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**VDV-Schrift**

**301-2-1**  
07/2018

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**IBIS-IP Beschreibung der Dienste /  
Service description**

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Gemeinsame Datenstrukturen und Aufzählungstypen /  
Common Data Structures and Enumerations  
V2.1

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**Gesamtbearbeitung**  
Ausschuss für Telematik und Informationssysteme (ATI)

Gefördert durch:



aufgrund eines Beschlusses  
des Deutschen Bundestages



# IBIS-IP Beschreibung der Dienste / Service description

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## Gemeinsame Datenstrukturen und Aufzählungstypen / Common Data Structures and Enumerations V2.11

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## Vorwort

Diese VDV-Schrift wurde aus der VDV-301-2 separiert, um Anpassungen an einzelnen IBIS-IP-Diensten unabhängig von anderen IBIS-IP-Diensten vornehmen zu können.

In der VDV-301-2 werden die technischen Grundlagen wie auch die Basisdienste, welche die Grundlagen eines IBIS-IP-Systems bilden, beschrieben.

Die VDV-Schrift 301-2-1 beschreibt die gemeinsamen Datenstrukturen und Aufzählungstypen.

### **Foreword**

This VDV-requirement document has been separated from the VDV-301-2 in order to make adjustments to individual IBIS IP services independent from other IBIS IP services.

The technical basics as well as the basic services of the IBIS-IP systems are described in the VDV-301-2.

The VDV 301-2-1 describes the common data structures and enumerations.

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# 1 IBIS-IP datatypes

## 1.1 IBIS-IP.anyURI

<b>IBIS-IP.anyURI</b>			<i>+Structure</i>	<b>IBIS IP structure for describing an address value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:anyURI</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 1 Description of IBIS-IP.anyURI

## 1.2 IBIS-IP.boolean

<b>IBIS-IP.boolean</b>			<i>+Structure</i>	<b>IBIS IP structure for describing a boolean value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:boolean</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 2 Description of IBIS-IP.boolean

## 1.3 IBIS-IP.byte

<b>IBIS-IP.byte</b>			<i>+Structure</i>	<b>IBIS IP structure for describing a byte value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:byte</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 3 Description of IBIS-IP.byte

## 1.4 IBIS-IP.date

<b>IBIS-IP.date</b>			<i>+Structure</i>	<b>IBIS IP structure for describing a date value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:date</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 4 Description of IBIS-IP.date

## 1.5 IBIS-IP.dateTime

<i>IBIS-IP.dateTime</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a date value with time</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:dateTime</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 5 Description of IBIS-IP.dateTime

## 1.6 IBIS-IP.double

<i>IBIS-IP.double</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a floating point value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:double</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 6 Description of IBIS-IP.double

## 1.7 IBIS-IP.duration

<i>IBIS-IP.duration</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a duration</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:duration</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 7 Description of IBIS-IP.duration

## 1.8 IBIS-IP.int

<i>IBIS-IP.int</i>			<i>+Structure</i>	<b>IBIS IP structure for describing an integer</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:int</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 8 Description of IBIS-IP.int

## 1.9 IBIS-IP.language

<i>IBIS-IP.language</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a language specification</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:language</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 9 Description of IBIS-IP.language

## 1.10 IBIS-IP.NMTOKEN

<i>IBIS-IP.NMTOKEN</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a Token Value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:NMTOKEN</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 10 Description of IBIS-IP.NMTOKEN

## 1.11 IBIS-IP.nonNegativeInteger

<i>IBIS-IP.nonNegativeInteger</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a non-negative integer</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:nonNegativeInteger</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 11 Description of IBIS-IP.nonNegativeInteger

## 1.12 IBIS-IP.normalizedString

<i>IBIS-IP.normalizedString</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a normalised string value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:normalizedString</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 12 Description of IBIS-IP.normalizedString

## 1.13 IBIS-IP.string

<i>IBIS-IP.string</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a string value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:string</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 13 Description of IBIS-IP.string

## 1.14 IBIS-IP.time

<i>IBIS-IP.time</i>			<i>+Structure</i>	<b>IBIS IP structure for describing a time value</b>
	<b>Value</b>	<b>1:1</b>	<i>xs:time</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 14 Description of IBIS-IP.time

## 1.15 IBIS-IP.unsignedInt

<b>IBIS-IP.unsignedInt</b>			+Structure	<b>IBIS IP structure for describing an unsigned integer</b>
	<b>Value</b>	1:1	<i>xs:unsignedInt</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 15 Description of IBIS-IP.unsignedInt

## 1.16 IBIS-IP.unsignedLong

<b>IBIS-IP.unsignedLong</b>			+Structure	<b>IBIS IP structure for describing an unsigned long integer</b>
	<b>Value</b>	1:1	<i>xs:unsignedLong</i>	Specification of the actual value
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 16 Description of IBIS-IP.unsignedLong

## 1.17 InternationalTextType

<b>InternationalTextType</b>			+Structure	<b>IBIS IP structure for describing of a foreign-language text</b>
	<b>Value</b>	1:1	<i>IBIS-IP.string</i>	Specification of the actual value
	<b>Language</b>	1:1	<i>IBIS-IP.language</i>	Specification of language
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Value for an error that has occurred

Table 17 Description of InternationalTextType

### Value:

#### **Support of inline formatting:**

The text inserted to the element *Value* can contain inline formatting instructions using XML based syntax. XML elements for inline formatting that are unknown to a device have to be ignored, but the content of the element has to be displayed. In this way it is not necessary that each device implements all available inline formatting elements and the backwards compatibility is ensured for future extensions.

#### *Example:*

```
Westend <icon type="P+R">[P+R]</icon>
```

*Devices that support icons will show the P+R-Icon.*

*If a device doesn't support the inline formatting element <icon> it has to delete both xml tags but not the content between the tags, so the device shows "Westend [P+R]" instead.*

The following formatting elements are defined:

XML Element	Description
<code>&lt;b&gt; &lt;/b&gt;</code>	Bold text.
<code>&lt;narrow&gt; &lt;/narrow&gt;</code>	Text with narrow chars (opposite to bold text).
<code>&lt;i&gt; &lt;/i&gt;</code>	Italic text.
<code>&lt;blink timeMs="150" duty="70"&gt; &lt;/blink&gt;</code>	Blinking text that blinks every 150ms and is visible 70% the time.
<code>&lt;font type="Fontname"&gt; &lt;/font&gt;</code>	Text with a special font selected by type.
<code>&lt;invert&gt; &lt;/invert&gt;</code>	Inverted text.
<code>&lt;color fg="#ff0000" bg="#00aaaa"&gt; &lt;/color&gt;</code>	Color of the text with fg as foreground color and bg as background color noted as #rrggbb value.
<code>&lt;icon type="P+R"&gt;[P+R]&lt;/icon&gt;</code>	Insertion of a special icon. The type will specify the icon that has to be displayed (see list below). The text between the icon-tags is an alternative text that has to be displayed if <icon> is not supported or the icon addressed by type is unknown.

Table 18 List of possible elements for inline formatting

For element icon the following types are defined:

Icon type	Description
P+R	Park and Ride-Symbol
school	School bus („Hänsel und Gretel“)
coffee	Coffee cup
U	Symbol for underground lines
S	Symbol for suburban lines
company	Company logo of the owner of the car
airplane	Symbol for the airport
football	Symbol for the football stadium
fair	Logo of the fairground
coach	Symbol to use beside a coach number

Table 19 List of possible icons

It is also allowed to use custom project specific icons. To avoid collisions with the standardized icons all custom icons have to be prefixed with c\_.

*Example:*  
If a symbol for a shopping mall shall be displayed a custom icon c\_shopping can be introduced.

