllipse

No.	7–1
Data name	DE_SemiMajorAxisOfPositionalErrorEllipse
Definition	Information about the semimajor axis of the positional error ellipse (2 σ), which is an indication of the reliability of the position data obtained from the GNSS. For values of 127 m or over, set the value to 254 (0xFE). If unavailable, set the value to 255 (0xFF).
Data size	8 bits
Date type	Unsigned integer
Expression range	0 to 127 m
Resolution	0.5 m

ASN.1 Representation:

```
SemiMajorAxisOfPositionalErrorEllipse ::= INTEGER(0..255)
  -- units of 0.5m
  -- available range (0..254)
  -- 127m or over (254)
 -- unavailable (255)
```

6.7.2. DE_SemiMinorAxisOfPositionalErrorEllipse

No.	7–2
Data name	DE_SemiMinorAxisOfPositionalErrorEllipse
Definition	Information about the semiminor axis of the positional error ellipse (2 σ), which is an indication of the reliability of the position data obtained from the GNSS. For values of 127 m or over, set the value to 254 (0xFE). If unavailable, set the value to 255 (0xFF).
Data size	8 bits
Date type	Unsigned integer
Expression range	0 to 127 m
Resolution	0.5 m

```
ASN.1 Representation:
SemiMinorAxisOfPositionalErrorEllipse ::= INTEGER(0..255)
  -- units of 0.5m
  -- available range (0..254)
  -- 127m or over (254)
-- unavailable (255)
```

6.7.3. DE_SemiMajorAxisOrientationOfPositionalErrorEllipse

No.	7–3
Data name	DE_SemiMajorAxisOrientationOfPositionalErrorEllipse
Definition	Information about the orientation of the semimajor axis of the positional error ellipse (2σ), which is an indication of the reliability of the position data obtained from the GNSS. For the angle of the semimajor axis, use due north as 0 degrees, and set the value to the angular orientation in clockwise direction. If unavailable, set the value to 65535 (0xFFFF).
Data size	16 bits
Date type	Unsigned integer
Expression range	0 to 359.9875 degrees
Resolution	0.0125 degrees

```
ASN.1 Representation:
SemiMajorAxisOrientationOfPositionalErrorEllipse ::= INTEGER(0..65535)
  -- units of 0.0125 degrees from North
  -- available range (0..28799)
  -- North (0)
  -- East (7200)
  -- South (14400)
  -- West (21600)
-- unavailable (65535)
```

6.8. DF_PositionAcquisitionOptionalInformation

Definitions for each of the data elements that make up the DF_PositionOptionalInformation are given below.

6.8.1. DE_GNSSPositioningMode

No.	8–1
Data name	DE_GNSSPositioningMode
Definition	Information about the positioning mode used for the position data obtained from the GNSS.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable 1: No fix 2: 2D fix mode 3: 3D fix mode

ASN.1 Representation:

```
GNSSPositioningMode ::= ENUMERATED{
        unavailable         (0),
        no fix              (1),
        2D fix mode         (2),
        3D fix mode         (3),
}
```

6.8.2. DE_GNSSPDOP

No.	8–2
Data name	DE_GNSSPDOP
Definition	Information about the influence of the geometric arrangement of the satellites on the precision of the position data obtained from the GNSS. Set the value to the PDOP (Position Dilution Of Precision) value at the time of positioning. For values of 12.4 or over, set the value to 62 (0x3E). If unavailable, set the value to 63 (0x3F).
Data size	6 bits
Date type	Unsigned integer
Expression range	0 to 12.4
Resolution	0.2

ASN.1 Representation:

```
GNSSPDOP ::= INTEGER{0..63}
-- units of 0.2
-- available range (0..62)
-- 12.4 or over (62)
-- unavailable (63)
```

6.8.3. DE_NumberOfGNSSSatellitesInUse

No.	8–3
Data name	DE_NumberOfGNSSSatellitesInUse
Definition	Information about the number of satellites being tracked to determine the position data obtained from the GNSS. For values of 14 or over, set the value to 14(0xE). If unavailable, set the value to 15 (0xF).
Data size	4 bits
Date type	Unsigned integer
Expression range	0 to 14
Resolution	1

ASN.1 Representation:

```
NumberOfGNSSSatellitesInUse ::= INTEGER{0..15}
-- units of 1
-- available range (0..14)
-- 14 or over (14)
-- unavailable (15)
```

