

*A Joint Standard of AASHTO, ITE, and NEMA*

# NTCIP 1406:2000 v01.02

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Transit Communications  
Interface Profiles  
part of the National Transportation  
Communications for ITS Protocol  
  
Standard on  
On-Board (OB) Objects

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December 31, 2000

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In February 1997, the TCIP Technical Working Group organized the first subgroups to standardize the business area data interface objects. In March 1997, the TCIP TWG formed the On-Board/Control Center Subgroup to standardize the on-board data interface objects, which resulted in this document.

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- Federal Highway Administration
- Federal Transit Administration

## FOREWORD

This document uses only metric units.

This document is an NTCIP Device Data Dictionary Standard. Device Data Dictionary Standards provide definitions of data elements for use within NTCIP and TCIP systems.

The TCIP family of standards addresses Advanced Public Transportation Systems (APTS) data interfaces, and related automated transit tools and data. The standards also address the business requirements of the APTS data interfaces. In some cases, specialized terms were needed to define general classes of information. For example, different business areas needed to define data elements related to time, date and footnotes. Special data types were developed so that these data concepts were consistent across business areas, while specific needs were met. These data types are defined in this document.

For more information about NTCIP standards, visit the NTCIP Web site at <http://www.ntcip.org>. For a hardcopy summary of NTCIP information, contact the NTCIP Coordinator at the address below.

In preparation of this NTCIP document, input of users and other interested parties was sought and evaluated. Inquires, comments, and proposed or recommended revisions should be submitted to:

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### Approvals

This document was separately balloted and approved by AASHTO, ITE, and NEMA after recommendation by the Joint Committee on the NTCIP. Each organization has approved this standard as the following standard type, as of the date:

AASHTO – Standard Specification; October 1999  
ITE – Software Standard; May 2000  
NEMA – Suggested Standard for Future Design; April 2000

### History

From 1997 to 1999, this document was referenced as ITE ST-ITS-TCIP-OB and/or NEMA TS 3.TCIP-OB. However, to provide an organized numbering scheme for the NTCIP documents, this document is now referenced as NTCIP 1406. The technical specification of NTCIP 1406 is identical to the former reference, except as noted in the development history below:

ST-ITS-TCIP-OB version 0.1. August 1997 -- ITE ITS Standards Committee accepted for distribution for User Comment.

ST-ITS-TCIP-OB, Recommended Standard version 1.0, October 1, 1998. October 1998 – Accepted as a Recommended Standard by the Joint Committee on the NTCIP. See the Standards Development Report Attachment A for revisions from the User Comment Draft in Sections (prior numbers) 2.1, 2.2, 3.3, 4.2, 4.3.2, 4.4, 5.1, 5.2, and 6.0.

TS 3.TCIP-OB, version 98.10.01, October 1, 1998. NTCIP Standards Bulletin B0034 reported minor changes in formatting from the previous version. Approved by AASHTO in October 1999,

approved by ITE in May 2000, and approved by NEMA in April 2000. (Assigned document number NTCIP 1406.)

NTCIP 1406 v01.02, December 31, 2000. October 2001 – Reformatted for printing: incremented version number and updated date; added and revised front matter; updated references to NTCIP and NEMA document numbers in Clause on References; updated references to ITE document numbers; inserted introduction text in Section on Requirements; deleted Annex A Comment Form; and inserted introduction text in Annex for the ASN.1 Script.

## INTRODUCTION

This document defines the On-Board data elements and messages that are supported by the Transit Communications Interface Profiles (TCIP). TCIP serves as the "transit" component of the National Transportation Communication for ITS Protocol.

There are four annexes to this document.

This document defines requirements that are applicable to all NTCIP and TCIP environments and also contains optional and conditional clauses that are applicable to specific environments for which they are intended.

The following keywords apply to this document: AASHTO, ITE, NEMA, NTCIP, TCIP, on-board.

In 1992, the NEMA 3-TS Transportation Management Systems and Associated Control Devices Section began the effort to develop the NTCIP. Under the guidance of the Federal Highway Administration's NTCIP Steering Group, the NEMA effort was expanded to include the development of communications standards for all transportation field devices that could be used in an Intelligent Transportation Systems (ITS) network.

In September 1996, an agreement was executed among AASHTO, ITE, and NEMA to jointly develop, approve, and maintain the NTCIP standards.

In 1997, the ITE, in cooperation with the American Public Transit Association (APTA), the U.S. DOT's Federal Transit Administration, and the U.S. DOT's FHWA, began development of the TCIP. The TCIP Technical Working Group was accepted as a subdivision of the Joint Committee on the NTCIP.

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NTCIP and TCIP Data Dictionary and ASN.1 Script

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## CONTENTS

SECTION 1	GENERAL .....	1-1
1.1	Scope.....	1-1
1.2	References.....	1-1
1.2.1	Normative References .....	1-1
1.2.2	Informative References.....	1-2
1.2.3	Contact Information.....	1-3
SECTION 2	TERMINOLOGY .....	2-1
2.1	Business Area Definitions .....	2-1
2.2	Abbreviations .....	2-1
2.3	Acronyms .....	2-1
SECTION 3	BASIC CONCEPTS.....	3-1
3.1	On-Board Business Area Domain.....	3-1
3.2	Bus Components and Data Flows .....	3-1
3.3	Classification Scheme .....	3-3
3.3.1	National Architecture Classification Scheme.....	3-3
3.3.2	TCIP Classification Tree.....	3-3
3.4	Coding Conventions .....	3-4
SECTION 4	REQUIREMENTS.....	4-1
4.1	On-Board Bus Data Dictionary .....	4-1
4.2	On-Board Bus Message Set.....	4-35
SECTION 5	CONFORMANCE .....	5-1
5.1	Level 1 Conformance.....	5-1
5.2	Level 2 Conformance.....	5-1
ANNEX A	TCIP ON-BOARD/SAE J1587 CROSS REFERENCE TABLE (DATA ELEMENTS).....	A-1
ANNEX B	TCIP ON-BOARD/SAE J1587 CROSS REFERENCE TABLE (MESSAGES) .....	B-1
ANNEX C	DATA ELEMENT/MESSAGE USE CROSS REFERENCE TABLE .....	C-1
ANNEX D	ANS.1 SCRIPT .....	D-1



## Section 1 GENERAL

### 1.1 SCOPE

The on-board domain covers the data needs of the functions related to on-board applications. This includes all data needed for the communications between on-board components within a public transportation vehicle and other transit applications. The data objects defined in this specification are critical to transit agencies because they provide information (such as AVL information) for vehicle performance monitoring and transit operations.

This document only covers the on-board data element and message definitions for bus components. The NTCIP 1407 *Standard on Control Center Objects* covers the data elements and messages for the control center business area, and the dialogs between the on-board (mobile end) and control center (fixed end) business areas. The IEEE Transit Communications Interface Profiles for Rail Transit Systems (WG 9) will cover the on-board data element and message definitions for on-board rail components. A separate document will be published with data elements and messages common to both rail and bus.

The on-board business area provides dynamic information on locations and operating status of public transportation vehicles to Information Service Providers (ISP), Traffic Management Centers (TMC), Remote Traveler Support (RTS), Planning Subsystems (PS), and other transit management systems. It receives scheduling, routing and dispatching, and other operations-related information from transit management centers (or control centers).

### 1.2 REFERENCES

For approved amendments, contact:

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For draft revisions or amendments to this document, which may be under consideration by the relevant TCIP Working Group, and for recommended amendments of the NTCIP Joint Committee, visit the World Wide Web at <http://www.ntcip.org> or <http://www.ite.org>.

A copy of the database containing the TCIP data elements and messages for each of the business areas is available. To download a copy of the TCIP database, follow the instructions on either the NTCIP or ITE Websites.

Two types of references are cited in this section. Normative references contain provisions that apply when implementing this standard. Informative references contain rules and guidelines which may provide a more detailed understanding of the data, interface, format, profiles, or application of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standard listed below.

#### 1.2.1 Normative References

NTCIP 1400, formerly referenced as ST-ITS-TCIP-FRAME, *Transit Communications Interface Profile Framework*, Institute of Transportation Engineers, Version 1.1, April 30, 1998.

NTCIP 1407, formerly referenced as ST-ITS-TCIP-CC, *Transit Communications Interface Profile, Standard on Control Center Objects*, Institute of Transportation Engineers, Version 1.0, September 1, 1998.

NTCIP 1401, formerly referenced as ST-ITS-TCIP-CPT, *Transit Communications Interface Profile, Standard on Common Public Transportation Objects*, Institute of Transportation Engineers, Version 1.1, July 31, 1998.

NTCIP 1405, formerly referenced as ST-ITS-TCIP-SP, *Transit Communications Interface Profile, Standard on Spatial Representation of Transit Objects*, Institute of Transportation Engineers, Version 1.1, July 31, 1998.

ISO/IEC 8824:1994, *Abstract Syntax Notation One (ASN.1)*.

SAE J1587 – *Joint SAE/TMC Recommended Practice for Electronic Data Interchange Between Microcomputer Systems in Heavy Duty Vehicle Applications*, January 1996.

SAE J1708 – *Serial Data Communications Between Microcomputer Systems in Heavy-Duty Vehicle Applications*, October 1993.

### 1.2.2 Informative References

Draft IEEE P1489/D0.0.7, *Draft Standard for Data Dictionaries for Intelligent Transportation Systems*, Version 0.0.7, October 9, 1997.

Draft IEEE P1488/D0.0.6, *Draft Standard for Message Set Template for Intelligent Transportation Systems*, Version 0.0.6, October 17, 1997.

SAE J1455 – *Joint SAE/TMC Recommended Environmental Practices for Electronic Equipment Design (Heavy-Duty Trucks)*, August 1994.

The National Architecture for ITS, U.S. Department of Transportation Joint Program Office, January 1997.

IEEE P1477 *Standard for Passenger Information System for Rail Transit Vehicles*. Draft: June 25, 1997.

IEEE P1477.1 *Standard for Passenger Information System for Rail Transit Vehicles – Logical Interfaces*. (TBD)

IEEE P1475 *Standard for the Functioning of and Interfaces among Propulsion, Friction Brake and Train-borne Master Control on Rail Rapid Transit Vehicles*. Draft D 3.1, February 1998.

IEEE P1473 *Communication Protocol on Trains*. Draft: February 5, 1998.

IEEE P1483 *Safety Standards for Software Systems*. Draft: D 0.10, January 7, 1998.

IEEE P1474.1 *Communications-Based Train Control Functional and Performance Requirements*. Draft: D1.0, January 1998.

IEEE P1482 *Rail Vehicle Monitoring and Diagnostic Systems*. Draft 3.0, February 1998.

IEEE P1476 *Auxiliary Power Systems*. Draft: December 17, 1997.

IEEE P 1478 *Environmental Standards for Rail Transit Equipment*. Draft: Rev 2, October 1, 1997.

IEEE Pxxxx *Transit Communications Interface Profile*. Standard on Rail Objects. (TBD)

VDV Standard 420 – *Technical Requirements for Automatic Vehicle Location/Control Systems – Radio Data Transmission*, English Edition. Verband Deutscher Verkehrsunternehmen (German Association of Public Transport Operators), January 1992.

### 1.2.3 Contact Information

The American National Standards Institute (ANSI), as the U.S. representative on the ISO/IEC International Standards organization maintains a register of all ISO/IEC standards. They can be contacted as follows:

ANSI  
11 West 42<sup>nd</sup> Street, 13<sup>th</sup> Floor  
New York, New York 10036  
(212) 642-4900  
[www.ansi.org](http://www.ansi.org)

The Society of Automotive Engineers develops and maintains the J1708/J1587/J1455 family of standards. These documents may be obtained from SAE at:

Society of Automotive Engineers  
400 Commonwealth Drive  
Warrendale, PA 15096  
(724) 772-4841  
[www.sae.org](http://www.sae.org)

The Institute of Electrical and Electronics Engineers (IEEE) develops and maintains the IEEE Standards on Data Dictionary and Message Set Template for Intelligent Transportation Systems. The IEEE Rail Communications Standards Committee develops and maintains the IEEE Rail standards. These draft documents may be obtained from IEEE at:

The Institute of Electrical and Electronics Engineers  
445 Hoes Lane, P.O. Box 1331  
Piscataway, NJ 08855-1331  
(732) 981-0060  
[www.standards.ieee.org](http://www.standards.ieee.org)

The Intelligent Transportation Society of America (ITSA) distributes documents developed by the U.S. DOT Joint Program Office (JPO) on ITS. The National System Architecture may be obtained from ITSA at:

Intelligent Transportation Society of America  
400 Virginia Avenue, S.W.  
Suite 800  
Washington, D.C. 20024-2730  
(202) 484-4584  
[www.itsa.org/public/archdocs/national.html](http://www.itsa.org/public/archdocs/national.html)  
or from Odetics at: [www.odetics.com/itsarch/](http://www.odetics.com/itsarch/)



## Section 2 TERMINOLOGY

For the purposes of this document and to standardize the terminology in the transit industry, the following definitions, abbreviations, acronyms, conventions and notations apply to this document.

### 2.1 BUSINESS AREA DEFINITIONS

**Vehicle Control Head** The primary human-machine interface for control, communications, display and status on the transit vehicle. Typically, the VCH is a device installed in a transit vehicle. It allows the driver of a transit vehicle to log in, to change head signs, and to communicate with transit management centers, etc.

**Vehicle Area Network** A data communications network that is installed on a public transit vehicle. The network supports data exchanges between various on-board systems. Similar to a Local Area Network (LAN) in a company or an office, a vehicle area network supports data communications primarily in a transit vehicle.

### 2.2 ABBREVIATIONS

<b>Ack</b>	Acknowledge
<b>Cd</b>	Code
<b>Ctrl</b>	Control
<b>Fac</b>	Facility
<b>ID</b>	Identification
<b>Max</b>	Maximum
<b>Min</b>	Minimum
<b>Msg</b>	Message
<b>Nbr</b>	Number
<b>Qty</b>	Quantity
<b>Rt</b>	Rate

### 2.3 ACRONYMS

<b>APC</b>	Automated Passenger Counter
<b>AVL</b>	Automated Vehicle Location
<b>AVI</b>	Automated Vehicle Identification
<b>CC</b>	Control Center
<b>DGPS</b>	Differential Global Positioning System

<b>DMI</b>	Distance Measuring Instrument
<b>FCU</b>	Fare Collection Unit
<b>GPS</b>	Global Positioning System
<b>MID</b>	Message Identification (used in SAE J1708/J1587)
<b>PID</b>	Parameter Identification (used in SAE J1708/J1587)
<b>OB</b>	On-board
<b>VCH</b>	Vehicle Control Head
<b>VIN</b>	Vehicle Identification Number
<b>VLU</b>	Vehicle Logic Unit (see Section 4.2)



## Section 3 Basic Concepts

### 3.1 ON-BOARD BUSINESS AREA DOMAIN

The on-board business area involves data communications of on-board systems (or devices) on a transit vehicle. It covers data elements and messages that are transmitted from one on-board device (or component) to another, or from an on-board system to the transit management center. The data elements and messages included in this document focus on bus components, and as such are primarily derived from the SAE J1587 standard. However, the on-board business area deals with more domains than those covered by the SAE J1587 standard, it includes data elements and messages that are of little concern to the J1587 standard, and it includes rail-related data element and message definitions.