Inline formatting elements can be nested.

*Example:*

To get an inverted P+R-Symbol the following sequence can be used:

```
Westend <invert><icon type="P+R">[P+R]</icon><invert>
```

Using the fallback rules defined above the following will happen if a device doesn't support all formatting sequences:

- Devices that don't support inverted text have to show a non-inverted P+R-Symbol because of the rule that all unknown formatting tags have to be removed.
- Devices that don't support the icon type "P+R" have to show the alternative text [P+R] between the icon tags because of the rule that in case of an unknown icon type the alternative text between the icon tags has to be used.
- Devices that don't support icons have to show the alternative text [P+R] because of the rule that all unknown formatting elements have to be removed.

### Encoding in XML

Before putting the text to the *Value* element of *InternationalTextType* all chars (including the tags of inline formatting) with special meaning in XML have to be masked. This is normally done by used XML library.

*Example:*

*If a text with a bold part has to be displayed the following inline formatting code can be used:*

Text with `<b>bold</b>` part

*After inserting the text to the Value-Element of InternationalText the brackets of the bold tags have to be masked:*

```
<Value>Text with &lt;b&gt;bold&lt;/b&gt; part</Value>
```

*If one of the chars with special meaning in XML shall be displayed on the device it has to be escaped twice. To show the text*

> Tierpark

*on the display it has to be encoded in this way:*

```
<Value>&amp;gt; Tierpark</Value>
```

### Compatibility if no inline formatting is supported:

Implementation hint:

To be compatible with this version of VDV 301-2-1 without implementing inline formatting you have to do the following steps to strip off the formatting sequences:

- 1) Remove all XML-Tags from the string
- 2) Replace the following XML entity references with the corresponding char:
  - a) &lt;
  - b) &gt;
  - c) &amp;
  - d) &quot;
  - e) &apos;

## 2 Common data structure

### 2.1 AdditionalAnnouncement

<b>AdditionalAnnouncement</b>			<b>+Structure</b>	<b>Structure which describes the additional information for an announcement</b>
	<b>AnnouncementRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	announcement reference
	<i>AnnouncementText</i>	0:*	<i>+InternationalTextType</i>	Announcement text
	<i>AnnouncementTTSText</i>	0:*	<i>+InternationalTextType</i>	Announcement text for text to speech engines
			<i>choice</i>	One of the choices below
a	<b>ImmediateInformation</b>	-1:1	<i>IBIS-IP.boolean</i>	Immediate sending of the additional announcement
b	<b>PeriodicalInformation</b>		<i>IBIS-IP.duration</i>	Periodical sending of the additional announcement
c	<b>InformationAtSpecificPoint</b>		<i>+SpecificPoint</i>	Sending of an announcement at a specific (trip) point (point information cf. 2.34)

Table 1 Description of AdditionalAnnouncement

### 2.2 Announcement

<b>Announcement</b>			<b>+Structure</b>	<b>Structure with information which is needed for an announcement</b>
	<b>AnnouncementRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	announcement reference
	<i>AnnouncementText</i>	0:*	<i>+InternationalTextType</i>	Announcement text
	<i>AnnouncementTTSText</i>	0:*	<i>+InternationalTextType</i>	Announcement text for text to speech engines

Table 2 Description of Announcement

### 2.3 BayArea

<b>BayArea</b>			<b>+Structure</b>	<b>Structure which describes the bay area (in relation to the stop sign)</b>
	<i>BeforeBay</i>	0:1	<i>IBIS-IP.double</i>	Bay begin, distance to the stop sign in meters in moving direction
	<i>BehindBay</i>	0:1	<i>IBIS-IP.double</i>	Bay ending, distance after the stop sign in meters in moving direction

Table 3 Description of BayArea

## 2.4 BeaconPoint

<b>BeaconPoint</b>			<b>+Structure</b>	<b>Structure which describes a beacon point</b>
	<i>PointRef</i>	0:1	<i>IBIS-IP.NMOKEN</i>	Reference at a point
	<b>BeaconCode</b>	1:1	<i>IBIS-IP.NMOKEN</i>	Beacon code
	<i>ShortName</i>	0:*	<i>+International TextType</i>	Beacon short name
	<i>Description</i>	0:*	<i>+International TextType</i>	Description of the beacon

Table 4 Description of BeaconPoint

## 2.5 CardApplInformation

<b>CardApplInformations</b>			<b>+Structure</b>	<b>Structure for information of applications of a read card</b>
	<b>CardApplInformationLength</b>	1:1	<i>IBIS-IP.unsignedInt</i>	Length of the byte array from <i>CardApplInformationData</i>
	<b>CardApplInformationData</b>	1:*	<i>IBIS-IP.byte</i>	Data array for application data

Table 5 Description of CardApplInformation

## 2.6 CardTicketData

<b>CardTicketData</b>			<b>+Structure</b>	<b>information of tariff data on card</b>
	<b>CardTicketDataID</b>	1:1	<i>IBIS-IP.unsigned-Long</i>	Card ID
	<b>CardTicketDataLength</b>	1:1	<i>IBIS-IP.unsignedInt</i>	Length of ticket data
	<b>CardTicketData</b>	1:*	<i>IBIS-IP.byte</i>	Data array for ticket information

Table 6 Description of CardTicketData

## 2.7 CardType

<b>CardType</b>			<b>+Structure</b>	<b>Structure to describe a card type (ticket)</b>
	<b>CardSerialNumber</b>	1:1	<i>IBIS-IP.NMOKEN</i>	Serial number of the card
	<b>CardTypeID</b>	1:1	<i>IBIS-IP.NMOKEN</i>	Type ID of the card
	<i>CardTypeText</i>	0:*	<i>+International TextType</i>	Type ID of the card as string/text

Table 7 Description of CardType

## 2.8 Connection

<b>Connection</b>			<b>+Structure</b>	<b>Structure which describes a connection</b>
	<b>StopRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Reference at a stop point which the connection is concerning on
	<b>ConnectionRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Reference at the connection
	<b>ConnectionType</b>	1:1	<i>ConnectionTypeEnumeration</i>	Type of connection (cf. 3.2)
	<b>DisplayContent</b>	0:1	<i>+DisplayContent</i>	Display content of the distributor (cf. 2.19)
	<b>Platform</b>	0:1	<i>IBIS-IP.string</i>	Information about the platform for the interchange
	<b>ConnectionState</b>	0:1	<i>ConnectionStateEnumeration</i>	Description of the connection state in case of a ordered connection (cf. 3.1)
	<b>TransportMode</b>	0:1	<i>+Vehicle</i>	Information about the transport mode for the connection (cf.2.62)
	<b>ExpectedDepartureTime</b>	0:1	<i>IBIS-IP.dateTime</i>	Information on the expected departure based on realtime information
	<b>ScheduledDepartureTime</b>	0:1	<i>IBIS-IP.dateTime</i>	Information on the planned departure

Table 8 Description of Connection

## 2.9 DataAcceptedResponse

<b>DataAcceptedResponse</b>			<b>+Structure</b>	<b>Struktur eines Dienstes zur Beantwortung einer Operation, welche Daten dem Dienst zur Verfügung stellt</b>
	<b>DataAcceptedResponseData</b>	1:1	<i>+DataAcceptedResponseDataStructure</i>	Ausführliche Antwortstruktur (siehe 2.10)
	<b>OperationErrorMessage</b>	1:1	<i>IBIS-IP.string</i>	Fehlermeldung

Table 9 Description of DataAcceptedResponse

## 2.10 DataAcceptedResponseData

<b>DataAcceptedResponseData</b>			<b>+Structure</b>	<b>Detailed response structure including data</b>
	<b>TimeStamp</b>	1:1	<i>IBIS-IP.dateTime</i>	Time stamp of the response
	<b>DataAccepted</b>	1:1	<i>IBIS-IP.boolean</i>	Data acknowledge
	<b>ErrorCode</b>	0:1	<i>ErrorCodeEnumeration</i>	Descriptive value for an error (cf. 3.11)
	<b>ErrorInformation</b>	0:1	<i>IBIS-IP.string</i>	Error code information (free text)

Table 10 Description of DataAcceptedResponseData

## 2.11 DataVersion

With the data version different versions of this XML-Scheme are possible in one system.

