Technolution

Open Data Protocol Definition Bridges, VRI and DRIPs

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CONTENTS

1. INTRODUCTION

1.1 Context

Traffic management systems gather and produce a large amount of data. This data includes information about bridges, parking lots, information panels etc.

The 'Open Data' project makes this data available to the public for common use.

The 'Standard for Publishing Dynamic Parking Data' protocol [TL_SPDP] specifies a way to publish parking data. This protocol has been used as a base to define equivalent data publication for Bridges, Displays and VRIs. Data is provided to the public via the so-called 'pull' protocol (see Figure 1). This mechanism is described in [TL_SPDP].
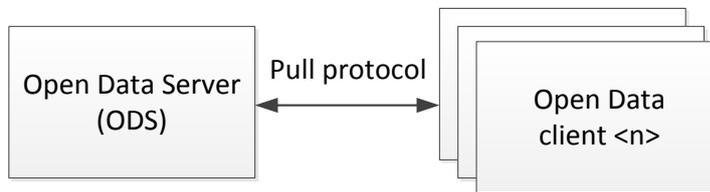Open Data

Figure 1: System overview

1.2 Purpose of this document

This document describes the Open Data protocol that is available to Open Data clients for obtaining dynamic data. Application developers can use this document as reference guide.

2. OPEN DATA PROTOCOL

Four object types are supported for the Open Data protocol:
- parking facilities;
- bridges;
- information displays;
- VRI's[1].

For each object type both static and dynamic data is available. Static information about an object is entered manually by an operator and imported into the Open Data Server. An example of this static data can be the location on the map for displaying an object or the operator who is responsible for an object. Dynamic data is updated automatically and represents the current status of an object. This could be for example whether a bridge is open or closed. Because of the difference in nature between these two types of data, they can be requested separately. When dynamic and static data refer to the same object, this is evident from the fact that they use the same UUID as identifier to refer to the object.

[TL_SPDP] describes the content of parking facility data. This document describes the contents of other object types. These descriptions are not based on a standard (since there is currently no standard for this type of data). For the definition of static and dynamic parking information, the reader is referred to [TL_SPDP]. This document will use similar structures to represent the other types of data.
All timestamp fields 'lastUpdated' represent seconds since Unix Epoch (according to [TL_SPDP]).

Objects are matched by a UUID, which is part of the requested URL (see chapter 3 for details). The UUID is also part of a generic wrapper structure that is applicable to all object types. Figure 2 shows this generic structure and its relation to the ActualStatus object for parking data (as defined in [TL_SPDP]).
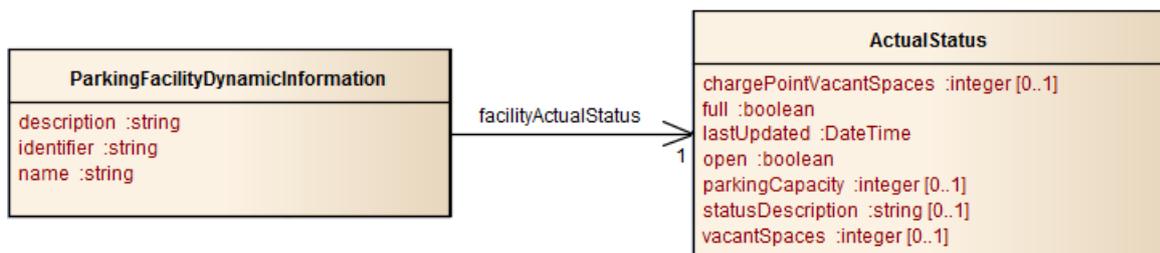
Figure 2: Wrapper class for status data

The meaning of the fields of the generic structure are described in the following table. This table is applicable to all object types described in the remainder of this chapter.

Field	Description
description	Description of the object
identifier	UUID of the object
name	Name of the object

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[1] VRI is an abbreviation of the Dutch word 'verkeersregelinstallatie'. This is a generic term that can be translated as 'traffic control installation'. In the Open Data interface a 'VRI' is equivalent to the subtype 'traffic light'.

2.1.1 Complex data types

This chapter contains a number of specific complex data types. They are explained in the following table:

Data type	Description
DateTime	A type containing a date and a time on that date.
Weekday	A day of the week. Names in the enumeration have been chosen in accordance with the standard the HTTP standard (see IETF RFC 0822, Standard for ARPA Internet Text Messages, paragraph 5.1).
Time	A type containing the hour, minutes and seconds (on any day).
TimeType	Type for indication of time granularity containing a string. Possible values are {"Seconds", "Minutes", "Hours", "Days", "Weeks"}.

2.2 Dynamic data

This section will describe the dynamic data in the Open Data Protocol.

2.2.1 Dynamic bridge data

Name of the wrapper structure: BridgeDynamicInformation

2.2.1.1 ActualStatus
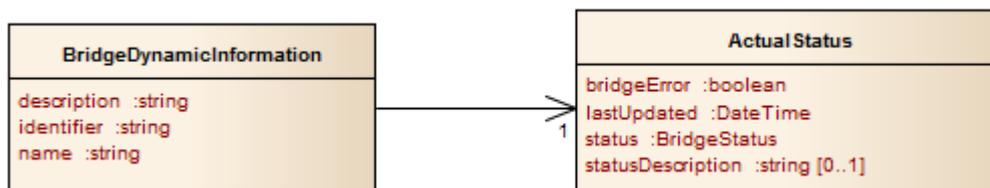
Field	Description
bridgeError	Indicates if the bridge is currently in error state (this state is independent of the operational status). This might be due to a broken peripheral (e.g. a warning light).
lastUpdated	Timestamp of last update.
status	Operational status of the bridge. See paragraph 2.2.1.2 for details.
statusDescription	Explanation for the current actual status.