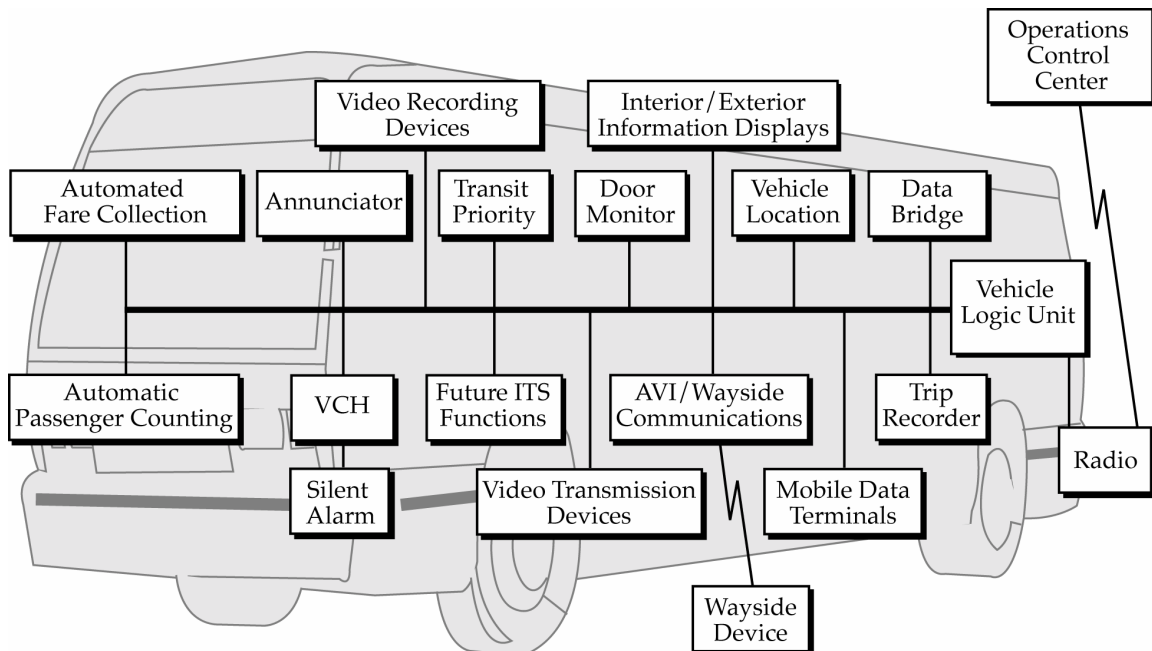
The on-board business area is important in the family of the TCIP standards because it defines the data elements and messages that are related to transit vehicles.

### 3.2 BUS COMPONENTS AND DATA FLOWS

The on-board business area describes data elements and messages of various components of a transit vehicle. Because components vary in different transit vehicle types, the on-board business area covers two basic transit modes (bus and rail) and their components, data objects and data flows. This document only includes the on-board requirements for bus operations.

The on-board business area provides various vehicle-related raw data. These data are either fed into on-board systems (or devices) through a vehicle area network, or into other business areas through wire and wireless data communications. Although, the list of functions and devices used on board a rubber-tired transit vehicle continues to grow, some typical data flows are shown in Figure 3.1.

**Figure 3.1 Sample Data Flows of TCIP On-Board Applications**



<b>Annunciator</b>	A device which provides audible and visual announcements of next stop, stop requested and other information, both on and off the PT vehicle. The requests may derive from on-board the vehicle (e.g., passengers) from pointers to text and announcements or from ASCII messages, or from pointers received from wayside detection devices.
<b>APC</b>	A device that determines the current number of passengers boarding, alighting and/or loading a public transportation vehicle. The function can calculate the load after pullout from a stop or count passengers as they board or alight the vehicle.
<b>Automated Fare Collection</b>	A system that sells or processes fare media. The system performs functions such as receiving and acquiring value from a fare instrument or the patron by calculating the cost of the service, validating fare media, dispensing rides to customers, and reporting the number of fares by rider and fare type, boarding (and alighting) point or zone.
<b>AVI/Wayside Communications</b>	Devices that receive or transmit short-range (digital) communications from/to a transponder posted alongside the roadway or transitway. The device may be used to transmit vehicle position (or receive actual position information), report (upload) service, vehicle performance or financial information, or to download scheduling, fare tables or bad card list data sets.
<b>Data Bridge</b>	A device or gateway that isolates the vehicle area network from the drive train communications network or any other network.
<b>Door Monitor</b>	A sensor or device that monitors the position (e.g., open, closed) of the vehicle's doors.
<b>Future ITS Functions</b>	Any future functions that may be added to a public transportation vehicle such as smart card terminals, collision avoidance radar, information kiosks, modem connectors, telephones, etc.
<b>Interior/Exterior Information Displays</b>	Posted displays installed inside and outside the transit vehicle that provides information to riders on the transit vehicle and transit service. These message signs may be changed dynamically.
<b>Mobile Data Terminals</b>	A multipurpose device whose function is determined by the user. The MDT may be a laptop computer, or a dedicated display and data entry device for supervisors, police or patrons. (This device is distinguished from the VCH, which is used by the vehicle operator.)
<b>Operations Control Center</b>	The fixed end function which includes handling voice and data traffic between the mobile and fixed end, dispatch, incident management, fleet management and the functions of the transit management system.
<b>Radio</b>	A mobile radio unit that receives and transmits voice and/or data to a fixed site for processing.

<b>Silent Alarm</b>	A function that provides for the remote generation of an emergency alarm condition on the vehicle.
<b>Transit Signal Priority</b>	A function that requests priority advancement for a transit vehicle through an intersection or corridor from a traffic signal controller or traffic management system. (This is a specialized function of a traffic signal priority system.)
<b>Trip Recorder</b>	A function that acquires and disseminates current or historical data obtained from the constant monitoring of the drive train communications network and/or sensors.
<b>VCH</b>	(see Section 2.1)
<b>Vehicle Location</b>	A function that provides current automatic vehicle location (AVL) data from specific navigation sensors or integrated navigation suites. Sensors include GPS, DGPS, radio triangulation and dead reckoning or inertial sensors (e.g., compass, wheel rotations, gyros, accelerometers).
<b>Vehicle Logic Unit</b>	The primary on-board controller and interface to the mobile radio unit. This unit may contain the power source for all the on-board devices.
<b>Video Recording Devices</b>	Devices used to record video images.
<b>Video Transmission Devices</b>	Devices used to transmit video images.

### **3.3 CLASSIFICATION SCHEME**

#### **3.3.1. National Architecture Classification Scheme**

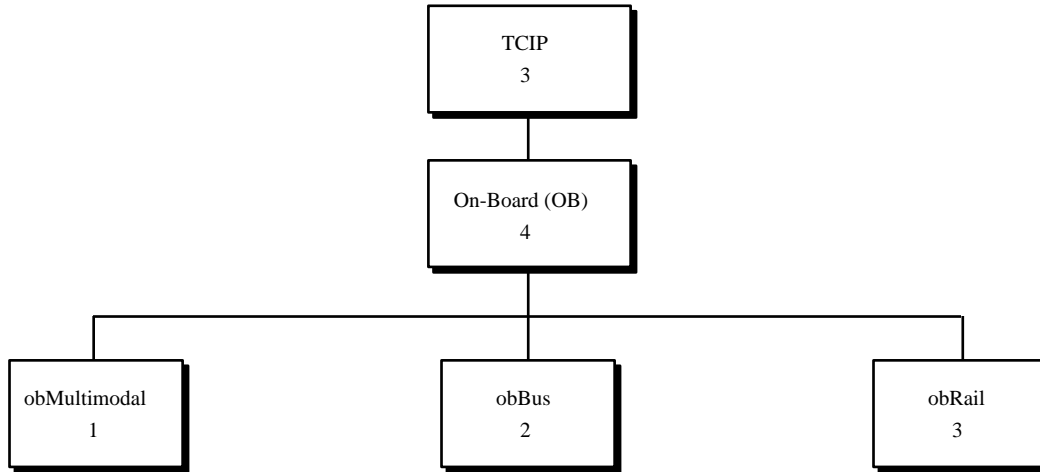
This business area falls into the three level categories in the National Architecture Classification as described in the Framework document and the IEEE P1489 Annex B. The Level 1 category is a top-level class used to describe moving components including vehicles. The Level 2 category is a second-level class whose objects are derived from the Level 1 category. Bus and rail vehicles are elements in this category. The Level 3 category contains on-board objects used for management of public transportation vehicles.

#### **3.3.2 TCIP Classification Tree**

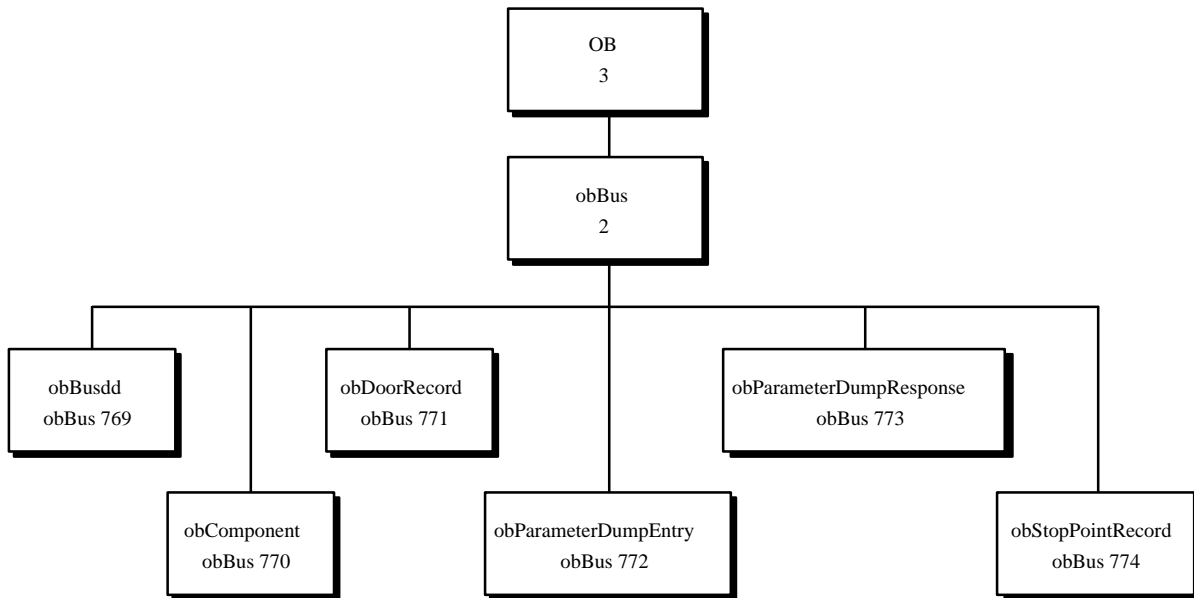
The on-board business area supports object classes to represent different types of data used by on-board systems (or components) in two transit modes (bus and rail). Users can interchange the representation for each class depending on the needs and capabilities of their applications.

The document classifies three types of data classes that are used in various on-board systems as illustrated in Figure 3.2. These three types are bus, rail, and multimodal (common). The multimodal class consists of a collection of objects and messages that are common in bus, rail and other modal systems. A TCIP conformant application for the bus mode should contain data elements and messages defined in the multimodal and bus nodes (e.g., Figure 3.3). Similarly, an application for the rail mode should contain data elements and messages defined in the multimodal and rail nodes.

**Figure 3.2 TCIP On-Board Tree Structure**



**Figure 3.3 TCIP On-board Bus Tree Structure**



### 3.4 CODING CONVENTIONS

This document encapsulates data used in the SAE J1587 standard. It follows a coding rule, that is, if a TCIP data object is derived from the SAE J1587 standard, its enumerated values should be coded to follow the SAE J1587 convention. For example, a bitmap composed of eight bits is defined in the SAE J1587 standard with the first bit designated as bit 1 and the eighth bit as bit 8. This document and ASN.1 convention defines the first bit as bit 0 and the last bit as bit 7. As a consequence, when converted to TCIP objects SAE J1587 data elements will assume the TCIP coding conventions by mapping the [J1587] bits 1 through n to [TCIP] bits 0 through n-1.

J1587: [stop bit] [8, 7, 6, 5, 4, 3, 2, 1 ] [start bit]  
TCIP: [0, 1, 2, 3, 4, 5, 6, 7]

SAE J1587 does not specify its data elements in the International System of Units (SI). When used in TCIP the original SAE J1587 units will be assumed.

The SAE J1587 standard assigns a parameter identifier (PID) to one or more primitive data elements. When more than one data element is grouped into an object, TCIP assigns a separate object identifier to each primitive data element, as well as another object identifier to the group of data elements. For example, the three-dimensional location – latitude, longitude and altitude – are assigned a PID of A.239; this standard assigns an object identifier of Obj1587 9 to the message (i.e., grouping of data elements) Obj1587BusPositionVector and three additional object identifiers to the data elements that compose Obj1587BusPositionVector – OB-J1587-PositionLatitude (obBusdd 207), OB-J1587-PositionLongitude (obBusdd 208), OB-J1587-PositionAltitude (obBusdd 209). This assures a one to one correspondence between TCIP object identifiers and SAE J1587 PIDs.

The format used by SAE J1587 to document variable length messages corresponds to Abstract Syntax Notation One encoding rules. J1587 inserts a length parameter after the PID and followed by the values (e.g., pid, n, aaabbbccccc, where pid is equivalent to the object or type identifier, n is equivalent to the length – or length bitmap, and aaabbbccccc is equivalent to the data stream or series of octets). These coding conventions should be used to map between SAE J1587 and TCIP on-board objects.



## Section 4 Requirements

This section defines those data dictionary elements that are expected to be used by On-Board implementations of business objects. The objects are described in terms of the IEEE 1489. The objects are presented in the order of their appearance on the SP classification tree.

### 4.1 ON-BOARD BUS DATA DICTIONARY

**Table 4.1      Look Up Table for OB-ConfidenceMeasure and OB-RouteDeviation**

Bits 0-3\4-5	00 [0.5 m]	01 [1 m]	10 [5 m]	11 [10 m]
0000	0	8	25	110
0001	0.5	9	30	120
0010	1.0	10	35	130
0011	1.5	11	40	140
0100	2.0	12	45	150
0101	2.5	13	50	160
0110	3.0	14	55	170
0111	3.5	15	60	180
1000	4.0	16	65	190
1001	4.5	17	70	200
1010	5.0	18	75	210
1011	5.5	19	80	220
1100	6.0	20	85	230
1101	6.5	21	90	240
1110	7.0	22	95	250
1111	7.5	23	100	Over 250

**Descriptive Name:** OB\_AlarmSummary\_cd  
**Descriptive Name Context:** ITS  
**Definition:** A boolean value that indicates whether an alarm has been triggered on board a public transportation vehicle.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:**  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 769  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-AlarmSummary  
**Value Domain:**  
**Data Type:** BOOLEAN  
**Representation Class Term:** code  
**Valid Value Range:**  
**Valid Value List:** TRUE = alarm set  
FALSE = no alarm set  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**



**Descriptive Name:** OB\_ConfidenceMeasure\_cd

**Descriptive Name Context:** ITS

**Definition:** Confidence measure of sensor measurement quality. Units are based on sensor measurements.

**Formula:** Deviation (D) \* Scale Factor (SF) + T(c-1) [meters]  
SF bits:  
00: D\* 0.5 m  
01: D\* 1 + 7 m  
10: D\* 5 + 20 m  
11: D\*10 + 100 m

where T(c-1) is the last value of the last column.

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** TCIP Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** See Table 4.1.