<i>DataVersion</i>			<i>+Structure</i>	<b>Structure with information of the data version</b>
	<i>DataType</i>	1:1	<i>IBIS-IP.string</i>	Free text description of the data type
	<i>VersionRef</i>	1:1	<i>IBIS-IP.NMOKEN</i>	Version information

Table 11 Description of DataVersion

## 2.12 DataVersionList

<i>DataVersionList</i>			<i>+Structure</i>	<b>Structure with which several data versions can be listed</b>
	<i>DataVersion</i>	1:*	<i>+DataVersion</i>	Data Structure for the description of data types (cf. 2.11)

Table 12 Description of DataVersionList

## 2.13 Destination

<i>Destination</i>			<i>+Structure</i>	<b>Structure with information about the destination</b>
	<i>DestinationRef</i>	1:1	<i>IBIS-IP.NMOKEN</i>	Reference at the display destination text
	<i>DestinationName</i>	0:*	<i>+InternationalTextType</i>	Text which is published at the display
	<i>DestinationShortName</i>	0:*	<i>+InternationalTextType</i>	Short text which is published at the display

Table 13 Description of Destination

### **DestinationName:**

To provide a *DestinationName* which consists of more than one line the element *DestinationName* may occur several times per language. All *DestinationName* elements with the same *Language* will be interpreted as the lines of a multiline destination with the first element as the first line of the destination. If the device can only show one line, it has to show the first line.

## 2.14 DeviceInformation

<i>DeviceInformation</i>			+Structure	Structure with non changeable device configuration data
<i>DeviceInformationGroup</i>	<b>DeviceName</b>	1:1	<i>IBIS-IP.string</i>	Device name
	<b>Manufacturer</b>	1:1	<i>IBIS-IP.string</i>	Manufacturer of the device
	<b>SerialNumber</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Serial number of the device
	<b>DeviceClass</b>	1:1	+ <i>DeviceClassEnumeration</i>	One of the possible device class (cf. 3.3)
	<i>DataVersionList</i>	0:1	+ <i>DataVersionList</i>	List with the data versions (cf. 2.12)
	<i>WebInterfaceAddress</i>	0:1	<i>IBIS-IP.anyURI</i>	URI for a optional web interface for maintenance

Table 14 Description of DeviceInformation

## 2.15 DeviceSpecification

<i>DeviceSpecification</i>			+Structure	Structure which describes a device
	<b>DeviceClass</b>	1:1	<i>DeviceClassEnumeration</i>	One of the available device classes (cf. 3.3)
	<b>DeviceID</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Device-ID

Table 15 Description of DeviceSpecification

## 2.16 DeviceSpecificationList

<i>DeviceSpecificationList</i>			+Structure	Structure with the device specification list
	<b>DeviceSpecification</b>	1:*	+ <i>DeviceSpecification</i>	Device information (cf. 2.15)

Table 16 Description of DeviceSpecificationList

## 2.17 DeviceSpecificationWithState

<i>DeviceSpecificationWithState</i>			+Structure	Structure with the device specification including the current working states
	<b>DeviceSpecification</b>	1:1	+ <i>DeviceSpecification</i>	Structure which describes a device (cf. 2.15)
	<b>DeviceState</b>	1:1	<i>DeviceStateEnumeration</i>	possible states of the device (cf. 3.5)

Table 17 Description of DeviceSpecificationWithState

## 2.18 DeviceSpecificationWithStateList

<i>DeviceSpecificationWithStateList</i>			+Structure	List of objects of with device specifications and their states
	<b><i>DeviceSpecificationWithState</i></b>	1:*	+ <i>DeviceSpecificationWithState</i>	Structure with the device specification including the current working states

Table 18 Description of DeviceSpecificationWithStateList

## 2.19 DisplayContent

<i>DisplayContent</i>			+Structure	Structure with the complete display content
	<i>DisplayContentRef</i>	0:1	<i>IBIS-IP.NMOKEN</i>	Reference at the display content
	<b><i>LineInformation</i></b>	1:1	+ <i>LineInformation</i>	information about the line, which has to be displayed (cf. 2.31)
	<b><i>Destination</i></b>	1:1	+ <i>Destination</i>	Information about the destination, which has to be displayed (cf. 2.13)
	<i>ViaPoint</i>	0:*	+ <i>ViaPoint</i>	Information about the via points, which have to be displayed (cf. 2.63)
	<i>AdditionalInformation</i>	0:*	+ <i>InternationalTextType</i>	Information about the additional information like express bus, additional bus etc. , which has to be displayed
<i>DisplayPolicy</i>	<i>Priority</i>	0:1	<i>IBIS-IP.nonNegativeInteger</i>	Information about the display priority
	<i>PeriodDuration</i>	0:1	<i>IBIS-IP.duration</i>	Information about the period duration
	<i>Duration</i>	0:1	<i>IBIS-IP.duration</i>	Duration of a display turn

Table 19 Description of DisplayContent

### **DisplayContentRef:**

The *DisplayContentRef* can be used to distinguish different contents for different display types and positions. For each received *DisplayContent* the display compares the *DisplayContentRef* with an internal configuration and selects the *DisplayContent* in case of a match.

If the display doesn't have a *DisplayContentRef* configured or cannot find a *DisplayContent* that matches to its configuration, it picks the first *DisplayContent* where the *DisplayContentRef* is empty.

The used names for the *DisplayContentRef* can be selected project specific. As best practice the following structure is suggested:

<display position>\_<display type>-<display number>. The display position is mandatory, the display type and display number are optional.

Suggested display positions:

- Front
- Side
- Interior
- Rear

Suggested display types:

- LED
- TFT

*Example:*

*Using this scheme it is possible to create a flexible system to provide the display specific information. Examples:*

- *Interior\_LED-3: Interior display number 3 with type LED*
- *Interior\_LED: All interior displays with type LED*
- *Side-4: The side display with number 4*
- *Side: All side displays*
- *<Empty DisplayContentRef>: All displays*

*To get a flexible system a device can have a prioritized list of DisplayContentRefs it uses to select the correct content.*

*Example for the interior display number 3 (the first entry has highest priority):*

- *Interior\_LED-3*
- *Interior\_LED*
- *Interior*
- *<Empty DisplayContentRef>*

*Using this list the display would use the DisplayContent that addresses this single interior display 3 with the highest priority. If this is not found it would use the group names Interior\_LED or Interior.*

*If no correct group is found it will fall back to the generic DisplayContent with empty DisplayContentRef.*

*DisplayContentRefs can be project dependent. In most situations it is sufficient to use only the groupname (Front, Interior, ...) and the fallback to the <Empty DisplayContentRef>.*

## 2.20 DoorCounting

<b>DoorCounting</b>		<b>+Structure</b>	<b>Counting data of a door</b>
<b>ObjectClass</b>	<b>1:1</b>	<i>DoorCounting ObjectClassE numeration</i>	Value with the detailed description of the counted object (cf. chapter 3.6)
<b>In</b>	<b>1:1</b>	<i>+IBIS-IP.int</i>	Number of boarded passengers
<b>Out</b>	<b>1:1</b>	<i>+IBIS-IP.int</i>	Number of escaped passengers
<b>CountQuality</b>	<b>0:1</b>	<i>DoorCounting QualityEnume ration</i>	Textstring with information on the quality of counting (cf. 3.8)