2.2.1.2 <Enumeration> BridgeStatus
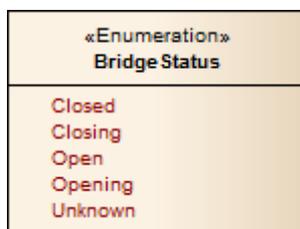
Field	Description
Closed	The bridge is closed. Road traffic can cross the bridge.
Closing	The bridge is moving from 'Open' to 'Closed' state.
Open	The bridge is fully opened. No road traffic can cross the bridge.
Opening	The bridge is moving from 'Closed' to 'Open' state.
Unknown	The bridge status is unknown (e.g.no communication).

2.2.2 Dynamic display data

2.2.2.1 ActualStatus

Field	Description
displayInfo	A string representing (optional) display information like current luminance, temperature and protocol version.
image	Array of bytes representing the current image in PNG format. This includes text and images (the full display content is represented as an image).
lastUpdated	Timestamp of last update.
status	Operational status of the display. See paragraph 2.2.2.2 for details.
statusDescription	Explanation for the current actual status.
text	The display content represented as a (readable) ASCII text string. Predefined icons are represented by a 'tag'[2]. Other images are not available as text.

2.2.2.2 <Enumeration> DisplayStatus
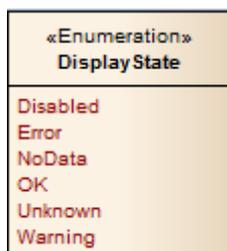
Field	Description
Disabled	The display is extinguished.
Error	The display has an error.
NoData	The display has no data to show.
OK	The display functions as intended.
Unknown	The display cannot be operated (e.g. no communication).
Warning	The display has a non-critical error (e.g. single led defect).

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[2] See Appendix A for details

2.2.3 Dynamic VRI data

2.2.3.1 ActualStatus

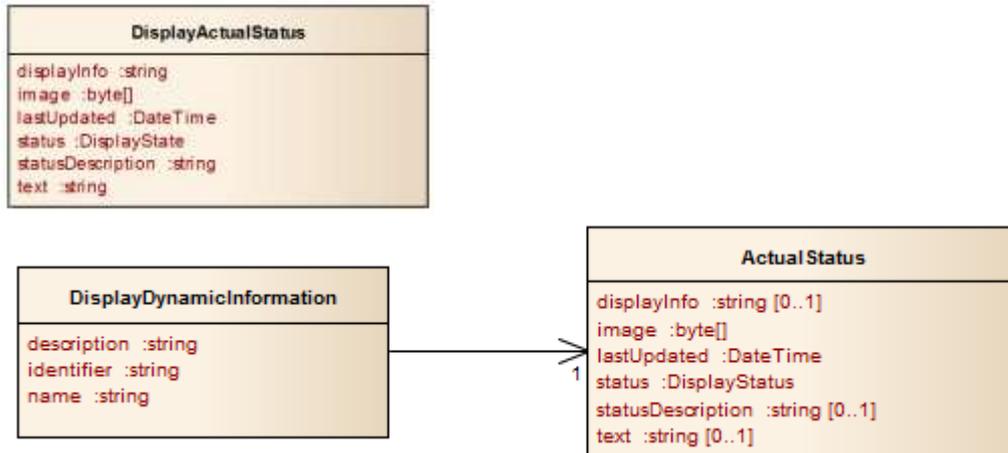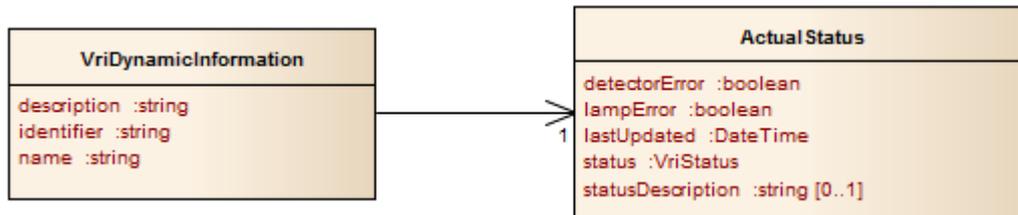| Field	Description
detectorError	Indicates if the VRI has 1 or more defect detectors.
lampError	Indicates if the VRI has 1 or more defect lamps.
lastUpdated	Timestamp of last update.
status	Operational status of the VRI. See paragraph 2.2.3.2 for details.
statusDescription	Explanation for the current actual status.

2.2.3.2 <Enumeration> VriStatus
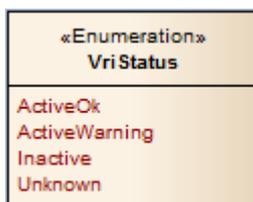
Field	Description
ActiveOk	The VRI is controlled autonomously without any problems.
ActiveWarning	The VRI is controlled autonomously, but has problems (e.g. a lamp or detector problem).
Inactive	The VRI is not being controlled (e.g. extinguished or blinking).
Unknown	The status of the VRI is unknown (e.g. no communication).

2.3 Static data

This section will describe the static data in the Open Data Protocol.

