RFP 25 Vehicle Interface

Confidential, Draft

24 Pages

Abstract

In a vehicle, several devices own status information, which is of common interest. Status changes have to be observed by clients without the knowledge of details about the status owner or any other services that care about obtaining the status from the different devices. In other cases, a client needs to change the status of a vehicle object. Security aspect have to be considered since a status may have a safety critical character.

The topology of a vehicle is not known at the design time of a status client. Further a client needs to obtain properties of a status and also it's owner.

0 Document Information

0.1 Table of Contents

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0.2 Status

This document suggests an API for vehicle status access for the Open Services Gateway Initiative, and requests discussion. Distribution of this document is unlimited within OSGi.

0.3 Acknowledgement

0.4 Terminology and Document Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY" and "OPTIONAL" in this document are to be interpreted as described in [1].

`Source code is shown in this typeface.`

0.5 Revision History

The last named individual in this history is currently responsible for this document.

Revision	Date	Comments
Initial	Sep 03 2001	Christof Menzenbach, Siemens VDO christof.menzenbach@de3.vdogrp.de

1 Introduction

A vehicle has a lot of components which own status information. Those statuses are typically accessible via in vehicle networks like CAN or MOST. Examples for a status are "Seat position" or "external Lights". Status information has to be obtained or controlled by clients. The client of a status is not interested in the services that provide a status, but has usually a high interest in the object that owns a status. The owner of a status is typically a "real-world" in vehicle object and can not be mapped to bundles or services. Properties of a status owner are e.g. "position in Vehicle".

2 Motivation and Rationale

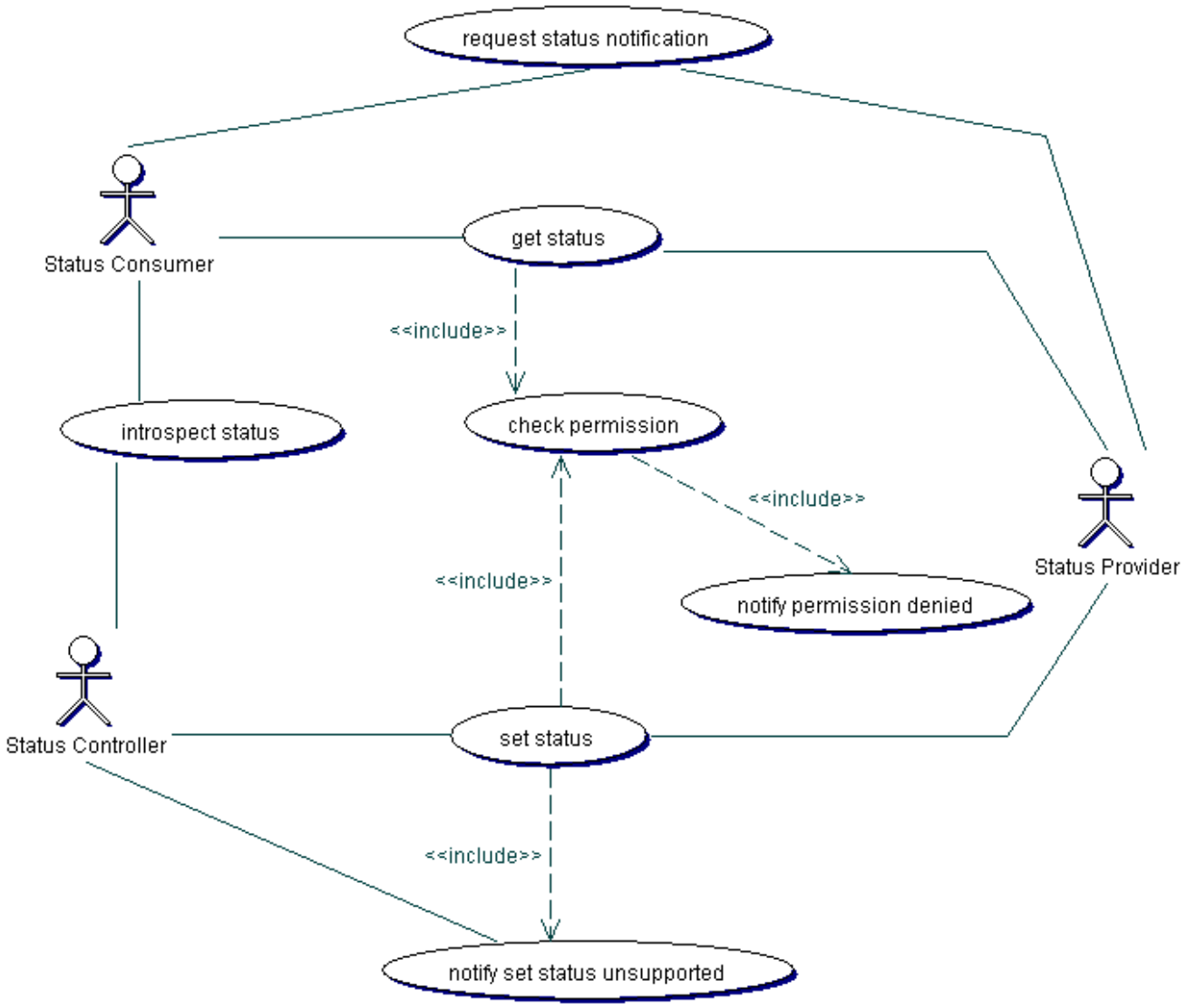
Real world components of a vehicle are very likely vendor specific. Therefore it is very difficult to model those components and their status information as they appear for a specific vehicle. Also the vehicle configuration differs extremely between vehicles of different types and vendors. Anyhow it is required to get access to vehicle objects in order to build value adding services on top.