**External Name:** obBusdd 770

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-ConfidenceMeasure

**Value Domain:** IEEE/ASTM SI : length [m]

**Data Type:** INTEGER

**Representation Class Term:** code

**Valid Value Range:** 0..63

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:** bits:  
0-3 Deviation Value  
4-5 Scale factor

**Internal Layout Max Size:** 63

**Internal Layout Min Size:** 0

**Descriptive Name:** OB\_ConfidenceMeasureShort\_cd

**Descriptive Name Context:** ITS

**Definition:** Confidence measure of sensor measurement quality. This data element may be used for restrictive bandwidths. The confidence is based on vendor specifications for the hardware and/or software. The vendor must specify the accuracy (e.g., the spread from expected [+/- units]), and the confidence level (e.g., sigma, CEP). Moreover, the units (for the accuracy measure) shall be specified.

**Formula:**

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** TCIP Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** The various levels should be specified as Level i: better than +/- xx, y [sigma].

**External Name:** obBusdd 771

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-ConfidenceMeasureShort

**Value Domain:**

**Data Type:** INTEGER

**Representation Class Term:** code

**Valid Value Range:** (0..3)

**Valid Value List:** Four Levels of Resolution:  
level0 (0), -- Level 0;  
level1 (1), -- Level 1;  
level2 (2), -- Level 2;  
level3 (3) -- Level 3

**Valid Value Rule:**

**Internal Representation Layout:**

**Internal Layout Max Size:** 3

**Internal Layout Min Size:** 0

**Descriptive Name:** OB\_DataLoadRelease\_dt/ ANSI X3.30  
**Descriptive Name Context:** ITS  
**Definition:** The release date of the data load sign message or annunciator message library.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:** software  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 772  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-DataLoadRelease  
**Value Domain:** ANSI X3.30  
**Data Type:** DATETIME  
**Representation Class Term:** time  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_DoorClose\_tm / ANSI NCITS.310  
**Descriptive Name Context:** ITS  
**Definition:** The time a door closes on a PT vehicle.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 773  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-DoorCloseTime  
**Value Domain:** ANSI NCITS.310  
**Data Type:** TIME  
**Representation Class Term:** time  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_DoorOpen\_tm / ANSI NCITS.310  
**Descriptive Name Context:** ITS  
**Definition:** The time a door opens on a PT vehicle.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 774  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-DoorOpenTime  
**Value Domain:** ANSI NCITS.310  
**Data Type:** TIME  
**Representation Class Term:** time  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_DoorStatusSummary\_cd  
**Descriptive Name Context:** ITS  
**Definition:** A summary report that indicates whether a door is open on a PT vehicle.  
True = door is open  
False = all doors are closed.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.0  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 775  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-DoorStatusSummary  
**Value Domain:**  
**Data Type:** BOOLEAN  
**Representation Class Term:** code  
**Valid Value Range:**  
**Valid Value List:** TRUE = door open  
FALSE = all doors are closed  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_HeadingDelta\_rt / SI-10 1997

**Descriptive Name Context:** ITS

**Definition:** This object indicates heading change during specified time interval measured by degrees/second. The object is used to trigger event recording equipment that records actual path traveled.

**Formula:**

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** TCIP Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:** Heading

**Related Data Concept:**

**Relationship Type:**

**Remarks:**

**External Name:** obBusdd 776

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-HeadingDelta

**Value Domain:** IEEE/ASTM SI 10-1997 : [deg / s ]

**Data Type:** SHORT

**Representation Class Term:** rate

**Valid Value Range:**

**Valid Value List:**

**Valid Value Rule:** 0 to -180 Heading change in the clock direction.  
0 to 180 Heading change in the anti-clock direction.

**Internal Representation Layout:**

**Internal Layout Max Size:**

**Internal Layout Min Size:**

**Descriptive Name:** OB\_HiResolutionDistance\_qty / SI : length  
**Descriptive Name Context:** ITS  
**Definition:** The relative distance since last reporting period.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 777  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-HiResolutionDistance  
**Value Domain:** IEEE/ASTM SI-10 1997 : length [deka meters]  
**Data Type:** UBYTE  
**Representation Class Term:** quantity  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:** Resolution is 10 meters per bit.  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**



**Descriptive Name:** OB\_ManufacturerShort\_txt / UCS  
**Descriptive Name Context:** ITS  
**Definition:** Vendor of an electronic module.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:** Software  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 778  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-ManufacturerShort  
**Value Domain:**  
**Data Type:** NAME  
**Representation Class Term:** text  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_MID\_nbr / SAE J1708

**Descriptive Name Context:** ITS

**Definition:** An identifier which is associated with the functional address for the message origin or destination. This number is the message identification assignment transmitted by an on-board device or system. The data element is imported from SAE J1708/J1587. Numbers between 257 and 512 are assigned by this standard (and not SAE).

**Formula:**

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** TCIP Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** For most recent valid codes see SAE J1708

**External Name:** obBusdd 779

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-MID

**Value Domain:** SAE J1708/J1587

**Data Type:** INTEGER

**Representation Class Term:** number

**Valid Value Range:** (1..512)

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:**

**Internal Layout Max Size:** 512

**Internal Layout Min Size:** 1

**Descriptive Name:** OB\_MIDDescription\_txt / UCS  
**Descriptive Name Context:** ITS  
**Definition:** The description of a component. The component functionality is designated by the MID, SAE J1708.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:** Component  
**Relationship Type:** description of  
**Remarks:**  
**External Name:** obBusdd 780  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-MIDDescription  
**Value Domain:** UCS  
**Data Type:** FOOTNOTE  
**Representation Class Term:** text  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_OpAcknowledge\_cd  
**Descriptive Name Context:** ITS  
**Definition:** A driver or PT operator response to a message received from a dispatcher.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:** response to CC-AcknowledgeRequest-cd  
**External Name:** obBusdd 781  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-OpAcknowledge  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:**  
**Valid Value List:** The object is defined as follows.  
ack (0) Acknowledge  
(Ack returned to "receive msg")  
ackNo (1) Acknowledge/No  
(Ack with a "no" response)  
ackYes (2) Acknowledge/yes  
(Ack with a "yes" response)  
spare (3) Spare  
(for variable responses or to force operator to press a  
function key)  
**Valid Value Rule:**  
**Internal Representation Layout:** INTEGER (0..3)  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_PassengerAlighting\_qty  
**Descriptive Name Context:** ITS  
**Definition:** The number of passengers that are counted alighting a PT vehicle in revenue service.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 782  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-PassengerAlighting  
**Value Domain:**  
**Data Type:** USHORT  
**Representation Class Term:** quantity  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_PassengerBoarding\_qty  
**Descriptive Name Context:** ITS  
**Definition:** The number of passengers that are counted boarding a PT vehicle in revenue service.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 783  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-PassengerBoarding  
**Value Domain:**  
**Data Type:** USHORT  
**Representation Class Term:** quantity  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_PassengerLoad\_qty  
**Descriptive Name Context:** ITS  
**Definition:** The number of passengers carried on a revenue vehicle between any two stop points.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 784  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-PassengerLoad  
**Value Domain:**  
**Data Type:** USHORT  
**Representation Class Term:** quantity  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

<b>Descriptive Name:</b>	OB_PID_nbr
<b>Descriptive Name Context:</b>	ITS
<b>Definition:</b>	This object describes a parameter identification number defined in the SAE J1587 standard. PID range from 769 to 1096 are assigned by this standard.
<b>Formula:</b>	
<b>Source:</b>	TCIP Working Group
<b>Class Name:</b>	OB
<b>Classification Scheme Name:</b>	TCIP Classification Scheme
<b>Classification Scheme Version:</b>	ST-ITS-TCIP-FRAME V 1.2
<b>Keyword:</b>	
<b>Related Data Concept:</b>	
<b>Relationship Type:</b>	
<b>Remarks:</b>	
<b>External Name:</b>	obBusdd 785
<b>External Name Usage:</b>	TCIP Tree Identifier
<b>ASN1 Name:</b>	OB-PID
<b>Value Domain:</b>	
<b>Data Type:</b>	INTEGER
<b>Representation Class Term:</b>	number
<b>Valid Value Range:</b>	(769..1096)
<b>Valid Value List:</b>	
<b>Valid Value Rule:</b>	
<b>Internal Representation Layout:</b>	
<b>Internal Layout Max Size:</b>	1096
<b>Internal Layout Min Size:</b>	1



**Descriptive Name:** OB\_Rate\_rt / IEEE/ASTM SI 10-1997

**Descriptive Name Context:** ITS

**Definition:** The rate or frequency at which a PT vehicle should report the status of one of its parameters.

**Formula:**

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** Minimum rate is approximately 18.2 hours between reporting times.

**External Name:** obBusdd 786

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-Rate

**Value Domain:** IEEE/ASTM SI (time)

**Data Type:** USHORT

**Representation Class Term:** rate

**Valid Value Range:**

**Valid Value List:**

**Valid Value Rule:** The unit is number of seconds between reports.

**Internal Representation Layout:**

**Internal Layout Max Size:**

**Internal Layout Min Size:**

<b>Descriptive Name:</b>	OB_ReponseData_txt / UCS
<b>Descriptive Name Context:</b>	ITS
<b>Definition:</b>	The variable response to CC-MsgResponseType.
<b>Formula:</b>	
<b>Source:</b>	TCIP Working Group
<b>Class Name:</b>	OB
<b>Classification Scheme Name:</b>	TCIP Classification Scheme
<b>Classification Scheme Version:</b>	ST-ITS-TCIP-FRAME V 1.2
<b>Keyword:</b>	
<b>Related Data Concept:</b>	
<b>Relationship Type:</b>	
<b>Remarks:</b>	
<b>External Name:</b>	obBusdd 787
<b>External Name Usage:</b>	TCIP Tree Identifier
<b>ASN1 Name:</b>	OB-ResponseData
<b>Value Domain:</b>	UCS (constrained by UTF-8)
<b>Data Type:</b>	UTF8String
<b>Representation Class Term:</b>	text
<b>Valid Value Range:</b>	
<b>Valid Value List:</b>	
<b>Valid Value Rule:</b>	
<b>Internal Representation Layout:</b>	UTF8String (SIZE (1..15))
<b>Internal Layout Max Size:</b>	15
<b>Internal Layout Min Size:</b>	1

**Descriptive Name:** OB\_RollingAverageInterval\_tm / SI-10 1997 - time  
**Descriptive Name Context:** ITS  
**Definition:** This object indicates an interval used to measure the rolling average speed of an operating vehicle.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:** Interval  
**Related Data Concept:** OB-RollingAverageSpeed  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 788  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-RollingAverageInterval  
**Value Domain:** IEEE/ASTM SI-10 1997- time [s]  
**Data Type:** DURTIME  
**Representation Class Term:** time  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_RollingAverageSpeed\_rt/IEEE/ASTM SI 10-1997

**Descriptive Name Context:** ITS

**Definition:** This object indicates a rolling average speed with a moving interval defined in the object OB-RollingAverageInterval. The rolling average speed represents more accurate information about the movement of an operating vehicle.

**Formula:** Average speed over OB-RollingAverageInterval [s]

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** TCIP Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:** Speed

**Related Data Concept:**

**Relationship Type:**

**Remarks:**

**External Name:** obBusdd 789

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-RollingAverageSpeed

**Value Domain:** IEEE/ASTM SI 10 -1997 [k meter/ hour]

**Data Type:** UBYTE

**Representation Class Term:** rate

**Valid Value Range:** (0..255)

**Valid Value List:**

**Valid Value Rule:** Units are in kilometers / hr

**Internal Representation Layout:**

**Internal Layout Max Size:** 255

**Internal Layout Min Size:** 0

**Descriptive Name:** OB\_RouteAdherenceOffset\_qty / IEEE/ASTM SI-10 1997

**Descriptive Name Context:** ITS

**Definition:** The distance by which a PT vehicle is outside its route.

**Formula:**

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:** This is a line of sight distance from its expected position on the route. The distance is calculated from geometric or geographic coordinate pairs (triplets).

**External Name:** obBusdd 790

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-RouteAdherenceOffset

**Value Domain:** IEEE/ASTM SI 10-1997 (meter)

**Data Type:** ULONG

**Representation Class Term:** quantity

**Valid Value Range:**

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:**

**Internal Layout Max Size:**

**Internal Layout Min Size:**

**Descriptive Name:** OB\_RouteAdherenceStatus\_cd  
**Descriptive Name Context:** ITS  
**Definition:** This object indicates whether a public transport vehicle is on/off route based on the threshold set by the Agency.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:** Route  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 791  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-RouteAdherenceStatus  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0..3)  
**Valid Value List:**  
left (0)           The vehicle is left of the direction of the route.  
right (1)          The vehicle is right of the direction of the route.  
on (2)            The vehicle is on the route.  
reserved (3)      Reserved (unused).  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 3  
**Internal Layout Min Size:** 0

**Descriptive Name:** OB\_RouteDeviation\_qty/IEEE/ASTM SI-10 1997

**Descriptive Name Context:** ITS

**Definition:** This object describes the distance by which a public transport vehicle deviates from its expected pattern (that includes actual and reported exception).

**Formula:** Deviation (D) \* Scale Factor (SF) + T(c-1) [meters]  
00: D\* 0.5 m  
01: D\* 1 + 7 m  
10: D\* 5 + 20 m  
11: D\*10 + 100 m  
where T(c-1) is the last value of the last column.

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** TCIP Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:** Route

**Related Data Concept:**

**Relationship Type:**

**Remarks:** See Table 4.1

**External Name:** obBusdd 792

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-RouteDeviation

**Value Domain:** IEEE/ASTM SI 10 - 1997

**Data Type:** INTEGER

**Representation Class Term:** quantity

**Valid Value Range:** (0..63)

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:** bits  
0-3 Value  
4-5 Scale

**Internal Layout Max Size:** 63

**Internal Layout Min Size:** 0

**Descriptive Name:** OB\_ScheduleAdherenceOffset\_tm / SI 10-1997 [time]  
**Descriptive Name Context:** ITS  
**Definition:** The time (in seconds) that a PT vehicle is ahead or behind its trip schedule.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:** The convention used is "+" late (0) and "-" early (1)  
**External Name:** obBusdd 793  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-ScheduleAdherenceOffset  
**Value Domain:** IEEE/ASTM SI 10-1997 (time)  
**Data Type:** LONG  
**Representation Class Term:** time  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**



**Descriptive Name:** OB\_SensorType\_cd  
**Descriptive Name Context:** ITS  
**Definition:** The type of sensor used for tracking vehicle position.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 794  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-SensorType  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:** (0.255)  
**Valid Value List:**  
null (0)  
gps (1)  
dgps (2)  
gyroscope (3)  
accelerometer (4)  
compass (5)  
dmi (6) Differential transmission wheel rotation  
(distance measuring instrument)  
signpost (7)  
avi (8) Automatic vehicle identification  
radio-triangulation (9)  
differential-odometer (10)  
11 – 155 Reserved  
155 – 255 Local use codes  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 255  
**Internal Layout Min Size:** 0

<b>Descriptive Name:</b>	OB_StopPointGo_tm / ANSI NCITS.310
<b>Descriptive Name Context:</b>	ITS
<b>Definition:</b>	The time a PT vehicle starts moving after it stops at a stop point.
<b>Formula:</b>	
<b>Source:</b>	TCIP Working Group
<b>Class Name:</b>	OB
<b>Classification Scheme Name:</b>	ITS Classification Scheme
<b>Classification Scheme Version:</b>	ST-ITS-TCIP-FRAME V 1.2
<b>Keyword:</b>	
<b>Related Data Concept:</b>	
<b>Relationship Type:</b>	
<b>Remarks:</b>	
<b>External Name:</b>	obBusdd 795
<b>External Name Usage:</b>	TCIP Tree Identifier
<b>ASN1 Name:</b>	OB-StopPointGo
<b>Value Domain:</b>	ANSI NCITS.310
<b>Data Type:</b>	TIME
<b>Representation Class Term:</b>	time
<b>Valid Value Range:</b>	
<b>Valid Value List:</b>	
<b>Valid Value Rule:</b>	
<b>Internal Representation Layout:</b>	
<b>Internal Layout Max Size:</b>	
<b>Internal Layout Min Size:</b>	

**Descriptive Name:** OB\_StopPointStop\_tm / ANSI NCITS.310

**Descriptive Name Context:** ITS

**Definition:** The time a PT vehicle stops at a stop point. In the case where a PT vehicle may reposition itself at a stop point before the driver opens the door, the last time, just prior to the door opening, should be used.