Table 20 Description of DoorCounting

## 2.21 DoorCountingList

<i>DoorCountingList</i>			<i>+Structure</i>	<b>Structure for a list of door with for which values are set</b>
	<i>DoorID</i>	1:1	<i>IBIS-IP.NMTOKEN</i>	ID for identification of the door
	<i>CountSet</i>	1:*	<i>+DoorCounting</i>	Structure with counting values (cf. chapter 2.20)

Table 21 Description of DoorCountingList

## 2.22 DoorInformation

<i>DoorInformation</i>			<i>+Structure</i>	<b>Structure with information about the counting at a specific door</b>
	<i>DoorID</i>	1:1	<i>IBIS-IP.NMTOKEN</i>	ID for identification of the door
	<i>Count</i>	1:*	<i>+DoorCounting</i>	structure for the counting data (cf. 2.20)
	<i>State</i>	0:1	<i>+DoorState</i>	Structure with door states (cf. 2.25)

Table 22 Description of DoorInformation

## 2.23 DoorOpenState

<i>DoorOpenState</i>			<i>+Structure</i>	<b>Door state</b>
	<i>Value</i>	1:1	<i>DoorOpenStateEnumeration</i>	Description value of the opening state of a door (cf. 3.9)
	<i>ErrorCode</i>	0:1	<i>ErrorCodeEnumeration</i>	Descriptive value for an error (cf. 3.11)

Table 23 Description of DoorOpenState

## 2.24 DoorOperationState

<i>DoorOperationState</i>			<i>+Structure</i>	<b>Door operation state</b>
	<i>Value</i>	1:1	<i>DoorOperationStateEnumeration</i>	Description value of the operation state (cf. chapter 3.10)
	<i>ErrorCode</i>	0:1	<i>ErrorCodeEnumeration</i>	Descriptive value for an error (cf. chapter 3.11)

Table 24 Description of DoorOperationState

## 2.25 DoorState

<i>DoorState</i>			<i>+Structure</i>	<b>Structure for description of the door state</b>
	<i>OpenState</i>	1:1	<i>+DoorOpenState</i>	Structure for description of door opening state (cf. 2.23)
	<i>OperationState</i>	0:1	<i>+DoorOperationState</i>	Structure for description of the door operation state (cf. 2.24)

Table 25 Description of DoorState

## 2.26 FareZoneInformation

<b>FareZoneInformation</b>			<i>+Structure</i>	<b>Structure for the description of information for tariffs and fare zones</b>
<i>Fare-Zone-Information</i>	<b>FarezoneID</b>	1:1	<i>IBIS-IP.NMOKEN</i>	Index of a fare zone
	<i>FarezoneType</i>	0:1	<i>+ZoneType</i>	Information about the fare zone type (cf. 2.64)
	<i>FarezoneLongName</i>	0:*	<i>+InternationalTextType</i>	Fare zone long name
	<i>FarezoneShortName</i>	0:*	<i>+InternationalTextType</i>	Fare zone short name

Table 26 Description of FareZoneInformation

## 2.27 GlobalCardStatus

<b>GlobalCardStatus</b>			<i>+Structure</i>	<b>Global card status</b>
	<b>GlobalCardStatusID</b>	1:1	<i>IBIS-IP.unsignedInt</i>	ID of Card status based on the EN 1545
	<i>GlobalCardStatusText</i>	0:*	<i>IBIS-IP.string</i>	Text of global card status based on the EN 1545

Table 27 Description of GlobalCardStatus

## 2.28 GNSSPoint

<b>GNSSPoint</b>			<i>+Structure</i>	<b>Structure which describes a point where coordinates are used for locating the point</b>
	<i>PointRef</i>	0:1	<i>IBIS-IP.NMOKEN</i>	Reference at a GNSS point
	<b>Longitude</b>	1:1	<i>+GNSSCoordinate</i>	Structure for geographical longitude (cf. 2.29)
	<b>Latitude</b>	1:1	<i>+GNSSCoordinate</i>	Structure for geographical latitude (cf. 2.29)
	<i>Altitude</i>	0:1	<i>IBIS-IP.double</i>	Geographical Altitude

Table 28 Description of GNSSPoint

## 2.29 GNSSCoordinate

<b>GNSSCoordinate</b>			<i>+Structure</i>	<b>Structure for describing coordinates on the surface</b>
	<b>Degree</b>	1:1	<i>IBIS-IP.double</i>	Coordinate in degree
	<b>Direction</b>	1:1	<i>IBIS-IP.string</i>	geographical direction

Table 29 Description of GNSSCoordinate

## 2.30 JourneyStopInformation

<i>JourneyStopInformation</i>			+Structure	Structure to describe a stop point by the Journey Information Determination
	<b>StopRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Reference at the stop point
	<b>StopName</b>	1:*	+ <i>International TextType</i>	Name of stop point
	<i>StopAlternativeName</i>	0:*	+ <i>International TextType</i>	Alternative name of stop point
	<i>Platform</i>	0:1	<i>IBIS-IP.string</i>	Name of the platform
	<b>DisplayContent</b>	1:*	+ <i>DisplayContent</i>	Information about display content (cf. 2.19)
	<i>Announcement</i>	0:*	+ <i>Announcement</i>	Information for announcement (cf. 2.2)
	<i>ArrivalScheduled</i>	0:1	<i>IBIS-IP.dateTime</i>	Scheduled arrival
	<i>DepartureScheduled</i>	0:1	<i>IBIS-IP.dateTime</i>	Scheduled departure
	<i>Connection</i>	0:*	+ <i>Connection</i>	Information about the connections (cf. 2.8)
	<i>BayArea</i>	0:1	+ <i>BayArea</i>	Information about the size of the Bay Area (cf. 2.3)
	<i>GNSSPoint</i>	0:1	+ <i>GNSSPoint</i>	Information for the Geo-Coordinates of the stop point (cf. 2.28)
	<i>FareZone</i>	0:*	<i>IBIS-IP.NMTOKEN</i>	Valid fare zone at the current stop point

Table 30 Description of JourneyStopInformation

## 2.31 LineInformation

<i>LineInformation</i>			+Structure	Structure for description of the line information
	<b>LineRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Reference at the line
	<i>LineName</i>	0:*	+ <i>International TextType</i>	name of line
	<i>LineShortName</i>	0:*	+ <i>International TextType</i>	short name of line
	<i>LineNumber</i>	0:1	<i>IBIS-IP.int</i>	number of line

Table 31 Description of LineInformation

## 2.32 LogMessage

<i>LogMessage</i>			+Structure	Structure for logging message
	<b>MessageProvider</b>	1:1	+ <i>DeviceSpecification</i>	Message provider (cf. 2.15)
	<b>MessageBody</b>	1:1	+ <i>Message</i>	Message content (cf. 2.33)

Table 32 Description of LogMessage

## 2.33 Message

<i>Message</i>			<i>+Structure</i>	<b>Structure for describing a message</b>
	<i>Message-ID</i>	1:1	<i>IBIS-IP.int</i>	index of message
	<i>TimeStamp</i>	1:1	<i>IBIS-IP.dateTime</i>	time stamp, when the message was created
	<i>MessageType</i>	1:1	<i>MessageType Enumeration</i>	kind of message (cf. chapter 3.18)
	<i>MessageText</i>	1:1	<i>IBIS-IP.string</i>	Message text

