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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

In the present document, modal verbs have the following meanings:

shall indicates a mandatory requirement to do something

shall not indicates an interdiction (prohibition) to do something

The constructions "shall" and "shall not" are confined to the context of normative provisions, and do not appear in Technical Reports.

The constructions "must" and "must not" are not used as substitutes for "shall" and "shall not". Their use is avoided insofar as possible, and they are not used in a normative context except in a direct citation from an external, referenced, non-3GPP document, or so as to maintain continuity of style when extending or modifying the provisions of such a referenced document.

should indicates a recommendation to do something

should not indicates a recommendation not to do something

may indicates permission to do something

need not indicates permission not to do something

The construction "may not" is ambiguous and is not used in normative elements. The unambiguous constructions "might not" or "shall not" are used instead, depending upon the meaning intended.

can indicates that something is possible

cannot indicates that something is impossible

The constructions "can" and "cannot" are not substitutes for "may" and "need not".

will indicates that something is certain or expected to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

will not indicates that something is certain or expected not to happen as a result of action taken by an agency the behaviour of which is outside the scope of the present document

might indicates a likelihood that something will happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

might not indicates a likelihood that something will not happen as a result of action taken by some agency the behaviour of which is outside the scope of the present document

In addition:

is (or any other verb in the indicative mood) indicates a statement of fact

is not (or any other negative verb in the indicative mood) indicates a statement of fact

The constructions "is" and "is not" do not indicate requirements.

Sample Document

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1 Scope

The present document specifies the protocol aspects for the data delivery management capability of SEAL for the application content/data for vertical applications (e.g. V2X) over the 3GPP system as part of SEAL services specified in 3GPP TS 23.434 [3] and 3GPP TS 23.433 [2].

The present document is applicable to the user equipment (UE) supporting the data delivery management client functionality as described in 3GPP TS 23.433 [2], to the application server supporting the data delivery management server functionality as described in 3GPP TS 23.433 [2] and to the application server supporting the vertical application server (VAL server) functionality as defined in the specific vertical application service (VAL service) specifications.

NOTE: The specification of the VAL server for a specific VAL service is out of scope of present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document in the same Release as the present document.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.433: "Service Enabler Architecture Layer for Verticals (SEAL); Data Delivery enabler for vertical applications".
- [3] 3GPP TS 23.434: "Service Enabler Architecture Layer for Verticals (SEAL); Functional architecture and information flows".
- [4] 3GPP TS 24.008: "Mobile Radio Interface Layer 3 specification; Core Network Protocols; Stage 3".
- [5] 3GPP TS 24.501: "Non-Access-Stratum (NAS) protocol for 5G System (5GS); Stage 3".
- [6] 3GPP TS 24.546: "Configuration management - Service Enabler Architecture Layer for Verticals (SEAL); Protocol specification".
- [7] 3GPP TS 24.547: "Identity management - Service Enabler Architecture Layer for Verticals (SEAL); Protocol specification".
- [8] 3GPP TS 24.558: "Enabling Edge Applications; Protocol specification".
- [9] 3GPP TS 29.548: "Service Enabler Architecture Layer for Verticals (SEAL); SEAL Data Delivery (SEALDD) Server Services; Stage 3".
- [10] 3GPP TS 29.558: "Enabling Edge Applications; Application Programming Interface (API) specification; Stage 3".
- [11] IETF RFC 3339: "Date and Time on the Internet: Timestamps".
- [12] IETF RFC 4825: "The Extensible Markup Language (XML) Configuration Access Protocol (XCAP)".
- [13] IETF RFC 6750: "The OAuth 2.0 Authorization Framework: Bearer Token Usage".
- [13A] IETF RFC 6838: "Media Type Specifications and Registration Procedures".

- [14] IETF RFC 7252: "The Constrained Application Protocol (CoAP)".
- [15] IETF RFC 7641: "Observing Resources in the Constrained Application Protocol (CoAP)".
- [16] IETF RFC 7959: "Block-Wise Transfers in the Constrained Application Protocol (CoAP) ".
- [17] IETF RFC 8132: "PATCH and FETCH Methods for the Constrained Application Protocol (CoAP)".
- [18] IETF RFC 8323: "CoAP (Constrained Application Protocol) over TCP, TLS, and WebSockets".
- [19] IETF RFC 8610: "Concise Data Definition Language (CDDL): A Notational Convention to Express Concise Binary Object Representation (CBOR) and JSON Data Structures".
- [20] IETF RFC 8949: "Concise Binary Object Representation (CBOR)".
- [21] IETF RFC 9110: "HTTP Semantics".
- [22] IETF RFC 9177: "Constrained Application Protocol (CoAP) Block-Wise Transfer Options Supporting Robust Transmission".
- [23] OMA OMA-TS-XDM_Core-V2_1-20120403-A: "XML Document Management (XDM) Specification".

