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Road vehicles — Information for remote diagnostic support — General requirements, definitions and use cases

AMENDMENT 1

Véhicules routiers — Information pour support de diagnostic à distance — Exigences générales, définitions et cas d'utilisation

AMENDEMENT 1

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

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Road vehicles — Information for remote diagnostic support — General requirements, definitions and use cases

AMENDMENT 1

Annex A

Replace Annex A with the following:

Annex A
(informative)

Implementation based on ISO 20078 – Road Vehicles – Extended Vehicle (ExVe) – Web Services

A.1 Introduction

A.1.1 General

This annex contains a web service specification of the use cases listed in this document. The web service specification is based on the ISO 20078:2021 series. All web services are defined as REST APIs, using JSON for the transfer of content.

The ISO 20078:2021 series is indispensable for implementing web services according to this annex.

A.1.2 Security

All REST APIs are using OAuth2 compatible framework for access control, OpenID Connect compatible framework for identification purposes and HTTPS for securing the transfer, see ISO 20078-3:2021 for details. The exact details of how to obtain access is described by each offering party.

A.1.3 Error codes

A.1.3.1 ISO 20078

The HTTP status codes (error codes) listed for each REST API are described in ISO 20078-2:2021.

A.1.3.2 General error conditions

General error conditions are valid for all use cases. Table A.1 presents the mapping of error conditions in 5.5 to REST API errors:

Table A.1 — Mapping of error conditions to REST API

Error condition	HTTP status code	ExveErrorId	Example
Request currently not possible to perform by the ExVe	503	20080-1000	{ "dtcReadout": { "id": "abcde-12345-ghjke-67474", "messageTimestamp": "2016-02-24T09:23:46Z", "exveErrorId": "20080-1000", "exveErrorMsg": "Request currently not possible to perform by the ExVe", "vehicleId": "12345678909876543" } }

A.1.3.3 Use case specific error conditions

Use case specific errors are mapped to HTTP status codes in each REST API.

A.2 Resources

A web service is exposing access to one or more resources. To be able to access a resource through a web service, access needs to be granted. This can be done either directly to the resource or through a container.

Table A.2 maps the ISO 20080 (this document) use cases to REST APIs and resources. In some cases, mapping of a use case to a REST API provides little standardization benefit, as it is highly offering party specific.

Table A.2 — Mapping of use cases to REST APIs

UC	Use case name	REST API	Resource(s)	Comment
01	Use case discovery	resourceReadout	Not applicable	
02	Identify ECUs installed in the vehicle	ecuReadouts	ECU readout	
03	Read diagnostic trouble codes (DTCs)	dtcReadouts	DTC readout	
04	Read readiness codes	readinessCodeReadouts	Readiness code readout	
05	Read DTC snapshot data	dtcSnapshotReadout	DTC snapshot readout	
06	Read selected diagnostic parametric dynamic data	parameterReadout	Parameter readout	
07	Read malfunction indicator status	malfunctionIndicatorReadout	Malfunction indicator readout	
08	Clear DTCs	clearDtcJob	Clear DTC job	
09	Adjust the settings of a selected system	Not applicable/no standardized API due to differences between offering parties.	Not applicable	System setting input and result are offering party specific.
10	Activation of actuators	Not applicable/no standardized API due to differences between offering parties.	Not applicable	Actuator input and result are offering party specific.
11	Activate a self-test routine	Not applicable/no standardized API due to differences between offering parties.	Not applicable	Self-test input and result are offering party specific.

ISO 20078-2:2021 defines new syntax for resource versioning (used in Accept and Content-Type HTTP headers). Existing implementations of ISO 20080 based on the ISO 20078:2019 series version can still be used. For new implementations, support of the ISO 20078:2021 series is recommended (see Table A.3 for details).