6.8.4. DE_GNSSMultiPathDetection

No.	8–4
Data name	DE_GNSSMultiPathDetection
Definition	Information about the multipath status (RF signals from GNSS satellites being reflected by buildings or other objects in the vicinity and also received along with the original signal) when determining the position data obtained from the GNSS.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable 1: No multipath 2: Multipath 3: Reserved

ASN.1 Representation:

```
GNSSMultipathDetection ::= ENUMERATED{
        unavailable         (0),
        no multipath        (1),
        multipath (2),
        reserved            (3),
}
```

6.8.5. DE_DeadReckoningAvailability

No.	8–5
Data name	DE_DeadReckoningAvailability
Definition	Information about presence or absence of dead reckoning function that determines position from the information from various sensors.
Data size	1 bit
Date type	Boolean
Allocation	0: No dead reckoning function/unavailable 1: Dead reckoning function available

ASN.1 Representation:

```
DeadReckoningAvailability ::= BOOLEAN
-- unavailable          (0)
-- available            (1)
```

6.8.6. DE_MapMatchingAvailability

No.	8–6
Data name	DE_MapMatchingAvailability
Definition	Information about presence or absence of a function that matches the position data for the vehicle with map data.
Data size	1 bit
Date type	Boolean
Allocation	0: No map matching function/unavailable 1: Map matching function available

```
ASN.1 Representation:
MapMatchingAvailability ::= BOOLEAN
-- unavailable          (0)
 -- available           (1)
```

6.9. DF_VehicleStatusOptionalInformation

Definitions for each of the data elements that make up the DF_VehicleStatusOptionalInformation are given below.

6.9.1. DE_YawRate

No.	9–1
Data name	DE_YawRate
Definition	Information about the yaw rate of the vehicle. Positive values indicate clockwise rotation. If unavailable, set the value to –32768 (0x8000).
Auto Size	16 bits
Date type	integer
Expression range	–327.67 to 327.67 degrees/s
Resolution	0.01 degrees/s

```
ASN.1 Representation:
YawRate ::= INTEGER(-32767..32768)
  -- units of 0.01 degree/s
  -- positive value specifies clockwise rotation
  -- available range (-32767..32767)
-- unavailable (-32768)
```

6.9.2. DE_BrakeAppliedStatus

No.	9–2
Data name	DE_BrakeAppliedStatus
Definition	Information about the brake status of the vehicle. If no independent wheel brake information is available, set the value of [5] to 0, and set the values of [0] to [3] all to the same value according to the brake off/on status.
Data size	6 bits
Date type	Bit string
Allocation	[0]: Left front brake　0: OFF 1: ON [1]: Left rear brake　0: OFF 1: ON [2]: Right front brake　0: OFF 1: ON [3]: Right rear brake　0: OFF 1: ON [4]: Brake status availability　0: Unavailable 1: Available [5]: Independent wheel brake availability　0: Unavailable 1: Available

```
ASN.1 Representation:
BrakeAppliedStatus ::= BIT STRING{
    leftFrontBrake                  (0),
    leftRearBrake                   (1),
    rightFrontBrake                 (2),
    rightRearBrake                  (3),
    brakeStatusAvailability         (4),
    independentWheelBrakeAvailability (5)
}
```

6.9.3. DE_AuxiliaryBrakeAppliedStatus

No.	9–3
Data name	DE_AuxiliaryBrakeAppliedStatus
Definition	Information about the status of the auxiliary brake of the vehicle. If the vehicle is not equipped with an auxiliary brake, or the information is unavailable, set the value to 0.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable 1: OFF 2: ON 3: Reserved

ASN.1 Representation:

```
AuxiliaryBrakeAppliedStatus ::= ENUMERATED{
    unavailable     (0),
    off             (1),
    on              (2),
    reserved        (3)
}
```

6.9.4. DE_ThrottlePosition

No.	9–4
Data name	DE_ThrottlePosition
Definition	Information about the throttle position of the vehicle. If unavailable, set the value to 255 (0xFF).
Data size	8 bits
Date type	Unsigned integer
Expression range	0 to 100%
Resolution	0.5%

ASN.1 Representation:

```
ThrottlePosition ::= INTEGER(0..255)
  -- units of 0.5%
  -- available range (0..200)
 -- unavailable (255)
```

