

Diameter Maintenance and Extensions (DIME)  
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**The Diameter Load Balancing Application (DLBA)  
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Abstract

This specification documents a Diameter Load Balancing Application (DLBA), which uses the normal Diameter application approach for the capability negotiation, propagation and management of Diameter load information between Diameter nodes to enable load balancing of Diameter requests.

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**[1.](#) Introduction**

The problem statement for Diameter overload control can be found in [[I-D.ietf-dime-overload-reqs](#)]. It describes the lack of support of conveying load information to enable load balancing of Diameter requests in case Diameter servers become overload and the inability of Diameter servers to communicate with Diameter clients to reject requests when they become severely overloaded.

[[I-D.tschofenig-dime-overload-arch](#)] goes a step further in providing an outline of architectural principles and an information model.

This document specifies Diameter Load Balancing Application (DLBA), which uses the AVPs defined in [[I-D.tschofenig-dime-overload-arch](#)]. As the name indicates, this document focuses on load balancing.

The Diameter Load Balancing Application (DLBA) typically runs between a load balancer and a Diameter server. The load balancer may act as a DLBA client and the Diameter server as a DLBA server but the roles may also be reversed without loss in protocol functionality since Diameter is flexible as a protocol. There may be zero or more intermediate Diameter agents on the path between the DLBA client and the DLBA server. Understanding the DLBA functionality is not expected from relays and redirect agents.

The main usage for this application is within a single realm, as shown in Figure 2 of [[I-D.tschofenig-dime-overload-arch](#)], where a load balancer distributes incoming Diameter requests to different Diameter servers. Designing the load balancing functionality as a

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stand-alone application prevents Diameter servers and load balancers to adjust their information exchange frequency to meet the needs of the network administrator regardless of remaining Diameter application traffic.

## 2. Requirements

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 [RFC 2119](#) [[RFC2119](#)].

## 3. Commands

The DLBA-Report-Request message is used to request load information.

```
<DLBA-Report-Request> ::= < Diameter Header: TBD2, REQ, PXY >
    < Session-Id >
    { Auth-Application-Id }
    { Origin-Host }
    { Origin-Realm }
    { Destination-Realm }
    { Auth-Request-Type }
    { Destination-Host }
    [ Auth-Session-State ]
    * [ Class ]
    [ Origin-State-Id ]
    * [ Proxy-Info ]
    * [ Route-Record ]

    [ Supported-Features ]
    [ Sending-Rate ]
    [ Load-Info ]
    * [ AVP ]
```

The DLBA-Report-Answer message is used as a response to the DLBA-Report-Request. The message MAY piggyback load information in order to avoid unnecessary DLBA-Report-Request messages in the reverse direction.

```
<DLBA-Report-Answer> ::= < Diameter Header: TBD2, PXY >
    < Session-Id >
    { Result-Code }
    { Origin-Host }
    { Origin-Realm }
    [ Auth-Session-State ]
    * [ Class ]
    [ Error-Message ]
```



```

    [ Error-Reporting-Host ]
    [ Failed-AVP ]
    [ Origin-State-Id ]
    * [ Redirect-Host ]
    [ Redirect-Host-Usage ]
    [ Redirect-Max-Cache-Time ]
    * [ Proxy-Info ]

    [ Supported-Features ]
    [ Sending-Rate ]
    [ Load-Info ]
    * [ AVP ]
    
```

Diameter is flexible from a message handling point of view. Therefore, any the DLBA capable Diameter node, such as a load balancer or a Diameter server, MAY initiate a DLBA-Report-Request at any given time. The receiver of the DLBA-Report-Request responds with a DLBA-Report-Answer and includes the Result-Code AVP indicating whether it could honor the action/report in the request. The DLBA-Report-Answer SHOULD also piggyback load information.

A DLBA client MUST set the Auth-Session-State AVP to the value NO\_STATE\_MAINTAINED and SHOULD include load information into the DLBA-Report-Request message, if available. The DLBA-Report-Response message MUST contain the Auth-Session-State AVP set to value NO\_STATE\_MAINTAINED.

