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The Diameter Capabilities Update Application

Abstract

This document defines a new Diameter application and associated Command Codes. The Capabilities Update application is intended to allow the dynamic update of certain Diameter peer capabilities while the peer-to-peer connection is in the open state.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc6737.

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1. Introduction

Capabilities exchange is an important component of the Diameter base protocol [RFC6733], allowing peers to exchange identities and Diameter capabilities (protocol version number, supported Diameter applications, security mechanisms, etc.). As defined in RFC 3588, however, the capabilities exchange process takes place only once, at the inception of a transport connection between a given pair of peers. Therefore, if a peer's capabilities change (due to a software update, for example), the existing connection(s) must be torn down (along with all of the associated user sessions) and restarted before the modified capabilities can be advertised.

This document defines a new Diameter application intended to allow the dynamic update of a subset of Diameter peer capabilities over an existing connection. Because the Capabilities Update application specified herein operates over an existing transport connection, modification of certain capabilities is prohibited. Specifically, modifying the security mechanism in use is not allowed; if the security method used between a pair of peers is changed, the affected connection MUST be restarted.

2. Specification of 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. Diameter Protocol Considerations

This section details the relationship of the Diameter Capabilities Update application to the Diameter base protocol.

This document specifies Diameter Application-Id 10. Diameter nodes conforming to this specification MUST advertise support by including the value 10 in the Auth-Application-Id of the Capabilities-Exchange-Request (CER) and Capabilities-Exchange-Answer (CEA) commands [RFC6733].

4. Capabilities Update

When the capabilities of a Diameter node conforming to this specification change, the node MUST notify all of the nodes with which it has an open transport connection and which have also advertised support for the Capabilities Update application using the Capabilities-Update-Request (CUR) message (Section 4.1.1). This message allows the update of a peer's capabilities (supported Diameter applications, etc.).

A Diameter node only issues a given command to those peers that have advertised support for the Diameter application that defines the command; a Diameter node must cache the supported applications in order to ensure that unrecognized commands and/or Attribute-Value Pairs (AVPs) are not unnecessarily sent to a peer.

The receiver of the CUR MUST determine common applications by computing the intersection of its own set of supported Application Ids against all of the Application-Id AVPs (Auth-Application-Id, Acct-Application-Id, and Vendor-Specific-Application-Id) present in the CUR. The value of the Vendor-Id AVP in the Vendor-Specific-Application-Id MUST NOT be used during computation.

If the receiver of a CUR does not have any applications in common with the sender, then it MUST return a Capabilities-Update-Answer (CUA) (Section 4.1.2) with the Result-Code AVP set to DIAMETER_NO_COMMON_APPLICATION [RFC6733], and it SHOULD disconnect the transport-layer connection. However, if active sessions are using the connection, peers MAY delay disconnection until the sessions can be redirected or gracefully terminated. Note that receiving a CUA from a peer advertising itself as a relay (see [RFC6733], Section 2.4) MUST be interpreted as having common applications with the peer.

As for CER/CEA messages, the CUR and CUA messages MUST NOT be proxied, redirected, or relayed.

Even though the CUR/CUA messages cannot be proxied, it is still possible for an upstream agent to receive a message for which there are no peers available to handle the application that corresponds to the Command Code. This could happen if, for example, the peers are too busy or down. In such instances, the 'E' bit MUST be set in the answer message with the Result-Code AVP set to DIAMETER_UNABLE_TO_DELIVER to inform the downstream peer to take action (e.g., re-routing requests to an alternate peer).

4.1. Command Code Values

This section defines Command Code [RFC6733] values that MUST be supported by all Diameter implementations conforming to this specification. The following Command Codes are defined in this document: Capabilities-Update-Request (CUR, Section 4.1.1), and Capabilities-Update-Answer (CUA, Section 4.1.2). The Diameter Command Code Format (CCF) ([RFC6733], Section 3.2) is used in the definitions.

4.1.1. Capabilities-Update-Request

The Capabilities-Update-Request (CUR), indicated by the Command Code set to 328 and the Command Flags' 'R' bit set, is sent to update local capabilities. Upon detection of a transport failure, this message MUST NOT be sent to an alternate peer.

When Diameter is run over the Stream Control Transmission Protocol (SCTP) [RFC4960], which allows connections to span multiple interfaces and multiple IP addresses, the Capabilities-Update-Request message MUST contain one Host-IP-Address AVP for each potential IP address that may be locally used when transmitting Diameter messages.

Message Format

```
   <CUR> ::= < Diameter Header: 328, REQ >
             { Origin-Host }
             { Origin-Realm }
           1* { Host-IP-Address }
             { Vendor-Id }
             { Product-Name }
             [ Origin-State-Id ]
            * [ Supported-Vendor-Id ]
            * [ Auth-Application-Id ]
            * [ Acct-Application-Id ]
            * [ Vendor-Specific-Application-Id ]
             [ Firmware-Revision ]
            * [ AVP ]
```

4.1.2. Capabilities-Update-Answer

The Capabilities-Update-Answer, indicated by the Command Code set to 328 and the Command Flags' 'R' bit cleared, is sent in response to a CUR message.

Message Format

```
<CUA> ::= < Diameter Header: 328 >
          { Origin-Host }
          { Origin-Realm }
          { Result-Code }
          [ Error-Message ]
        * [ AVP ]
```

5. Security Considerations

The security considerations applicable to the Diameter base protocol [RFC6733] are also applicable to this document.

6. IANA Considerations

This section explains the criteria to be used by the IANA for assignment of numbers within namespaces used within this document.

6.1. Application Identifier

This specification assigns the value 10 (Diameter Capabilities Update) from the Application Identifiers namespace [RFC6733]. See Section 3 for the assignment of the namespace in this specification.

6.2. Command Codes

This specification assigns the value 328 (Capabilities-Update-Request/Capabilities-Update-Answer (CUR/CUA)) from the Command Codes namespace [RFC6733]. See Section 4.1 for the assignment of the namespace in this specification.

7. Contributors

This document is based upon work done by Tina Tsou.

8. Acknowledgements

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9. References

9.1. 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.

9.2. Informative References

[RFC4960] Stewart, R., "Stream Control Transmission Protocol", RFC 4960, September 2007.

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