2.3.1 Static Bridge data
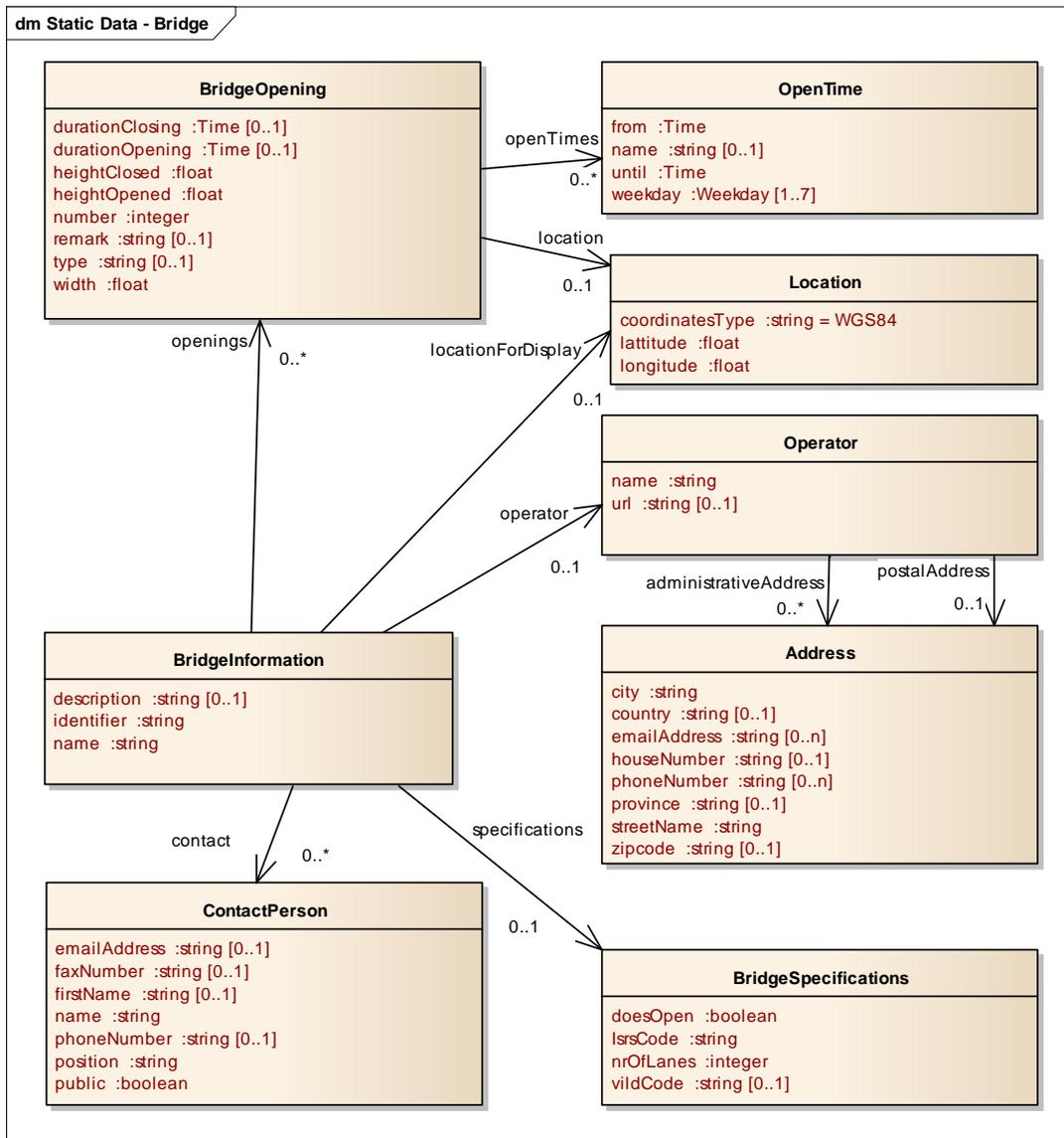
Figure 1 : The static data for Bridges structured in UML

2.3.1.1 BridgeInformation

Field	Description
description	Description of the bridge
identifier	UUID of the bridge
name	Name of the bridge
opening	List of parts of the bridge which can be opened
operator	Responsible operator of the bridge
specifications	Specific details about the bridge
locationForDisplay	The location of the bridge for displaying on the map
contact	List of contact persons for the bridge

Field	Field type	Minimum occurrences	Maximum occurrences
description	xs:string	0	1
identifier	xs:string	1	1
name	xs:string	1	1
opening	BridgeOpening	0	unbounded
operator	Operator	0	1
specifications	BridgeSpecifications	0	1
locationForDisplay	Location	0	1
contact	ContactPerson	0	unbounded

2.3.1.2 Address

Field	Description
city	City of address
country	Country of address
emailAddress	Email address of address
houseNumber	House number of address / for postal address also allowed: P.O.Box number
phoneNumber	Telephone number of address
province	Province of address
streetName	Street name of address / for postal address also allowed: P.O.Box
zipcode	Zip code of address

Field	Field type	Minimum occurrences	Maximum occurrences
city	xs:string	1	1
country	xs:string	0	1
emailAddress	xs:string	0	unbounded
houseNumber	xs:string	0	1
phoneNumber	xs:string	0	unbounded
province	xs:string	0	1
streetName	xs:string	1	1
zipcode	xs:string	0	1

2.3.1.3 BridgeOpening

Field	Description
durationClosing	Time required to transition from Open to Closed state
durationOpening	Time required to transition from Closed to Open state
heightClosed	Height in meters when closed measured from sealevel
heightOpened	Height in meters when opened measured from sealevel
number	Number of this part of the bridge which can be opened
openTimes	Possible opening times for this bridge
remark	Extra remarks (e.g. about train or road)
type	Mechanism type for opening this part of the bridge
width	Width in meters

Field	Field type	Minimum occurrences	Maximum occurrences
durationClosing	Time	0	1
durationOpening	Time	0	1
heightClosed	xs:float	1	1
heightOpened	xs:float	1	1
number	xs:integer	1	1
openTimes	OpenTime	0	unbounded
remark	xs:string	0	1
type	xs:string	0	1
width	xs:float	1	1

2.3.1.4 ContactPerson

Field	Description
emailAddress	E-mail address of the contact person
faxNumber	Fax number of the contact person
firstName	First name of the contact person
name	Name of the contact person
phoneNumber	Telephone number of the contact person
position	Function of the contact person
public	Indicates whether the contact details of the contact person can be made public or not

Field	Field type	Minimum occurrences	Maximum occurrences
emailAddress	xs:string	0	1
faxNumber	xs:string	0	1
firstName	xs:string	0	1
name	xs:string	1	1
phoneNumber	xs:string	0	1
position	xs:string	1	1
public	xs:boolean	1	1

2.3.1.5 Location

Field	Description
coordinatesType	Type of coordinate system, preferably WGS84
latitude	Latitude of coordinate in decimal degrees
longitude	Longitude of coordinate in decimal degrees