Nevertheless it is possible to agree on a set of status objects which can be shared upon several vehicles and vehicle vendors. A client should have capabilities to obtain instances of components that will own a status of a defined type. Further it is required that the client of a status is able to identify the position of a status owning component.

During a discussion in the VEG meeting (29/30 Aug. 2000) it became clear that the requirement are not limited to the vehicle domain.

2.1 Use Case view

The following diagram shows the use cases identified.



2.1.1 Actors

2.1.1.1 Status Provider

A proxy for one or many objects that have status information of common interest. The owner of this role has the responsibilities to notify the status of common interest and to perform change requests for a status that is known.

This role is supported by a bundle that uses any means to obtain and set a status, to and from an object outside its boundaries.

The status provider is anonymous in the view of a status controller or a status consumer.

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2.1.1.2 Status Consumer

A status consumer has interest in a status of a specific status owner outside its boundaries.

2.1.1.3 Status Controller

A status controller has interest in modifying the status of a specific status owner outside its boundaries.

This role is supported by a bundle that has the responsibilities to change a status of an object that is outside of its own boundaries. A status is identified by a type. The associating objects are identified as instances.

2.1.2 Use Cases

2.1.2.1 Introspect Status

Following properties can be introspected:

- Availability of status instances with a given type. An instance of a status belongs to a real-world component inside the vehicle. This component is called status owner.
- Control supported. Is a status controllable or is it just read only.
- Position of the owner. The position of the status owner within the vehicle.
- Textural description of status and owner.
- Upper/lower limit of status.
- Description of states.

2.1.2.2 Get Status

Get a status. The status has a known type and belongs to a status owner.

2.1.2.3 Set Status

Set a status. The status has a known type and belongs to a status owner.

2.1.2.4 Check Permission

Check whether a Status Consumer or a Status Controller has permission to access the status. Reject an attempt to set or get a status without a permission.

2.1.2.5 Notify Permission denied

Not all clients have permission to set or get a status. Notify the attempt to set or get a status without permission.

2.1.2.6 Notify set Status unsupported

Not all status is controllable. An attempt to set the status when this is not supported will be notified.

3 Technical Discussion

This chapter describes how the requirements for vehicle status and control are covered by existing APIs and what remains to the vehicle API. Further a list of identified statuses is given here.