**Formula:**

**Source:** TCIP Working Group

**Class Name:** OB

**Classification Scheme Name:** ITS Classification Scheme

**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2

**Keyword:**

**Related Data Concept:**

**Relationship Type:**

**Remarks:**

**External Name:** obBusdd 796

**External Name Usage:** TCIP Tree Identifier

**ASN1 Name:** OB-StopPointStop

**Value Domain:** ANSI NCITS.310

**Data Type:** TIME

**Representation Class Term:** time

**Valid Value Range:**

**Valid Value List:**

**Valid Value Rule:**

**Internal Representation Layout:**

**Internal Layout Max Size:**

**Internal Layout Min Size:**

<b>Descriptive Name:</b>	OB_StopPointZoneEntry_tm / ANSI NCITS.310
<b>Descriptive Name Context:</b>	ITS
<b>Definition:</b>	The time a PT vehicle enters a designated area of a stop point.
<b>Formula:</b>	
<b>Source:</b>	TCIP Working Group
<b>Class Name:</b>	OB
<b>Classification Scheme Name:</b>	ITS Classification Scheme
<b>Classification Scheme Version:</b>	ST-ITS-TCIP-FRAME V 1.2
<b>Keyword:</b>	
<b>Related Data Concept:</b>	
<b>Relationship Type:</b>	
<b>Remarks:</b>	
<b>External Name:</b>	obBusdd 797
<b>External Name Usage:</b>	TCIP Tree Identifier
<b>ASN1 Name:</b>	OB-StopPointZoneEntry
<b>Value Domain:</b>	ANSI NCITS.310
<b>Data Type:</b>	TIME
<b>Representation Class Term:</b>	time
<b>Valid Value Range:</b>	
<b>Valid Value List:</b>	
<b>Valid Value Rule:</b>	
<b>Internal Representation Layout:</b>	
<b>Internal Layout Max Size:</b>	
<b>Internal Layout Min Size:</b>	

**Descriptive Name:** OB\_StopPointZoneExit\_tm / ANSI NCITS.310  
**Descriptive Name Context:** ITS  
**Definition:** The time a PT vehicle exits a designated area identified with a stop point.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 798  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-StopPointZoneExit  
**Value Domain:** ANSI NCITS.310  
**Data Type:** TIME  
**Representation Class Term:** time  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**

**Descriptive Name:** OB\_VideoUnitControl\_cd  
**Descriptive Name Context:** ITS  
**Definition:** Control parameters for video recording unit. This data element contains the list of commands for the video unit.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:** Video  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 799  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-VideoUnitControl  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 255  
**Internal Layout Min Size:** 0

**Descriptive Name:** OB\_VideoUnitStatus\_cd  
**Descriptive Name Context:** ITS  
**Definition:** Operating status of video recording (transmission) unit.  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** TCIP Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:** Video  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 800  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-VideoUnitStatus  
**Value Domain:**  
**Data Type:** INTEGER  
**Representation Class Term:** code  
**Valid Value Range:**  
**Valid Value List:**  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:** 255  
**Internal Layout Min Size:** 0

**Descriptive Name:** OB\_WakeUp\_cd  
**Descriptive Name Context:** ITS  
**Definition:** A signal that "wakes up" or alerts a transponder to the presence of a transmitter (device or mobile unit).  
**Formula:**  
**Source:** TCIP Working Group  
**Class Name:** OB  
**Classification Scheme Name:** ITS Classification Scheme  
**Classification Scheme Version:** ST-ITS-TCIP-FRAME V 1.2  
**Keyword:**  
**Related Data Concept:**  
**Relationship Type:**  
**Remarks:**  
**External Name:** obBusdd 801  
**External Name Usage:** TCIP Tree Identifier  
**ASN1 Name:** OB-WakeUp  
**Value Domain:**  
**Data Type:** BOOLEAN  
**Representation Class Term:** code  
**Valid Value Range:**  
**Valid Value List:** True = wake up  
False = dormant  
**Valid Value Rule:**  
**Internal Representation Layout:**  
**Internal Layout Max Size:**  
**Internal Layout Min Size:**



## 4.2 ON-BOARD BUS MESSAGE SET

<b>Message Identifier:</b>	TCIP
<b>Message Set Identifier:</b>	ST-TCIP-TCIP-OB
<b>Message Set Version:</b>	V 1.0
<b>Message Group Identifier:</b>	OB
<b>Message Name:</b>	ObComponent
<b>Message Description:</b>	A description of a component (hardware, software, library) that is located on board a public transportation vehicle. ObBusComponentIdentificationParameters is a J1587 data element which contains component ID, serial number, make and model.
<b>Meta Data Source:</b>	Direct
<b>Priority:</b>	no priority
<b>Frequency:</b>	CcPTVMessageTemplate
<b>Message Length:</b>	5
<b>Keywords:</b>	
<b>Time Stamp:</b>	
<b>Message Body:</b>	<pre>ObComponent ::= SEQUENCE {     componentID    OB-MID    OPTIONAL,     component-parameters ObBusComponentIdentificationParameters    OPTIONAL,     sw-dataload-parameters SEQUENCE OF ObSWComponent    OPTIONAL,     dateInstalled   CPT-DateTime    OPTIONAL,     description     OB-MIDDescription    OPTIONAL }</pre>
<b>Object Identifier:</b>	obBus 770

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-OB  
**Message Set Version:** V 1.0  
**Message Group Identifier:** OB  
**Message Name:** ObDoorRecord  
**Message Description:** The activities related to the opening/closing of a door on a public transportation vehicle (in revenue service) at a stop point. If alighting or boarding count is not present, then application assumes that no alightings or boardings occurred.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcPVMMessageTemplate  
**Message Length:** 6  
**Keywords:**  
**Time Stamp:**  
**Message Body:** ObDoorRecord ::= SEQUENCE {  
    doorNo OB-MID, -- related MID or address for door or lift  
    open-time OB-DoorOpenTime,  
    close-time OB-DoorCloseTime OPTIONAL,  
    boarding SEQUENCE OF OB-PassengerBoarding OPTIONAL,  
    alighting SEQUENCE OF OB-PassengerAlighting OPTIONAL,  
    fare-transaction SEQUENCE OF FcTransaction OPTIONAL  
}  
**Object Identifier:** obBus 771

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-OB  
**Message Set Version:** V 1.0  
**Message Group Identifier:** OB  
**Message Name:** ObParameterDumpEntry  
**Message Description:** A parameter value as recorded by a logical storage device.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** ObParameterDumpResponse  
**Message Length:** 4  
**Keywords:**  
**Time Stamp:**  
**Message Body:** ObParameterDumpEntry ::= SEQUENCE {  
    recorded-time TIME,  
    recorded-date DATE,  
    parameter-id OB-PID,  
    parameter-value OCTET STRING -- open type, this must comply with J1587 objects  
}  
**Object Identifier:** obBus 772

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-OB  
**Message Set Version:** V 1.0  
**Message Group Identifier:** OB  
**Message Name:** ObParameterDumpResponse  
**Message Description:** The collection of parameters as specified by the CcParameterDumpRequest message.  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcPTVMessageTemplate  
**Message Length:** 2  
**Keywords:**  
**Time Stamp:**  
**Message Body:** ObParameterDumpResponse ::= SEQUENCE {  
    from-device OB-MID OPTIONAL,  
    parameter-dump SEQUENCE OF ObParameterDumpEntry  
}  
**Object Identifier:** obBus 773

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-OB  
**Message Set Version:** V 1.0  
**Message Group Identifier:** OB  
**Message Name:** ObStopPointRecord  
**Message Description:** A description of the typical events occurring on a transit vehicle at or near a stop point. This includes entering/exiting stop point zone, stop/start moving at a stop point, schedule adherence status, vehicle positioning, and information related to doors on the transit vehicle (ObDoorRecord).  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcPTVMessageTemplate  
**Message Length:** 8  
**Keywords:**  
**Time Stamp:**  
**Message Body:**

```
ObStopPointRecord ::= SEQUENCE {  
  stop-point-id CPT-StopPointID OPTIONAL,  
  location SpPointclass OPTIONAL,  
  entry-to-stop-point-zone OB-StopPointZoneEntry,  
  exit-to-stop-point-zone OB-StopPointZoneExit,  
  stop-time-at-stop-pt OB-StopPointStop OPTIONAL,  
  start-time-at-stop-pt OB-StopPointGo OPTIONAL,  
  schedule-adh-status OB-ScheduleAdherenceOffset, -- status  
  door-records SEQUENCE OF ObDoorRecord  
  -- only one record may indicate that this is summary data  
}
```

**Object Identifier:** obBus 774

**Message Identifier:** TCIP  
**Message Set Identifier:** ST-TCIP-TCIP-OB  
**Message Set Version:** V 1.0  
**Message Group Identifier:** OB  
**Message Name:** ObSWComponent  
**Message Description:** A description of software attributes that are contained in a component (MID).  
**Meta Data Source:** Direct  
**Priority:** no priority  
**Frequency:** CcPtvMessageTemplate  
**Message Length:** 5  
**Keywords:**  
**Time Stamp:**  
**Message Body:** ObSWComponent ::= SEQUENCE {  
    component OB-MID,  
    identification OB-J1587-SoftwareIdentification,  
    manufacturer CPT-Manufacturer OPTIONAL,  
    revision CPT-VersionNo OPTIONAL,  
    data-loads SEQUENCE OF SEQUENCE {  
        data-load-id INTEGER (0..255) OPTIONAL,  
        data-load-name IA5String (SIZE (0..17)) OPTIONAL,  
        data-load-release OB-DataLoadRelease OPTIONAL,  
        revision-no CPT-VersionNo  
    }  
}  
**Object Identifier:** obBus 775

## Section 5 Conformance

The on-board business area supports the three levels of conformance as defined in NTCIP 1400, version 01.04. Conformance Levels are defined as a collection of OB-related objects that are required to support a function of a component in the on-board area. Level 1 conformance only includes data elements contained within this document and other documents that support this business area. Level 2 conformance includes all the requirements contained in Section 4.2, On-Board Bus Message Set.

### 5.1 LEVEL 1 CONFORMANCE

Level 1 conformance for on-board bus applications is listed as follows:

Data Element Name	Reference*
OB Data Elements	NTCIP 1406 Section 4.1 NTCIP 1406 ANNEX A
CPT Data Elements	NTCIP 1401 Section 4.1

\* NTCIP 1406 refers to this document. See Section 4.1 for complete listing. NTCIP 1401 Section 4.1 refers to the Common Public Transportation Data Elements.

### 5.2 LEVEL 2 CONFORMANCE

Level 2 conformance for on-board **bus** applications includes all Level 1 conformance requirements and those requirements listed below:

Message Name	Reference*
OB Messages	NTCIP 1406 Section 4.2 NTCIP 1406 ANNEX B
CPT Messages	NTCIP 1401 Section 4.2
SP Messages	NTCIP 1405 Section 4.2

\* NTCIP 1406 refers to this document. See Section 4.2 for complete listing. NTCIP 1401 Section 4.2 refers to the Common Public Transportation Messages. NTCIP 1405 Section 4.2 refers to the Spatial Representation Messages.





**Annex A**  
**TCIP On-Board/SAE J1587 Cross Reference Table**  
**(Data Elements)**

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 1	OB-BUS-EGRRatio	UBYTE	27	Percent Exhaust Gas Recirculation Valve Position	
obBusdd 2	OB-BUS-PercentAccelPosition3	UBYTE	28	Percent Accelerator Position #3	
obBusdd 3	OB-BUS-PercentAccelPosition2	UBYTE	29	Percent Accelerator Position #2	
obBusdd 4	OB-J1587-CrankcaseBlowbyPressure	BYTE	30	Crank Case Blowby Pressure	
obBusdd 5	OB-J1587-ShiftFingerActuatorStatus2	UBYTE	35	Shift Finger Actuator Status #2	
obBusdd 6	OB-J1587-ClutchPlatesWearCondition	UBYTE	36	Clutch Plates Wear Condition	
obBusdd 7	OB-J1587-TransmissionTankAirPressure	UBYTE	37	Transmission Tank Air Pressure	
obBusdd 8	OB-J1587-SecondFuelLevelRightSide	UBYTE	38	Second Fuel Level (Right Side)	
obBusdd 9	OB-J1587-TirePressureCheckInterval	UBYTE	39	Tire Pressure Check Interval	
obBusdd 10	OB-J1587-EngineRetarderSwitchesStatus	UBYTE	40	Engine Retarder Switches Status	
obBusdd 11	OB-J1587-CruiseControlSwitchesStatus	UBYTE	41	Cruise Control Switches Status	
obBusdd 12	OB-J1587-PressureSwitchStatus	UBYTE	42	Pressure Switch Status	
obBusdd 13	OB-J1587-IgnitionSwitchStatus	UBYTE	43	Ignition Switch Status	
obBusdd 14	OB-J1587-AWILS	UBYTE	44	Attention/Warning Indicator Lamps Status	
obBusdd 15	OB-J1587-InletAirHeaterStatus	UBYTE	45	Inlet Air Heater Status	
obBusdd 16	OB-J1587-VehicleWetTankPressure	UBYTE	46	Vehicle Wet Tank Pressure	
obBusdd 17	OB-J1587-RetarderStatus	UBYTE	47	Retarder Status	
obBusdd 18	OB-J1587-ERBPressure	UBYTE	48	Extended Range Barometric Pressure	
obBusdd 19	OB-J1587-ABSControlStatus	UBYTE	49	ABS Control Status	bitmap
obBusdd 20	OB-J1587-ACCCStatusCommand	UBYTE	50	Air Conditioner Compressor Clutch Status/Command	bitmap