Field	Field type	Minimum occurrences	Maximum occurrences
coordinatesType	xs:string	0	1
latitude	xs:float	0	1
longitude	xs:float	0	1

2.3.1.6 OpenTime

Field	Description
endOfOpen	End time (of day) for possible opening of bridge
periodName	Optional name for this time period
remark	Remark possibly indicating special conditions for this enty time
startOfOpen	Start time (of day) for possible opening of bridge
weekday	List of weekdays for which this entry period is valid

Field	Field type	Minimum occurrences	Maximum occurrences
endOfOpen	Time	1	1
periodName	xs:string	0	1
remark	xs:string	0	1
startOfOpen	Time	1	1
weekday	Weekday	1	7

2.3.1.7 Operator

Field	Description
name	Name of the operator
administrativeAddress	List of administrative addresses of the operator
postalAddress	Postal address of the operator
url	Website address of the operator

Field	Field type	Minimum occurrences	Maximum occurrences
name	xs:string	1	1
administrativeAddress	Address	0	unbounded
postalAddress	Address	0	1
url	xs:string	0	1

2.3.1.8 BridgeSpecifications

Field	Description
doesOpen	Indicates whether the bridge can be opened
IsrsCode	ISRS identifier for this bridge
nrOfLanes	The total number of lanes of this bridge
vildCode	The VILD code of the road on which this bridge is located (if any)

Field	Field type	Minimum occurrences	Maximum occurrences
doesOpen	xs:boolean	1	1
IsrsCode	xs:string	1	1
nrOfLanes	xs:integer	1	1
vildCode	xs:string	0	1

2.3.2 Static Display data
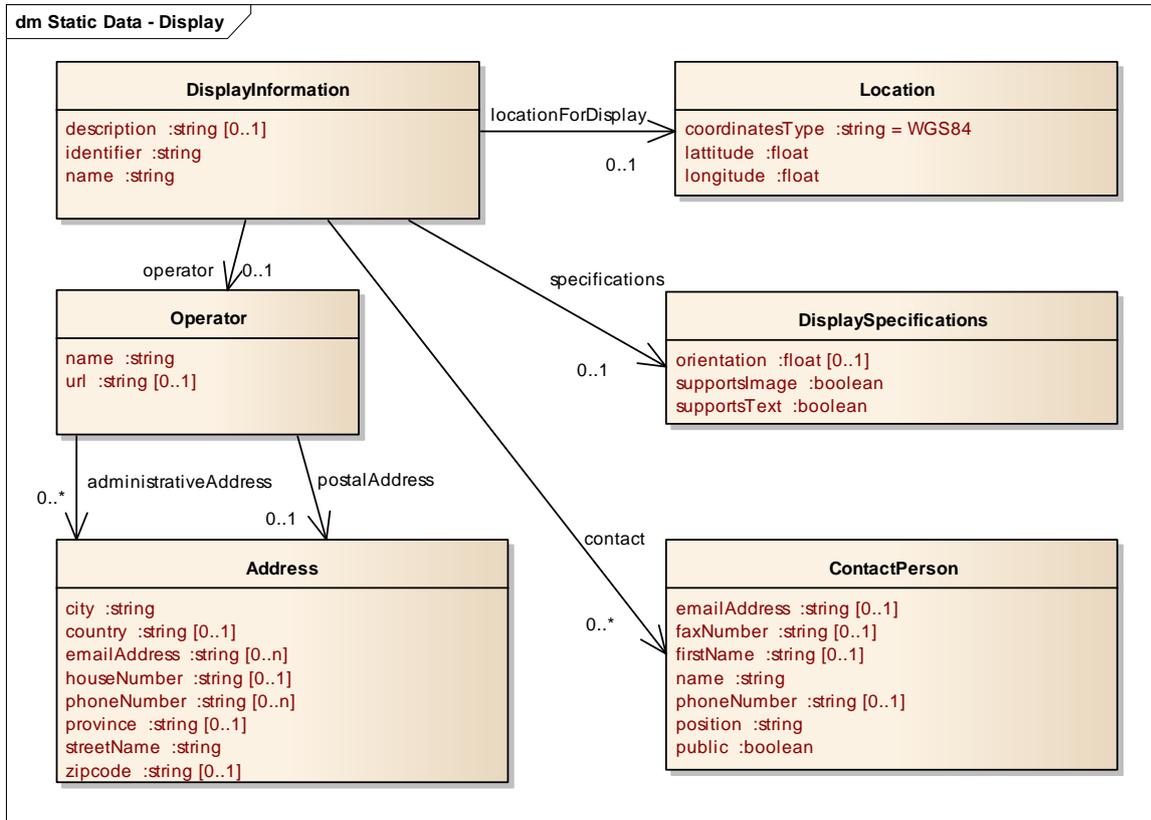
Figure 2 : The static data for Displays structured in UML

2.3.2.1 DisplayInformation

Field	Description
description	Description of the display
identifier	UUID of the display
name	Name of the display
specifications	Specific details about the display
locationForDisplay	The location of the display for displaying on the map
contact	List of contact persons for the display

Field	Field type	Minimum occurrences	Maximum occurrences
description	xs:string	0	1
identifier	xs:string	1	1
name	xs:string	1	1
specifications	DisplaySpecifications	0	1
locationForDisplay	Location	0	1
contact	ContactPerson	0	unbounded

2.3.2.2 Address

Field	Description
city	City of address
country	Country of address
emailAddress	Email address of address
houseNumber	House number of address / for postal address also allowed: P.O.Box number
phoneNumber	Telephone number of address
province	Province of address
streetName	Street name of address / for postal address also allowed: P.O.Box
zipcode	Zip code of address

Field	Field type	Minimum occurrences	Maximum occurrences
city	xs:string	1	1
country	xs:string	0	1
emailAddress	xs:string	0	unbounded
houseNumber	xs:string	0	1
phoneNumber	xs:string	0	unbounded
province	xs:string	0	1
streetName	xs:string	1	1
zipcode	xs:string	0	1