3.1.1 Use Case realisation

3.1.1.1 Introspect Status

The vehicle API shall offer a service to obtain the availability of status information. This is strongly related to a vehicle configuration. A client knows about a status type and has no further information about available vehicle components which are owning a status of a given type. The service returns a set of status instances. Each instance object belongs to a vehicle component and provides further information about:

- A unique identifier of the status. This will be used to formulate the request for notification, identify the status to be controlled and to identify notified statuses.
- Control supported. Is a status controllable or is it just read only.
- Position of the owner. The position of the status owner within the vehicle.
- Textural description of status and owner.
- Upper/lower limit of status.
- Description of states. A status can describe a state of a vehicle component (e.g. ON, OFF). A state can't be expressed by a measurement.

3.1.1.2 Get Status

The client is notified about a status. This requires a kind of query mechanism in order to specify the status instance and the notification policy. The query utilizes other means that are responsible to connect services, and describes the request with properties.

The vehicle API shall offer a Status object that aggregates the following.

- An object holding the status to be notified. This is either a measurement or a state.

- A list with status properties.
  - the type of the status (e.g. seat position, door lock)
  - the instance of the object where the status belongs to (status owner).
  - warning level
  - notification reason

3.1.1.3 Set Status

The client requests a status change. This requires a kind of querying mechanism for the Status Provider. The query utilizes other means that are responsible to connect services, and describes the request with properties. The vehicle API shall offer a status object that aggregates the following.

- An object holding the status to be set. This is either a measurement or a state.
- A list with status properties.
  - the type of the status (e.g. seat position, door lock)
  - the instance of the object where the status belongs to (status owner).

3.1.1.4 Check Permission

A client needs permission in order to set or get a status. This is covered by services and API's that are outside the boundaries of the Vehicle API.

3.1.1.5 Notify Permission denied

A client shall be notified in a case of a denied permission This is covered by services and API's that are outside the boundaries of the Vehicle API.

3.1.1.6 Notify set Status unsupported

A client shall be notified if a set of a status is not supported (e.g. fuel capacity). Introspect status already provides information about supported control. Any attempt to set a status which is not controllable will be rejected and the client receives a notification.

3.2 Vehicle status items overview

3.2.1 Vehicle identification number

Type	Multiple Instances	Control supported
String	No	No

Properties	
WarningLevel	No

3.2.2 Manufacturer

Type	Multiple Instances	Control supported
String	No	No

Properties	
WarningLevel	No

3.2.3 Model

Type	Multiple Instances	Control supported
String	No	No

Properties	
WarningLevel	No

3.2.4 4. Construction year

Type	Multiple Instances	Control supported
String	No	No

Properties	
WarningLevel	No

3.2.5 Production location

Type	Multiple Instances	Control supported
Position	No	No

Properties	
WarningLevel	No

3.2.6 6. Vehicle description data

Type	Multiple Instances	Control supported
String	No	No

Properties	
WarningLevel	No

3.2.7 7. Ignition status

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.8 Model category

Type	Multiple Instances	Control supported
String	No	No

Properties	
WarningLevel	No

3.2.9 Engine description

Type	Multiple Instances	Control supported
String	No	No

Properties	
WarningLevel	No

3.2.10 1. Door lock

Type	Multiple Instances	Control supported
State	Yes	Yes

Properties	
WarningLevel	No

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3.2.11 2. Door ajar

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	Yes

3.2.12 Trunk open

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	Yes

3.2.13 4. Window control

Type	Multiple Instances	Control supported
State	Yes	Yes

Properties	
WarningLevel	No

3.2.14 Sun roof control

Type	Multiple Instances	Control supported
State	No	Yes

Properties	
WarningLevel	No

3.2.15 6. Turn signal status

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	No

3.2.16 Hazard signal status

3.2.17 Mirror

Type	Multiple Instances	Control supported
State	Yes	Yes

Properties	
WarningLevel	No

3.2.18 Seat position

Type	Multiple Instances	Control supported
Measurement	Yes	Yes

Properties	
WarningLevel	No

3.2.19 Antenna control

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.20 Tire pressure

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	Yes

3.2.21 Seat belt status

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	Yes

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3.2.22 Horn

Type	Multiple Instances	Control supported
State	No	Yes

Properties	
WarningLevel	No

3.2.23 Trigger Security alert control

3.2.24 Wiper status

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.25 Interior temperature status

