

Extended Vehicle : Technical Integration Guide

Table of Contents

1	Get an OAuth access token	4
1.1	JSON Web Token (preferred).....	5
1.1.1	Build the JSON Web Token	5
1.1.2	Build the request	6
1.1.3	Sample values	6
1.2	Client certificate (mutual TLS)	8
1.2.1	Build the request	9
1.2.2	Sample values	10
2	Request vehicle data	12
2.1	Extended Vehicle interface definition	Fehler! Textmarke nicht definiert.
2.2	Build the request.....	12
2.3	Response codes.....	12

This page should give information to third parties how to integrate the Extended Vehicle service.

Change History

Version	Date	Comment
01	June 2021	Document created
02	August 2021	Small adaptations
03	November 2021	2.1.3.1: added 2.1.3.2: added element “use” to JWKS payload

1 Introduction

Extended Vehicle (hereafter referred to as ExVe) is an ISO norm addressing the need of different parties to access data, aggregated information and functionality from Connected Vehicles in a standardized, safe and secure way. ExVe defines a framework for interoperable web services used by several parties via the internet by adapting current and widely used IT approaches based on OAuth 2.0 [ISO 20078-1, 20078-3]

This document provides information for third parties how to integrate the ISO ExVe web service / interface implemented by Volkswagen Group from technical point of view. The integration process includes the following steps:

1. Request OAuth access token from ExVe authorization server
2. Request Vehicle Data by providing the access token

The following chapters describe those steps in more detail.

2 Request OAuth Access Token

For authorization / authentication at ExVe, third parties need to send an OAuth access token in every request to the ExVe interface. For getting this OAuth token, each (technical) client must authenticate itself. There are the following client authentication methods available:

- JSON Web Token (preferred)
- Client certificates

2.1 JSON Web Token (JWT)

Using this authentication method, client sends a signed JWT to the ExVe authorization server. ExVe validates the signature via JWKS configured in the ExVe authorization server. The client (third party) needs to provide a JWKS endpoint for sharing public keys via technical onboarding.

Algorithm which can be used signing JWT is: RS256

2.1.1 Build the JSON Web Token

Note: Before the request can be executed successfully, the client needs to be registered at ExVe Authorization Server. Please contact your VW Group contact person to ensure this.

Create a signed JSON Web Token with following attributes:

```
{
  "typ": "JWT",
  "alg": "RS256",
  "kid": "{{KEY_ID}}"
}
```

Code Block 1 JWT Header

```
{
  "iss": "{{CLIENT_KEY}}",
  "aud": "{{audience}}",
  "sub": "{{CLIENT_KEY}}",
  "exp": "{{TOKEN_EXPIRATION}}",
  "jti": "{{TOKEN ID}}"
}
```

Code Block 2 JWT Payload

2.1.1.1 Values for {{CLIENT_KEY}}

Client keys are client-specific and will be generated during onboarding process. The client key is unique per client and will be the same for every environment.

2.1.1.2 Values for {{audience}}

Environment	Value
Development	https://int.retailservices.audi.de:443

Environment	Value
Staging	https://qa.retailservices.audi.de:443
Production	https://live.retailservices.audi.de:443

2.1.2 Build the request

With the created JSON Web Token, the client can create a HTTP request:

- HTTP Method: POST
- Headers:
 - Authorization: Bearer *{your created JSON Web Token}*
 - Content-type: application/json
- Parameters:
 - grant-type: client_credentials
 - scope: vehicledata_read
- URL: *{see table below}*

2.1.2.1 URL endpoints for getting the oAuth token

Environment	URL
Development	https://int.retailservices.audi.de/authserver/v1/audi/auth/oauth/v2/token
Staging	https://qa.retailservices.audi.de/authserver/v1/audi/auth/oauth/v2/token
Production	https://live.retailservices.audi.de/authserver/v1/audi/auth/oauth/v2/token