2.3.2.3 ContactPerson

Field	Description
emailAddress	E-mail address of the contact person
faxNumber	Fax number of the contact person
firstName	First name of the contact person
name	Name of the contact person
phoneNumber	Telephone number of the contact person
position	Function of the contact person
public	Indicates whether the contact details of the contact person can be made public or not

Field	Field type	Minimum occurrences	Maximum occurrences
emailAddress	xs:string	0	1
faxNumber	xs:string	0	1
firstName	xs:string	0	1
name	xs:string	1	1
phoneNumber	xs:string	0	1
position	xs:string	1	1
public	xs:boolean	1	1

2.3.2.4 Location

Field	Description
coordinatesType	Type of coordinate system, preferably WGS84
Latitude	Latitude of coordinate in decimal degrees
Longitude	Longitude of coordinate in decimal degrees

Field	Field type	Minimum occurrences	Maximum occurrences
coordinatesType	xs:string	0	1
Latitude	xs:float	0	1
Longitude	xs:float	0	1

2.3.2.5 Operator

Field	Description
name	Name of the operator
administrativeAddress	List of administrative addresses of the operator
postalAddress	Postal address of the operator
url	Website address of the operator

Field	Field type	Minimum occurrences	Maximum occurrences
name	xs:string	1	1
administrativeAddress	Address	0	unbounded
postalAddress	Address	0	1
url	xs:string	0	1

2.3.2.6 DisplaySpecifications

Field	Description
orientation	Direction of orientation in degrees to magnetic north
supportsImage	Whether the display supports images
supportsText	Whether the display supports text

Field	Field type	Minimum occurrences	Maximum occurrences
orientation	xs:float	0	1
supportsImage	xs:boolean	1	1
supportsText	xs:boolean	1	1

2.3.3 Static VRI data
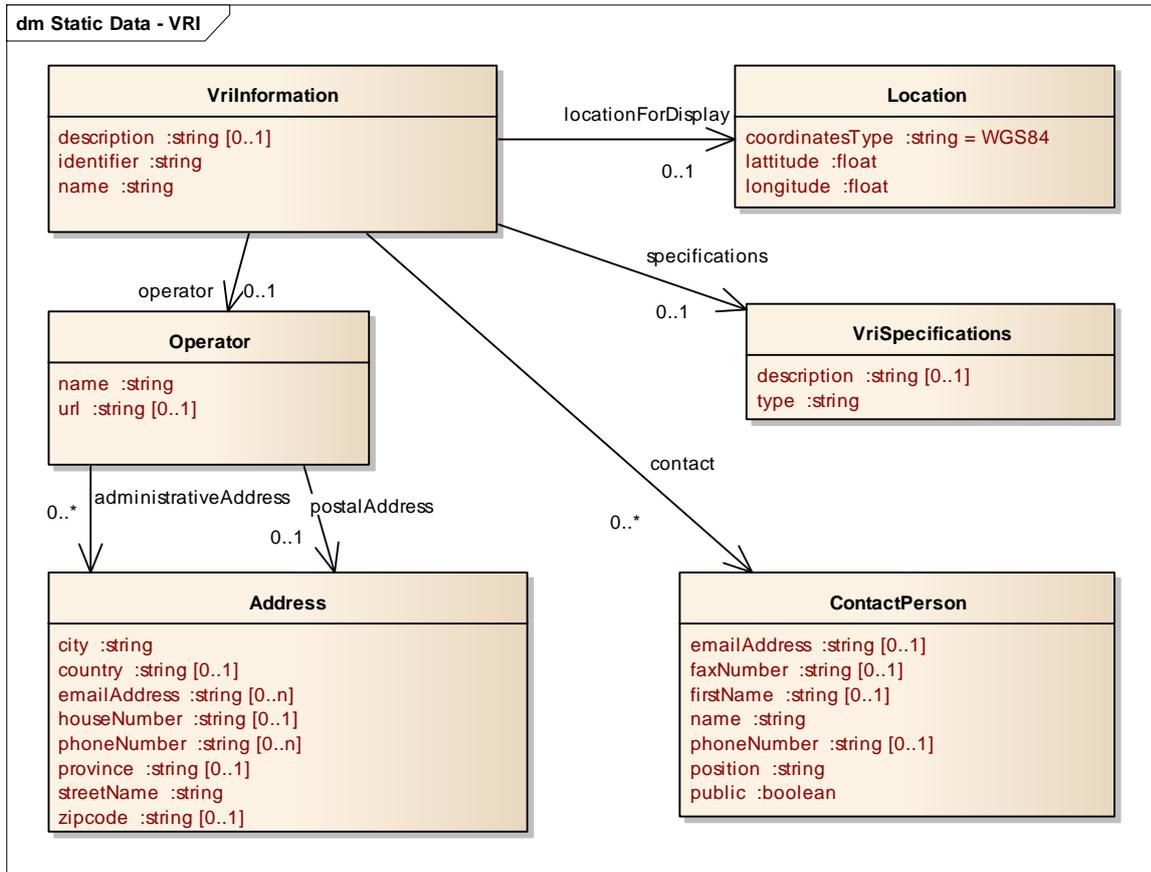
Figure 3 : The static data for VRIs structured in UML

2.3.3.1 VriInformation

Field	Description
description	Description of the VRI
identifier	UUID of the VRI
name	Name of the VRI
specifications	Specific details about the VRI
locationForDisplay	The location of the VRI for displaying on the map
contact	List of contact persons for the VRI

Field	Field type	Minimum occurrences	Maximum occurrences
description	xs:string	0	1
identifier	xs:string	1	1
name	xs:string	1	1
specifications	VriSpecifications	0	1
locationForDisplay	Location	0	1
contact	ContactPerson	0	unbounded