Table 33 Description of Message

## 2.34 Point

<i>Point</i>			<i>+Structure</i>	<b>Structure with (logical) point description</b>
	<i>PointIndex</i>	1:1	<i>IBIS-IP.int</i>	Point index
	<i>PointType</i>	1:1	<i>+PointType</i>	Type of the point (cf. chapter 2.36)
	<i>DistanceToPreviousPoint</i>	1:1	<i>IBIS-IP.int</i>	Distance to the previous point in [m]

Table 34 Description of Point

## 2.35 PointSequence

<i>PointSequence</i>			<i>+Structure</i>	<b>Structure for describing a sequence of points</b>
	<i>Point</i>	2:*	<i>+Point</i>	Description of points (cf. 2.34)

Table 35 Description of PointSequence

## 2.36 PointType

<i>PointType</i>			<i>+Structure</i>	<b>Structure for choosing a specific point type</b>
			<i>choice</i>	One of the structures below
a	<i>StopPoint</i>	-1:1	<i>+JourneyStopInformation</i>	Stop point (cf. chapter 2.30)
b	<i>BeaconPoint</i>		<i>+BeaconPoint</i>	Beacon point (cf. chapter 2.4)
c	<i>GNSSLocationPoint</i>		<i>+GNSSPoint</i>	Point, location described in coordinates (cf. chapter 2.28)
d	<i>TimingPoint</i>		<i>+TimingPoint</i>	Point where a schedule comparison should take place (cf. chapter 2.56)
e	<i>TSPPoint</i>		<i>+TSPPoint</i>	Point for traffic light prioritisation (cf. chapter 2.59)

Table 36 Description of PointType

## 2.37 ServiceIdentification

The ServiceIdentification structure allows identifying a service in the system. Contrary to the ServiceSpecification (cf. 2.42) this structure is additionally including the information about the device where the service is running.

<b>ServiceIdentification</b>			+Structure	<b>Structure for the unique identification of a service in the system</b>
	<b>ServiceName</b>	1:1	+ServiceSpecification	Structure for the service description
	<b>Device</b>	1:1	+DeviceSpecification	Structure for device description

Table 37 Description of ServiceIdentification

## 2.38 ServiceIdentificationWithState

<b>ServiceIdentificationWithState</b>			+Structure	<b>Structure for unique identification of a service in the whole system including its state</b>
	<b>ServiceIdentification</b>	1:1	+ServiceIdentification	Structure for unique identification of a service in the whole system (cf. 2.37)
	<b>ServiceState</b>	1:1	ServiceStateEnumeration	Information about the state of the service

Table 38 Description of ServiceIdentificationWithState

## 2.39 ServiceIdentificationWithStateList

<b>ServiceIdentificationWithStateList</b>			+Structure	<b>Structure with a list of all unique services and their state in the system</b>
	<b>ServiceIdentificationWithState</b>	1:*	+ServiceIdentificationWithState	Structure for the unique identification of a service including its state (cf. 2.43)

Table 39 Description of ServiceIdentificationWithStateList

## 2.40 ServiceInformation

<b>ServiceInformation</b>			+Structure	<b>Structure for description of the services which are available on a device</b>
	<b>Service</b>	1:1	+ServiceSpecification	Structure for description of a service (cf. 2.42)
	<b>Autostart</b>	1:1	IBIS-IP.boolean	Information whether a service has to be started automatically by the DeviceManagement (and not by the SystemManagementService), especially relevant for the vehicle operation functionalities

Table 40 Description of ServiceInformation

## 2.41 ServiceInformationList

<b>ServiceInformationList</b>			+Structure	<b>Structure for describing a list of services which are available on a device</b>
	<b>ServiceInformation</b>	1:*	+ServiceInformation	Structure for describing available services (cf. 2.40)

Table 41 Description of ServiceInformationList

## 2.42 ServiceSpecification

Die ServiceSpecification beschreibt einen Dienst geräteweit eindeutig durch Angabe des ServiceNamens und der IBIS-IP-Version. Eine systemweit eindeutige Identifikation erfordert zusätzlich die Kenntnis des Gerätes, auf dem ein Dienst läuft. Die entsprechende Datenstruktur ist die ServiceIdentification (vgl. 2.37)

<b>ServiceSpecification</b>			+Structure	<b>Structure for the unique service identification on a device</b>
	<b>ServiceName</b>	1:1	<i>ServiceName Enumeration</i>	A possible service (cf. 0)
	<b>IBIS-IP-Version</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Version information of the used protocol (this is especially necessary for the SystemManagementService to know which service (version) has to be started)

Table 42 Description of ServiceSpecification

## 2.43 ServiceSpecificationWithState

<b>ServiceSpecificationWithState</b>			+Structure	<b>Structure for the unique identification of a service at the device including its status</b>
	<b>ServiceSpecification</b>	1:1	<i>+ServiceSpecification</i>	Structure which describes a service (cf. 2.42)
	<b>ServiceState</b>	1:1	<i>ServiceState Enumeration</i>	Information about the operation state of the service

Table 43 Description of ServiceSpecificationWithState

## 2.44 ServiceSpecificationWithStateList

<b>ServiceSpecificationWithStateList</b>			+Structure	<b>Structure with a list of the service specifications including the operation states</b>
	<b>ServiceSpecificationWithState</b>	1:*	<i>+ServiceSpecificationWithState</i>	Description structure of a service including the operation state (cf 2.43)

Table 44 Description of ServiceSpecificationWithStateList

## 2.45 ServiceStart

<b>ServiceStart</b>			+Structure	<b>Structure with services that are available at one device</b>
	<b>ServiceIdentification</b>	1:1	<i>+ServiceIdentification</i>	Structure with all available services (cf. 2.37)
	<b>Autostart</b>	1:1	<i>+IBIS-IP.boolean</i>	Autostart flag (true or false)

Table 45 Description of ServiceStart

## 2.46 ServiceStartList

<b>ServiceStartList</b>			+Structure	<b>Structure with services that are available at one device</b>
	<b>ServiceIdentification</b>	1:*	+ServiceIdentification	Structure with all available services (cf. 2.37)

Table 46 Description of ServiceStartList

## 2.47 ShortTripStop

<b>ShortTripStop</b>			+Structure	<b>Structure with a list of all possible short trips</b>
	<b>JourneyStopInformation</b>	1:1	+JourneyStopInformation	Structure which describes a journey stop (cf. 2.30)
	<b>FareZoneInformation</b>	1:1	+FareZoneInformation	Structure which describes a fare zone (cf. 2.52)

Table 47 Description of ShortTripStop

## 2.48 ShortTripStopList

<b>ShortTripStopList</b>			+Structure	<b>Structure with a list of all possible short trips</b>
	<b>ShortTripStopList</b>	1:*	+ShortTripStop	Structure which describes one short trip (cf. 2.47)

Table 48 Description of ShortTripStopList

## 2.49 SpecificPoint

<b>SpecificPoint</b>			+Structure	<b>Structure with a specific point</b>
	<b>PointRef</b>	1:1	IBIS-IP.NMTOKEN	Reference at a point
	<b>DistanceToPreviousPoint</b>	1:1	IBIS-IP.double	Distance to the previous point in [m]