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 21	OB-J1587-ThrottlePosition	UBYTE	51	Throttle Position	
obBusdd 22	OB-J1587-EngineIntercoolerTemperature	UBYTE	52	Engine Intercooler Temperature	
obBusdd 23	OB-J1587-TransmissionSynchronizerClutchValue	UBYTE	53	Transmission Synchronizer Clutch Value	
obBusdd 24	OB-J1587-TransmissionSynchronizerBrakeValue	UBYTE	54	Transmission Synchronizer Brake Value	
obBusdd 25	OB-J1587-ShiftFingerPositionalStatus	UBYTE	55	Shift Finger Positional Status	bitmap
obBusdd 26	OB-J1587-TransmissionRangeSwitchStatus	UBYTE	56	Transmission Range Switch Status	bitmap
obBusdd 27	OB-J1587-TransmissionActuatorStatus2	UBYTE	57	Transmission Actuator Status #2	bitmap
obBusdd 28	OB-J1587-ShiftFingerActuatorStatus1	UBYTE	58	Shift Finger Actuator Status	bitmap
obBusdd 29	OB-J1587-ShiftFingerGearPosition	UBYTE	59	Shift Finger Gear Position	
obBusdd 30	OB-J1587-ShiftFingerRailPosition	UBYTE	60	Shift Finger Rail Position	
obBusdd 31	OB-J1587-ParkingBrakeActuatorStatus	UBYTE	61	Parking Brake Actuator Status	bitmap
obBusdd 32	OB-J1587-RetarderInhibitStatus	UBYTE	62	Retarder Inhibit Status	bitmap
obBusdd 33	OB-J1587-TransmissionActuatorStatus1	UBYTE	63	Transmission Actuator Status #1	bitmap
obBusdd 34	OB-J1587-DirectionSwitchStatus	UBYTE	64	Direction Switch Status	bitmap
obBusdd 35	OB-J1587-BrakeSwitchStatus	UBYTE	65	Brake Switch Status	bitmap
obBusdd 36	OB-J1587-VehicleEnablingComponentStatus	UBYTE	66	Vehicle Enabling Component Status	bitmap
obBusdd 37	OB-J1587-ShiftRequestSwitchStatus	UBYTE	67	Shift Request Switch Status	bitmap
obBusdd 38	OB-J1587-TorqueLimitingFactor	UBYTE	68	Torque Limiting Factor	formula
obBusdd 39	OB-J1587-TwoSpeedAxleSwitchStatus	UBYTE	69	Two Speed Axle Switch Status	bitmap
obBusdd 40	OB-J1587-ParkingBrakeSwitchStatus	UBYTE	70	Parking Brake Switch Status	bitmap
obBusdd 41	OB-J1587-IdleShutdownTimerStatus	UBYTE	71	Idle Shutdown Timer Status	bitmap
obBusdd 42	OB-J1587-BlowerBypassValvePosition	UBYTE	72	Blower Bypass Valve Position	
obBusdd 43	OB-J1587-AuxiliaryWaterPumpPressure	UBYTE	73	Auxiliary Water Pump Pressure	

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 44	OB-J1587-MaximumRoadSpeedLimit	UBYTE	74	Maximum Road Speed Limit	
obBusdd 45	OB-J1587-SteeringAxleTemperature	UBYTE	75	Steering Axle Temperature	
obBusdd 46	OB-J1587-AxleLiftAirPressure	UBYTE	76	Axle Lift Air Pressure	
obBusdd 47	OB-J1587-ForwardRearDriveAxleTemperature	UBYTE	77	Forward Rear Drive Axle Temperature	
obBusdd 48	OB-J1587-RearRearDriveAxleTemperature	UBYTE	78	Rear Rear-Drive Axle Temperature	
obBusdd 49	OB-J1587-RoadSurfaceTemperature	UBYTE	79	Road Surface Temperature	
obBusdd 50	OB-J1587-WasherFluidLevel	UBYTE	80	Washer Fluid Level	
obBusdd 51	OB-J1587-ParticulateTrapInletPressure	UBYTE	81	Particulate Trap Inlet Pressure	
obBusdd 52	OB-J1587-AirStartPressure	UBYTE	82	Air Start Pressure	
obBusdd 53	OB-J1587-VehicleSpeedLimitStatus	UBYTE	83	Road Speed Limit Status	bitmap
obBusdd 54	OB-J1587-VehicleSpeed	UBYTE	84	Road Speed	similar to IM-VehicleSpeed (IM denotes restricted meaning)
obBusdd 55	OB-J1587-CruiseControlStatus	UBYTE	85	Cruise Control Status	bitmap
obBusdd 56	OB-J1587-CruiseControlSetSpeed	UBYTE	86	Cruise Control Set Speed	
obBusdd 57	OB-J1587-CruiseControlHighSetLimitSpeed	UBYTE	87	Cruise Control High-Set Limit Speed	
obBusdd 58	OB-J1587-PowerTakeoffStatus	UBYTE	89	Power Takeoff Status	bitmap
obBusdd 59	OB-J1587-PowerTakeoffOilTemperature	UBYTE	90	Power Take Off Oil Temperature	
obBusdd 60	OB-J1587-PercentAcceleratorPedalPosition	UBYTE	91	Percent Accelerator Pedal Position	
obBusdd 61	OB-J1587-PercentEngineLoad	UBYTE	92	Percent Engine Load	
obBusdd 62	OB-J1587-OutputTorque	BYTE	93	Output Torque	
obBusdd 63	OB-J1587-FuelDeliveryPressure	UBYTE	94	Fuel Delivery Pressure	
obBusdd 64	OB-J1587-FuelFilterDifferentialPressure	UBYTE	95	Fuel Filter Differential Pressure	

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 65	OB-J1587-FuelLevel	UBYTE	96	Fuel Level	
obBusdd 66	OB-J1587-WaterinFuelIndicator	UBYTE	97	Water in Fuel Indicator	bitmap
obBusdd 67	OB-J1587-EngineOilLevel	UBYTE	98	Engine Oil Level	
obBusdd 68	OB-J1587-EngineOilFilterDifferentialPressure	UBYTE	99	Engine Oil Filter Differential Pressure	
obBusdd 69	OB-J1587-EngineOilPressure	UBYTE	100	Engine Oil Pressure	
obBusdd 70	OB-J1587-CrankcasePressure1	BYTE	101	Crankcase Pressure	
obBusdd 71	OB-J1587-BoostPressure	UBYTE	102	Boost Pressure	
obBusdd 72	OB-J1587-TurboSpeed	UBYTE	103	Turbo Speed	
obBusdd 73	OB-J1587-TurboOilPressure	UBYTE	104	Turbo Oil Pressure	
obBusdd 74	OB-J1587-IntakeManifoldTemperature	UBYTE	105	Intake Manifold Temperature	
obBusdd 75	OB-J1587-AirInletPressure	UBYTE	106	Air Inlet Pressure	
obBusdd 76	OB-J1587-AirFilterDifferentialPressure	UBYTE	107	Air Filter Differential Pressure	
obBusdd 77	OB-J1587-BarometricPressure	UBYTE	108	Barometric Pressure	
obBusdd 78	OB-J1587-CoolantPressure	UBYTE	109	Coolant Pressure	
obBusdd 79	OB-J1587-EngineCoolantTemperature	UBYTE	110	Engine Coolant Temperature	
obBusdd 80	OB-J1587-CoolantLevel	UBYTE	111	Coolant Level	
obBusdd 81	OB-J1587-CoolantFilterDifferencePressure	UBYTE	112	Coolant Filter Differential Pressure	
obBusdd 82	OB-J1587-GovernorDroop	UBYTE	113	Governor Droop	
obBusdd 83	OB-J1587-NetBatteryCurrent	UBYTE	114	Net Battery Current	
obBusdd 84	OB-J1587-AlternatorCurrent	UBYTE	115	Alternator Current	
obBusdd 85	OB-J1587-BrakeApplicationPressure	UBYTE	116	Brake Application Pressure	
obBusdd 86	OB-J1587-BrakePrimaryPressure	UBYTE	117	Brake Primary Pressure	
obBusdd 87	OB-J1587-BrakeSecondaryPressure	UBYTE	118	Brake Secondary Pressure	
obBusdd 88	OB-J1587-HydraulicRetarderPressure	UBYTE	119	Hydraulic Retarder Pressure	

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 89	OB-J1587-HydraulicRetarderOilTemperature	UBYTE	120	Hydraulic Retarder Oil Temperature	
obBusdd 90	OB-J1587-EngineRetarderStatus	UBYTE	121	Engine Retarder Status	bitmap
obBusdd 91	OB-J1587-EngineRetarderPercent	UBYTE	122	Engine Retarder Percent	
obBusdd 92	OB-J1587-ClutchPressure	UBYTE	123	Clutch Pressure	
obBusdd 93	OB-J1587-TransmissionOilLevel	UBYTE	124	Transmission Oil Level	
obBusdd 94	OB-J1587-TransmissionOilLevelHighLow	UBYTE	125	Transmission Oil Level High/Low	
obBusdd 95	OB-J1587-TransmissionFilterDifferentialPressure	UBYTE	126	Transmission Filter Differential Pressure	
obBusdd 96	OB-J1587-TransmissionOilPressure	UBYTE	127	Transmission Oil Pressure	
obBusdd 97	OB-J1587-AverageFuelRate	USHORT	133	Average Fuel Rate	
obBusdd 98	OB-J1587-WheelSpeedSensorStatusLeftSide	UBYTE	134	Wheel Speed Sensor Status	Left Side
obBusdd 99	OB-J1587-WheelSpeedSensorStatusRightSide	UBYTE	134	Wheel Speed Sensor Status	Right Side
obBusdd 100	OB-J1587-ERFDPPressureAbsolute	USHORT	135	Extended Range Fuel Delivery Pressure (Absolute)	
obBusdd 101	OB-J1587-AuxiliaryVacuumPressureReading	USHORT	136	Auxiliary Vacuum Pressure Reading	
obBusdd 102	OB-J1587-AuxiliaryGagePressureReading	USHORT	137	Auxiliary Gage Pressure Reading	
obBusdd 103	OB-J1587-AuxiliaryAbsolutePressureReading	USHORT	138	Auxiliary Absolute Pressure Reading	
obBusdd 104	OB-J1587-TPCSChannelFuncMode	USHORT	139	Tire Pressure Control System Channel Functional Mode	
obBusdd 105	OB-J1587-TPCSSolenoidStatus	USHORT	140	Tire Pressure Control System Solenoid Status	
obBusdd 106	OB-J1587-TrailerTagorPushChannelTirePressureTarget	USHORT	141	Trailer Tag or Push Channel Tire Pressure Target	
obBusdd 107	OB-J1587-DriveChannelTirePressureTarget	USHORT	142	Drive Channel Tire Pressure Target	

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 108	OB-J1587-SteerChannelTirePressureTarget	USHORT	143	Steer Channel Tire Pressure Target	
obBusdd 109	OB-J1587-TrailerTagorPushChannelTirePressure	USHORT	144	Trailer Tag or Push Channel Tire Pressure	
obBusdd 110	OB-J1587-DriveChannelTirePressure	USHORT	145	Drive Channel Tire Pressure	
obBusdd 111	OB-J1587-SteerChannelTirePressure	USHORT	146	Steer Channel Tire Pressure	
obBusdd 112	OB-J1587-AverageFuelEconomyNaturalGas	USHORT	147	Average Fuel Economy Natural Gas	
obBusdd 113	OB-J1587-InstantaneousFuelEconomyNaturalGas	USHORT	148	Instantaneous Fuel Economy (Natural Gas)	
obBusdd 114	OB-J1587-MassFlowRateNaturalGas	USHORT	149	Mass Flow Rate (Natural Gas)	
obBusdd 115	OB-J1587-PTOEngagementControlStatus	USHORT	150	PTO Engagement Control Status	
obBusdd 116	OB-J1587-ATCControlStatus	USHORT	151	ATC Control Status	
obBusdd 117	OB-J1587-NumberOfECUResets	USHORT	152	Number of ECU Resets	
obBusdd 118	OB-J1587-CrankcasePressure	SHORT	153	Crankcase Pressure	
obBusdd 119	OB-J1587-AuxiliaryInputandOutputStatus1	USHORT	154	Auxiliary Input and Output Status #1	bitmap
obBusdd 120	OB-J1587-AuxiliaryInputandOutputStatus2	USHORT	155	Auxiliary Input and Output Status #2	bitmap
obBusdd 121	OB-J1587-InjectorTimingRailPressure	USHORT	156	Injector Timing Rail Pressure	
obBusdd 122	OB-J1587-InjectorMeteringRailPressure	USHORT	157	Injector Metering Rail Pressure	
obBusdd 123	OB-J1587-BatteryPotentialVoltageSwitched	USHORT	158	Battery Potential Voltage Switched	
obBusdd 124	OB-J1587-GasSupplyPressure	USHORT	159	Gas Supply Pressure	
obBusdd 125	OB-J1587-MainShaftSpeed	USHORT	160	Main Shaft Speed	
obBusdd 126	OB-J1587-InputShaftSpeed1	USHORT	161	Input Shaft Speed	

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 127	OB-J1587-TransmissionRangeSelected	OCTET STRING (SIZE ( 1.. 2))	162	Transmission Range Selected	
obBusdd 128	OB-J1587-TransmissionRangeAttained	OCTET STRING (SIZE ( 1.. 2))	163	Transmission Range Attained	
obBusdd 129	OB-J1587-Injection ControlPressure	USHORT	164	Injection Control Pressure	
obBusdd 130	OB-J1587-CompassBearing	USHORT	165	Compass Bearing	similar to SP- AngularDirection
obBusdd 131	OB-J1587-RatedEnginePower	USHORT	166	Rated Engine Power	
obBusdd 132	OB-J1587-AlternatorPotentialVoltage	USHORT	167	Alternator Potential Voltage	
obBusdd 133	OB-J1587-BatteryPotentialVoltage	USHORT	168	Battery Potential Voltage	
obBusdd 134	OB-J1587-CargoAmbientTemperature	SHORT	169	Cargo Ambient Temperature	
obBusdd 135	OB-J1587-CabInteriorTemperature	SHORT	170	Cab Interior Temperature	
obBusdd 136	OB-J1587-AmbientAirTemperature	SHORT	171	Ambient Air Temperature	
obBusdd 137	OB-J1587-AirInletTemperature	SHORT	172	Air Inlet Temperature	
obBusdd 138	OB-J1587-ExhaustGasTemperature	SHORT	173	Exhaust Gas Temperature	
obBusdd 139	OB-J1587-FuelTemperature	SHORT	174	Fuel Temperature	
obBusdd 139	OB-J1587-EngineOilTemperature	SHORT	175	Engine Oil Temperature	
obBusdd 140	OB-J1587-TurboOilTemperature	SHORT	176	Turbo Oil Temperature	
obBusdd 141	OB-J1587-FrontAxleWeight	USHORT	178	Front Axle Weight	
obBusdd 142	OB-J1587-RearAxleWeight	USHORT	179	Rear Axle Weight	
obBusdd 143	OB-J1587-TrailerWeight	USHORT	180	Trailer Weight	
obBusdd 144	OB-J1587-CargoWeight	USHORT	181	Cargo Weight	
obBusdd 145	OB-J1587-TripFuel	USHORT	182	Trip Fuel	
obBusdd 146	OB-J1587-FuelRateInstantaneous	USHORT	183	Fuel Rate (Instantaneous)	
obBusdd 147	OB-J1587-InstantaneousFuelEconomy	USHORT	184	Instantaneous Fuel Economy	
obBusdd 148	OB-J1587-AverageFuelEconomy	USHORT	185	Average Fuel Economy	