2.3.3.2 Address

Field	Description
city	City of address
country	Country of address
emailAddress	Email address of address
houseNumber	House number of address / for postal address also allowed: P.O.Box number
phoneNumber	Telephone number of address
province	Province of address
streetName	Street name of address / for postal address also allowed: P.O.Box
zipcode	Zip code of address

Field	Field type	Minimum occurrences	Maximum occurrences
city	xs:string	1	1
country	xs:string	0	1
emailAddress	xs:string	0	unbounded
houseNumber	xs:string	0	1
phoneNumber	xs:string	0	unbounded
province	xs:string	0	1
streetName	xs:string	1	1
zipcode	xs:string	0	1

2.3.3.3 ContactPerson

Field	Description
emailAddress	E-mail address of the contact person
faxNumber	Fax number of the contact person
firstName	First name of the contact person
name	Name of the contact person
phoneNumber	Telephone number of the contact person
position	Function of the contact person
public	Indicates whether the contact details of the contact person can be made public or not

Field	Field type	Minimum occurrences	Maximum occurrences
emailAddress	xs:string	0	1
faxNumber	xs:string	0	1
firstName	xs:string	0	1
name	xs:string	1	1
phoneNumber	xs:string	0	1
position	xs:string	1	1
public	xs:boolean	1	1

2.3.3.4 Location

Field	Description
coordinatesType	Type of coordinate system, preferably WGS84
Latitude	Latitude of coordinate in decimal degrees
Longitude	Longitude of coordinate in decimal degrees

Field	Field type	Minimum occurrences	Maximum occurrences
coordinatesType	xs:string	0	1
Latitude	xs:float	0	1
Longitude	xs:float	0	1

2.3.3.5 Operator

Field	Description
name	Name of the operator
administrativeAddress	List of administrative addresses of the operator
postalAddress	Postal address of the operator
url	Website address of the operator

Field	Field type	Minimum occurrences	Maximum occurrences
name	xs:string	1	1
administrativeAddress	Address	0	unbounded
postalAddress	Address	0	1
url	xs:string	0	1

2.3.3.6 VriSpecifications

Field	Description
type	The type of crossing
description	Description of the crossing

Field	Field type	Minimum occurrences	Maximum occurrences
type	xs:string	1	1
description	xs:string	0	1

2.4 Index data

When requesting a list of known Bridges, Displays or VRIs, the returned data will be a list of index entries. This section will describe the structure of these index entries.
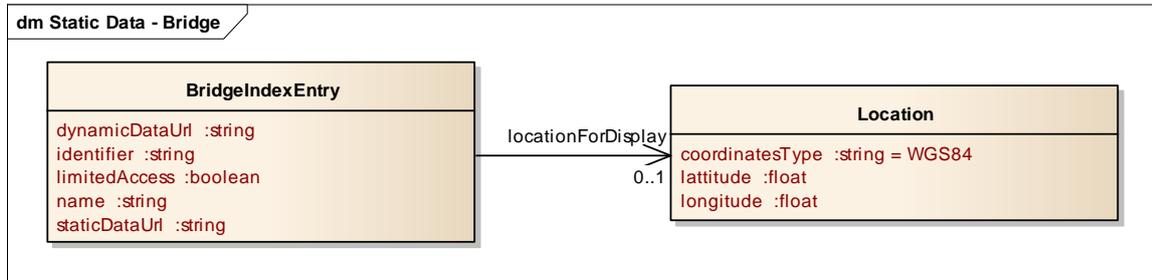
2.4.1 BridgeIndexEntry

Figure 4 : The index data for Bridges structured in UML

Field	Description
dynamicDataUrl	URL that must be used to retrieve the dynamic data of the bridge
identifier	UUID of the bridge
limitedAccess	Indicates whether authentication is necessary to request data for this bridge
name	Name of the bridge
staticDataUrl	URL that must be used to retrieve the static data of the bridge
locationForDisplay	Location of the bridge for displaying on maps (preferred in WGS84)

Field	Field type	Minimum occurrences	Maximum occurrences
dynamicDataUrl	xs:string	1	1
identifier	xs:string	1	1
limitedAccess	xs:boolean	1	1
name	xs:string	1	1
staticDataUrl	xs:string	1	1
locationForDisplay	Location	0	1

2.4.2 DisplayIndexEntry
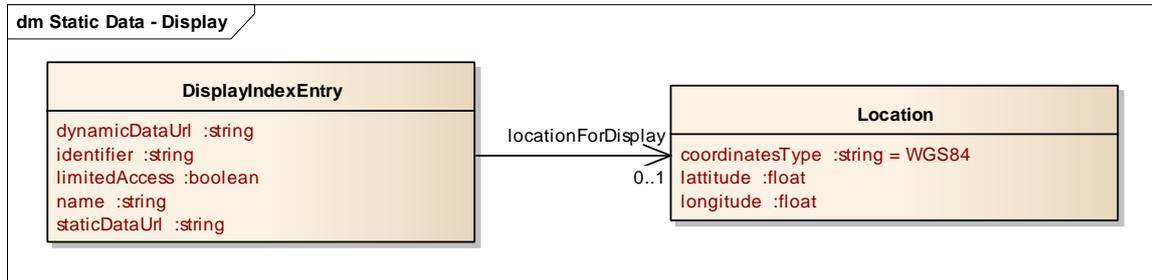
Figure 5 : The index data for Displays structured in UML

Field	Description
dynamicDataUrl	URL that must be used to retrieve the dynamic data of the display
identifier	UUID of the display
limitedAccess	Indicates whether authentication is necessary to request data for this display
name	Name of the display
staticDataUrl	URL that must be used to retrieve the static data of the display
locationForDisplay	Location of the display for displaying on maps (preferred in WGS84)

