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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 PC4a interface between the Proximity-based Services (ProSe) Function and the Home Subscriber Server (HSS) defined for ProSe.

This specification defines the Diameter application for PC4a reference point between the ProSe Function and the HSS.The interactions between the ProSe Function and the HSS are specified.

The stage 2 description for Proximity-based Services (ProSe) features in EPS is specified in 3GPP TS 23.303 [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 23.303: "Proximity based services; Stage 2".

[3] Void.

[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] 3GPP TS 23.003: "Numbering, addressing and identification".

[8] IETF RFC 5234: "Augmented BNF for Syntax Specifications: ABNF".

[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 23.007: "Restoration procedures".

[12] 3GPP TS 29.329: "Sh Interface based on the Diameter protocol".

[13] void

[14] 3GPP TS 29.173: "Location Services (LCS); Diameter-based SLh interface for Control Plane LCS".

[15] IETF RFC 7683: "Diameter Overload Indication Conveyance".

[16] 3GPP TS 24.334: "Proximity-services (ProSe) User Equipment (UE) to ProSe function protocol aspects; Stage 3".

[17] 3GPP TS 24.333: "Proximity-services (ProSe) Management Objects (MO); Stage 3".

[18] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[19] 3GPP TS 32.251: "Telecommunication management; Charging management; Packet Switched (PS) domain charging".

[20] 3GPP TS 32.298: "Charging Management; CDR parameter description".

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

[22] IETF RFC 8583: "Diameter Load Information Conveyance".

[23] IETF RFC 6733: "Diameter Base Protocol".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 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 TR 21.905 [1].

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].

DRMP	Diameter Routing Message Priority
DSCP	Differentiated Services Code Point
ProSe	Proximity-based Services

4 General Description

4.1 Introduction

The PC4a reference point between the ProSe Function and the HSS is defined in the 3GPP TS 23.303 [2].

This document describes the PC4a interface related procedures, message parameters and protocol specifications.

The PC4a interface allows the ProSe Function to retrieve ProSe related subscription data in order to authorise access from the UE for ProSe.

5 Procedure Descriptions

5.1 Introduction

This clause describes the Diameter-based PC4a interface related procedures and information elements exchanged between the ProSe 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 ProSe Subscriber Information Retrieval

5.2.1 General

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

- to request ProSe 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. Tables 5.2.1-1 and 5.2.1-2 detail the involved information elements.

Table 5.2.1-1: ProSe Subscriber Information Retrieval Request

Information Element Name	Mapping to Diameter AVP	Cat.	Description
IMSI	User-Name (See IETF RFC 6733 [23])	M	This information element shall contain the user IMSI, formatted according to 3GPP TS 23.003 [7], 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: ProSe 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 (see IETF RFC 6733 [23]). The Experimental-Result AVP shall be used for PC4a 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 ProSe Subscription - ProSe Not Allowed
ProSe Subscription Data (See 6.3.2)	ProSe-Subscription-Data	C	This information element shall contain the ProSe Subscription Data that gives the user permission to use ProSe.
MSISDN (See 3GPP TS 29.329 [12])	MSISDN	C	This information element shall contain the user MSISDN, formatted according to 3GPP TS 29.329 [12]. 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 [7]. 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 ProSe Function

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

If the ProSe Function retrieved the ProSe related subscription data, the ProSe Function shall perform the authorisation for ProSe as described in the 3GPP TS 23.303 [2].

5.2.3 Detailed Behaviour of the HSS

When receiving a ProSe 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 ProSe subscription data for the IMSI, the HSS shall return an Experimental-Result of DIAMETER_ERROR_UNKNOWN_PROSE_SUBSCRIPTION.

If the UE is not allowed to use ProSe in the visited PLMN, the HSS shall return an Experimental-Result of DIAMETER_ERROR_PROSE_NOT_ALLOWED. Otherwise, the HSS shall return a Result-Code of DIAMETER_SUCCESS and shall store ProSe Function identity (the ProSe Function identity is received within the Origin-Host AVP) and download the ProSe subscription data to the ProSe 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 ProSe Subscriber Data

5.3.1 General

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

It shall be used to update subscriber related data in the ProSe 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 ProSe subscription data of the subscriber,
- update of a subset of the ProSe subscription data of the subscriber,
- deletion of the ProSe 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 ProSe Subscriber Data Request

Information element name	Mapping to Diameter AVP	Cat.	Description
IMSI	User-Name (See IETF RFC 6733 [23])	M	This information element shall contain the user IMSI, formatted according to 3GPP TS 23.003 [7], 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.
ProSe Subscription Data (See 6.3.2)	ProSe-Subscription-Data	C	This information element shall contain the ProSe Subscription Data that gives the user permission to use ProSe.
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 [7]. It shall be present if the UE is roaming in a PLMN different from the Home PLMN.
UPR Flags	UPR-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 ProSe 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 (see IETF RFC 6733 [23]). The Experimental-Result AVP shall be used for PC4a 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 ProSe Subscription

5.3.2 Detailed behaviour of the ProSe Function

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

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