2.1.3 Sample values

2.1.3.1 Sample URL for JWKS Endpoint

```
https://host/jwks.json
```

2.1.3.2 Sample Payload from JWKS Endpoint

```

{
  "keys": [
    {
      "kty": "RSA",
      "e": "AQAB",
      "use": "sig",
      "kid": "theonlykey",
      "alg": "RS256",
      "use": "sig",
      "n": "262grmX8QcTbYnnApv3YZVCEclMxI0IdlLbJ2ib7U-
t9dYy7FM1aKaEjQNgpVuYpQTGxr9eeVbiGxo5V624ycMwFcyblmIes3Jn9bVp8Q69fKVCO_S
blLt4maA0Fyza2TTgDxIo-
K6tXFb6V2IPdmOHmEXPYO_yHuOpVpTUBxqeh1WjpN0aN4LNEY7JTK4mU0wbIJxKrrqnC37F8
EkONIV8veNr5Aeu-g1SgMfl6GQhzzQORUnoYE-bfsQycNOoInQHhwGvGZi_HGG_WlLb7I-
b_wc8SBQPX7PpWDAldZzZnVlkuPj__Qu4nDFEu91DcPqM_3IM21hHwxswEbEkfqCgPBUmmaH
eLn2k_ZLNo7pgg46rDRvTovliBlqE686woQHn5S_bEI0r30_YGcfx3PvTIVtkbV4SXd85qh
JkpD2FTfGN7pIyTz2LeUnLcgHTwKKWRes5E882TuIJfvTCBRJd-
C8Q1Nh77jQ9D4oEVEMa_qW5ummte1KkwujzI0oTO1i17Om19r1KYaP6Frnk5Mbl9RzxHxPuK
cgi_mRFLweGHvHmUSopPfUY62vVvSB2wf3L1H3pwB3yUxEuSTB-
YsKrYh8oJpf5TFmWG3pyR3MaQAMVm72fAqbCiBFxAWLtp93m06HGPFvFnWaqbDrMiwTl7IMWd
cNpYsF8MnZk5wTE"
    }
  ]
}

```

2.1.3.3 Sample encoded self-signed JSON Web Token for authentication

```

{
  "typ": "JWT",
  "alg": "RS256",
  "kid": "Un3456TvNyvGz8rET05nBvmzf"
}
{
  "iss": "audi",
  "aud": "https://host.audi.de:443",
  "sub": "audi",
  "exp": 1628022659,
  "jti": "6b56c490-c5a6-4f63-a160-4a1206ef1819"
}

```

2.1.3.4 Sample request to request OAuth token

```

curl --location --request POST
'https://host.audi.de/authserver/v1/audi/auth/oauth/v2/token?grant_type=
client_credentials&scope=vehicledata_read' \
--header 'Content-Type: application/json' \
--header 'Authorization: Bearer
eyJ0eXAiOiJKV1QiLCJhbGciOiJIUzI1NiJ9.eyJpc3MiOiJhdWRpIiwiaXNkIjoiaHR0cHM6L
y9pbmV0YyVlsc2VydmVjZXMuYXVkaS5kZTo0NDMiLCJzdWIiOiJhdWRpIiwiaXNkIjoiaHR0cHM6L
yNDQ4NTAxLjQdGkiOiI0ZjEyMzZC0wNzlmLTQ5ZDQtYWM2Ny04ZDIwNjExMmUyNWQiLCJpY
XQiOiJEM2TI0NDQ5MDF9.tnqhn6AfyTyumkz2D3NFmEcNDjUSwT-fJm7Koq0Thd0' \

```

2.1.3.5 Sample response with issued OAuth token issued by Extended Vehicle

2.2.1 Build the request

Note: Before the request can be executed successfully, the client needs to be registered at ExVe Authorization Server. Please contact your VW Group contact person to ensure this

Request your oAuth access token using your client certificate for authentication:

- HTTP Method: POST
- Certificate:
 - Certificate
 - private key
- Parameters:
 - grant-type: client_credentials
 - scope: vehicledata_read
 - client_id: {CLIENT_KEY}
- URL: {see table below}

2.2.1.1 Values for {{CLIENT_KEY}}

Client keys are client-specific and will be provided separately. The client key is unique per client and will be the same for every environment.