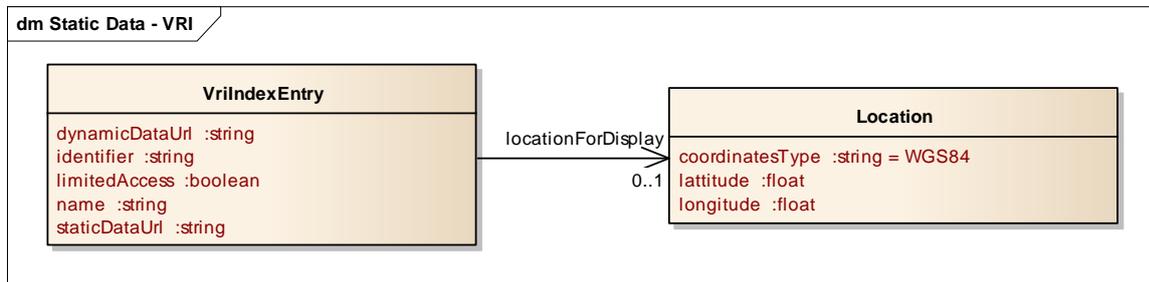| Field	Field type	Minimum occurrences	Maximum occurrences
dynamicDataUrl	xs:string	1	1
identifier	xs:string	1	1
limitedAccess	xs:boolean	1	1
name	xs:string	1	1
staticDataUrl	xs:string	1	1
locationForDisplay	Location	0	1

2.4.3 VriIndexEntry

Figure 6 : The index data for VRIs structured in UML

Field	Description
dynamicDataUrl	URL that must be used to retrieve the dynamic data of the VRI
identifier	UUID of the VRI
limitedAccess	Indicates whether authentication is necessary to request data for this VRI
name	Name of the VRI
staticDataUrl	URL that must be used to retrieve the static data of the VRI
locationForDisplay	Location of the VRI for displaying on maps (preferred in WGS84)

Field	Field type	Minimum occurrences	Maximum occurrences
dynamicDataUrl	xs:string	1	1
identifier	xs:string	1	1
limitedAccess	xs:boolean	1	1
name	xs:string	1	1
staticDataUrl	xs:string	1	1
locationForDisplay	Location	0	1

3. REST INTERFACE

Clients obtain data by requesting a URL. In [TL_SPDP] for parking data, there are three request types defined: A list of objects, static data for a specific object or dynamic data for a specific object. Similarly for Bridges, Displays and VRIs it is possible to request a list of known objects of a specific type (all Bridges, all Displays or all VRIs). For requesting a list of objects, the URL is built up as:

```
http://<server_IP>/<objectType>/<version>/
```
- `<server_IP>`: the IP address of the server;
- `<objectType>`: one of the following types:
  - o `parkingdata;`
  - o `bridgedata;`
  - o `displaydata;`
  - o `vridata.`
- `<version>`: protocol version (for the current interface '`v1`');

For version 1 the following URLs are used to get a list of available objects:
- `http://<server_IP>/parkingdata/v1/`
- `http://<server_IP>/bridgedata/v1/`
- `http://<server_IP>/displaydata/v1/`
- `http://<server_IP>/vridata/v1/`

When the UUID of an object is known, it can be requested directly. The URL to use will depend on the type of object (Parking, Bridge, Display, VRI) and whether the static or dynamic date is requested. This URL is built up as follows:

```
http://<server_IP>/<objectType>/<version>/<static|dynamic>/<UUID>
```

- `<server_IP>`: the IP address of the server;
- `<objectType>`: one of the following types:
  - o `parkingdata;`
  - o `bridgedata;`
  - o `displaydata;`
  - o `vridata.`
- `<version>`: protocol version (for the current interface '`v1`');
- `<static|dynamic>`: indicates whether 'static' or 'dynamic' data is involved. Only dynamic data is supported;
- `<UUID>`: globally unique identifier.

In addition to the requests for retrieving a list of objects, static data for a specific object or dynamic data for a specific object, we will also define a way to formulate a query for objects for which the properties meet specific requirements (see section 3.1.4). When querying for objects, the URL is built up as:

```
http://<server_IP>/query/<version>/?<parameters>
```
- `<server_IP>`: the IP address of the server;
- `<version>`: protocol version (for the current interface '`v1`');
- `<parameters>`: a list of key-value pairs separated by '&' characters (e.g. `name=Kralingse%20plas-5`), where spaces and other unsafe characters are replaced by `%20` per [RFC 1738]. The possible keys are:

        o `objectType`: The type of an object should be this ("parkingdata", "bridgedata", "displaydata" or "vridata").

        o `name`: The name of an object should be this.

        o `minLatitude`: The latitude of the location of the object should be at least this.

        o `maxLatitude`: The latitude of the location of the object should be at most this.

        o `minLongitude`: The longitude of the location of the object should be at least this.

        o `maxLongitude`: The longitude of the location of the object should be at most this.

When no parameters are provided, the query will default in returning a list of all objects of all types. For version 1 the following URL would be used to get a list of all available objects: `http://<server_IP>/query/v1/`

3.1   Client pull response

When requesting a list of objects, the responses for the different types are described in the following subsections.

3.1.1 Client pull responses for lists of objects

3.1.1.1 Message content

The content of the response message for a list of Bridge objects is structured like:

Field	Type
bridges	BridgeIndexEntry

The content of the response message for a list of Display objects is structured like:

Field	Type
displays	DisplayIndexEntry

The content of the response message for a list of Bridge objects is structured like:

Field	Type
vris	VriIndexEntry

3.1.1.2 JSON example of response for list of Bridges

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
    bridges: [
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
```

```
                "longitude": 4.98765
            },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        },
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        }
    ]
}
```

3.1.1.3 JSON example of response for list of Displays

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
    displays: [
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        },
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        }
    ]
}
```