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.26 External Light

Type	Multiple Instances	Control supported
State	Yes	Yes

Properties	
WarningLevel	No

3.2.27 Internal light

Type	Multiple Instances	Control supported
State	Yes	Yes

Properties	
WarningLevel	No

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3.2.28 Dashboard light

Type	Multiple Instances	Control supported
State	No	Yes

Properties	
WarningLevel	No

3.2.29 Washing liquid level (headlight, rearwindow, …)

Type	Multiple Instances	Control supported
Measurement	Yes	No

Properties	
WarningLevel	No

3.2.30 Interior noise level

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.31 Window shutter status

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	No

3.2.32 Brake fluid level

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	Yes

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3.2.33 Brake ware

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	Yes

3.2.34 Handbrake status

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	Yes

3.2.35 Steering wheel position

Type	Multiple Instances	Control supported
Measurement	No	Yes

Properties	
WarningLevel	No

3.2.36 Seat occupation status

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	No

3.2.37 Engine speed

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

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3.2.38 Immobilizer

Type	Multiple Instances	Control supported
State	No	Yes

Properties	
WarningLevel	No

3.2.39 Power train performance

Type	Multiple Instances	Control supported
State	No	Yes

Properties	
WarningLevel	No

3.2.40 Ignition

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.41 Engine control (start, stop)

Type	Multiple Instances	Control supported
State	No	Yes

Properties	
WarningLevel	No

3.2.42 Engine coolant temperature

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

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3.2.43 Engine coolant pressure

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.44 Engine coolant level

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.45 Engine oil temperature

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.46 Engine oil pressure

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.47 Engine oil level

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.48 Gear oil temperature

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.49 Gear oil pressure

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.50 Gear oil level

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.51 Current Gear

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.52 PRNDL

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

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3.2.53 Fuel consumption

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.54 Speed

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.55 Odometer (trip, total)

Type	Multiple Instances	Control supported
Measurement	Yes	No

Properties	
WarningLevel	No

3.2.56 Fuel level

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.57 Battery charge

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

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3.2.58 Airbag status

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	No

3.2.59 Traction control status

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.60 Antilock brakes

Type	Multiple Instances	Control supported
State	Yes	No

Properties	
WarningLevel	No

3.2.61 Cruise control

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.62 Variable suspension

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

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3.2.63 Rain sensor

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

3.2.64 13. External temperature

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	Yes

3.2.65 External air pressure

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.66 Sun intensity level

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.67 Driver identification

3.2.68 Crash detector

Type	Multiple Instances	Control supported
State	No	No

Properties	
WarningLevel	No

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3.2.69 Distance to object

Type	Multiple Instances	Control supported
Measurement	Yes	No

Properties	
WarningLevel	No

3.2.70 Maintenance (date of next service)

Type	Multiple Instances	Control supported
Measurement	No	No

Properties	
WarningLevel	No

3.2.71 Maintenance (date of next service, km up to next service)

Type	Multiple Instances	Control supported
	No	No

Properties	
WarningLevel	No

4 Security Considerations

Providing access to vehicle status and control raises security issues. They are already explained in Chapter 2 and Chapter 3.

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5 Document Support

5.1 References

[1]. Bradner, S., Key words for use in RFCs to Indicate Requirement Levels, RFC2119, March 1997.

5.2 Author's Address

Name	Christof Menzenbach
Company	Siemens VDO
Address	Philipstr. 1; D-35576 Wetzlar
Voice	+49 6441 370 591
e-mail	christof.menzenbach@de3.vdogrp.de

5.3 Acronyms and Abbreviations

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