Table 49 Description of SpecificPoint

## 2.50 StopInformation

<b>StopInformation</b>		<b>+Structure</b>	<b>Structure for description of a stop point</b>
<b>StopIndex</b>	1:1	<i>IBIS-IP.int</i>	Index of this stop point in a list of stop point
<b>StopRef</b>	1:1	<i>IBIS-IP.NMOKEN</i>	Reference at a stop point
<b>StopName</b>	1:*	<i>+International TextType</i>	name of stop point
<i>StopAlternativeName</i>	0:*	<i>+International TextType</i>	alternative name of stop point
<i>Platform</i>	0:1	<i>IBIS-IP.string</i>	Name of the platform
<b>DisplayContent</b>	1:*	<i>+DisplayContent</i>	Information about the display content (cf. chapter 2.19)
<i>StopAnnouncement</i>	0:*	<i>+Announcement</i>	Information about the announcement (cf. chapter 2.2)
<i>ArrivalScheduled</i>	0:1	<i>IBIS-IP.dateTime</i>	Scheduled arrival
<i>DepartureScheduled</i>	0:1	<i>IBIS-IP.dateTime</i>	Scheduled departure
<i>RecordedArrivalTime</i>	0:1	<i>IBIS-IP.dateTime</i>	Recorded arrival time
<i>DistanceToNextStop</i>	0:1	<i>IBIS-IP.int</i>	Distance to the next stop point
<i>Connection</i>	0:*	<i>+Connection</i>	Information about the connections (cf. chapter 2.8)
<i>FareZone</i>	0:*	<i>IBIS-IP.NMOKEN</i>	Valid fare zone at this stop point

Table 50 Description of StopInformation

## 2.51 StopInformationRequest

<b>StopInformationRequest</b>		<b>+Structure</b>	<b>Structure for description of a stop point</b>
<b>StopIndex</b>	0:1	<i>IBIS-IP.int</i>	Index of this stop point in a list of stop point
<b>StopRef</b>	0:1	<i>IBIS-IP.NMOKEN</i>	Reference at a stop point
<b>StopName</b>	0:1	<i>+International TextType</i>	name of stop point
<b>DisplayContent</b>	1:*	<i>+DisplayContent</i>	Information about the display content (cf. chapter 2.19)
<i>StopAnnouncement</i>	0:*	<i>+Announcement</i>	Information about the announcement (cf. chapter 2.2)
<i>ArrivalScheduled</i>	0:1	<i>IBIS-IP.dateTime</i>	Scheduled arrival
<i>DepartureScheduled</i>	0:1	<i>IBIS-IP.dateTime</i>	Scheduled departure
<i>RecordedArrivalTime</i>	0:1	<i>IBIS-IP.dateTime</i>	Recorded arrival time
<i>DistanceToNextStop</i>	0:1	<i>IBIS-IP.int</i>	Distance to the next stop point
<i>Connection</i>	0:*	<i>+Connection</i>	Information about the connections (cf. chapter 2.8)
<i>FareZone</i>	0:*	<i>IBIS-IP.NMOKEN</i>	Valid fare zone at this stop point

Table 51 Description of StopInformationRequest

## 2.52 StopPointTariffInformation

StopPointTariffInformationStructure			+Structure	Structure with tariff information for a stop point
Stop-Point-Tariff-Information	<b>JourneyStopInformation</b>	1:1	+Journey-StopInformationStructure	Information about the requested stop point (cf. 2.30)
	<b>FareZoneInformation</b>	1:1	+FareZone-Information-Structure	Information about the fare zone for this stop point (cf. 2.26 )

Table 52 Description of StopInformation

## 2.53 StopSequence

StopSequence			+Structure	Structure for describing a sequence of stop points
	<b>StopPoint</b>	2:*	+StopInformation	Stop point information (cf. 2.50)

Table 53 Description of StopSequence

## 2.54 SubscribeRequest

SubscribeRequest			+Structure	Structure with a subscription request
	<b>Client-IP-Address</b>	1:1	IBIS-IP.string	IP address of the client for which subscription
	<b>ReplyPort</b>	0:1	IBIS-IP.int	Reply port for the subscription
	<b>Reply-Path</b>	0:1	IBIS-IP.string	Reply path for the subscriptions

Table 54 Description of SubscribeRequest

## 2.55 SubscribeResponse

SubscribeResponse			+Structure	Structure for the subscription response
			Choice	One of the structures below
a	<b>Active</b>	-1:1	IBIS-IP.boolean	Information about the subscription acknowledgement
b	<b>OperationErrorMessage</b>		IBIS-IP.string	Error message

Table 55 Description of SubscribeResponse

## 2.56 TimingPoint

TimingPoint			+Structure	Structure for describing a point, where a schedule comparison should take place
	<b>TimingPointRef</b>	0:1	IBIS-IP.NMOKEN	Reference at a point
	<b>ScheduleTime</b>	1:1	IBIS-IP.dateTime	Scheduled departure time
	<b>GNSSPoint</b>	1:1	+GNSSPoint	GNSS information (cf. 2.28)

Table 56 Description of TimingPoint

## 2.57 TripInformation

<i>TripInformation</i>			+Structure	Structure with trip information
	<i>TripRef</i>	1:1	<i>IBIS-IP.NMOKEN</i>	Reference at the trip ID
	<i>StopSequence</i>	1:1	+ <i>StopSequence</i>	Description of a stop sequence (cf. 2.53)
	<i>LocationState</i>	0:1	<i>LocationState Enumeration</i>	Rough information for the current position between two stop point (cf. 3.17)
	<i>TimetableDelay</i>	0:1	<i>IBIS-IP.int</i>	Timetable delay in seconds. Early times are shown as negative values.
	<i>AdditionalTextMessage</i>	0:*	+ <i>International TextType</i>	Additional text information (possibly multilingual)
	<i>AdditionalAnnouncement</i>	0:*	+ <i>AdditionalAnnouncement</i>	Additional announcement (cf. 2.1)
	<i>RouteDirection</i>	0:1	+ <i>RouteDirectionEnumeration</i>	Information on the direction a route is served (cf. 3.20)

Table 57 Description of TripInformation

## 2.58 TripSequence

<i>TripSequence</i>			+Structure	Structure with a trip sequence
	<i>TripRef</i>	1:1	<i>IBIS-IP.NMOKEN</i>	Reference at the trip ID
	<i>TripIndex</i>	0:1	<i>IBIS-IP.int</i>	Index at the current trip
	<i>TripStart</i>	0:1	<i>IBIS-IP.time</i>	Scheduled trip start
	<i>CurrentStopIndex</i>	0:1	<i>IBIS-IP.int</i>	Information about the index of the current stop point
	<i>JourneyMode</i>	0:1	<i>JourneyMode Enumeration</i>	Information about the mode of the journey (cf. chapter 3.16)
	<i>PointSequence</i>	1:1	+ <i>PointSequence</i>	Description of a sequence of points (cf. chapter 2.35)

Table 58 Description of TripSequence

## 2.59 TSPPoint

<i>TSPPoint</i>			+Structure	Structure with description of a point for traffic light prioritisation
	<i>TSPPointRef</i>	0:1	<i>IBIS-IP.NMOKEN</i>	Reference at a TSP point
	<i>TSPCode</i>	1:1	<i>IBIS-IP.NMOKEN</i>	TSP content
	<i>ShortName</i>	0:*	+ <i>International TextType</i>	TSP short name
	<i>Description</i>	0:*	+ <i>International TextType</i>	TSP description

Table 59 Description of TSPPoint

## 2.60 UnsubscribeRequest

<i>UnsubscribeRequest</i>			+Structure	Structure for the request of termination of a subscription
	<b>Client-IP-Address</b>	1:1	<i>IBIS-IP.string</i>	Information about the IP address where the subscription has to be terminated
	<i>ReplyPort</i>	0:1	<i>IBIS-IP.int</i>	Information about the reply port where the subscription has to be terminated
	<i>Reply-Path</i>	0:1	<i>IBIS-IP.string</i>	Information about the reply path where the subscription has to be terminated

