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# Diameter Bulk Signaling draft-liebsch-dime-diameter-bulksig-00.txt

### Abstract

Diameter has received wide acceptance in large scale networking based on applications like Network Access Server and Credit Control. Different Standards Development Organizations consider Diameter as base protocol for extended applications, e.g. to push or pull information between a Diameter client and server without alignment of application states and identification schemes with the Session-ID concept as utilized by the Diameter protocol. The use of Diameter bulk signaling to enable transmission of multi-user context with a single or few messages for application state recovery after failure represents a further use case, which requires investigation on its impact to the Diameter base specification. This document analyzes various use cases for Diameter bulk signaling and assesses practices to enable operation of such use cases from extended or new applications.

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### **<u>1</u>**. Introduction

Diameter [RFC3588] has received wide acceptance in large scale networking, e.g. in the 3rd Generation Partnership Project's (3GPP) Evolved Packet Core (EPC) network architecture [3GPP-EPC], based on applications like Network Access Server [RFC4005] and Credit-Control [RFC4006]. Such deployments also depend on application level defined, interoperable resilience schemes. It has been noticed that these could potentially be extended beyond the original Diameter session model by the concept of bulk handling. In this manner the efficiency of signaling can be enhanced significantly, as multi-user context is being conveyed with the exchange of a single or few Diameter messages. Further deployment considers operation of stateless applications on top of Diameter to push or pull information between a client and a server, disregarding the stateful operation of the Diameter protocol.

3GPP studies approaches for bulk signaling, such as for bulk activation/de-activation and bulk registration update. A standardization group of the European Telecommunications Standards Institute (ETSI), which is named TISPAN (Telecoms and Internet Converged Services and Protocols for Advanced Network), relies on an application on top of Diameter to enforce policies via standardized network reference points under the control of a Resource and Admission Control Subsystem (RACS). The Diameter Session-ID is terminated in Diameter end-points (Server and Client) and is transparent to the policy control application [ETSI-183060].

The problem space for bulk signaling in Diameter can be separated into two components: Treatment of a particular user's Session-ID in Diameter messages, which carry a Session-ID AVP, and techniques to group multi-user context for bulk transmission with a single Diameter message.

Bulk signaling on top of stateless Diameter operation and messages, which do not carry a Session-ID, is feasible without breaking the Diameter Session concept. However, the use of Diameter messages which rely on the existence of a Diameter Session-ID Attribute Value Pair (AVP) as the meaning of the message is in the context of a particular user subscription, requires additional rules how to treat and interpret the Session-ID of such messages. The same applies to stateless applications, which operate on top of Diameter and use messages that comprise a Session-ID AVP.

This document analyzes various use cases where the Diameter protocol can provide a vehicle for stateless operation or for the signaling of bulk information. Practices for stateless operation and bulk signaling using Diameter are described, analyzed and assessed

according to the level they follow or break the Diameter base specification. Furthermore, approaches to group and identify multiuser context for bulk signaling in a single Diameter PDU are specified.

## 2. Conventions and Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

This document uses the terminology of [RFC3588].

### 3. Overview of Scope and Content

This initial version of the draft introduces the problem space when using Diameter for bulk signaling and operating stateless applications on top of Diameter. Furthermore, a first collection of items, which should be discussed and described in detail in future versions of this document, is summarized. Some items have been identified during preceding discussion with the DIME Working Group.

The following structure and content are proposed for a first revision of this document.

- Analysis of Use Cases -- This section describes various use cases, where the Diameter protocol is already used or considered as vehicle for bulk signaling or stateless applications. Of relevance appears the 3GPP's technical evaluation of bulk signaling for the recovery of application states after full or partial node failure [3GPP-PCRFFR]. Of similar relevance are 3GPP use cases for stateless push and pull of user context on the 3GPP reference point S6a [3GPP-DIAM]. Furthermore, the ETSI's TISPAN group specifies an application for policy enforcement under control of a RACS, whereas the identification of user subscriptions on application level are not linked to the user-specific Session-IDs as per Diameter protocol [ETSI-183060]. Further existing or new use cases can be described and analyzed.
- Practices for Bulk Signaling -- This section describes current practices and proposals for new mechanisms to enable Diameter bulk signaling as well as the operation of applications on top of Diameter, which require no or utilize unrelated identification of users. Current practices as per 3GPP and TISPAN are described. New proposals can be included for later assessment. Current practices include overloading as well as disregarding of Diameter Session-IDs.
- o Classification of Practices -- This section assesses the described practices and classifies them according to their deviation from the Diameter standard as per [RFC3588], their impact on implementation complexity, and further aspects. Recommendations may be derived to support current and future standards development organizations' activity in this context. Also, the IETF may identify suitable techniques or space for extensions to Diameter or its applications to enable target use cases for bulk signaling efficiently.
- Coding Options to Group Multi-User Context for bulk signaling The efficiency and the benefit when signaling multi-user context in a single or a few messages depends on how much and which data

can be shared between individual user sessions. A requirement for bulk signaling is that a receiver of bulk signaling can unambiguously resolve and assign attributes and values to the associated user. This section describes different options to group the context information of multiple users for being transmitted in a single message.

# **<u>4</u>**. Security Considerations

To be done.

## 5. IANA Considerations

So far, no requirement for IANA actions has been identified.

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### **<u>6</u>**. References

#### <u>6.1</u>. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", <u>BCP 14</u>, <u>RFC 2119</u>, March 1997.
- [RFC3588] Calhoun, P., Loughney, J., Guttman, E., Zorn, G., and J. Arkko, "Diameter Base Protocol", <u>RFC 3588</u>, September 2003.

### <u>6.2</u>. Informative References

[3GPP-DIAM]

"3GPP TS 29.272 Mobility Management Entity (MME) and Serving GPRS Support Node (SGSN) related interfaces based on Diameter protocol", <<u>http://www.3gpp.org</u>>.

# [3GPP-EPC]

"3GPP TS 23.401, General Packet Radio Service (GPRS) enhancements for Evolved Universal Terrestrial Radio Access Network (E-UTRAN) access", <<u>http://www.3gpp.org</u>>.

## [3GPP-PCRFFR]

"3GPP TS 29.816 3GPP TS 29.272 Study on PRCF Failure and Restoration", <<u>http://www.3gpp.org</u>>.

### [ETSI-183060]

"ETSI TS 183 060, Resources and Admission Control Subsystem (RACS); Re interface based on the Diameter protocol", <<u>http://www.etsi.org/deliver/etsi\_ts/</u> 183000\_183\_099/183060/>.

- [RFC4005] Calhoun, P., Zorn, G., Spence, D., and D. Mitton, "Diameter Network Access Server Application", <u>RFC 4005</u>, August 2005.
- [RFC4006] Hakala, H., Mattila, L., Koskinen, J-P., Stura, M., and J. Loughney, "Diameter Credit-Control Application", <u>RFC 4006</u>, August 2005.

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