

ETSI TS 129 388 V15.1.0 (2019-10)



LTE;
V2X Control Function to Home Subscriber Server (HSS)
aspects (V4);
Stage 3
(3GPP TS 29.388 version 15.1.0 Release 15)



ReferenceRTS/TSGC-0429388vf10

KeywordsLTE

ETSI

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Foreword

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1 Scope

The present document describes the Diameter-based V4 interface between the V2X Control Function and the Home Subscriber Server (HSS) defined for V2X services.

This specification defines the Diameter application for V4 reference point between the V2X Control Function and the HSS. The interactions between the V2X Control Function and the HSS are specified.

The stage 2 description for V2X service features in EPS is specified in 3GPP TS 23.285 [2].

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.
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- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 23.285: "Architecture enhancements for V2X services; Stage 2".
- [3] IETF RFC 6733: "Diameter Base Protocol".
- [4] 3GPP TS 33.210: "3G Security; Network Domain Security; IP Network Layer Security".
- [5] IETF RFC 4960: "Stream Control Transmission Protocol".
- [6] 3GPP TS 29.229: "Cx and Dx interfaces based on the Diameter protocol".
- [7] IETF RFC 5234: "Augmented BNF for Syntax Specifications: ABNF".
- [8] 3GPP TS 23.003: "Numbering, addressing and identification".
- [9] 3GPP TS 29.228: "IP multimedia (IM) Subsystem Cx and Dx Interfaces; Signalling flows and Message Elements".
- [10] 3GPP TS 29.272: "Evolved Packet System; MME and SGSN Related Interfaces Based on Diameter Protocol".
- [11] 3GPP TS 29.329: "Sh Interface based on the Diameter protocol".
- [12] IETF RFC 7683: "Diameter Overload Indication Conveyance".
- [13] IETF RFC 7944: "Diameter Routing Message Priority".
- [14] 3GPP TS 23.007: "Restoration procedures".
- [15] 3GPP TS 29.344: "Proximity-services (ProSe) Function to Home Subscriber Server (HSS) aspects".
- [16] IETF RFC 8583: "Diameter Load Information Conveyance".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions 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].

example: text used to clarify abstract rules by applying them literally.

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].

ProSe	Proximity-based Services
V2X	Vehicle-to-Everything

4 General Description

4.1 Introduction

The V4 reference point between the V2X Control Function and the HSS is defined in the 3GPP TS 23.285 [2].

This document describes the V4 interface related procedures, message parameters and protocol specifications.

The V4 interface allows the V2X Control Function to retrieve V2X related subscription data in order to authorise access from the UE for V2X services.

5 Procedure Description

5.1 Introduction

This clause describes the Diameter-based V4 interface related procedures and information elements exchanged between the V2X Control Function and the HSS.

In the tables that describe the Information Elements transported by each Diameter command, each Information Element is marked as (M) Mandatory, (C) Conditional or (O) Optional in the "Cat." column. For the correct handling of the Information Element according to the category type, see the description detailed in clause 6 of the 3GPP TS 29.228 [9].

5.2 V2X Subscriber Information Retrieval

5.2.1 General

This procedure shall be used between the V2X Control Function and the HSS for authorization of the UE for V2X services. The procedure shall be invoked by the V2X Control Function and is used:

- to request V2X related subscription data.

This procedure is mapped to the commands ProSe-Subscriber-Information-Request/Answer (PIR/PIA) in the Diameter application specified in clause 6. Table 5.2.1-1 and table 5.2.1-2 detail the involved information elements.

Table 5.2.1-1: V2X Subscriber Information Retrieval Request

Information Element Name	Mapping to Diameter AVP	Cat.	Description
IMSI	User-Name (See IETF RFC 6733 [3])	M	This information element shall contain the user IMSI, formatted according to 3GPP TS 23.003 [8], clause 2.2.
Supported Features (See 3GPP TS 29.229 [6])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.

Table 5.2.1-2: V2X Subscriber Information Retrieval Answer

Information Element Name	Mapping to Diameter AVP	Cat.	Description
Result (See 6)	Result-Code / Experimental-Result	M	This IE shall contain the result of the operation. The Result-Code AVP shall be used to indicate success / errors as defined in the Diameter base protocol. The Experimental-Result AVP shall be used for V4 errors. This is a grouped AVP which shall contain the 3GPP Vendor ID in the Vendor-Id AVP, and the error code in the Experimental-Result-Code AVP. The following errors are applicable: - User Unknown - Unknown V2X Subscription - V2X Not Allowed
V2X Subscription Data (See 6.3.2)	V2X-Subscription-Data	C	This information element shall contain the V2X Subscription Data that gives the user permission to use V2X.
MSISDN (See 3GPP TS 29.329 [11])	MSISDN	C	This information element shall contain the user MSISDN, formatted according to 3GPP TS 29.329 [11]. It shall be present if available.
Visited PLMN Id (See 3GPP TS 29.272 [10])	Visited-PLMN-Id	C	This IE shall contain the MCC and the MNC of the PLMN where the UE is registered, see 3GPP TS 23.003 [8]. It shall be present if the UE is roaming in a PLMN different from the Home PLMN.
Supported Features (See 3GPP TS 29.229 [6])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.
Reset-IDs (See 3GPP TS 29.272 [10])	Reset-ID	O	The Reset-ID uniquely identifies a fallible resource in the HSS's realm on which the user (IMSI) depends. In the event of a restart of the fallible resource a Reset message containing the Reset-ID will exactly identify the impacted subscribers.