3 Definitions of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

Data delivery management SEAL client: An entity that provides the client side functionalities corresponding to the data delivery management SEAL service.

Data delivery management SEAL server: An entity that provides the server side functionalities corresponding to the data delivery management SEAL service.

For the purposes of the present document, the following terms and definitions given in 3GPP TS 23.434 [3] apply:

SEAL client
SEAL server
SEAL service
VAL user
VAL server
VAL service
Vertical
Vertical application

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ACR	Application Context Relocation
API	Application Programming Interface
CDDL	Concise Data Definition Language
CoAP	Constrained Application Protocol
DNS	Domain Name System
EAS	Edge Application Server
ECS	Edge Configuration Server

EDN	Edge Data Network
EES	Edge Enabler Server
MIME	Multipurpose Internet Mail Extensions
NAS	Non Access Stratum
SEAL	Service Enabler Architecture Layer for verticals
SEALDD	SEAL Data Delivery
SDDM	SEAL Data Delivery Management
SDDM-C	SEAL Data Delivery Management Client
SDDM-S	SEAL Data Delivery Management Server
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
URLLC	Ultra-Reliable Low Latency Communication
V2X	Vehicle-to-Everything
VAL	Vertical Application Layer
XCAP	XML Configuration Access Protocol

4 General description

Data delivery management is a SEAL service that provides the data delivery management related capabilities (data delivery and storage capabilities) to one or more vertical applications. The present document enables a SEAL data delivery management client (SDDM-C) and a VAL server to communicate with a SEAL data delivery management server (SDDM-S).

5 Edge applications over 3GPP services

The SDDM-C and the SDDM-S can utilize edge applications over 3GPP services to support SDDM. The edge applications over 3GPP services are specified in 3GPP TS 24.558 [8] and 3GPP TS 29.558 [10]. Interactions between the SDDM-C, the SDDM-S and the edge applications over 3GPP services are described in detail in clause 7.

6 Functional entities

6.1 SEAL data delivery management client (SDDM-C)

The SDDM-C functional entity acts as the application client for data delivery management related transactions. To be compliant with the procedures in the present document the SDDM-C:

- shall support the role of XCAP client as specified in IETF RFC 4825 [12];
- shall support the role of XDMC as specified in OMA OMA-TS-XDM_Core-V2_1 [23]; and
- shall support the data delivery management procedures in subclause 7.2.

To be compliant with the CoAP procedures in the present document the SDDM-C:

- shall support the role of CoAP client as specified in IETF RFC 7252 [14];
- shall support the capability to observe resources as specified in IETF RFC 7641 [15];
- shall support the block-wise transfer as specified in IETF RFC 7959 [16];
- may support the robust block transfer as specified in IETF RFC 9177 [22];
- shall support FETCH method of CoAP as specified in IETF RFC 8132 [17];
- should support CoAP over TCP and WebSocket as specified in IETF RFC 8323 [18];
- shall support CBOR encoding as specified in IETF RFC 8949 [20]; and

h) shall support the procedures defined in clause 7.2.

NOTE 1: The security mechanism to be supported for the CoAP procedures is described in 3GPP TS 24.547 [7].

NOTE 2: Support for TCP for the CoAP procedures is required if the client connects over the network which blocks or impedes the use of UDP, e.g. when NATs are present in the communication path.

NOTE 3: The CoAP protocol supports mechanism for reliable message exchange over UDP. Use of TCP can also be beneficial if reliable transport is required for other reasons, e.g. better observability of resources. Usage of CoAP over TCP is an implementation choice.

NOTE 4: Support for the robust block transfer mechanism for the CoAP procedures is beneficial in environments where packet loss is highly asymmetrical and where performance optimization of block transfers is required.

6.2 SEAL data delivery management server (SDDM-S)

The SDDM-S is a functional entity used to provide data delivery management supported within the vertical application layer. To be compliant with the procedures in the present document the SDDM-S:

- a) shall support the role of XCAP server as specified in IETF RFC 4825 [12];
- b) shall support the role of XDMS as specified in OMA OMA-TS-XDM_Core-V2_1 [23]; and
- c) shall support the data delivery management procedures in subclause 7.2.