Table A.3 — Mapping of REST API resource representation used in ISO 20080:2019 and ISO 20080:2019/Amd.1:2021 versions

UC	REST API	Resource version according to ISO 20078-2:2019	Resource version according to ISO 20078-2:2021
01	resourceReadout	application/x.exve.org.resourcereadout.v1+json	application/json; exve-resourceversion= resourcereadout.v1.0
02	ecuReadouts	application/x.exve.org.ecureadout.v1+json	application/json; exve-resourceversion= ecureadout.v1.0
03	dtcReadouts	application/x.exve.org.dtcreadout.v1+json	application/json; exve-resourceversion= dtcreadout.v1.0
04	readinessCodeReadouts	application/x.exve.org.readinesscodereadout.v1+json	application/json; exve-resourceversion= readinesscodereadout.v1.0
05	dtcSnapshotReadout	application/x.exve.org.dtcsnapshotreadout.v1+json	application/json; exve-resourceversion= dtcsnapshotreadout.v1.0
06	parameterReadout	application/x.exve.org.parameterreadout.v1+json	application/json; exve-resourceversion= parameterreadout.v1.0
07	malfunctionIndicatorReadout	application/x.exve.org.malfunctionIndicatorreadout.v1+json	application/json; exve-resourceversion= malfunctionindicatorreadout.v1.0
08	clearDtcJob	application/x.exve.org.cleardtcjob.v1+json	application/json; exve-resourceversion= cleardtcjob.v1.0

A.3 REST API information model

The rest API information model in Figure A.1 is compiled from the use cases in this document and used as a base for designing the REST APIs.

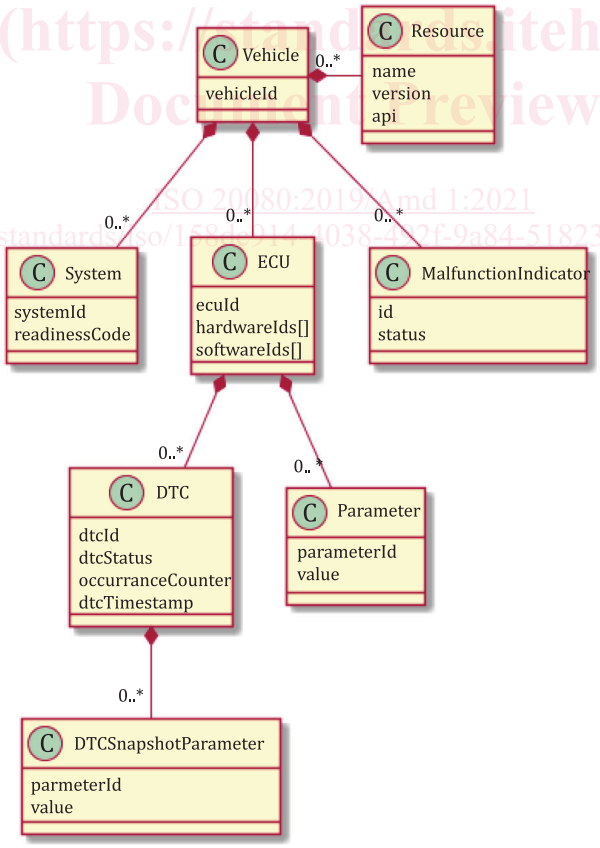

Figure A.1 — REST API information model

A.4 REST APIs

A.4.1 Use case 01 – resourceReadout

The resourceReadout API follows the asynchronous interaction pattern, as the processing time of the request can vary dependent on the offering party implementation (see Figure A.2). In some cases, it is possible to return the result immediately, whereas sometimes the accessing party needs to poll the API until the result is ready.

The accessing party starts by posting a resource readout request (see Table A.4). If the result is available immediately, the result is returned directly (see Table A.5). If the result is not available immediately, a status is returned instead of the readout. The accessing party is supposed to poll the request status until the processing is completed. When the processing is completed, the accessing party will receive the result.

The readout status and the completed readout will be available for a limited time after being created. This time is specified by the offering party.