5.2.2 Detailed Behaviour of the V2X Control Function

The V2X Control Function shall make use of this procedure to request V2X related subscription data.

If the V2X Control Function retrieved the V2X related subscription data, the V2X Control Function shall perform the authorisation for V2X as described in the 3GPP TS 23.285 [2].

5.2.3 Detailed Behaviour of the HSS

When receiving a V2X Subscriber Information Retrieval Request the HSS shall check if the IMSI for whom data is requested exists in the HSS. If not, an Experimental-Result of DIAMETER_ERROR_USER_UNKNOWN shall be returned.

If the IMSI exists but there is not any V2X subscription data for the IMSI, the HSS shall return an Experimental-Result of DIAMETER_ERROR_UNKNOWN_V2X_SUBSCRIPTION.

If the UE is not allowed to use V2X in the visited PLMN, the HSS shall return an Experimental-Result of DIAMETER_ERROR_V2X_NOT_ALLOWED. Otherwise, the HSS shall return a Result-Code of DIAMETER_SUCCESS and shall store V2X Control Function identity (the V2X Control Function identity is received within the Origin-Host AVP) and download the V2X subscription data to the V2X Control Function. The HSS shall provide the Visited PLMN ID of where the UE is registered if the UE is roaming in a PLMN different from the Home PLMN.

5.3 Update V2X Subscriber Data

5.3.1 General

The Update V2X Subscriber Data procedure shall be used between the V2X Control Function and the HSS to update the subscriber related data downloaded by means of the V2X Subscriber Information Retrieval operation (see clause 5.2) and stored in the V2X Control Function.

It shall be used to update subscriber related data in the V2X Control Function due to administrative changes of the user data in the HSS, i.e. if the user was given a subscription and the subscription has changed. It shall be used at least to perform the following:

- update of all of V2X subscription data of the subscriber,
- update of a subset of the V2X subscription data of the subscriber,
- deletion of the V2X subscription data of the subscriber.

The procedure will also be triggered when the VPLMN has changed.

This procedure is mapped to the commands Update-ProSe-Subscriber-Data-Request/Answer (UPR/UPA) in the Diameter application specified in clause 6.

Table 5.3.1-1 specifies the involved information elements for the request.

Table 5.3.1-2 specifies the involved information elements for the answer.

Table 5.3.1-1: Update V2X Subscriber Data Request

Information element name	Mapping to Diameter AVP	Cat.	Description
IMSI	User-Name (See IETF RFC 6733 [3])	M	This information element shall contain the user IMSI, formatted according to 3GPP TS 23.003 [8], clause 2.2.
Supported Features (See 3GPP TS 29.229 [6])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.
V2X Subscription Data (See 6.3.2)	V2X-Subscription-Data	C	This information element shall contain the V2X Subscription Data that gives the user permission to use V2X service.
Visited PLMN Id (See 3GPP TS 29.272 [10])	Visited-PLMN-Id	C	This IE shall contain the MCC and the MNC of the PLMN where the UE is registered, see 3GPP TS 23.003 [8]. It shall be present if the UE is roaming in a PLMN different from the Home PLMN.
V2X Update Flags (See 6.3.4)	V2X-Update-Flags	M	This Information Element shall contain a bit mask. See clause 6.3.6 for the meaning of the bits.
Reset-IDs (See 3GPP TS 29.272 [10])	Reset-ID	O	The Reset-ID uniquely identifies a fallible resource in the HSS's realm on which the user (IMSI) depends. In the event of a restart of the fallible resource a Reset message containing the Reset-ID will exactly identify the impacted subscribers.

Table 5.3.1-2: Update V2X Subscriber Data Answer

Information element name	Mapping to Diameter AVP	Cat.	Description
Supported Features (See 3GPP TS 29.229 [6])	Supported-Features	O	If present, this information element shall contain the list of features supported by the origin host.
Result (See 6.4)	Result-Code / Experimental-Result	M	This IE shall contain the result of the operation. The Result-Code AVP shall be used to indicate success / errors as defined in the Diameter base protocol. The Experimental-Result AVP shall be used for V4 errors. This is a grouped AVP which shall contain the 3GPP Vendor ID in the Vendor-Id AVP, and the error code in the Experimental-Result-Code AVP. The following errors are applicable in this case: - User Unknown - Unknown V2X Subscription

5.3.2 Detailed behaviour of the V2X Control Function

When receiving an Update V2X Subscriber Data request, the V2X Control Function shall check whether the IMSI is known.

If it is not known, a result code of DIAMETER_ERROR_USER_UNKNOWN shall be returned.

If it is known, the V2X Control Function shall update the corresponding data according to the indication as sent in the request, and acknowledge the Update V2X Subscriber Data message by returning an Update V2X Subscriber Data Answer. If the V2X-Update-Flags indicates that the V2X subscription data is to be deleted, the V2X Control Function shall delete the associated V2X UE context if it has been stored before.

If the update of the subscription data succeeds in the V2X Control Function, the Result-Code shall be set to DIAMETER_SUCCESS.