Table 60 Description of UnsubscribeRequest

## 2.61 UnsubscribeResponse

<i>UnsubscribeResponse</i>			+Structure	Structure for the response to a request of termination of a subscription
			<i>Choice</i>	One of the structures below
	a <b>Active</b>	-1:1	<i>IBIS-IP.boolean</i>	Information about the termination
	b <b>OperationErrorMessage</b>		<i>IBIS-IP.string</i>	Error message

Table 61 Description of UnsubscribeResponse

## 2.62 Vehicle

<i>Vehicle</i>			+Structure	Structure with information about the vehicle
	<b>VehicleTypeRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Reference at a vehicle type
	<i>Name</i>	0:*	<i>+InternationalTextType</i>	Vehicle name

Table 62 Description of Vehicle

## 2.63 ViaPoint

<i>ViaPoint</i>			+Structure	Structure which describes a via point
	<b>ViaPointRef</b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Reference at a via stop point
	<i>PlaceRef</i>	0:1	<i>IBIS-IP.NMTOKEN</i>	Reference at the associated stop place
	<i>PlaceName</i>	0:*	<i>+InternationalTextType</i>	name of the via point
	<i>PlaceShortName</i>	0:*	<i>+InternationalTextType</i>	short name of the via point
	<i>ViaPointDisplayPriority</i>	0:1	<i>IBIS-IP.int</i>	Information about the display priority of the via point

Table 63 Description of ViaPoint

## 2.64 ZoneType

<b>ZoneType</b>			<i>+Structure</i>	<b>Structure for description of a zone type</b>
	<b><i>FarezoneTypeID</i></b>	1:1	<i>IBIS-IP.NMTOKEN</i>	Index at the fare zone type
	<b><i>FarezoneTypeName</i></b>	0:*	<i>+InternationalTextType</i>	Fare zone type name

Table 64 Description of ZoneType

---

## 3 Common enumerations

The following chapter describes the enumerations used in IBIS-IP, which must be applied depending on the context in data exchange.

### 3.1 ConnectionStateEnumeration

Enumeration Name	Possible Values	Description
ConnectionStateEnumeration	ConnectionBroken ConnectionOK NoInformationAvailable	Information about the status of the connection

Table 65 Description of ConnectionStateEnumeration

### 3.2 ConnectionTypeEnumeration

Enumeration Name	Possible Values	Description
ConnectionTypeEnumeration	Interchange ProtectedConnection	Information about the type of the connection

Table 66 Description of ConnectionTypeEnumeration

### 3.3 DataIntervalEnumeration

Enumeration Name	Possible Values	Description
DataIntervalEnumeration	DistanceData GNSSData Heartbeat NetworkLocationData	Information about the type of cyclic data

Table 67 Description of DataIntervalEnumeration

### 3.4 DeviceClassEnumeration

Enumeration Name	Possible Values	Description
DeviceClassEnumeration	OnBoardUnit SideDisplay FrontDisplay InteriorDisplay Validator TicketVendingMachine AnnouncementSystem MMI VideoSystem APC MobileInterface Other TestDevice MultiFunctionalDisplay	Information about the device class according to VDV 301-2

Table 68 Description of DeviceClassEnumeration

### 3.5 DeviceStateEnumeration

Enumeration Name	Possible Values	Description
DeviceStateEnumeration	defective notavailable running readyForShutdown	Information about the device state

Table 69 Description of DeviceStateEnumeration

### 3.6 DeviceTaskEnumeration

Enumeration Name	Possible Values	Description
DeviceTaskEnumeration	restart start_standby stop_standby	Information about the device tasks according to VDV 301-2

Table 70 Description of DeviceTaskEnumeration

### 3.7 DoorCountingObjectClassEnumeration

Enumeration Name	Possible Values	Description
DoorCountingObjectClassEnumeration	Adult Bike Child Pram Wheelchair Unidentified Others	Information about the counted objects at the counting of passengers

Table 71 Description of DoorCountingObjectClassEnumeration

### 3.8 DoorCountingQualityEnumeration

Enumeration Name	Possible Values	Description
DoorCountingQualityEnumeration	Defect Other Regular Sabotage	Information about the counting quality

Table 72 Description of DoorCountingQualityEnumeration

### 3.9 DoorOpenStateEnumeration

Enumeration Name	Possible Values	Description
DoorOpenStateEnumeration	DoorsOpen AllDoorsClosed SingleDoorOpen SingleDoorClosed	Information about the opening state of a door

Table 73 Description of DoorOpenStateEnumeration

### 3.10 DoorOperationStateEnumeration

Enumeration Name	Possible Values	Description
DoorOperationStateEnumeration	Locked Normal EmergencyRelease	Information about the dorr operation state of a door

Table 74 Description of DoorOperationStateEnumeration

### 3.11 ErrorCodeEnumeration

Enumeration Name	Possible Values	Description
ErrorCodeEnumeration	DataEstimated FaultData NoScheduleDataAvailable DeviceMissing NoServiceResponse ImportantDataNotAvailable DataNotValid OperationNotSupported	Descriptive Information about the error reason

Table 75 Description of ErrorCodeEnumeration

### 3.12 ExitSideEnumeration

Enumeration Name	Possible Values	Description
ExitSideEnumeration	both left right unknown	Information about the exit side

Table 76 Description of ExitSideEnumeration

### 3.13 GNSSCoordinateSystemEnumeration

Enumeration Name	Possible Values	Description
GNSSCoordinateSystemsEnumeration	CH1903 ETSR89 IERS NAD27 NAD83 WGS84 WGS72 SGS85 P90	Information about the coordinate system used by the GNSS system

Table 77 Description of GNSSCoordinateSystemsEnumeration

### 3.14 GNSSQualityEnumeration

Enumeration Name	Possible Values	Description
GNSSQualityEnumeration	dGPS Estimated GPS NotValid Unknown	Information about the GNSS quality

Table 78 Description of GNSSQualityEnumeration

### 3.15 GNSSTypeEnumeration

Enumeration Name	Possible Values	Description
GNSSTypeEnumeration	GPS Glonass Galileo Beidou IRNSS Other DeadReckoning MixedGNSSTypes	Information about the GNSS type

Table 79 Description of GNSSTypeEnumeration

### 3.16 JourneyModeEnumeration

Enumeration Name	Possible Values	Description of
JourneyModeEnumeration	NoTrip AdditionalTrip ServiceTrip	Information about the journey mode

Table 80 Description of JourneyModeEnumeration

### 3.17 LocationStateEnumeration

Enumeration Name	Possible Values	Description
LocationStateEnumeration	AfterStop AtStop BetweenStop BeforeStop	Information about the location state relative to the subsequent stop point

Table 81 Description of LocationStateEnumeration

### 3.18 MessageTypeEnumeration

Enumeration Name	Possible Values	Description
MessageTypeEnumeration	Status Warning Error	Information about a message type

Table 82 Description of MessageTypeEnumeration

### 3.19 RouteDeviationEnumeration

Enumeration Name	Possible Values	Description
RouteDeviationEnumeration	onroute offroute unknown	Information about the route deviation

Table 83 Description of RouteDeviationEnumeration

### 3.20 RouteDirectionEnumeration

Enumeration Name	Possible Values	Description
RouteDirectionEnumeration	Forward Backward Clockwise Counterclockwise Other	Information on the general direction of a route

Table 84 Description of RouteDirectionEnumeration

### 3.21 ServiceNameEnumeration

Enumeration Name	Possible Values	Description
ServiceNameEnumeration	BeaconLocationService CustomerInformationService DeviceManagementService DistanceLocationService GNSSLocationService JourneyInformationService NetworkLocationService PassengerCountingService SystemDocumentationService SystemManagementService TicketingService TimeService TestService VideoLiveService VideoRecordingService VideoDisplayService DoorStateService TrainSetDataService TrainSetInformationService TrainSetManagementService TicketValidationService HTMLDisplayService	Information about the service names in VDV 301-2

Table 85 Description of ServiceNameEnumeration

Remark: In Version 1.0 of the ServiceNameEnumeration the PassengerCountingService is missing. If needed add this entry by yourself.