To be compliant with the CoAP procedures in the present document the SDDM-S:

- a) shall support the role of CoAP server as specified in IETF RFC 7252 [14];
- b) shall support the capability to observe resources as specified in IETF RFC 7641 [15];
- c) shall support the block-wise transfer as specified in IETF RFC 7959 [16];
- d) shall support the robust block transfer as specified in IETF RFC 9177 [22];
- e) shall support FETCH method of CoAP as specified in IETF RFC 8132 [17];
- f) shall support CoAP over TCP and Websocket as specified in IETF RFC 8323 [18];
- g) shall support CBOR encoding as specified in IETF RFC 8949 [20]; and
- h) shall support the procedures defined in clause 7.2.

NOTE: The security mechanism to be supported for the CoAP procedures is described in 3GPP TS 24.547 [7].

7 Data delivery management procedures

7.1 General

This clause provides the procedures for data delivery management between the SDDM-C and the SDDM-S as well as interactions between the SDDM-S and the VAL server. Interactions between the SDDM-C, the SDDM-S and the edge applications over 3GPP services are also described.

NOTE: 3GPP TS 29.548 [9] specifies stage-3 protocol definitions, message flows and APIs for services offered by the SDDM-S to VAL servers over the SEALDD-S reference point and to other SEALDD servers over the SEALDD-E reference point (see 3GPP TS 23.433 [2]).

7.2 On-network procedures

7.2.1 General

This clause provides the on-network procedures for data delivery management between the SLM-C and the SLM-S as well as interactions between the SDDM-S and the VAL server.

7.2.1.1 Authenticated identity in HTTP request

Upon receiving an HTTP request, the SDDM-S shall verify that the identity of the sender of the HTTP request (see IETF RFC 9110 [21]) is authorized as specified in 3GPP TS 24.547 [7], and if authentication is successful, the SDDM-S shall use the identity of the sender of the HTTP request as an authenticated identity.

7.2.1.2 Authenticated identity in CoAP request

Upon receiving a CoAP request, the SDDM-S shall verify that the identity of the sender of the CoAP request as specified in 3GPP TS 24.547 [7], and if authentication is successful, the SDDM-S shall use the identity of the sender of the CoAP request as an authenticated identity.

7.2.2 SEALDD enabled signalling transmission connection establishment procedure

7.2.2.1 SDDM client HTTP procedure

The SDDM-C sends a SEALDD regular transmission connection establishment request when it needs to request an SDDM connection establishment, the SDDM-C shall send an HTTP POST request message according to procedures specified in IETF RFC 9110 [21]. In the HTTP POST request message, the SDDM-C:

- a) shall include a Request-URI set to the URI corresponding to the identity of the SDDM-S.
- b) shall include an Authorization header field with the "Bearer" authentication scheme set to an access token of the "bearer" token type as specified in IETF RFC 6750 [13];
- c) shall include an application/vnd.3gpp.seal-data-delivery-info+xml MIME body with an <establishment-req> element in the <data-delivery-info> root element which:
 - 1) shall include a <requestor-id> element set to the identity of the SDDM-C, e.g. unique client identifier;
 - 2) shall include a <sealdd-flow-id> element set to the identity of the SDDM flow used by the SDDM-C and SDDM-S to identify the application traffic;
 - 3) shall include a <server-id> element set to the information of the VAL server;
 - 4) shall include a <endpoint-id> element set to the information of the endpoint of the selected VAL server to which the SEALDD regular transmission connection establishment request has to be sent;
 - 5) may include a <VAL-service-id> element set to the VAL service identity of the vertical application;
 - 6) may include a <traffic-descriptor-info> element specifying the information of the traffic. In the <traffic-descriptor-info> element, the SDDM-C may include:
 - i) a <user-plane-address> child element specifying the identity of the IP address of the traffic;
 - ii) a <port-number> child element specifying the identity of the port number of the traffic;
 - iii) a <URL> child element specifying the address of a given unique resource on the Web for the traffic;
 - iv) a <transport-layer-protocol> child element specifying the transport layer protocol for the traffic; and
 - 7) may include an <identity> element with a <VAL-user-id> child element set to the identity of the VAL user or the identity of the SDDM-C acting as the VAL UE and performing the request; and