**4. Attribute Value Pair Flag Rules**

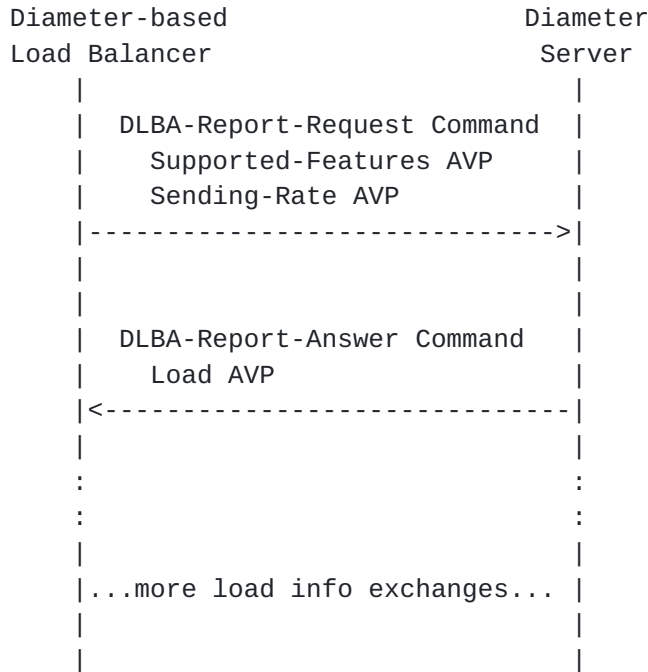
Attribute Name	AVP Code	Defined in	Value Type	AVP flag rules
Load-Info	TBD	RFC XYZ	Grouped	M   V
Load	TBD	RFC XYZ	Unsigned32	M   V
Supported-Features	TBD	RFC XYZ	Uint64	M   V
Sending-Rate	TBD	RFC XYZ	Unsigned32	M   V

All AVPs are defined in [[I-D.tschofenig-dime-overload-arch](#)].



**5. Example**

This example shows the simplicity of the DLBA application. Here the load balancer initiates the DLBA exchange and solicits load information from a Diameter server. The rate at which these messages are exchange depend on the Sending-Rate AVP. The Diameter server may, however, at any time send an unsolicited DLBA-Report-Request message in case the load situation changes unexpectedly.



**6. Transport Considerations**

In case of Stream Control Transmission Protocol (SCTP) transport, it is RECOMMENDED to mark Diameter packets using the DLBA defined SCTP Payload Protocol Identifier (PPID) TBD1. The PPID MAY be used by intermediating network nodes or agents to peek into SCTP message and find out that this is about overload control. Such information can be used for prioritizing SCTP packet handling as an example.

**7. IANA Considerations**

**7.1. Application Identifiers**

This specification reserves a new Diameter Application-ID TBD14 for the Diameter Load Balancing Application (DLBA) from the 'Authentication, Authorization, and Accounting (AAA) Parameters' Application IDs registry.





**7.2. SCTP Payload Protocol Identifier**

[Section 6](#) reserves a new SCTP Payload Protocol Identifier for the DLBA application usage. The value is reserved from the existing SCTP Payload Protocol Identifiers registry.

**7.3. Command Codes**

Two command codes are defined in [Section 3](#). The DLBA-Report-Request Command Code is TBD and the DLBA-Report-Answer Command Code is TBD. Both are allocated from the 'Authentication, Authorization, and Accounting (AAA) Parameters' Command Codes registry.

**7.4. Result-Code Values**

This specification adds Diameter Overload Control Application specific Permanent Failure codes from the 'Authentication, Authorization, and Accounting (AAA) Parameters' Result-Code AVP Values (code 268) - Permanent Failure registry:

AVP Values	Attribute Name	Reference
5xxx	DIAMETER_RATE_TOO_BIG	RFCxxxx
5xxx	DIAMETER_NO_COMMON_FEATURES	RFCxxxx

**8. Security Considerations**

This Diameter application uses the Diameter [[RFC6733](#)] security mechanisms and, what is more important, is primarily used within a single realm to allow a load balancer to obtain load information from Diameter servers for distributing Diameter requests depending on the utilization of these servers. Passing load information beyond an administrative domain is possible with Diameter but not advisable to avoid leaking valuable information to potentially untrustworthy parties.

**9. Acknowledgements**

This document re-uses the design from the Diameter-OVL application.

**10. References**



### **10.1. Normative References**

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC6733] Fajardo, V., Arkko, J., Loughney, J., and G. Zorn, "Diameter Base Protocol", [RFC 6733](#), October 2012.

### **10.2. Informative References**

- [I-D.ietf-dime-overload-reqs]  
McMurry, E. and B. Campbell, "Diameter Overload Control Requirements", [draft-ietf-dime-overload-reqs-07](#) (work in progress), June 2013.
- [I-D.tschofenig-dime-overload-arch]  
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