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Contents

Foreword

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

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1 Scope

The present document describes the Diameter-based interfaces between the V2X Control Function in the HPLMN and the V2X Control Function in the VPLMN (V6 interface).

This specification defines the Diameter application for V6 reference points between the V2X Control Functions. The interactions between the V2X Control Functions 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.
- 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 23.285: "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] 3GPP TS 29.336: "Home Subscriber Server (HSS) diameter interfaces for interworking with packet data networks and applications".

[14] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging applications".

[15] IETF RFC 7944: "Diameter Routing Message Priority".

[16] 3GPP TS 29.388: "V2X Control Function to V2X Control Function to Home Subscriber Server (HSS) aspects (V4)".

[17] 3GPP TS 29.345: "Inter-Proximity-services (ProSe) Function signalling aspects".

[18] 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.

3.3 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 V6 reference point is defined between a V2X Control Function in the HPLMN and a V2X Control Function in the VPLMN.

The definition of the V6 reference points and related functionalities are given in 3GPP TS 23.285 [2].

As defined in 3GPP TS 23.285 [2], the V6 reference point is used for:

- HPLMN control of service authorization for V2X.

5 Procedure Description

5.1 Introduction

This clause describes the Diameter-based V6 interface related procedures and Information elements exchanged between functional entities.

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 Service Authorization

5.2.1 General

The V2X Service Authorization Procedure shall be used between the V2X Control Function in the HPLMN and the V2X Control Function in the VPLMN to obtain service authorization information for V2X services. The procedure shall be invoked by the V2X Control Function in the HPLMN of the UE and is used:

- to request service authorization information for V2X related to the UE from the V2X Control Function in the VPLMN;
- to provide the V2X Control Function in the VPLMN with the UE identity (IMSI or MSISDN) in order to allow to perform charging:

This procedure is mapped to the commands ProSe-Authorization-Request/Answer (PAR/PAA) in the Diameter application specified in clause 6.

Table 5.2.1-1 specifies the involved information elements for the request.

Table 5.2.1-2 specifies the involved information elements for the answer.

Table 5.2.1-1: V2X Service Authorization Request

Information element name	Mapping to Diameter AVP	Cat.	Description
UE Identity (See 3GPP TS 29.336 [13])	User-Identifier	M	This information element shall contain either the user IMSI, formatted according to 3GPP TS 23.003 [8], clause 2.2, or the user MSISDN, formatted according to 3GPP TS 29.329 [11].
PLMN Id (See 3GPP TS 29.272 [10])	Visited-PLMN-Id	M	This IE shall contain the PLMN-Id (3GPP TS 23.003 [8]) of the network in which the V2X Control Function is located.
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 Service Authorization Answer

Information element name	Mapping to Diameter AVP	Cat.	Description
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 V6 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 - Unauthorized Service - Unauthorized Service in this 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.
V2X Authorization Data (See 6.3.2)	V2X-Authorization-Data	C	This Information Element shall contain the V2X authorization information of the user. It shall be present if success is reported.

5.2.2 Detailed behaviour of the V2X Control Function in the HPLMN

The V2X Control Function in the HPLMN shall make use of this procedure to request service authorization information for V2X related to the UE from the V2X Control Function in the VPLMN. The V2X Control Function shall include in the request the UE identity (IMSI or MSISDN) and the PLMN-Id identifying the PLMN of the requesting V2X Control Function.

When receiving a V2X Service Authorization response from the V2X Control Function in the VPLMN, the V2X Control Function in the HPLMN shall check the result code. If it indicates SUCCESS, the V2X Control Function shall merge with its own policy.

5.2.3 Detailed behaviour of the V2X Control Function in the VPLMN

When receiving a V2X Service Authorization request, the V2X Control Function in the VPLMN shall, in the following order:

1. Check whether the UE Identity (IMSI or MSISDN) exists. If not, a Result Code of DIAMETER_ERROR_USER_UNKNOWN shall be returned.
2. Check whether V2X is authorized for this UE Identity. If not, a Result Code of DIAMETER_ERROR_UNAUTHORIZED_SERVICE shall be returned.

If there is an error in any of the above steps then the V2X Control Function shall stop processing the request and shall return the error code specified in the respective step.

If the V2X Control Function cannot fulfil the received request for reasons not stated in the above steps, e.g. due to a database error or any of the required actions cannot be performed, it shall stop processing the request and set the Result Code to "DIAMETER_UNABLE_TO_COMPLY".

Otherwise, when the UE is authorized to use V2X over PC5 or V2X over MBMS in this PLMN, the V2X Control Function shall include the V2X-Authorization-Data AVP in the response to return V2X permissions and the V2X Application Server information, and shall set the Result Code to "DIAMETER_SUCCESS".

6 Protocol Specification and Implementations

6.1 Introduction

6.1.1 Use of Diameter base protocol

The Diameter base protocol as specified in IETF RFC 6733 [3] shall apply except as modified by the defined support of the methods and the defined support of the commands and AVPs, result and error codes as specified in this specification. Unless otherwise specified, the procedures (including error handling and unrecognised information handling) shall be used unmodified.

6.1.2 Securing Diameter Messages

For secure transport of Diameter messages, see 3GPP TS 33.210 [4].

6.1.3 Accounting functionality

Accounting functionality (Accounting Session State Machine, related command codes and AVPs) shall not be used on the V6 interface.

6.1.4 Use of sessions

Between the V2X Control Functions, Diameter sessions shall be implicitly terminated. An implicitly terminated session is one for which the server does not maintain state information. The client shall not send any re-authorization or session termination requests to the server.

The Diameter base protocol includes the Auth-Session-State AVP as the mechanism for the implementation of implicitly terminated sessions.

The client (server) shall include in its requests (responses) the Auth-Session-State AVP set to the value NO_STATE_MAINTAINED (1), as described in IETF RFC 6733 [3]. As a consequence, the server shall not maintain