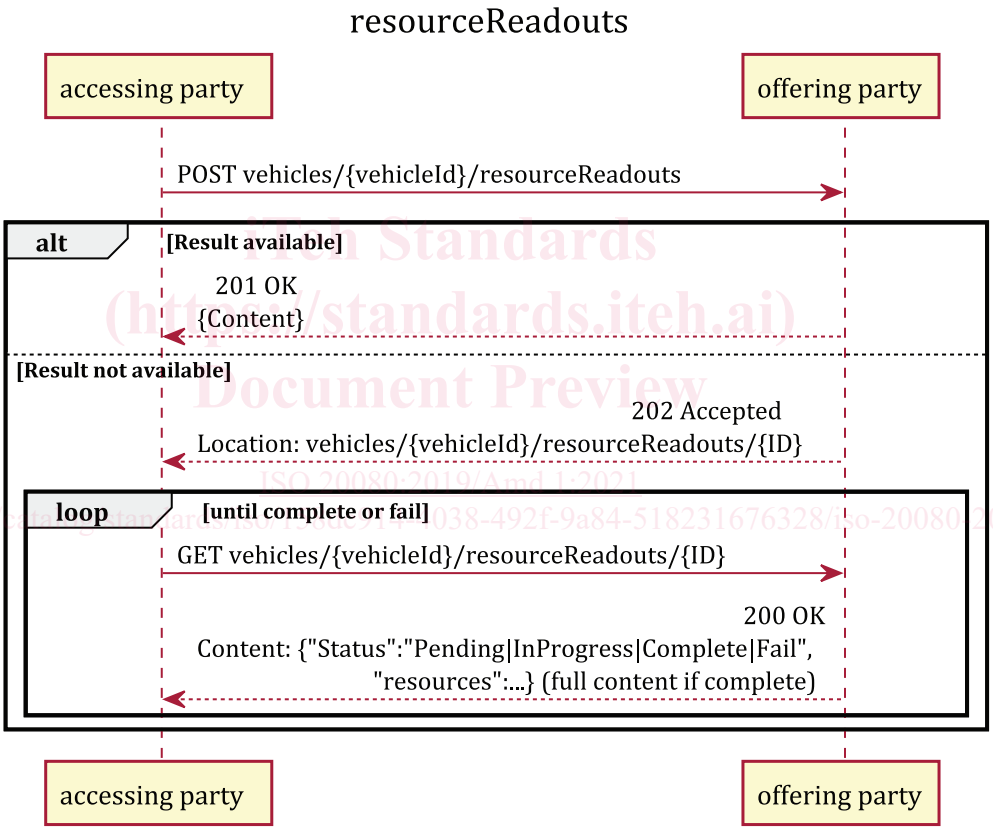

Figure A.2 — resourceReadouts sequence diagram

Table A.4 — POST resourceReadout

POST vehicles/{vehicleId}/resourceReadouts				
Description	This API creates a readout of available resources to the accessing party for one vehicle. If the result is available immediately, the result is returned. If the result is not available, a location to the resource readout is returned. This location shall be polled until the result is available.			
Parameters	vehicleId	string	required	The vehicle identifier of the vehicle to read from

Table A.4 *(continued)*

<table>
<tr><td rowspan="3">Request headers</td><td colspan="2">Host</td><td>required</td><td>According to HTTP/1.1 RFC 2616</td></tr>
<tr><td colspan="2">Authorization</td><td>required</td><td>Bearer {token}</td></tr>
<tr><td colspan="2">Accept</td><td>required</td><td>application/json; exve-resourceversion=resourcereadout.v1.0; charset=utf-8</td></tr>
<tr><td>Response headers</td><td colspan="2">Location</td><td colspan="2">Absolute URI of the /resourceReadouts endpoint</td></tr>
<tr><td rowspan="2">Response (success)</td><td>201</td><td colspan="3">Example (result available immediately):
<pre>
{
"resourceReadout": {
   "id": "abcde-12345-ghjke-67474",
   "asyncStatus": "Complete",
   "messageTimestamp": "2016-02-24T09:23:46Z",
   "vehicleId": "12345678909876543",
   "resources": [
      {
      "name": "DTC Readout",
      "version": "1",
      "api":
"https://example.org/vehicles/12345678909876543/dtcReadouts"
      },
      {
      "name": "ECU Readout",
      "version": "1",
      "api":
"https://example.org/vehicles/12345678909876543/ecuReadouts"
      }
      ]
   }
}
</pre></td></tr>
<tr><td>202</td><td colspan="3">Result is not available immediately. Location of resourceReadout will be returned, e.g. vehicles/{vehicleId}/resourceReadouts/{id}, see Location header.</td></tr>
<tr><td rowspan="10">Error codes</td><td>400</td><td colspan="3">Bad Request</td></tr>
<tr><td>401</td><td colspan="3">Unauthorized</td></tr>
<tr><td>403</td><td colspan="3">Forbidden</td></tr>
<tr><td>404</td><td colspan="3">Not Found</td></tr>
<tr><td>406</td><td colspan="3">Not Acceptable</td></tr>
<tr><td>500</td><td colspan="3">Internal Server Error</td></tr>
<tr><td>501</td><td colspan="3">Not Implemented</td></tr>
<tr><td>503</td><td colspan="3">Service Unavailable</td></tr>
<tr><td>505</td><td colspan="3">Version Not Supported</td></tr>
<tr><td>Access</td><td colspan="2">Any resource</td><td colspan="2">Access to any resource will give access to this API.</td></tr>
<tr><td>JSON schema</td><td colspan="4">See Clause A.5.</td></tr>
</table>