6.9.5. DE_ExteriorLights

No.	9–5
Data name	DE_ExteriorLights
Definition	Information about the status of the headlights, turn lights, and hazard lights of the vehicle. Reserved values set to 0.
Data size	8 bits
Date type	Bit string
Allocation	[0]: Headlights (low beam)　0: OFF 1: ON [1]: Headlights (high beam)　0: OFF 1: ON [2]: Left turn signal　0: OFF 1: ON [3]: Right turn signal　0: OFF 1: ON [4]: Headlight status availability　0: Unavailable 1: Available [5]: Turn signal status availability　0: Unavailable 1: Available [6]: Hazard signal status availability　0: Unavailable 1: Available [7]: Reserved (When hazard is ON, set [2] and [3] both to 1.)

ASN.1 Representation:

```
ExteriorLights ::= BIT STRING{
    lowBeamHeadlightOn          (0),
    highBeamHeadlightOn         (1),
    leftTurnSignalOn            (2),
    rightTurnSignalOn           (3),
    headlightAvailability       (4),
    turnSignalAvailability(5),
    hazardSignalAvailability    (6),
    reserved                    (7)
}
```

6.9.6. DE_AdaptiveCruiseControlStatus

No.	9–6
Data name	DE_AdaptiveCruiseControlStatus

Definition	Information about the ACC (Adaptive Cruise Control System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

ASN.1 Representation:

```
AdaptiveCruiseControlStatus ::= ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.9.7. DE_CooperativeAdaptiveCruiseControlStatus

No.	9–7
Data name	DE_CooperativeAdaptiveCruiseControlStatus
Definition	Information about the C–ACC (Cooperative Adaptive Cruise Control System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

ASN.1 Representation:

```
CooperativeAdaptiveCruiseControlStatus :== ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.9.8. DE_PreCrashSafetyStatus

No.	9–8
Data name	DE_PreCrashSafetyStatus
Definition	Information about the PCS (Pre–Crash Safety System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

```
ASN.1 Representation:
PreCrashSafetyStatus ::= ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.9.9. DE_AntilockBrakeStatus

No.	9–9
Data name	DE_AntilockBrakeStatus
Definition	Information about the ABS (Antilock Brake System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

```
ASN.1 Representation:
AntilockBrakeStatus ::= ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.9.10. DE_TractionControlStatus

No.	9–10
Data name	DE_TractionControlStatus
Definition	Information about the TRC (Traction Control System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

```
ASN.1 Representation:
TractionControlStatus ::= ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.9.11. DE_ElectronicStabilityControlStatus

No.	9–11
Data name	DE_ElectronicStabilityControlStatus
Definition	Information about the ESC (Electronic Stability Control System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

ASN.1 Representation:

```
ElectronicStabilityControlStatus ::= ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.9.12. DE_LaneKeepingAssistStatus

No.	9–12
Data name	DE_LaneKeepingAssistStatus
Definition	Information about the LKA (Lane Keeping Assist System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

ASN.1 Representation:

```
LaneKeepingAssistStatus ::= ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.9.13. DE_LaneDepartureWarningStatus

No.	9–13
Data name	DE_LaneDepartureWarningStatus
Definition	Information about the LDW (Lane Departure Warning System) of the vehicle.
Data size	2 bits
Date type	Enumerated
Allocation	0: Unavailable or not equipped with system 1: OFF 2: ON (Not engaged) 3: ON (Engaged)

```
ASN.1 Representation:
LaneDepartureWarningStatus ::= ENUMERATED{
    unavailable     (0), -- unavailable or not equipped with system or sensor
    off             (1),
    on              (2), -- not engaged
    engaged         (3)
}
```

6.10. DF_IntersectionInformation

Definitions for each of the data elements that make up the DF_IntersectionInformation are given below.

6.10.1. DE_IntersectionDistanceInformationAvailability

No.	10–1
Data name	DE_IntersectionDistanceInformationAvailability
Definition	Information about the availability of distance information to an upcoming intersection. If setting is not possible or unavailable, set the value to 0.
Data size	3 bits
Date type	Enumerated
Allocation	0: Unavailable 1: From map information 2: From roadside–to–vehicle communication 3 to 7: Reserved