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 149	OB-J1587-PowerTakeoffSpeed	USHORT	186	Power Takeoff Speed	
obBusdd 150	OB-J1587-PowerTakeoffSetSpeed	USHORT	187	Power Takeoff Set Speed	
obBusdd 151	OB-J1587-IdleEngineSpeed	USHORT	188	Idle Engine Speed	
obBusdd 152	OB-J1587-RatedEngineSpeed	USHORT	189	Rated Engine Speed	
obBusdd 153	OB-J1587-EngineSpeed	USHORT	190	Engine Speed	
obBusdd 154	OB-J1587-TransmissionOutputShaftSpeed	USHORT	191	Transmission Output Shaft Speed	
obBusdd 155	OB-J1587-TractionControlDisableState	UBYTE	199	Traction Control Disable State	Traction Control Disable State
obBusdd 156	OB-J1587-TractionControlDisableStateAccessCode	IA5String	199	Traction Control Disable State	Traction Control Disable State Access Code
obBusdd 157	OB-J1587-AuxiliaryADChannelNumber	UBYTE	223	Auxiliary A/D Counts	Channel Number
obBusdd 158	OB-J1587-AuxiliaryADCCounts	USHORT	223	Auxiliary A/D Counts	A/D Counts for a Channel
obBusdd 159	OB-J1587-TextMsgAckColumns	UBYTE	225	Text Message Acknowledged	Message Column Number
obBusdd 160	OB-J1587-TextMsgAckDisplayCtrlResponse	UBYTE	225	Text Message Acknowledged	Display Control Response
obBusdd 161	OB-J1587-TextMsgAckRows	UBYTE	225	Text Message Acknowledged	Message Row Number
obBusdd 162	OB-J1587-TextMsgColumns	UBYTE	226	Text Message to Display	Message Column Number
obBusdd 163	OB-J1587-TextMsgData	IA5String (SIZE ( 1.. 256))	226	Text Message to Display	ASCII text data
obBusdd 164	OB-J1587-TextMsgRows	UBYTE	226	Text Message to Display	Message Row/Line Number
obBusdd 165	OB-J1587-TextMsgStatus1	UBYTE	226	Text Message to Display	Status Character 1
obBusdd 166	OB-J1587-TextMsgStatus2	UBYTE	226	Text Message to Display	Status Character 2



TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 167	OB-J1587-TextMsgDisplayTypeColumns	UBYTE	227	Text Message Display Type	Number of Columns in the Display
obBusdd 168	OB-J1587-TextMsgDisplayTypeCurrentConfiguration	UBYTE	227	Text Message Display Type	Current Configuration
obBusdd 169	OB-J1587-TextMsgDisplayTypeRows	UBYTE	227	Text Message Display Type	Number of Rows in the Display
obBusdd 170	OB-J1587-SpeedSensorCalibration	ULONG	228	Speed Sensor Calibration	
obBusdd 171	OB-J1587-TotalFuelUsedNaturalGas	ULONG	229	Total Fuel Used (Natural Gas)	
obBusdd 172	OB-J1587-TotalIdleFuelUsedNaturalGas	ULONG	230	Total Idle Fuel Used (Natural Gas)	
obBusdd 173	OB-J1587-TripFuelNaturalGas	ULONG	231	Trip Fuel (Natural Gas)	
obBusdd 174	OB-J1587-DGPSIssueofData	UBYTE	232	DGPS Differential Correction	Issue of data
obBusdd 175	OB-J1587-DGPSRangeRateCorrection	BYTE	232	DGPS Differential Correction	Range-rate Correction
obBusdd 176	OB-J1587-DGPSPseudorangeCorrection	SHORT	232	DGPS Differential Correction	Pseudorange Correction
obBusdd 177	OB-J1587-DGPSScaleFactorUDRESatelliteID	UBYTE	232	DGPS Differential Correction	bitmap-Scale Factor/UDRE/Satellite ID
obBusdd 178	OB-J1587-DGPSZCountStationHealth	USHORT	232	DGPS Differential Correction	bitmap-Modified Z-Count/Station Health
obBusdd 179	OB-J1587-UnitNumberPowerUnit	IA5String	233	Unit Number (Power Unit)	
obBusdd 200	OB-J1587-SoftwareIdentification	IA5String	234	Software Identification	
obBusdd 201	OB-J1587-TotalIdleHours	ULONG	235	Total Idle Hours	
obBusdd 202	OB-J1587-TotalIdleFuelUsed	ULONG	236	Total Idle Fuel Used	
obBusdd 203	OB-J1587-VehicleIdentificationNumber	OCTET STRING (SIZE (1..17))	237	Vehicle Identification Number	same as CPT-VIN

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 204	OB-J1587-VelocityVectorSpeed	UBYTE	238	Velocity Vector – Speed	similar to IM-VehicleSpeed and OB-J1587-VehicleSpeed (resolution differs; also calculated verses instantaneous velocity)
obBusdd 205	OB-J1587-VelocityVectorHeading	USHORT	238	Velocity Vector – Heading	similar to SP-AngularDirection and OB-J1587-CompassHeading
obBusdd 206	OB-J1587-VelocityVectorPitch	SHORT	238	Velocity Vector – Pitch	
obBusdd 207	OB-J1587-PositionLatitude	LONG	239	Position Vector – Latitude	similar to SP-Latitude
obBusdd 208	OB-J1587-PositionLongitude	LONG	239	Position Vector – Longitude	similar to SP-Longitude
obBusdd 209	OB-J1587-PositionAltitude	SHORT	239	Position Vector – Altitude	similar to SP-Altitude (resolution differs; OB-J1587-Altitude specifies reference surface as sea level)
obBusdd 210	OB-J1587-ChangeReferenceNumber	IA5String	240	Change Reference Number	
obBusdd 211	OB-J1587-TirePressure	UBYTE	241	Tire Pressure	Tire Pressure
obBusdd 212	OB-J1587-TirePosition	UBYTE	241	Tire Pressure	Tire Position
	OB-J1587-TireTrailerorPowerUnitMID	OB-MID	241	Tire Pressure	Tire Trailer or Power Unit MID
obBusdd 213	OB-J1587-TireTemperature	UBYTE	242	Tire Temperature	Includes tire temperature, tire position and trailer or power unit MID.

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
	OB-J1587-ComponentID	OB-MID	243	Component Identification Parameter – Identifier	FC-ComponentID
obBusdd 214	OB-J1587-ComponentMake	IA5String	243	Component Identification Parameter – Make	
obBusdd 215	OB-J1587-ComponentModel	IA5String	243	Component Identification Parameter – Model	
obBusdd 216	OB-J1587-ComponentSerialNumber	IA5String	243	Component Identification Parameter – Serial Number	similar to CPT-SerialNumber
obBusdd 217	OB-J1587-TripDistance	ULONG	244	Trip Distance	calculated data; instance of SP-Distance
obBusdd 218	OB-J1587-TotalVehicleDistance	ULONG	245	Total Vehicle Distance	calculated data; instance of SP-Distance
obBusdd 219	OB-J1587-TotalVehicleHours	ULONG	246	Total Vehicle Hours	calculated data; instance of DURTIME
obBusdd 220	OB-J1587-TotalEngineHours	ULONG	247	Total Engine Hours	calculated data; instance of DURTIME
obBusdd 221	OB-J1587-TotalPTOHours	ULONG	248	Total PTO Hours	calculated data; instance of DURTIME
obBusdd 222	OB-J1587-TotalEngineRevolutions	ULONG	249	Total Engine Revolutions	
obBusdd 223	OB-J1587-TotalFuelUsed	ULONG	250	Total Fuel Used	
obBusdd 224	OB-J1587-CurrentHour	UBYTE	251	Clock – Hour	part of TIME
obBusdd 225	OB-J1587-CurrentMinute	UBYTE	251	Clock – Minute	part of TIME
obBusdd 226	OB-J1587-CurrentSecond	UBYTE	251	Clock – Second	part of TIME
obBusdd 227	OB-J1587-CurrentDay	UBYTE	252	Date – Day (0.25/bit)	part of DATE
obBusdd 228	OB-J1587-CurrentMonth	UBYTE	252	Date – Month (1 month/bit)	part of DATE

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 229	OB-J1587-CurrentYear	UBYTE	252	Date – Year (= year-1985) (1 year/bit from 1985)	
obBusdd 230	OB-J1587-ElapsedDays	UBYTE	253	Elapsed Time – Days (1 day/bit)	may be mapped to DURTIME
obBusdd 231	OB-J1587-ElapsedHours	UBYTE	253	Elapsed Time – Hours (1 hour/bit)	may be mapped to DURTIME
obBusdd 232	OB-J1587-ElapsedMinutes	UBYTE	253	Elapsed Time – Minutes (1 min/bit)	may be mapped to DURTIME
obBusdd 233	OB-J1587-ElapsedSeconds	UBYTE	253	Elapsed Time – Seconds (0.25 s/bit)	
	OB-J1587-ColdRestartComponent	OB-MID	257	Cold Restart of Specific Component	
obBusdd 234	OB-J1587-WarmRestartComponent	USHORT	258	Warm Restart of Specific Component	bitmap
obBusdd 235	OB-J1587-ComponentRestartResponse	UBYTE	259	Component Restart Response	
obBusdd 236	OB-J1587-FCUStatus	UBYTE	378	Fare Collection Unit Status	code; subset of FCComponent EventType
obBusdd 237	OB-J1587-TransitDoorStatus	UBYTE	379	Transit Door Status	bitmap
obBusdd 238	OB-J1587-Articulation Angle	BYTE	380	Articulation Angle	
obBusdd 239	OB-J1587-VehicleUseStatus	UBYTE	381	Vehicle Use Status	bitmap
obBusdd 240	OB-J1587-TransitSilentAlarmStatus	UBYTE	382	Transit Silent Alarm Status	bitmap
obBusdd 241	OB-J1587-VehicleAcceleration	BYTE	383	Vehicle Acceleration	
obBusdd 242	OB-J1587-PassengerCounterCountType	UBYTE	447	Passenger Count – Type of Passenger Count	
obBusdd 243	OB-J1587-PassengerCounterPatronCount	UBYTE	447	Passenger Count – Patron Count	similar to CC- PassengerCount
obBusdd 244	OB-J1587-DIUCommandType	UBYTE	449	Driver Interface Unit (DIU) Object/Form Command	Command Type

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 245	OB-J1587-DIUFormID	UBYTE	449	Driver Interface Unit (DIU) Object/Form Command	Form ID
obBusdd 246	OB-J1587-DIUObjectID	UBYTE	449	Driver Interface Unit (DIU) Object/Form Command	Object ID
obBusdd 247	OB-J1587-DIUDataMessage	UBYTE	449	Driver Interface Unit (DIU) Object/Form Command	Data Message
obBusdd 248	OB-J1587-IntersectionPreemptionConfiguration	UBYTE	500	Intersection Preemption Status and Configuration	Interleaved Data Control Configuration
obBusdd 249	OB-J1587-IntersectionPreemptionControlStatus	UBYTE	500	Intersection Preemption Status and Configuration	Strobe Activation Control Status
obBusdd 250	OB-J1587-VehicleID	USHORT	500	Intersection Preemption Status and Configuration – Vehicle ID	similar to CPT- VehicleID
obBusdd 251	OB-J1587-SignMsgData	IA5String	501	Signage Message – Message Data	
obBusdd 252	OB-J1587-SignMsgRecordType	IA5String (SIZE (1))	501	Signage Message – Record Type	
obBusdd 253	OB-J1587-FCUAssignedBlock	USHORT	502	FCU – Service Detail – Block	similar to SCH- BlockID
obBusdd 254	OB-J1587-FCUAssignedRoute	USHORT	502	FCU – Service Detail – Route	similar to SCH- RouteID
obBusdd 255	OB-J1587-FCUAssignedRun	USHORT	502	FCU – Service Detail – Run	similar to SCH- RunID
obBusdd 256	OB-J1587-FCUDriverSecurityCode	USHORT	502	FCU – Service Detail – Security Code	similar to FC- AgencyReserve Code

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 257	OB-J1587-FCUFareBoxStatus	UBYTE	502	FCU – Service Detail – Fare Box Status	bitmap corresponds to SCH-TripTimePtAttribute and SCH-RouteDirection Name (not a one to one correspondence)
obBusdd 258	OB-J1587-FCUPatternNumber	USHORT	502	FCU – Service Detail – Pattern Number	similar to SCH-PatternID
obBusdd 259	OB-J1587-FCUPresets	UBYTE	502	FCU – Service Detail – Presets	bitmap
obBusdd 260	OB-J1587-FCUTripNumber	USHORT	502	FCU – Service Detail – Trip Number	similar to SCH-TripID
obBusdd 261	OB-J1587-FCUAgencyandServiceID	UBYTE	503	FCU – Point of Sale – Fare Agency and service Id	bitmap (range 0-31) must be mapped to CPT-AgencyID (range 0..65535) and SCH-ServiceType
obBusdd 262	OB-J1587-FCUTransactionType	UBYTE	503	FCU – Point of Sale – Type of transaction	bitmap must be mapped to FC-Financial TransactionID, or FC-RiderClassification and FC-Financial TransactionType
obBusdd 263	OB-J1587-FCUTransfer	UBYTE	503	FCU – Point of Sale – transfer information	bitmap (0..15) must be mapped to CC-RouteDirection NameShort

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 264	OB-J1587-FCUTransferSold	UBYTE	503	FCU – Point of Sale – Transfer Sold	Mapped to FC-Financial TransactionID which Contains FC-FareMediaID and FC-FareInstrumentID. The Fare Instrument Defines Transfer Requirements.
obBusdd 265	OB-J1587-FCUTypeandPaymentDetail	UBYTE	503	FCU – Point of Sale – Type of Fare and Payment	Bitmap Mapped to FC-FareMediaID
obBusdd 266	OB-J1587-FCUValidityandTicketCategory	UBYTE	503	FCU – Point of Sale – Fare Validity Data and Ticket Category	Bitmap Mapped to FC-FareMediaID
obBusdd 267	OB-J1587-AnnunciatorMessageID	USHORT	504	Annunciator Voice Message – ID for Preset Messages (for Announcement Library)	Similar to CC-AnnouncementID
obBusdd 268	OB-J1587-AnnunciatorParameters	UBYTE	504	Annunciator Voice Message – Annunciator Location and Volume Level	Announcement Location Should be Mapped to SCH-Announcement LocationID
obBusdd 269	OB-J1587-VCHKeyboardKeyDepressionFlag	OCTET STRING (SIZE (1))	505	Vehicle Control Head Keyboard Message	Status of a Function Key Depression
obBusdd 270	OB-J1587-VCHKeyBoardKeyDepressionScanCode	OCTET STRING (SIZE (1))	505	Vehicle Control Head Keyboard Message	IBM Scan Code for a Function Key Depression
obBusdd 271	OB-J1587-VCHDMessage	IA5String (SIZE (1..14))	506	Vehicle Control Head Display Message	Message to be Displayed
obBusdd 272	OB-J1587-VCHDMessageLinePosition	IA5String (SIZE (1))	506	Vehicle Control Head Display Message	Line Position for Display of Message

TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 273	OB-J1587-VCHDMessageSegmentPosition	IA5String (SIZE (1))	506	Vehicle Control Head Display Message	Segment Position for Display of Message
obBusdd 274	OB-J1587-DriverID	IA5String	507	Driver Identification – Driver Id	OB-J1587-DriverID character string must be mapped to IDENS CPT- EmployeeID
obBusdd 275	OB-J1587-DriverOtherInfo	IA5String	507	Driver Identification – Other Information	may correspond to information on employee contained in cptEmployee
obBusdd 276	OB-J1587-TransitRouteAssignedBlock	IA5String	508	Transit Route Identification – Assigned Block	OB-J1587- AssignedBlock must be mapped to SCH- BlockDesignator (8 characters) or SCH-BlockID (16 bit integer)
obBusdd 277	OB-J1587-TransitRouteAssignedRoute	IA5String	508	Transit Route Identification – Assigned Route	OB-J1587- AssignedRoute must be mapped to SCH- RouteDesignator (8 characters), SCH-RouteName (30 characters) or SCH-RouteID (16 bit integer)