### 3.22 ServiceStateEnumeration

Enumeration Name	Possible Values	Description
ServiceStateEnumeration	defective notrunning running starting standby	Information about the service status

Table 86 Description of ServiceStateEnumeration

### 3.23 SystemDocumentationInformationEnumeration

Enumeration Name	Possible Values	Description
SystemDocumentationInformationEnumeration	ErrorMessage StatusMessage WarningMessage All	Information about the message type

Table 87 Description of SystemDocumentationInformationEnumeration

### 3.24 TicketRazziaInformationEnumeration

Enumeration Name	Possible Values	Description
TicketRazziaInformationEnumeration	razzia norazzia	Information whether a razzia takes place

Table 88 Description of TicketRazziaInformationEnumeration

### 3.25 TicketValidationEnumeration

Enumeration Name	Possible Values	Description
TicketValidationEnumeration	Valid notvalid NoCard	Validation result

Table 89 Description of TicketValidationEnumeration

### 3.26 VehicleModeEnumeration

Enumeration Name	Possible Values	Description
VehicleModeEnumeration	Air bus coach ferry metro rail tram underground	Vehicle mode information

Table 90 Description of VehicleModeEnumeration

---

## 4 Versionshistorie / Version History

### 4.1 Version 1.1

#### 4.1.1 Funktionale Erweiterungen Functional Upgrade

- Neue Enumeration *RouteDirectionEnumeration* ergänzt  
New enumeration *RouteDirectionEnumeration* added

#### 4.1.2 Technische Ergänzungen/Korrekturen Technical Upgrade/Corrections

- *Connection*-Struktur, neues Element *ScheduledDepartureTime* ergänzt, Min:Max-Angaben korrigiert  
*Connection* structure, new element *ScheduledDepartureTime* added, Min:Max information corrected
- *TripInformation*: Typ der *AdditionalTextMessage* von IBIS-IP.string auf +InternationalTextType geändert, neues Element *RouteDirection* ergänzt  
*TripInformation*: Type of *AdditionalTextMessage* of IBIS-IP.string changed to +InternationalTextType, new element *RouteDirection* added

#### 4.1.3 Textliche Korrekturen Textual Corrections

- *DeviceSpecification*: typo korrigiert  
*DeviceSpecification*: typo corrected

### 4.2 Version 2.0

#### 4.2.1 Funktionale Erweiterungen Functional Upgrade

- *ServiceNameEnumeration* aktualisiert, *PassengerCountingService*, *VideoLiveService*, *VideoRecordingService* and *VideoDisplayService* ergänzt (vgl. 3.21)  
*ServiceNameEnumeration* updated, *PassengerCountingService*, *VideoLiveService*, *VideoRecordingService* and *VideoDisplayService* added (cf. 3.21)

#### 4.2.2 Technische Ergänzungen/Korrekturen Technical Upgrade/Corrections

- Struktur *IBIS-IP-VersionEnumeration* wegen fehlenden Bedarfs entfernt  
Structure *IBIS-IP-VersionEnumeration* removed because there is no need for it
- *DeviceStateEnumeration*: Wert *readyForShutdown* hinzugefügt  
*DeviceStateEnumeration*: value *readyForShutdown* added
- In *ConnectionStructure: DisplayContentStructure*: *minOccurs* = "0" aktualisiert (vgl. 2.8)  
In *ConnectionStructure: DisplayContentStructure*: *minOccurs* = "0" updated (cf. 2.8)

- *TripInformation* structure: *AdditionalTextMessage*: maxOccurs="unbounded" aktualisiert (vgl. 2.57)  
*TripInformation* structure: *AdditionalTextMessage*: maxOccurs="unbounded" updated (cf. 2.57)

#### 4.2.3 Textliche Korrekturen Textual Corrections

- Beachte: Ein Schreibfehler in den XSD-Versionen 1.0 and 1.1 (*ExpectedDepatureTime* anstatt *ExpectedDepartureTime*) in der *Connection*-Struktur ist nun in "IBIS-IP\_common\_2.0.xsd" entfernt worden.  
Please note that a typo in the XSDs of version 1.0 and 1.1 (*ExpectedDepatureTime* instead of *ExpectedDepartureTime*) in the *Connection* structure is now removed in "IBIS-IP\_common\_2.0.xsd"
- Titel der Kapitel in Englisch  
Title of chapters in English

### 4.3 Version 2.1

#### 4.3.1 Funktionale Erweiterungen Functional Upgrade

- *DeviceClassEnumeration* aktualisiert, *MultiFunctionalDisplay* ergänzt (vgl. 3.4)  
*DeviceClassEnumeration* updated, *MultiFunctionalDisplay* added (cf. 3.4)
- *ErrorCodeEnumeration* aktualisiert, *OperationNotSupported* ergänzt (vgl. 3.11)  
*ErrorCodeEnumeration* updated, *OperationNotSupported* added (cf. 3.11)
- *ServiceNameEnumeration* aktualisiert, *DoorStateService*, *TrainSetDataService*, *TrainSetInformationService*, *TrainSetManagementService*, *TicketValidationService*, *HTMLDisplayService* ergänzt (vgl. 3.21)  
*ServiceNameEnumeration* updated, *DoorStateService*, *TrainSetDataService*, *TrainSetInformationService*, *TrainSetManagementService*, *TicketValidationService*, *HTMLDisplayService* added (cf. 3.21)

#### 4.3.2 Technische Ergänzungen/Korrekturen Technical Upgrade/Corrections

- *InternationalTextType* um die Definition von Inline-Formatierungen erweitert (vgl. 1.17)  
*InternationalTextType* with definitions for inline formatting elements extended (cf. 1.17)
- *DestinationStructure*: Mehrzeilige Texte definiert (vgl. 2.13)  
*DestinationStructure*: Multiline texts defined (cf. 2.13)
- *DisplayContent*: Versorgung unterschiedlicher Anzeiger mit verschiedenen Inhalten definiert (vgl. 2.19)  
*DisplayContent*: Supply of separate contents to different displays defined (cf. 2.19)

### 4.3.3 Textliche Korrekturen Textual Corrections

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## Regelwerke – Normen und Empfehlungen / References

- (1) CEN/TS 13149-7      Öffentlicher Verkehr - Planungs- und Steuerungssysteme für  
Straßenfahrzeuge - Teil 7: System- und Netzwerkarchitektur; Englische  
Fassung CEN/TS 13149-7:2015 /  
  
Public transport - Road vehicle scheduling and control systems - Part  
7: System and Network Architecture
  
- (2) CEN/TS 13149-8      Öffentlicher Verkehr - Planungs- und Steuerungssysteme für  
Straßenfahrzeuge - Teil 8: Physikalische Schicht für IP-Kommunikation;  
Englische Fassung CEN/TS 13149-8:2013 /  
  
Public transport - Road vehicle scheduling and control systems - Part  
8: Physical layer for IP communication
  
- (3) VDV 301-1            Internetprotokoll basiertes integriertes Bordinformationssystem IBIS-  
IP - Teil 1: Systemarchitektur /  
  
VDV 301-1: IBIS-IP, Part 1: System architecture
  
- (4) /VDV 301-2            Internetprotokoll basiertes integriertes Bordinformationssystem IBIS-  
IP - Teil 2: Schnittstellenspezifikation /  
  
VDV 301-2: IBIS-IP, Part 2: Interface Specification V1.0

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