



SURFACE VEHICLE INFORMATION REPORT

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SAE V2X ASN.1 Modules - Organization and Management Rules

RATIONALE

A set of rules is needed to facilitate the creation and management of the large number and variety of messages, data elements, and data frames, specified in ASN.1 notation and included in SAE J2735 and in other SAE technical reports that specify V2X applications. Those ASN.1 Entities are referred to as the "V2X ASN.1 Module Collection." This document specifies a set of rules that SAE technical committees (TCs) under the V2X Communications Steering Committee are to follow when making additions or modifications to any part of the V2X ASN.1 Module Collection.

INTRODUCTION

SAE J2735 contains many definitions of messages, data frames, and data elements specified in ASN.1 notation. Those ASN.1 Entities, when used in accordance with the provisions of relevant SAE V2X technical reports (standards, recommended practices, and information reports), including SAE J2735 itself, enable interoperable message exchanges between vehicles or between a vehicle and road infrastructure equipment in support of specific applications.

Traditionally, some of those V2X technical reports have also included ASN.1 Entities that supplement some of those present in SAE J2735.

ASN.1 Entities are organized into Modules. The set of Modules in SAE J2735, supplemented by those included in other SAE technical reports, which may eventually be merged into SAE J2735, is referred to as the "V2X ASN.1 Module Collection" in this document.

Managing the V2X ASN.1 Module Collection has been a difficult task due to the size of the Modules (hundreds of data frames and data elements supporting many different V2X applications) and to the fact that it involves multiple SAE technical reports, which are developed and periodically revised at different times and by different groups of experts.

This document specifies a set of rules for the creation and management of the V2X ASN.1 Module Collection. The purpose of these rules is to facilitate these tasks and ensure that future additions and modifications to any part of the V2X ASN.1 Module Collection will not introduce inconsistencies or break backward compatibility with currently deployed implementations.

The rules specified in this document are to be used by all the technical committees (TCs) under the SAE V2X Communications Steering Committee when they develop any additions or revisions for the V2X ASN.1 Module Collection.

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1. SCOPE

This document specifies a set of rules for the creation and management of the V2X ASN.1 Module Collection. These rules apply to the development of any message, data element, data frame, or any ASN.1 Entity that is part of the V2X ASN.1 Module Collection, regardless of the SAE technical report in which it appears. The intended audience for these rules includes every technical committee (TC) under the SAE V2X Communications Steering Committee.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J2735	V2X Communications Message Set Dictionary
SAE J2945	Dedicated Short Range Communication (DSRC) Systems Engineering Process Guidance for SAE J2945/X Documents and Common Design Concepts™
SAE J3067	Candidate Improvements to Dedicated Short Range Communications (DSRC) Message Set Dictionary [SAE J2735] Using Systems Engineering Methods

2.1.2 ISO/IEC Publications

Copies of ISO documents are available online at <https://webstore.ansi.org/>. Copies of IEC documents are available online at www.iec.ch.

ISO/IEC 8824-1:2015	Recommendation ITU-T X.680 (2015): Information Technology - Abstract Syntax Notation One (ASN.1): Specification of Basic Notation
ISO/IEC 8824-2:2015	Recommendation ITU-T X.681 (2015): Information Technology - Abstract Syntax Notation One (ASN.1): Information Object Specification
ISO/IEC 8824-3:2015	Recommendation ITU-T X.682 (2015): Information Technology - Abstract Syntax Notation One (ASN.1): Constraint Specification
ISO/IEC 8824-4:2015	Recommendation ITU-T X.683 (2015): Information Technology - Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 Specifications
ISO/IEC 9834-1:2011	Recommendation ITU-T X.660 (2011): Information Technology - Open Systems Interconnection - Procedures for the Operation of OSI Registration Authorities: General Procedures and Top Arcs of the ASN.1 International Object Identifier Tree

2.1.3 Other Publications

AASHTO, ITE, and NEMA. (2016). NTCIP 8002 Annex B1 version v01: National transportation communications for ITS protocol—Content outline for NTCIP 1200-series documents (for standards engineering process (SEP) content). *American Association of State Highway and Transportation Officials (AASHTO), Institute of Transportation Engineers (ITE), and National Electrical Manufacturers Association (NEMA)*. Retrieved from https://www.ntcip.org/file/2018/11/NTCIP8002_AnnexB1v0120160919.pdf.