TCIP OID	TCIP ASN.1 Name	TCIP Syntax	PID	PID Name	Remarks
obBusdd 278	OB-J1587-TransitRouteAssignedRun	IA5String	508	Transit Route Identification – Assigned Run	OB-J1587-AssignedRun must be mapped to SCH-RunDesignator (8 characters) or SCH-RunID (16 bit integer)
obBusdd 279	OB-J1587-MilePostID	IA5String	509	Mile Post Identification	OB-J1587-MilePostID character string must be mapped to SP-MilePostID (32 bit integer)



**Annex B**  
**TCIP On-Board/SAE J1587 Cross Reference Table**  
**(Messages)**

TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
obBus 1	ObBusWheelSpeedSensorStatus	::= SEQUENCE {  OB-J1587-WheelSpeedSensorStatusLeftSide, OB-J1587 WheelSpeedSensorStatusRightSide }	134	Wheel Speed Sensor Status
obBus 2	ObBusTractionControlDisableState	::= SEQUENCE {  OB-J1587-TractionControlDisableState, OB-J1587-TractionControlDisableStateAccessCode }	199	Traction Control Disable State
obBus 3	ObBusAuxiliaryADCCounts	::= SEQUENCE { OB-J1587-AuxiliaryADCCounts, OB-J1587-AuxiliaryADChannelNumber }	223	Auxiliary A/D Counts
obBus 4	ObBusTextMessageAcknowledged	::= SEQUENCE {  OB-J1587-TextMsgAckDisplayCtrlResponse, OB-J1587-TextMsgAckColumns, OB-J1587-TextMsgAckRows }	225	Text Message Acknowledged

TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
obBus 5	ObBusTextMessageToDisplay	<pre> ::= SEQUENCE {     OB-J1587-TextMsgStatus1,     OB-J1587-TextMsgStatus2,     OB-J1587-TextMsgRows,     OB-J1587-TextMsgColumns,     OB-J1587-TextMsgData   }</pre>	226	Text Message to Display
obBus 6	ObBusTextMessageDisplayType	<pre> ::= SEQUENCE {     OB-J1587-TextMsgDisplayTypeRows,     OB-J1587-TextMsgDisplayTypeCurrentConfiguration,     OB-J1587-TextMsgDisplayTypeColumns   }</pre>	227	Text Message Display Type
obBus 7	ObBusDGPSDifferentialCorrection	<pre> ::= SEQUENCE {     OB-J1587-DGPSZCountStationHealth,     OB-J1587-DGPSScaleFactorUDRESatelliteID,     OB-J1587-DGPSPseudorangeRateCorrection,     OB-J1587-DGPSRangeCorrection,     OB-J1587-DGPSIssueofData   }</pre>	232	DGPS Differential Correction
obBus 8	ObBusVelocityVector	<pre> ::= SEQUENCE {</pre>	238	Velocity Vector

TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
		OB-J1587-VelocityVectorVelocity, OB-J1587-VelocityVectorHeading, OB-J1587-VelocityVectorPitch }		
obBus 9	ObBusPositionVector	::= SEQUENCE {  OB-J1587-PositionLatitude, OB-J1587-PositionLongitude, OB-J1587-PositionAltitude }	239	Position Vector; similar to SpGeopoint
obBus 10	ObBusTirePressure	::= SEQUENCE { OB-J1587-TireTrailerorPowerUnitMID, OB-J1587-TirePressure, OB-J1587-TirePosition }	241	Tire Pressure
obBus 11	ObBusComponentIdentificationParameter	::= SEQUENCE {  OB-J1587-ComponentID, OB-J1587-ComponentMake, OB-J1587-ComponentModel, OB-J1587-ComponentSerialNumber }	243	Component Identification Parameter

TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
obBus 12	ObBusClock	<pre> ::= SEQUENCE {     OB-J1587-CurrentSecond,     OB-J1587-CurrentMinute,     OB-J1587-CurrentHour   }</pre>	251	Clock; similar to TIME
obBus 13	ObBusDate	<pre> ::= SEQUENCE {     OB-J1587-CurrentDay,     OB-J1587-CurrentMonth,     OB-J1587-CurrentYear   }</pre>	252	Date; similar to DATE
obBus 14	ObBusElapsedTime	<pre> ::= SEQUENCE {     OB-J1587-ElapsedSeconds,     OB-J1587-ElapsedMinutes,     OB-J1587-ElapsedHours,     OB-J1587-ElapsedDays   }</pre>	253	Elapsed Time; must be transformed to DURTIME
obBus 15	ObBusPassengerCount	<pre> ::= SEQUENCE {     OB-J1587-PassengerCounterCountType,     OB-J1587-PassengerCounterPatronCount   }</pre>	447	Passenger Count

TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
obBus 16	ObBusDIUObjectFormCommand	<pre>  ::= SEQUENCE {      OB-J1587-DIUCommandType,      OB-J1587-DIUFormID,      OB-J1587-DIUObjectID,      OB-J1587-DIUDataMessage  } </pre>	449	Driver Interface Unit (DIU) Object/Form Command
obBus 17	ObBusIntersectionPreemptionStatusandConfiguration	<pre>  ::= SEQUENCE {      OB-J1587-VehicleID,      OB-J1587-IntersectionPreemptionControlStatus,      OB-J1587-IntersectionPreemptionConfiguration  } </pre>	500	Intersection Preemption Status and Configuration
obBus 18	ObBusSignageMessage	<pre>  ::= SEQUENCE {      OB-J1587-SignageMessageRecordType,      OB-J1587-SignageMessageData  } </pre>	501	Signage Message; similar to CcAnnouncement Entry
obBus 19	ObBusFareCollectionUnitServiceDetail	<pre>  ::= SEQUENCE { </pre>	502	Fare Collection Unit – Service Detail

TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
		OB-J1587-FCUFareBoxStatus, OB-J1587-FCUFarePresets, OB-J1587-FCUTripNumber, OB-J1587-FCUPatternNumber, OB-J1587-FCUAssignedRoute, OB-J1587-FCUAssignedRun, OB-J1587-FCUAssignedBlock, OB-J1587-FCUDriverSecurityCode }		
obBus 20	ObBusFCUPOS	::= SEQUENCE {  OB-J1587-FCUTransactionType, OB-J1587-FCUTypeandPaymentDetail, OB-J1587-FCUValidityandTicketCategory, OB-J1587-FCUAgencyandServiceID, OB-J1587-FCUTransferData, OB-J1587-FCUTransferSold }	503	Fare Collection Unit – Point of Sale; similar to FcFinancial Transaction
obBus 21	ObBusAnnunciatorVoiceMessage	::= SEQUENCE {  OB-J1587-AnnunciatorParameters,	504	Annunciator Voice Message; similar to CcAnnouncementEntry



TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
		OB-J1587-AnnunciatorMessageID }		
obBus 22	ObBusVCHKeyboardMessage	::= SEQUENCE {  OB-J1587-VCHKeyboardKeyDepressionScanCode, OB-J1587-VCHKeyboardKeyDepressionScanFlag }	505	Vehicle Control Head Keyboard Message
obBus 23	ObBusVCHDMessage	::= SEQUENCE {  OB-J1587-VCHDMessageLinePosition, OB-J1587-VCHDMessageSegmentPosition, OB-J1587-VCHDMessage }	506	Vehicle Control Head Display Message
obBus 24	ObBusDriverIdentification	::= SEQUENCE {  OB-J1587-DriverID, OB-J1587-DriverOtherInfo }	507	Driver Identification; subset of CptEmployee
obBus 25	ObBusTransitRouteIdentification	::= SEQUENCE {  OB-J1587-TransitRouteAssignedRoute, OB-J1587-TransitRouteAssignedRun,	508	Transit Route Identification

TCIP OID	TCIP ASN.1 Name	TCIP Data Structure	PID	PID Name/Remarks
		OB-J1587-TransitRouteAssignedBlock }		

**Annex C**  
**Data Element/Message Use Cross Reference Table**

Data Element / Message	Message(s)
<b>ObBusComponentIdentificationParameters</b>	
	ObComponent
<b>OB-AlarmSummary</b>	
	CcPTVMessageTemplate
<b>ObComponent</b>	
	CcPTVRegistration
<b>OB-DoorCloseTime</b>	
	ObDoorRecord
<b>OB-DoorOpenTime</b>	
	ObDoorRecord
<b>ObDoorRecord</b>	
	ObStopPointRecord
<b>OB-DoorStatusSummary</b>	
	CcPTVMessageTemplate
<b>OB-MID</b>	
	CcActivateAnnouncementFreeform
	CcActivateAnnounceFromLibrary
	CcMsgRecord
	CcParameterDumpRequest
	CcParameterReportRequest
	CcParameterThreshold
	CcThresholdMonitorRequest
	ObComponent
	ObDoorRecord
	ObParameterDumpResponse
<b>OB-MIDDescription</b>	
	ObComponent
<b>ObParameterDumpEntry</b>	
	ObParameterDumpResponse

<b>Data Element / Message</b>	<b>Message(s)</b>
<b><i>OB-PassengerAlighting</i></b>	ObDoorRecord
<b><i>OB-PassengerBoarding</i></b>	ObDoorRecord
<b><i>OB-PID</i></b>	CcParameterDumpRequest CcParameterRateConfiguration CcParameterThreshold ObParameterDumpEntry
<b><i>OB-Rate</i></b>	CcParameterRateConfiguration
<b><i>OB-ScheduleAdherenceOffset</i></b>	ObStopPointRecord
<b><i>OB-StopPointGo</i></b>	ObStopPointRecord
<b><i>OB-StopPointStop</i></b>	ObStopPointRecord
<b><i>OB-StopPointZoneEntry</i></b>	ObStopPointRecord
<b><i>OB-StopPointZoneExit</i></b>	ObStopPointRecord
<b><i>ObSWComponent</i></b>	ObComponent

Data Element / Message	Message(s)
<i>ObBusTextMessageDisplayType</i>	CcActivateAnnouncementFreeform CcActivateAnnounceFromLibrary
<i>ObBusTextMessagetoDisplay</i>	CcActivateAnnouncementFreeform CcActivateAnnounceFromLibrary



