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T. Tsou
Huawei Technologies (USA)
R. Hao
Comcast Cable
T. Taylor, Ed.
Huawei Technologies

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Realm-Based Redirection In Diameter
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Abstract

The Diameter protocol allows a Diameter redirect agent to specify one or more individual hosts to which a Diameter message may be redirected by an upstream Diameter node. However, in some circumstances an operator may wish to redirect messages to an alternate domain without specifying individual hosts. This document specifies a mechanism by which this can be achieved. New applications may incorporate this capability by reference to the present document.

This memo updates Sections 6.13 and 6.14 of RFC6733 with respect to the usage of the Redirect-Host-Usage and Redirect-Max-Cache-Time AVPs.

Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

The usual redirect indication, as described in Section 6.1.8 and Sections 6.12-6.14 of [RFC6733], returns one or more individual host names to the upstream Diameter node. However, consider the case where an operator has offered a specific service but no longer wishes to do so. The operator has arranged for an alternative domain to provide the service. To aid in the transition to the new arrangement, the original operator maintains a redirect server to indicate the alternative destination to upstream nodes. However, the original operator has no interest in configuring a list of hosts in the alternative operator's domain, and would prefer simply to provide redirect indications to the domain as a whole.

As an example of another use case, consider a 3GPP IMS deployment where subscriber data is provisioned in a geo-redundant Home Subscriber Server (HSS) cluster for reliability. Each Application Server (AS) needs to maintain redundant Diameter Sh links to both cluster nodes for scalability. It is preferable that the AS should go to the local HSS cluster node when it is available. It would be useful for a cluster node to be able to redirect an AS request to its partner node in the cluster without specifying the individual Sh link to that alternate node. This could be accomplished by identifying each cluster node with a separate realm and individual Sh links with separate servers, and redirecting on the basis of realm rather than individual server. There can be multiple geo-redundant HSS clusters, in which case the Subscriber Location Function (SLF) performs the redirection.

Within this specification, the term "realm-based redirection" is used to refer to a mode of operation where the redirect indication specifies a realm and the upstream Diameter node reroutes the message to the realm rather than an individual host.

1.1. Requirements Language

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].

2. Support of Realm-Based Redirection Within Applications

Because realm-based redirection is not part of base Diameter behaviour, support for realm-based redirection by the agent MUST be specified as part of particular applications. In this way, Diameter's capability negotiation mechanism can be used indirectly to indicate support for realm-based redirection by indicating support

for the applications concerned. Designers of new applications can incorporate the mechanism specified here into their application by normative reference to this document.

The result of making realm-based redirection an application-specific behaviour is that it cannot be performed by a redirect agent, but instead must be performed by a Diameter server. However, despite the change in executing role, the behaviour itself is a slight modification of the behaviour of a redirect agent as described in Section 2.8.3 of [RFC6733].

An application can specify that realm-based redirection operates only on the initial message of a session, or on any message of a session. In the former case, existing sessions will not be disrupted by the deployment of realm-based redirection. In the latter case, existing sessions will be disrupted if they are stateful.

3. Realm-Based Redirection

This section specifies an extension to [RFC6733] to achieve realm-based redirection. The elements of this solution are:

- a new result code, DIAMETER_REALM_REDIRECT_INDICATION (3xxx TBD);
- one new attribute-value pair (AVP), Redirect-Realm; and
- associated behaviour at Diameter nodes implementing this specification. This behaviour includes the optional use of the Redirect-Host-Usage and Redirect-Max-Cache-Time AVPs. In this document, these AVPs apply to the peer discovered by a node acting on the server's response, an extension to their normal usage as described in Sections 6.13 and 6.14 of [RFC6733].

Section 3.2.2 and Section 3.2.3 describe how a proxy or client may update its routing table for the application and initial realm, as a result of selecting a peer in the new realm. Note that as a result, the proxy or client will automatically route subsequent requests for that application to the new realm (with the possible exception of requests within sessions already established with the initial realm) until the cached routing entry expires. This should be borne in mind if the rerouting is intended to be temporary.

3.1. Configuration of the Redirecting Server

A Diameter server MUST be configured as follows to execute realm-based redirection:

- configured with an application that incorporates realm-based redirection;
- the Local Action field of the routing table described in Section 2.7 of [RFC6733] is set to LOCAL;
- an application-specific field is set to indicate that the required local action is to perform realm-based redirection;
- an associated application-specific field is configured with the identities of one or more realms to which the request should be redirected.

3.2. Behaviour of Diameter Nodes

3.2.1. Behaviour at the Redirecting Server

As mentioned in Section 2, an application incorporating realm-based redirection may specify that redirection applies for any request or only for the initial request of a session (i.e., to prevent disruption of established sessions).