Table A.5 — GET resourceReadout

<table>
<tr><td colspan="6">GET vehicles/{vehicleId}/resourceReadouts/{id}</td></tr>
<tr><td>Description</td><td colspan="5">This API returns a readout of available resources to the accessing party for one vehicle. The id of the readout is returned when posting the request. If the resource readout is not completed, the readout status is returned. If the resource readout is completed, the result is returned.</td></tr>
<tr><td rowspan="2">Parameters</td><td>vehicleId</td><td>string</td><td>required</td><td colspan="2">The vehicle identifier of the vehicle to read from</td></tr>
<tr><td>id</td><td>string</td><td>required</td><td colspan="2">Id of the DTC readout</td></tr>
<tr><td rowspan="3">Request headers</td><td>Host</td><td>required</td><td colspan="3">According to HTTP/1.1 RFC 2616</td></tr>
<tr><td>Authorization</td><td>required</td><td colspan="3">Bearer {token}</td></tr>
<tr><td>Accept</td><td>required</td><td colspan="3">application/json; exve-resourceversion=resourcereadout.v1.0; charset=utf-8</td></tr>
<tr><td>Response headers</td><td>Content-Type</td><td colspan="4">application/json; exve-resourceversion= resourcereadout.v1.0;charset=utf-8</td></tr>
<tr><td>Response (success)</td><td>200</td><td colspan="4">Example (result available):
<pre>
{
"resourceReadout": {
   "id": "abcde-12345-ghjke-67474",
   "asyncStatus": "Complete",
   "messageTimestamp": "2016-02-24T09:23:46Z",
   "vehicleId": "12345678909876543",
   "resources": [
      {
      "name": "DTC Readout",
      "version": "1",
      "api":
"https://example.org/vehicles/12345678909876543/dtcReadouts"
      },
      {
      "name": "ECU Readout",
      "version": "1",
      "api":
"https://example.org/vehicles/12345678909876543/ecuReadouts"
      }
      ]
   }
}
</pre></td></tr>
</table>

Table A.5 *(continued)*

		Example (result not available):
		{
		"resourceReadout": {
		"id": "abcde-12345-ghjke-67474",
		"asyncStatus": "InProgress",
		"asyncWait": 10000,
		"asyncEstimatedComplete": "2016-02-24T09:24:00Z",
		"messageTimestamp": "2016-02-24T09:23:46Z",
		"vehicleId": "12345678909876543"
		}
		
		}

Error codes	400	Bad Request
	401	Unauthorized
	403	Forbidden
	404	Not Found
	406	Not Acceptable
	500	Internal Server Error
	501	Not Implemented
	503	Service Unavailable
	505	Version Not Supported
Access	Any resource	Access to any resource will give access to this API.
JSON schema	See Clause A.5.	

A.4.2 Use case 02 – ecuReadouts

The ecuReadout API follows the asynchronous interaction pattern, as the processing time of the request can vary dependent on the offering party implementation (see Figure A.3). In some cases, it is possible to return the result immediately, whereas sometimes the accessing party needs to poll the API until the result is ready.

The accessing party starts by posting an ECU readout request (see Table A.6). If the result is available immediately, the result is returned directly. If the result is not available immediately, a status is returned instead of the readout. The accessing party is supposed to poll the request status until the processing is completed (see Table A.7). When the processing is completed, the accessing party will receive the result.

The readout status and the completed readout will be available for a limited time after being created. This time is specified by the offering party.