## Annex D ANS.1 Script Informative Annex

This annex is a script in ASN.1 format for compiling the required OB business objects.

```
TCIP-OBDD  DEFINITIONS  AUTOMATIC TAGS ::= BEGIN

IMPORTS DATE, FOOTNOTE, TIME, LONG, ULONG, DURTIME, USHORT, NAME, UBYTE, SHORT,
DATETIME
    FROM TCIP-Subtypes
    ob, TCIP-CLASS,
    CPT-DateTime, CPT-Manufacturer, CPT-StopPointID, CPT-TransitFacilityID,
    CPT-VersionNo, CPT-VIN
    FROM TCIP-CPTDD
    --CcPTVMessageTemplate
    --    FROM TCIP-CCDD
    SpPointclass, SpPolygonclass
    FROM TCIP-SPDD
    FcTransaction    FROM TCIP-FCDD;

obBus  OBJECT IDENTIFIER ::= {ob 2}
obBusdd OBJECT IDENTIFIER ::= {obBus 2}

ob-AlarmSummary-id OBJECT IDENTIFIER ::= {obBusdd 769}
ob-AlarmSummary  TCIP-CLASS ::= {
OB-AlarmSummary IDENTIFIED BY ob-AlarmSummary-id
WITH DESCRIPTION "A boolean value that indicates whether an alarm has been triggered
on board a public transportation vehicle."
}
OB-AlarmSummary ::= BOOLEAN

ob-ConfidenceMeasure-id OBJECT IDENTIFIER ::= {obBusdd 770}
ob-ConfidenceMeasure  TCIP-CLASS ::= {
OB-ConfidenceMeasure IDENTIFIED BY ob-ConfidenceMeasure-id
WITH DESCRIPTION "Confidence measure of sensor measurement quality. Units are based
on sensor measurements."
}
OB-ConfidenceMeasure ::= INTEGER

ob-ConfidenceMeasureShort-id OBJECT IDENTIFIER ::= {obBusdd 771}
ob-ConfidenceMeasureShort TCIP-CLASS ::= {
OB-ConfidenceMeasureShort IDENTIFIED BY ob-ConfidenceMeasureShort-id
WITH DESCRIPTION "Confidence measure of sensor measurement quality. This data element
may be used for restrictive bandwidths. The confidence is based on vendor
specifications for the hardware and/or software. The vendor must specify the accuracy
(e.g., the spread from expected [+/- units]), and the confidence level (e.g., sigma,
CEP). Moreover, the units (for the accuracy measure) shall be specified."
}
OB-ConfidenceMeasureShort ::= INTEGER {
level0 (0), -- Level 0;
level1 (1), -- Level 1;
level2 (2), -- Level 2;
level3 (3) -- Level 3
} (0..3)

ob-DataLoadRelease-id OBJECT IDENTIFIER ::= {obBusdd 772}
ob-DataLoadRelease  TCIP-CLASS ::= {
OB-DataLoadRelease IDENTIFIED BY ob-DataLoadRelease-id
WITH DESCRIPTION "The release date of the data load sign message or annunciator
```

```
message library."
}
OB-DataLoadRelease      ::= DATETIME

ob-DoorCloseTime-id OBJECT IDENTIFIER ::= {obBusdd 773}
ob-DoorCloseTime TCIP-CLASS ::= {
OB-DoorCloseTime IDENTIFIED BY ob-DoorCloseTime-id
WITH DESCRIPTION "The time a door closes on a PT vehicle."
}
OB-DoorCloseTime ::= TIME

ob-DoorOpenTime-id OBJECT IDENTIFIER ::= {obBusdd 774}
ob-DoorOpenTime TCIP-CLASS ::= {
OB-DoorOpenTime IDENTIFIED BY ob-DoorOpenTime-id
WITH DESCRIPTION "The time a door opens on a PT vehicle."
}
OB-DoorOpenTime ::= TIME

ob-DoorStatusSummary-id OBJECT IDENTIFIER ::= {obBusdd 775}
ob-DoorStatusSummary TCIP-CLASS ::= {
OB-DoorStatusSummary IDENTIFIED BY ob-DoorStatusSummary-id
WITH DESCRIPTION "A summary report that indicates whether a door is open on a PT
vehicle. True indicates that a door is open; false indicates that all doors are
closed."
}
OB-DoorStatusSummary      ::= BOOLEAN

ob-HeadingDelta-id OBJECT IDENTIFIER ::= {obBusdd 776}
ob-HeadingDelta TCIP-CLASS ::= {
OB-HeadingDelta IDENTIFIED BY ob-HeadingDelta-id
WITH DESCRIPTION "This object indicates heading change during specified time
interval measured by degrees/second. The object is used to trigger event
recording equipment that records actual path traveled."
}
OB-HeadingDelta ::= SHORT

ob-HiResolutionDistance-id OBJECT IDENTIFIER ::= {obBusdd 777}
ob-HiResolutionDistance TCIP-CLASS ::= {
OB-HiResolutionDistance IDENTIFIED BY ob-HiResolutionDistance-id
WITH DESCRIPTION "The relative distance since last reporting period."
}
OB-HiResolutionDistance ::= UBYTE

ob-ManufacturerShort-id OBJECT IDENTIFIER ::= {obBusdd 778}
ob-ManufacturerShort TCIP-CLASS ::= {
OB-ManufacturerShort IDENTIFIED BY ob-ManufacturerShort-id
WITH DESCRIPTION "Vendor of an electronic module."
}
OB-ManufacturerShort      ::= NAME

ob-MID-id OBJECT IDENTIFIER ::= {obBusdd 779}
ob-MID TCIP-CLASS ::= {
OB-MID IDENTIFIED BY ob-MID-id
WITH DESCRIPTION "An identifier which is associated with the functional address
for the message origin or destination. This number is the message identification
assignment transmitted by an on-board device or system. The data element is
imported from SAE J1708/J1587. Numbers between 257 to 512 are assigned by this
standard (and not SAE)."
}
OB-MID ::= INTEGER

ob-MIDDescription-id OBJECT IDENTIFIER ::= {obBusdd 780}
```



```
ob-MIDDescription TCIP-CLASS ::= {
OB-MIDDescription IDENTIFIED BY ob-MIDDescription-id
WITH DESCRIPTION "The description of a component. The component functionality is
designated by the MID, SAE J1708."
}
OB-MIDDescription ::= FOOTNOTE

ob-OpAcknowledge-id OBJECT IDENTIFIER ::= {obBusdd 781}
ob-OpAcknowledge TCIP-CLASS ::= {
OB-OpAcknowledge IDENTIFIED BY ob-OpAcknowledge-id
WITH DESCRIPTION "A driver or PT operator response to a message received from a
dispatcher."
}
OB-OpAcknowledge ::= INTEGER {
ack (0), -- Acknowledge (Ack returned to "receive msg")
ackNo (1), -- Acknowledge/No (Ack with a "no" response)
ackYes (2), -- Acknowledge/yes (Ack with a "yes" response)
spare (3) -- Spare (for variable responses or
} (0..3)

ob-PassengerAlighting-id OBJECT IDENTIFIER ::= {obBusdd 782}
ob-PassengerAlighting TCIP-CLASS ::= {
OB-PassengerAlighting IDENTIFIED BY ob-PassengerAlighting-id
WITH DESCRIPTION "The number of passengers that are counted alighting a PT vehicle in
revenue service."
}
OB-PassengerAlighting ::= USHORT

ob-PassengerBoarding-id OBJECT IDENTIFIER ::= {obBusdd 783}
ob-PassengerBoarding TCIP-CLASS ::= {
OB-PassengerBoarding IDENTIFIED BY ob-PassengerBoarding-id
WITH DESCRIPTION "The number of passengers that are counted boarding a PT vehicle in
revenue service."
}
OB-PassengerBoarding ::= USHORT

ob-PassengerLoad-id OBJECT IDENTIFIER ::= {obBusdd 784}
ob-PassengerLoad TCIP-CLASS ::= {
OB-PassengerLoad IDENTIFIED BY ob-PassengerLoad-id
WITH DESCRIPTION "The number of passengers carried on a revenue vehicle between any
two stop points."
}
OB-PassengerLoad ::= USHORT

ob-PID-id OBJECT IDENTIFIER ::= {obBusdd 785}
ob-PID TCIP-CLASS ::= {
OB-PID IDENTIFIED BY ob-PID-id
WITH DESCRIPTION "This object describes a parameter identification number defined
in the SAE J1587 standard. PID range from 769 to 1096 are assigned by this
standard."
}
OB-PID ::= INTEGER

ob-Rate-id OBJECT IDENTIFIER ::= {obBusdd 786}
ob-Rate TCIP-CLASS ::= {
OB-Rate IDENTIFIED BY ob-Rate-id
WITH DESCRIPTION "The rate or frequency at which a PT vehicle should report the
status of one of its parameters."
}
OB-Rate ::= USHORT
```

```
ob-ResponseData-id OBJECT IDENTIFIER ::= {obBusdd 787}
ob-ResponseData TCIP-CLASS ::= {
OB-ResponseData IDENTIFIED BY ob-ResponseData-id
WITH DESCRIPTION "The variable response to ccAcknowledgeRequest."
}
OB-ResponseData ::= UTF8String (SIZE (1..15))

ob-RollingAverageInterval-id OBJECT IDENTIFIER ::= {obBusdd 788}
ob-RollingAverageInterval TCIP-CLASS ::= {
OB-RollingAverageInterval IDENTIFIED BY ob-RollingAverageInterval-id
WITH DESCRIPTION "This object indicates an interval used to measure the rolling
average speed of an operating vehicle."
}
OB-RollingAverageInterval ::= DURTIME

ob-RollingAverageSpeed-id OBJECT IDENTIFIER ::= {obBusdd 789}
ob-RollingAverageSpeed TCIP-CLASS ::= {
OB-RollingAverageSpeed IDENTIFIED BY ob-RollingAverageSpeed-id
WITH DESCRIPTION "This object indicates a rolling average speed with a moving
interval defined in the object ObRollingAverageInterval. The rolling average
speed represents more accurate information about the movement of an operating
vehicle."
}
OB-RollingAverageSpeed ::= UBYTE

ob-RouteAdherenceOffset-id OBJECT IDENTIFIER ::= {obBusdd 790}
ob-RouteAdherenceOffset TCIP-CLASS ::= {
OB-RouteAdherenceOffset IDENTIFIED BY ob-RouteAdherenceOffset-id
WITH DESCRIPTION "The distance by which a PT vehicle is outside its route."
}
OB-RouteAdherenceOffset ::= ULONG

ob-RouteAdherenceStatus-id OBJECT IDENTIFIER ::= {obBusdd 791}
ob-RouteAdherenceStatus TCIP-CLASS ::= {
OB-RouteAdherenceStatus IDENTIFIED BY ob-RouteAdherenceStatus-id
WITH DESCRIPTION "This object indicates whether a public transport vehicle is
on/off route based on the threshold set by the Agency."
}
OB-RouteAdherenceStatus ::= INTEGER {
left (0), -- The vehicle is left of the direction of the route.
right (1), -- The vehicle is right of the direction of the route.
on (2), -- The vehicle is on the route.
reserved (3) -- reserved (unused).
} (0..3)

ob-RouteDeviation-id OBJECT IDENTIFIER ::= {obBusdd 792}
ob-RouteDeviation TCIP-CLASS ::= {
OB-RouteDeviation IDENTIFIED BY ob-RouteDeviation-id
WITH DESCRIPTION "This object describes the distance by which a public
transport vehicle deviates from its expected pattern (that includes actual
and reported exception)."
}
OB-RouteDeviation ::= INTEGER

ob-ScheduleAdherenceOffset-id OBJECT IDENTIFIER ::= {obBusdd 793}
ob-ScheduleAdherenceOffset TCIP-CLASS ::= {
OB-ScheduleAdherenceOffset IDENTIFIED BY ob-ScheduleAdherenceOffset-id
WITH DESCRIPTION "The time (in seconds) that a PT vehicle is ahead or behind
its trip schedule."
}
OB-ScheduleAdherenceOffset ::= LONG
```

```
ob-SensorType-id OBJECT IDENTIFIER ::= {obBusdd 794}
ob-SensorType TCIP-CLASS ::= {
OB-SensorType IDENTIFIED BY ob-SensorType-id
WITH DESCRIPTION "The type of sensor used for tracking vehicle position."
}
OB-SensorType ::= INTEGER{
null (0),
gps (1),
dgps (2),
gyroscope (3),
accelerometer (4),
compass (5),
dmi (6) , --differential transmission, wheel rotation (distance measuring instrument)
signpost (7),
avi (8), -- automatic vehicle identification
radio-triangulation (9),
differential-odometer (10)
-- 11 - 155 reserved
-- 155 - 255 local use codes
} (0..255)

ob-StopPointGo-id OBJECT IDENTIFIER ::= {obBusdd 795}
ob-StopPointGo TCIP-CLASS ::= {
OB-StopPointGo IDENTIFIED BY ob-StopPointGo-id
WITH DESCRIPTION "The time a PT vehicle starts moving after it stops at a stop
point."
}
OB-StopPointGo ::= TIME

ob-StopPointStop-id OBJECT IDENTIFIER ::= {obBusdd 796}
ob-StopPointStop TCIP-CLASS ::= {
OB-StopPointStop IDENTIFIED BY ob-StopPointStop-id
WITH DESCRIPTION "The time a PT vehicle stops at a stop point. In the case where
a PT vehicle may reposition itself at a stop point before the driver opens the door,
the last time, just prior to the door opening, should be used."
}
OB-StopPointStop ::= TIME

ob-StopPointZoneEntry-id OBJECT IDENTIFIER ::= {obBusdd 797}
ob-StopPointZoneEntry TCIP-CLASS ::= {
OB-StopPointZoneEntry IDENTIFIED BY ob-StopPointZoneEntry-id
WITH DESCRIPTION "The time a PT vehicle enters a designated area of a stop point."
}
OB-StopPointZoneEntry ::= TIME

ob-StopPointZoneExit-id OBJECT IDENTIFIER ::= {obBusdd 798}
ob-StopPointZoneExit TCIP-CLASS ::= {
OB-StopPointZoneExit IDENTIFIED BY ob-StopPointZoneExit-id
WITH DESCRIPTION "The time a PT vehicle exits a designated area identified with a
stop point."
}
OB-StopPointZoneExit ::= TIME

ob-VideoUnitControl-id OBJECT IDENTIFIER ::= {obBusdd 799}
ob-VideoUnitControl TCIP-CLASS ::= {
OB-VideoUnitControl IDENTIFIED BY ob-VideoUnitControl-id
WITH DESCRIPTION "Control parameters for video recording unit. This data element
contains the list of commands for the video unit. "
}
OB-VideoUnitControl ::= INTEGER
```

```
ob-VideoUnitStatus-id OBJECT IDENTIFIER ::= {obBusdd 800}
ob-VideoUnitStatus TCIP-CLASS ::= {
OB-VideoUnitStatus IDENTIFIED BY ob-VideoUnitStatus-id
WITH DESCRIPTION "Operating status of video recording (transmission)unit."
}
OB-VideoUnitStatus ::= INTEGER

ob-WakeUp-id OBJECT IDENTIFIER ::= {obBusdd 801}
ob-WakeUp TCIP-CLASS ::= {
OB-WakeUp IDENTIFIED BY ob-WakeUp-id
WITH DESCRIPTION "A signal that 'wakes up' or alerts a transponder to the presence
of a transmitter (device or mobile unit)."
```

}

```
OB-WakeUp ::= BOOLEAN

--*****
-- OB Bus Message Set
--*****

obComponent-id OBJECT IDENTIFIER ::= {obBus 770}
ObComponent ::= SEQUENCE {
    componentID          OB-MID          OPTIONAL,
    component-parameters ObBusComponentIdentificationParameters  OPTIONAL,
    sw-dataload-parameters SEQUENCE OF ObSWComponent  OPTIONAL,
    dateInstalled        CPT-DateTime  OPTIONAL,
    description          OB-MIDDescription  OPTIONAL
}
obComponent TCIP-CLASS ::= {
ObComponent IDENTIFIED BY obComponent-id
WITH DESCRIPTION "A description of a component (hardware, software, library) that is
located on board a public transportation vehicle.
ObBusComponentIdentificationParameters is a J1587 data element
which contains component ID, serial number, make and model."
}

obDoorRecord-id OBJECT IDENTIFIER ::= {obBus 771}
ObDoorRecord ::= SEQUENCE {
    doorNo          OB-MID,  -- related MID or address for door or lift
    open-time      OB-DoorOpenTime,
    close-time     OB-DoorCloseTime  OPTIONAL,
    boarding       SEQUENCE OF OB-PassengerBoarding  OPTIONAL,
    alighting      SEQUENCE OF OB-PassengerAlighting  OPTIONAL,
    fare-transaction SEQUENCE OF FcTransaction  OPTIONAL
}
obDoorRecord          TCIP-CLASS ::= {
ObDoorRecord IDENTIFIED BY obDoorRecord-id
WITH DESCRIPTION "The activities related to the opening/closing of a door on a
public transportation vehicle (in revenue service) at a stop
point. If alighting or boarding count is not present, then
application assumes that no alightings or boardings occurred."
}

obParameterDumpEntry-id OBJECT IDENTIFIER ::= {obBus 772}
ObParameterDumpEntry ::= SEQUENCE {
    recorded-time      TIME,
    recorded-date      DATE,
    parameter-id       OB-PID,
    parameter-value    OCTET STRING -- open type, this must comply with J1587
objects
}
obParameterDumpEntry          TCIP-CLASS ::= {
ObParameterDumpEntry IDENTIFIED BY obParameterDumpEntry-id
```

```
WITH DESCRIPTION "A parameter value as recorded by a logical storage device."  
}
```

```
obParameterDumpResponse-id OBJECT IDENTIFIER ::= {obBus 773}
```

```
ObParameterDumpResponse ::= SEQUENCE {  
    from-device      OB-MID OPTIONAL,  
    parameter-dump  SEQUENCE OF ObParameterDumpEntry  
}
```

```
obParameterDumpResponse TCIP-CLASS ::= {  
ObParameterDumpResponse IDENTIFIED BY obParameterDumpResponse-id  
WITH DESCRIPTION "The collection of parameters as specified by the  
CcParameterDumpRequest message."  
}
```

```
obStopPointRecord-id OBJECT IDENTIFIER ::= {obBus 774}
```

```
ObStopPointRecord ::= SEQUENCE {  
    stop-point-id      CPT-StopPointID      OPTIONAL,  
    location           SpPointclass        OPTIONAL ,  
    entry-to-stop-point-zone OB-StopPointZoneEntry,  
    exit-to-stop-point-zone OB-StopPointZoneExit,  
    stop-time-at-stop-pt OB-StopPointStop   OPTIONAL,  
    start-time-at-stop-pt OB-StopPointGo    OPTIONAL,  
    schedule-adh-status OB-ScheduleAdherenceOffset, -- status  
    door-records      SEQUENCE OF ObDoorRecord  
    -- only one record may indicate that this is summary data  
}
```

```
obStopPointRecord TCIP-CLASS ::= {  
ObStopPointRecord IDENTIFIED BY obStopPointRecord-id  
WITH DESCRIPTION "A description of the typical events occurring on a transit  
vehicle at or near a stop point. This includes  
entering/exiting stop point zone, stop/start moving at a stop  
point, schedule adherence status, vehicle positioning, and  
information related to doors on the transit vehicle  
(ObDoorRecord)."  
}
```

```
obSWComponent-id OBJECT IDENTIFIER ::= {obBus 775}
```

```
ObSWComponent ::= SEQUENCE {  
    component OB-MID,  
    identification OB-J1587-SoftwareIdentification,  
    manufacturer CPT-Manufacturer OPTIONAL,  
    revision CPT-VersionNo OPTIONAL,  
    data-loads SEQUENCE OF SEQUENCE {  
        data-load-id INTEGER (0..255) OPTIONAL,  
        data-load-name IA5String (SIZE (0..17)) OPTIONAL,  
        date-time OB-DataLoadRelease OPTIONAL,  
        revision-no CPT-VersionNo  
    }  
}
```

```
obSWComponent TCIP-CLASS ::= {  
ObSWComponent IDENTIFIED BY obSWComponent-id  
WITH DESCRIPTION "A description of the software attributes of a component."  
}
```

```
--*****  
-- External objects from SAE J1587  
--*****
```

```
OB-J1587-SoftwareIdentification ::= IA5String  
OB-J1587-RoadSpeed ::= IA5String  
OB-J1587-VelocityVectorHeading ::= IA5String  
ObBusTextMessageDisplayType ::= IA5String
```

```
ObBusTextMessageToDisplay ::= IA5String  
ObBusComponentIdentificationParameters ::= IA5String
```

```
END -- TCIP-OBDD
```