```
ASN.1 Representation:
IntersectionDistanceInformationAvailability ::= ENUMERATED{
    unavailable                 (0),
    from digital map            (1),
    from I2VCommunication       (2),
     ... -- values 3 to 7 reserved
}
```

6.10.2. DE_IntersectionDistance

No.	10–2
Data name	DE_IntersectionDistance
Definition	Information about the distance to an upcoming intersection. If unavailable, set the value to 1023 (0x3FF).
Data size	10 bits
Date type	Unsigned integer
Expression range	0 to 1000 m
Resolution	1 m

```
ASN.1 Representation:
IntersectionDistance ::= INTEGER(0..1023)
  -- units of 1 m
  -- available range (0..1000)
 -- unavailable (1023)
```

6.10.3. DE_IntersectionPositionInformationAvailability

No.	10–3
Data name	DE_IntersectionPositionInformationAvailability
Definition	Information about the availability of position information for an upcoming intersection. If setting is not possible or unavailable, set the value to 0.
Data size	3 bits
Date type	Enumerated
Allocation	0: Unavailable 1: From map information 2: From roadside–to–vehicle communication 3 to 7: Reserved

```
ASN.1 Representation:
IntersectionPositionInformationAvailability ::= ENUMERATED{
    unavailable                 (0),
    from digital map            (1),
    from I2VCommunication       (2),
     ... -- values 3 to 7 reserved
}
```

6.10.4. DE_IntersectionLatitude

No.	10–4
Data name	DE_IntersectionLatitude
Definition	Information about the latitude of an upcoming intersection. Geodetic datum is WGS84 (or equivalent). Positive values indicate north latitude, and negative values indicate south latitude. If unavailable, set the value to –2147483648 (0x80000000).
Data size	32 bits
Date type	Integer
Expression range	–90 to 90 degrees
Resolution	0.0000001 degree

```
ASN.1 Representation:
IntersectionLatitude ::= INTEGER(-2147483648..2147483647)
  -- units of 0.1 micro degree
  -- available range (-900000000..900000000)
 -- unavailable (-2147483648)
```

6.10.5. DE_IntersectionLongitude

No.	10–5
Data name	DE_IntersectionLongitude
Definition	Information about the longitude of an upcoming intersection. Geodetic datum is WGS84 (or equivalent). Positive values indicate east longitude, and negative values indicate west longitude. If unavailable, set the value to –2147483648 (0x80000000).
Data size	32 bits
Date type	Integer
Expression range	–180 to 180 degrees
Resolution	0.0000001 degree

ASN.1 Representation:

```
IntersectionLongitude ::= INTEGER(-2147483648..2147483647)
  -- units of 0.1 micro degree
  -- available range (-1800000000..1800000000)
-- unavailable (-2147483648)
```

6.11. DF_ExtendedInformation

Definitions for each of the data elements that make up the DF_ExtendedInformation are given below..

6.11.1. DE_ExtendedInformationForPrivateVehicle

No.	11–1
Data name	DE_ExtendedInformationForPrivateVehicle
Definition	Extended information for private vehicles. Set if the DE_VehicleRoleClassification is "Private vehicle".
Data size	8 bits
Date type	Enumerated
Allocation	The upper 4 bits are for driving information, and the lower 4 bits are for status information. Driving information 0: Driving 1: Newly licensed driver 2: Elderly driver 3: disabled driver 4: Hearing impaired driver 5: Temporary licensed driver 6: Riding with kindergartener or school children 7: Riding with social welfare support recipient 8 to 15: Reserved Status information 0: Normal 1: Getting on and off 2: Kindergartener or school children getting on and off 3: Social welfare support recipient getting on and off 4: Loading and unloading 5 to 14: Reserved 15: Emergency stop

ASN.1 Representation:

```
ExtendedVehicleInformationForPrivateVehicle ::= OCTET STRING(SIZE(1))
  -- SEQUENCE{
  --      drivingInfo         DrivingInformationForPrivateVehicle,
  --           4bits
  --      statusInfo          StatusInformationForPrivateVehicle,
--           4bits
  -- }
DrivingInformationForPrivateVehicle ::= ENUMERATED{
    normal or no information                                (0),
    newly-licensed driver                                   (1),
    elderly driver                                          (2),
    physically handicapped driver                   (3),
    hearing impaired driver                                 (4),
    temporary licensed driver                               (5),
    riding with kindergartener and school children  (6),
    riding with social-welfare support recipient            (7),
      ... -- values 8 to 15 reserved
}
StatusInformationForPrivateVehicle ::= ENUMERATED{
    normal                                                  (0),
    getting on and off                                      (1),
    kindergartener and school children getting on and off   (2),
    social-welfare support recipient getting on and off     (3),
    loading and unloading                                   (4),
      ... -- values 5 to 14 reserved
    emergency stop                                          (15)
}
```

6.11.2. DE_ExtendedInformationForEmergencyVehicle

No.	11–2
Data name	DE_ExtendedInformationForEmergencyVehicle
Definition	Extended information for emergency vehicles. Set if the DE_VehicleRoleClassification is "Emergency vehicle".
Data size	8 bits
Date type	Enumerated
Allocation	The upper 4 bits are reserved, and the lower 4 bits are for status information. Vehicle information 0: Ambulance 1 : Firefighting vehicle 2 : Police vehicle 3 to 14 : Reserved 15: Other emergency vehicle Status information 0: Normal 1: Emergency driving 2: Operation on road 3 to 14: Reserved 15: Emergency stop

ASN.1 Representation:

```
ExtendedVehicleInformationForEmergencyVehicle ::= OCTET STRING(SIZE(1))
 -- SEQUENCE{
 --      reserveBits,
 --          4bits, set to all  0
 --      statusInfo   StatusInformationForEmergencyVehicle,
 --          4bits
 -- }
VehicleRoleInformationForEmergencyVehicle ::= ENUMERATED{
    ambulance               (0),
    fire engine             (1),
    police car              (2),
    ... -- values 3 to 14 reserved
    others                  (15)
    }
StatusInformationForEmergencyVehicle ::= ENUMERATED{
    normal                  (0),
    emergency driving       (1),
    operation on road       (2),
     ... -- values 3 to 14 reserved
    emergency stop          (15)
}
```

6.11.3. DE_ExtendedInformationForRoadWorkVehicle

No.	11–3
Data name	DE_ExtendedInformationForRoadWorkVehicle
Definition	Extended information for road work vehicles. Set if the DE_VehicleRoleClassification is "Road work vehicle".
Data size	8 bits
Date type	Enumerated
Allocation	The upper 4 bits are for restriction information, and the lower 4 bits are for status information. Restriction information 0: No restriction 1: Driving lane restriction 2: Road shoulder restriction 3 to 15: Reserved Status information 0: Normal 1: Under construction 2: Road working 3: Road working at low speed run 4: Accident handling 5: Traffic jam ahead 6 to 14: Reserved 15: Emergency stop

ASN.1 Representation:

```
ExtendedVehicleInformationForRoadWorkVehicle ::= OCTET STRING(SIZE(1))
 -- SEQUENCE{
 --      restrictInfo        RestrictionInformationForRoadWorkVehicle,
 --          4bits
 --      statusInfo          StatusInformationForRoadWorkVehicle,
 --          4bits
 -- }
RestrictionInformationForRoadWorkVehicle ::= ENUMERATED{
    no restriction                          (0),
    driving lane restriction                (1),
    road shoulder restriction               (2),
     ... -- values 3 to 15 reserved
}
StatusInformationForRoadWorkVehicle ::= ENUMERATED{
    normal                                  (0),
    under construction                      (1),
    road working                            (2),
    road working at low speed run (3),
    accident handling                       (4),
    traffic jam ahead                       (5),
     ... -- values 6 to 14 reserved
    emergency stop                          (15)
}
```

6.11.4. DE_ExtendedInformationForPassengerTransportationVehicle,

No.	11–4
Data name	DE_ExtendedInformationForPassengerTransportationVehicle
Definition	Extended information for passenger transportation vehicle. Set if the DE_VehicleRoleClassification is "Passenger transportation vehicle".
Data size	8 bits
Date type	Enumerated
Allocation	The upper 4 bits are for driving information, and the lower 4 bits are for status information. Driving information 0: Normal / No information 1: Route bus in service 2: School bus in service 3: Welfare support car in service 4: Taxi in service 5 to 15: Reserved Status information 0: Normal 1: Getting on and off 2: Kindergartener or school children getting on and off 3: Social welfare support recipient getting on and off 4: Loading and unloading 5: Starting from a stop 6 to 14: Reserved 15: Emergency stop

ASN.1 Representation:

```
ExtendedVehicleInformationForPassengerTransportationVehicle ::= OCTET STRING(SIZE(1))
  -- SEQUENCE{
  --     drivingInfo      DrivingInformationForPassengerTransportationVehicle,
  --         4bits
  --     statusInfo       StatusInformationForPassengerTransportationVehicle,
  --         4bits
  -- }
DrivingInformationForPassengerTransportationVehicle ::= ENUMERATED{
  normal or no information          (0),
    route bus in service            (1),
    school bus in service           (2),
    welfare support car in service  (3),
    taxi in service                 (4),
     ... -- values 5 to 15 reserved
}
StatusInformationForPassengerTransportationVehicle ::= ENUMERATED{
    normal                                                  (0),
    getting on and off                                      (1),
    kindergartener and school children getting on and off   (2),
    social-welfare support recipient getting on and off     (3),
    loading and unloading                                   (4),
    starting from a stop                                    (5),
     ... -- values 6 to 14 reserved
    emergency stop                                          (15)
}
```

6.11.5. DE_ExtendedInformationForFreightTransportationVehicle

No.	11–5
Data name	DE_ExtendedInformationForFreightTransportationVehicle
Definition	Extended information for freight transportation vehicle. Set if the DE_VehicleRoleClassification is "Freight transportation vehicle".
Data size	8 bits
Date type	Enumerated
Allocation	The upper 4 bits are reserved, and the lower 4 bits are for status information. Reserved 0: Normal / No information 1 to 15: Reserved Status information 0: Normal 1: Loading and unloading goods 2 to 14: Reserved 15: Emergency stop

ASN.1 Representation:

```
ExtendedVehicleInformationForFreightTransportationVehicle ::= OCTET STRING(SIZE(1))
  -- SEQUENCE{
  --     reserveBits,
  --         4bits, set to all 0
  --     statusInfo   StatusInformationForFreightTransportationVehicle,
  --         4bits
  -- }
StatusInformationForFreightTransportationVehicle ::= ENUMERATED{
    normal                              (0),
    loading and unloading               (1),
   ... -- values 2 to 14 reserved
    emergency stop                      (15)
}
```

6.11.6. DE_ExtendedInformationForSpecialVehicle

No.	11–6
Data name	DE_ExtendedInformationForSpecialVehicle
Definition	Extended information for special vehicles (excluding road work vehicles). Set if the DE_VehicleRoleClassification is "Special vehicle".
Data size	8 bits
Date type	Enumerated
Allocation	The upper 4 bits are reserved, and the lower 4 bits are for status information. Reserved 0: Normal / No information 1 to 15: Reserved Status information 0: Normal 1: Road working 2 to 14: Reserved 15: Emergency stop

ASN.1 Representation:

```
ExtendedVehicleInformationForSpecialVehicle ::= OCTET STRING(SIZE(1))
 -- SEQUENCE{
 --      reserveBits,
 --          4bits, set to all 0
 --      statusInfo    StatusInformationForSpecialVehicle,
 --          4bits
 -- }
StatusInformationForSpecialVehicle ::= ENUMERATED{
    normal                      (0),
    road working                (1),
     ... -- values 2 to 14 reserved
    emergency stop              (15)
}
```

6.11.7. DE_ExtendedInformationForOthers

No.	11–7
Data name	DE_ExtendedInformationForOthers
Definition	Extended information for vehicles not classified as private vehicle, emergency vehicle, road work vehicle, passenger transportation vehicle, freight transportation vehicle, or special vehicle. Set if the DE_VehicleRoleClassification is "Other, Unknown".
Data size	8 bits
Date type	Enumerated
Allocation	The upper 4 bits are reserved, and the lower 4 bits are for status information. Reserved 0: Normal / No information 1 to 15: Reserved Status information 0: Normal 1 to 14: Reserved 15: Emergency stop

ASN.1 Representation:

```
ExtendedVehicleInformationForOthers ::= OCTET STRING(SIZE(1))
 -- SEQUENCE{
 --      reserveBits,
 --          4bits, set to all 0
 --      statusInfo   StatusInformationForOthers,
 --          4bits
 -- }
StatusInformationForOthers ::= ENUMERATED{
    normal                          (0),
     ... -- values 1 to 14 reserved
    emergency stop                  (15)
}
```

6.12. DF_FreeFieldManagementInformation

Definitions for each of the data elements that make up the DF_FreeFieldManagementInformation are given below.

6.12.1. DE_IndividualAppHeaderLength

No.	12–1
Data name	DE_IndividualAppHeaderLength
Definition	Data size information for free application header field. The unit is bytes.
Data size	5 bits
Date type	Unsigned integer
Expression range	4 to 22 bytes
Resolution	1 byte

ASN.1 Representation:

```
IndividualAppHeaderLength ::= INTEGER(0..31)
  -- units of 1 byte
  -- available range (4..22)
```

6.12.2. DE_NumberOfIndividualAppData

No.	12–2
Data name	DE_NumberOfIndividualAppData
Definition	Information about the number of individual application data in the free field. The maximum value is 7.
Data size	3 bits
Date type	Unsigned integer
Expression range	1 to 7
Resolution	1

ASN.1 Representation:

```
NumberOfIndividualAppData ::= INTEGER(0..7)
-- available range (1..7)
```

6.13. DF_IndividualAppDataManagementInformation

Definitions for each of the data elements that make up the DF_IndividualAppDataManagementInformation are given below.

6.13.1. DE_IndividualServiceStandardID

No.	13–1
Data name	DE_IndividualServiceStandardID
Definition	Information about the individual service standard ID for the individual application data.
Data size	8 bits
Date type	Enumerated
Allocation	(Allocated by the operation management organization.)

```
ASN.1 Representation:
IndividualServiceStandardID ::= ENUMERATED{
  reserved (0),
   ... -- values 1 to 255 reserved and assigned by the operation management organization
}
```

6.13.2. DE_IndividualAppDataAddress

No.	13–2
Data name	DE_IndividualAppDataAddress
Definition	Start position of the individual application data, taking the start of the free application data field as zero. The unit is bytes.
Data size	8 bits
Date type	Unsigned integer
Expression range	0 to 59th byte
Resolution	1 byte

```
ASN.1 Representation:
IndividualAppDataAddress ::= INTEGER(0..255)
  -- units of 1byte (first address of freeAppDataField as 0th byte)
 -- available range (0..59)
```

6.13.3. DE_IndividualAppDataLength

No.	13–3
Data name	DE_IndividualAppDataLength
Definition	Data size information for the individual application data. The unit is bytes.
Data size	8 bits
Date type	Unsigned integer
Expression range	1 to 60 bytes
Resolution	1 byte

ASN.1 Representation:

```
IndividualAppDataLength ::= INTEGER(0..255)
  -- units of 1byte
  -- available range (1..60)
```

Annex A: Extension and Change Rules

The annex A describes the rules to extensions and change rules on conjunction with future version upgrades are described below. The compatibility of basic messages shall be ensured so that even if messages from a different version are received, the ITS Connect onboard units can use the information with the scope of the corresponding version.

(1) With respect to order, size, and bit configuration of data frames and data elements already decided in a previous version, all specifications should be defined with the same specifications as the previous version, and they should not be changed in the new version. For example, if it is necessary to change the bit structure (due to the lack of a reserved area), in order to add the new information to the previously-determined data elements, the previously-determined elements retain the original bit structure, and the previously-determined data elements and a new data frame for setting the new data elements when necessary is added in accordance with the rule described in (2). As a result, even if an onboard unit compatible with a prior version receives a message from the new version, it can be used within the scope of the information defined in the previous version.

(2) When adding a new data frame or new data element to a common field, add it sequentially before the free field. For example, even if a new data element has content that should be classified into a previously-determined data frame, it shall be not added to the previously-determined data frame but shall newly be added before the free field. The method for adding is as follows.

- When adding a new data frame, add it before the free field.
- Data elements are set in one of the data frames. When adding new data elements, define a new data frame before the free field if necessary and add it to that data frame.

Also, when adding a new data frame that is arbitrarily set in a common field, following actions should be required as well.

- Set DE_OptionFlag bit [6] (whether there is an extension option flag) to 1.
- Define and operate a new extension option flag according to the new data frame. The extension option flag is set in any data element.
- If there are not data elements or data frames that set new extension option flags, define a new data element or data frame and add it in front of the free field.

(3) Due to the upgrading the common field, the allocated data size may increase and the individual application data may not fit in the free field. Therefore, any extension shall allocate minimum 30byte for the free field and common field shall be less than or equal to 70byte.

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