U.S. DOT. (2022). Architecture Reference for cooperative and intelligent transportation (ARC-IT). *U.S. Department of Transportation (DOT)*. Retrieved from <http://local.iteris.com/arc-it/>.

3. DEFINITIONS

For the purposes of this documents, the definitions, abbreviations, and acronyms found in SAE J2735 also apply.

3.1 ASN.1 SCHEMA FILE

A text file that consists of a single Module or a concatenation of Modules.

3.2 MODULE

An ASN.1 construct as defined in ISO/IEC 8824-1, which consists of a Module header, the BEGIN keyword, an optional EXPORTS clause, an optional IMPORTS clause, a set of ASN.1 Assignments, and the END keyword.

A Module header begins with a Module name and an optional¹ Module OID. Each ASN.1 Assignment defines an ASN.1 Type or other ASN.1 Entity.

3.3 ASN.1 ASSIGNMENT

An ASN.1 construct as defined in ISO/IEC 8824-1, which consists of a name and an ASN.1 Entity.

An ASN.1 Assignment assigns a name to an ASN.1 Entity in the scope of the enclosing Module.

3.4 ASN.1 TYPE

A type as specified in ISO/IEC 8824-1.

Messages, data frames, and data elements as defined in SAE J2735 are ASN.1 Types.

3.5 ASN.1 ENTITY

A type, value notation, value set, information object class, information object, or information object set, as specified in ISO/IEC 8824-1 and ISO/IEC 8824-2.

ASN.1 Types are the most frequent kind of ASN.1 Entities.

3.6 ROOT MODULE

A Module that contains a set of ASN.1 Entities that form the outermost layer of a V2X message.

The Root Module references other Modules of the V2X Module Collection but is not referenced by other Modules.

3.7 COMMON MODULE

A Module that contains a set of ASN.1 Entities of general interest, which are referenced, or intended to be referenced, by multiple Modules of the V2X Module Collection.

3.8 V2X ASN.1 MODULE COLLECTION

The set of Modules that contain ASN.1 Entities that support a variety of V2X applications and are published by SAE.

The Modules in the V2X ASN.1 Module Collection are published as part of SAE J2735 and other SAE technical reports. The content of each version of the V2X ASN.1 Module Collection is immutable. When changes or additions are needed, new versions of the affected Modules are generated.

¹ The OID is mandatory in V2X Modules; see 5.3.

3.9 V2X CORE ASN.1 MODULE COLLECTION

The subset of the V2X ASN.1 Module Collection that is managed by the V2X Core TC and is included in SAE J2735.

The composition of the subset may change for each version of the V2X ASN.1 Module Collection.

3.10 OBJECT IDENTIFIER

A globally unique identifier specified in ISO/IEC 9834-1 and consisting of a sequence of non-negative integers.

Object identifiers form a tree, called the OID tree. Each node in the OID tree identifies either a registration authority or an object (of any kind) managed by a registration authority that is an ancestor of the node. Common examples of objects are organizations, standards, documents, Modules, and versions, but there are no restrictions on the nature of an object that can be identified by an OID. If a node represents an organization, the organization typically acts as a registration authority for the child nodes of that node.

3.11 MODULE OID

An OID permanently assigned to a Module by the owner of the Module.

In ASN.1, each Module begins with a name followed by an optional² Module OID. If a different Module OID is assigned to each version of a Module, the Module OID can be used to uniquely reference a specific version of the Module. Usually, this is not possible with the Module name alone because Module names are not intended to be globally unique. This document requires that a different Module OID be assigned to each major version of a Module.

3.12 IMPORTS CLAUSE

An ASN.1 construct that declares a list of named ASN.1 Entities, which are defined in a Module other than the enclosing Module and are referenced in the present Module.

When an ASN.1 Entity “X” defined in a Module “B” is listed in the IMPORTS clause of Module “A,” the name of ASN.1 Entity “X” is allowed to appear anywhere in Module “A” with no further qualification. The use of the Module OID to identify the Module that contains the imported ASN.1 Entities is optional in ASN.1, but required in this document.

3.13 EXTERNAL REFERENCE

An ASN.1 construct as defined in ISO/IEC 8824-1, which consists of a Module name, a dot (.), and the name of an ASN.1 Entity.

In ASN.1, external references can be used to refer to entities defined in a different Module, but in general their use is not permitted (and is unnecessary) when the importing Module contains an IMPORTS clause. The only exception is when the IMPORTS clause contains two entities with the same name imported from different Modules.

² The OID is mandatory in V2X Modules; see 5.3.