If a server configured as described in Section 3.1 receives a request to which realm-based redirection applies, the server MUST reply with an answer message with the 'E' bit set, while maintaining the Hop-by-Hop Identifier in the header. The server MUST include the Result-Code AVP set to DIAMETER_REALM_REDIRECT_INDICATION. The server MUST also include the alternate realm identifier(s) with which it has been configured, each in a separate Redirect-Realm AVP instance.

The server MAY include a copy of the Redirect-Host-Usage AVP, which SHOULD be set to REALM_AND_APPLICATION. If this AVP is added, the Redirect-Max-Cache-Time AVP MUST also be included. Note that these AVPs apply to the peer discovered by a node acting on the server's response, as described in the next section. This is an extension of their normal usage as described by Sections 6.13 and 6.14 of [RFC6733].

> If the redirected request contained a Destination-Host AVP, that AVP is ignored by the server.

3.2.2. Proxy Behaviour

A proxy conforming to this specification that receives an answer message with the Result-Code AVP set to DIAMETER_REALM_REDIRECT_INDICATION MAY attempt to reroute the original request to a server in a realm identified by a Redirect-Realm AVP instance in the answer message, or MAY simply forward the

message to the upstream peer. If it chooses to reroute the request, it MUST take the following steps:

1. Select a specific realm from amongst those identified in instances of the Redirect-Realm AVP in the answer message.

2. If successful, locate and establish a route to a peer in the realm given by the Redirect-Realm AVP, using normal discovery procedures as described in Section 5.2 of [RFC6733].

3. If again successful:

   A. update its cache of routing entries for the realm and application to which the original request was directed, taking into account the Redirect-Host-Usage and Redirect-Max-Cache-Time AVPs, if present in the answer.

   B. Remove the Destination-Host (if present) and Destination-Realm AVPs from the original request and add a new Destination-Realm AVP containing the realm selected in the initial step.

   C. Forward the modified request.

4. If either of the preceding steps 2-3 fail and additional realms have been identified in the original answer, select another instance of the Redirect-Realm AVP in that answer and repeat steps 2-3 for the realm that it identifies.

3.2.3. Client Behaviour

A client conforming to this specification MUST be prepared to receive either an answer message containing a Result-Code AVP set to DIAMETER_REALM_REDIRECT_INDICATION, or, as the result of proxy action, some other result from a realm differing from the one to which it sent the original request. In the case where it receives DIAMETER_REALM_REDIRECT_INDICATION, the client SHOULD follow the same steps prescribed in the previous section for a proxy, in order both to update its routing table and to obtain service for the original request.

3.3. The Redirect-Realm AVP

The Redirect-Realm AVP (code TBD) is of type DiameterIdentity. It specifies a realm to which a node receiving a redirect indication containing the result code value DIAMETER_REALM_REDIRECT_INDICATION and the Redirect-Realm AVP SHOULD route the original request. The M flag for the Redirect-Realm AVP MUST be set, and the V flag MUST NOT

be set.

3.4. DIAMETER_REDIRECT_INDICATION Error Code

The DIAMETER_REDIRECT_INDICATION (3xxx TBD) error code indicates that a server has determined that the request within an application supporting realm-based redirection could not be satisfied locally and the initiator of the request SHOULD direct the request directly to a peer within a realm that has been identified in the response. When set, the Redirect-Realm AVP MUST be present.

4. Security Considerations

Realm-based redirection implies a potential change in business relationships, the authorization checks described in Section 2.9 of [RFC6733].

5. IANA Considerations

This specification adds a new AVP code [TBD] Redirect-Realm in the AVP Code registry under Authentication, Authorization, and Accounting (AAA) Parameters.

This specification allocates a new Result-Code value DIAMETER_REALM_REDIRECT_INDICATION (3xxx TBD) in the Result-Code AVP Values (code 268) - Protocol Errors registry under Authentication, Authorization, and Accounting (AAA) Parameters.

6. Acknowledgements

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7. Normative References

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Authors' Addresses

Tina Tsou
Huawei Technologies (USA)
2330 Central Expressway
Santa Clara, CA 95050
USA

Phone: +1 408 330 4424
Email: Tina.Tsou.Zouting@huawei.com
URI: http://tinatsou.weebly.com/contact.html

Ruibing Hao
Comcast Cable
One Comcast Center
Philadelphia, PA 19103
USA

Phone: +1 215 286 3991(O)
Email: Ruibing_Hao@cable.comcast.com

Tom Taylor (editor)
Huawei Technologies
Ottawa
Canada

Email: tom.taylor.stds@gmail.com