2.2.1.2 URL endpoints for getting the oAuth token

Environment	URL
Development	https://int.retailservices.audi.de/authserver/v1/audi/auth/oauth/v2/token
Staging	https://qa.retailservices.audi.de/authserver/v1/audi/auth/oauth/v2/token
Production	https://live.retailservices.audi.de/authserver/v1/audi/auth/oauth/v2/token

2.2.2 Sample values

2.2.2.1 Certificate Example

```
T2CFnjCCA4agAwIBAgIJAI81OQqPsF16MA0GCSqGSIb3DQEBCwUAMGQxCzAJBgNVBAYT
AmIuMRMwEQYDVQIDApTb211LVN0YXR1MQowCAYDVQQHDAFhMQowCAYDVQQKDAFhMQ
owCAYDVQQQLDAFhMQowCAYDVQQDDAFhMRAwDgYJKoZIhvcNAQkBFgFhMB4XDTE5MDYxM
zA2NDY0MVowXDTIwMDYxMjA2NDY0MVowZDELMAkGA1UEBhMCaW4xEzARBgNVBAGMClNv
bWUuT3RhdGUxCjAIBGNVBAcMAWExCjAIBGNVBAoMAWExCjAIBGNVBAsMAWExCjAIBGN
VBAMMAWExEDA0BkgkqhkiG9w0BCQEWAWeggiMA0GCSqGSIb3DQEBAAQAAICDwAwgg
IKAoICAQCryAeMfm7bejtTDTa70H0HBna3ci2TRBWLrgp36vCbhRXQO6HUtsFKzqNyd
N6qE/GCEHNJi7p76WYGUJYa1/g1HTS1bqLyXiML10+C0lat8hZVLDPT1mreJUSxcUhJ
zq7oSV3DYhYj5+lw1WY6VtPN6QtPosd4PynbBya+yyGTy41XcTNR1Jd8wS1dC62vGf+
q4WJff6I+6f1MNmxNuW+OCPNFBAuibRH7B1BwAvLYp1gc2T1jvrmdKJ9A9YpDunoqTb
VwGHHofGvJHTnDI07jkLcW7ewr+Sv51+4D9qR86m60c+717LEJXEpG+cGAq5lzYkbPh
FwTiR5pXxkPQ5Mmy9NukFViDxT0zdOTzU5gJroLvXFtpzDqWlZQompg2Y3sLsA98M5V
FLEqfz4dalzBiWf5BUygwKpztO2zXtANHC2gyKyCx8ZxjmM6bG9eC/b2vmSK3ASmW0h
PIlCftAM+n1Aw/YImLm07jg087WYNTRFvdm9x9X06z6N4ZMW9PEksw8oS6FzD3rXW3P
XKAsmG9qOckb9CvrlnMlHs3AuUcOkAPpWnMJ+efdruWrGRWXiKgyL7SbfriW7/FNuCl
xCfApsQtBqodIMZ9RVIWrleIFL3L1KbcWZ00QIYd8CvYWacUWlQ86IMAAf6f2qyeY5P
2U42KKxm8WDN0MA1oRywvQIDAQABo1MwUTAdBgNVHQ4EFgQULvhhfMO11jaBBSg8x7v
j+hpQROEwHwYDVR0jBBgwFoAULvhhfMO11jaBBSg8x7vj+hpQROEwDwYDVR0TAQH/BA
UwAwEB/zANBgkqhkiG9w0BAQsFAAOCAgEATQF8cnOAKFxAUAK8LJHjokZG5ZNO754S27
BTg3DejOX+opkdZ5LttG2mHs+GZRg0wBOa0gNO2D/O0OhQvQQUx34dCgfuKRMkY6C/6
aQLmlk3d4FBYTthigoP+JCKS4K+QIge1ovQm/M55BWZOitLbaFVnr4V3Qm/bONbZpnC
0sbFFHfKF/bpGcmTZ58IHNbJLStk+dzbd6qp5AGr/fmY0+3d2D8+9OAEAJ89AbwTsgp
V1FwDS1Ge386dnWFpcNBXJSzSj4E834ZXtx5QWKpTW7Z+VgLiPgg+G+TK25buRYMAfy
e9iJfYYCDlpFQe0Ih1uTw9f9gGQySfWx+Q7QCnaydHKIUP4bh158bvSijswS3EwqXVw
30/cuAjFnYeelr8evfpJ310mp3bsJ268vuK9f18w1H9vAbSkAQ6jkSElItHukjpvRdg
9cYlKt1TR6FX/kas7AeJ9hdiRy/9UIxwJdVWqRhjhtH72OgCr/zR+yaOBP8gb65WGUD
BbUm8jAxqYk+LUOyCBmc+dvjj8GF27LfgQ4TwaMaeZgXcc8T88LBUtWr/Z2cGAlByv
u7Phr8z+YrGCohLJCMRcXN5RJB/tDktRhWhvf8J+jLIik31X9WKbQou8q19R52k8EQv
Cc2DDt+fW9ANRM22udzumQlibr5G6APQhtnTtDB/c7FKols=
```