3.1.1.4 JSON example of response for list of VRIs

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
    vris: [
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        },
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        }
    ]
}
```

When requesting a single object directly, the response contain more details for the specified object. Since the UUID is globally unique, it corresponds to exactly one item if it exists. When requesting the dynamic information, the actual status for parking information is described in [TL_SPDP]. , The responses for the other types are described in the following subsections.

3.1.2 Client pull responses for dynamic data

3.1.2.1 JSON example of response for dynamic Bridge data

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
  "bridgeDynamicInformation": {
    "facilityActualStatus": {
      "status": "Closing",
      "bridgeError": false,
      "lastUpdated": 1402560876,
      "statusDescription": "Gaat dicht"
    },
```

```
    "description": "r_bfull",
    "identifier": "b_full",
    "name": "B Rivier"
  }
}
```

3.1.2.2 JSON example of response for dynamic Display data

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
  "displayDynamicInformation": {
    "facilityActualStatus": {
      "displayInfo": "v1",
      "image": "z4Ag4oiIIOKEnQ==",
      "lastUpdated": 1402560876,
      "status": "OK",
      "statusDescription": "OK"
      "text": "π ∈ ℝ",
    },
    "description": "",
    "identifier": "3002AR_a1124e02-7524-4270-b121-a6310956a384",
    "name": "Display-5"
  }
}
```

3.1.2.3 JSON example of response for dynamic VRI data

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
  "vriDynamicInformation": {
    "facilityActualStatus": {
      "detectorError": false,
      "lampError": false,
      "lastUpdated": 1402560876,
      "status": "ActiveOk",
      "statusDescription": "OK"
    },
    "description": "Vri description",
    "identifier": "Vri-uuid-098876",
    "name": "Vri-name"
  }
}
```

An error code is returned if the requested UUID cannot be found (see 3.3).

3.1.3 Client pull responses for static data

Similarly for static data, the responses for the different object types are described in the subsequent sections.

3.1.3.1 JSON example of response for static Bridge data

```
HTTP/1.1 200 OK
```

```
Content-Type: application/json
Content-Length: ...
{
"bridgedata":
    {
      "location": {
        "coordinatesType": "WGS84",
        "latitude": 51.912211,
        "longitude": 4.430988
      },
      "description": "",
      "identifier": "3002AR_5d7dd779-f64a-4a46-903f-6563b04c355a",
      "name": "123456"
    }
}
```

3.1.3.2 JSON example of response for static Display data

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
"displaydata":
    {
      "location": {
        "coordinatesType": "WGS84",
        "latitude": 51.936,
        "longitude": 4.515
      },
      "description": "",
      "identifier": "3002AR_a1124e02-7524-4270-b121-a6310956a384",
      "name": "Kralingse plas-5"
    }
}
```

3.1.3.3 JSON example of response for static VRI data

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
  "vridata":
    {
      "location": {
        "coordinatesType": "WGS84",
        "latitude": 51.84,
        "longitude": 4.372
      },
      "description": "",
      "identifier": "3002AR_61811515-4b69-4347-888e-af9a4fe4be4e",
      "name": "00001"
    }
}
```

An error code is returned if the requested UUID cannot be found (see 3.3).

3.1.4 Client query interface

Instead of requesting a list of all available objects of a specific type, we will also allow querying for objects with specific properties. As described at the start of this chapter, an empty query (e.g. `http://<server_IP>/query/v1/`) will result in a list of all available objects.

3.1.4.1 JSON example of response for query

```
HTTP/1.1 200 OK
Content-Type: application/json
Content-Length: ...
{
    "query": [
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        },
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        },
        {
            "name": "...",
            "identifier": "...",
            "limitedAccess": true
            "locationForDisplay":
                {
                    "coordinatesType": "WGS84"
                    "latitude": 52.326701
                    "longitude": 4.98765
                },
            "staticDataUrl": "http://...",
            "dynamicDataUrl": "http://..."
        },
    ]
}
```

An error code is returned if the query is malformed (see 3.3).

3.2   Authentication

No authentication is required for the Open Data interface towards clients.

3.3   Server status response codes

According to [TL_SPDP], the server can respond with one of the following HTTP response codes:

- status code 200 ('Ok') if the request was accepted by the server;
- status code 400 ('Bad request') if the request is incorrect according to the server;
- status code 404 ('Not found') if the server has no data for this object.

4. GLOSSARY

Abbreviation	Explanation
HTTP	Hypertext Transfer Protocol
JSON	JavaScript Object Notation
URL	Uniform Resource Locator
UUID	Universally Unique Identifier

5.   DOCUMENT REFERENCES

Reference	Document
[TL_SPDP]	Standaard voor Publicatie Dynamische Parkeerdata, Standard for Publishing Dynamic Parking Data, Werkgroep SPDP, version 1.0, 09-02-2014

APPENDIX A. ICON TAGS FOR DISPLAYS

Some displays support the ability to show text lines combined with icons. These icons are part of a fixed set. To show an icon, a tag is inserted in the text line.

A tag has the following format: `${tag}` (e.g. `${tram}`)

Table 1 shows the mapping between available tags and the corresponding icon.

tag	icon	tag	icon	tag	icon	tag	icon
A13		file		pijlkr		t8	
A15		gstoffen		pijlll		t9	
A16		h		pijllr		ta	
A20		info		pijln		tafrit	
A29		keerom		pijlnr		te	
A38		klok		pijlnl		tn	
A4		knooppunt		pijlop		tram	
aanhanger		min		pijlopn		trein	
afrit		N209		plus		ts	
auto		N210		pr		tu	
autosnelweg		N213		proute		tunnel	
autoz		N218		ringA4		verkeerslichten	
bedrijf		N219		ringA15		vliegh	
brug		N220		ringA16		vliegl	
bus		N468		ringA20		vliegr	
centrum		N470		sleep		voetbal	
chl		N492		spatie		vol	
chr		ns		t0		vrachtwagen	
cl		ongeval		t1		vrij	
cop		p		t2		wiu	
cr		pech		t3		zoo	
E19		pijlhl		t4		!	
E25		pijlhlr		t5			
E30		pijlhr		t6			
euro		pijlkl		t7			

Table 1: Icon overview

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