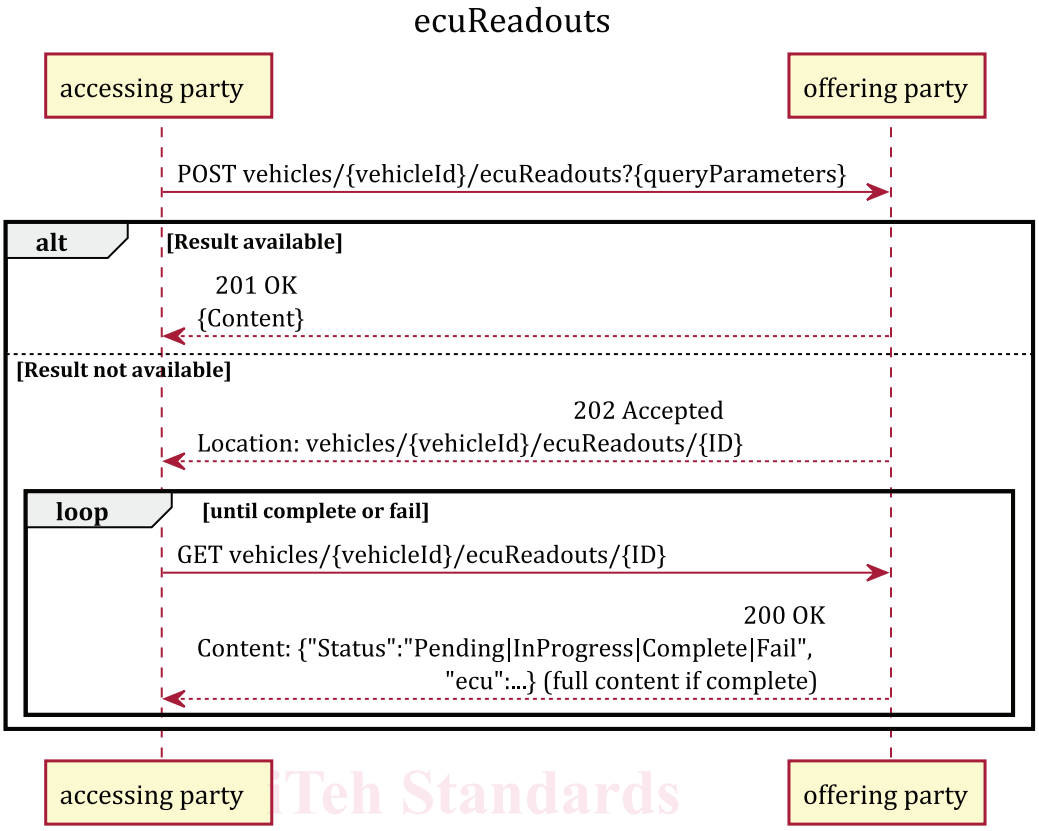

Figure A.3 — ecuReadouts sequence diagram

Table A.6 — POST ecuReadout

POST vehicles/{vehicleId}/ecuReadouts/ecuId={ecuId}				
Description	This API creates a readout of ECUs for one vehicle. If the result is available immediately, the result is returned. If the result is not available, a location to the ECU readout is returned. This location shall be polled until the result is available.			
Parameters	vehicleId	string	required	The vehicle identifier of the vehicle to read from
	ecuId	string	optional	Return this ECU id only Default: Return all ECUs
Request headers	Host	required	According to HTTP/1.1 RFC 2616	
	Authorization	required	Bearer {token}	
	Accept	required	application/json; exve-resourceversion=ecureadout.v1.0; charset=utf-8	
Response headers	Location	Absolute URI of the /ecuReadouts endpoint		

Table A.6 *(continued)*

Response (success)	201	Example (result available immediately):
		{
		"ecuReadout": {
		"id": "abcde-12345-ghjke-67474",
		"asyncStatus": "Complete",
		"messageTimestamp": "2016-02-24T09:23:46Z",
		vehicleId": "12345678909876543",
		"receivedTimestamp": "2016-02-24T09:23:46Z",
		"ecus": [
		{
		"ecuId": "ABC",
		"hardwareIds": ["1234567"],
		"softwareIds": ["9876543"]
		}, {
		"ecuId": "DEF",
		"hardwareIds": ["2345678"],
		"softwareIds": ["8976543"]
		}, {
		"ecuId": "GHI",
		"hardwareIds": ["3456789"],
		"softwareIds": ["7896543","7896555"]
		}
		]
		}
		}

	202	Result is not available immediately. Location of ecuReadout will be returned, e.g. vehicles/{vehicleId}/ecuReadouts/{id}, see Location header.
Error codes	400	Bad Request
	401	Unauthorized
	403	Forbidden
	404	Not Found
	406	Not Acceptable
	500	Internal Server Error
	501	Not Implemented
	503	Service Unavailable
	505	Version Not Supported
Access	ECU readout	Full access to this API
JSON schema	See Clause A.5.	