2.2.2.2 Sample request

```
curl -X POST
"https://int.retailservices.audi.de:21443/authserver/v1/audi/auth
/oauth/v2/token?grant_type=client_credentials&scope=vehicledata_r
ead&client_id=audi"
--cert {certificate}
--key {privatekey}
```


3 Request vehicle data

3.1 Build the request

You can request the vehicle data by building your request the following way:

- HTTP Method: GET
- Headers:
 - Authorization: Bearer *{oAuth access token you retrieved before}*
- URL: *{see table below}*

Environment	URL
Development	https://dev.exve.vmobsrv.com/container/{containerID}/vehicles/{VIN}
Staging	https://staging.exve.vmobsrv.com/container/{containerID}/vehicles/{VIN}
Production	https://prod.exve.vmobsrv.com/container/{containerID}/vehicles/{VIN}

Element	Explanation
containerID	<p>Vehicle Data is exposed via container. The concept of containers is also introduced within ISO 20078</p> <p>A third party can create a container via ExVe B2B-Portal of VW Group. During container creation, an unique identified is generated automatically (containerID)</p> <p>Example: b6a1ce06-b700-431d-8b0f-8498685227ca</p>
VIN	<p>Vehicle Identification Number</p> <p>Example: WVVZZZ1JZXW000001</p>

3.2 Response codes

HTTP response code	Description
200	OK
204	There are no data points available for the vehicle
401	You are not authorized to view the resource
403	Accessing the resource, you were trying to reach is forbidden or the vehicle owner has not granted consent
404	The resource you were trying to reach is not found
429	Too many requests - there is an active rate limit for this VIN/user combination
503	The request could not be processed because the data source is currently unavailable

3.3 Response Payload (HTTP 200)

In the following, some examples of response payloads are demonstrated.

```
{
  "container": "742ba6c1-7213-4d80-bf0d-c5814b3501e4",
  "data": [
    {
      "name": "Mileage",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "km",
      "value": "123"
    },
    {
      "name": "Abstellzeit",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "unknown",
      "value": "2017-12-03T17:00:00Z"
    }
  ],
  "vin": "WVWZZZ1JZXW100001"
}
```

```

{
  "container": "6ea13a20-f3fe-46ff-9b62-44d0b6d7c72c",
  "data": [
    {
      "name": "Anprallort - Rollover",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "false"
    },
    {
      "name": "Anprallort - Heck Fahrer",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "true"
    },
    {
      "name": "Anprallort - Seite Fahrer",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "true"
    },
    {
      "name": "Crashschwere",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "1"
    },
    {
      "name": "Anprallort - Fußgängerschutz",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "true"
    },
    {
      "name": "Anprallort - Heck Beifahrer",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "false"
    },
    {
      "name": "Anprallort - Seite Beifahrer",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "false"
    },
    {
      "name": "Anprallort - Front Beifahrer",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "false"
    },
    {
      "name": "Anprallort - Front Fahrer",
      "timestamp": "2019-12-23T10:00:00Z",
      "unit": "null",
      "value": "true"
    }
  ],
  "vin": "WVWZZZ1JZXW100004"
}

```