

Sipping
Internet-Draft
Expires: October 21, 2006

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April 19, 2006

**Registration Event Package Extension for Session Initiation Protocol
(SIP) Globally Routeable User Agent URIs (GRUUs)
draft-ietf-sipping-gruu-reg-event-04**

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Abstract

This draft defines an extension to [RFC 3680](#) [2] for representing the GRUU associated with a Contact.

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1. Introduction

The addition of GRUU (Globally Routable Unique URI) support to the REGISTER message, defined in [3], introduces another element of state to the registrar. Subscribers to the registration event package [2] will sometimes have need for the new state.

For example, the Welcome Notices example in [2] will only operate correctly if the contact address in the reg event notification is reachable by the sender of the welcome notice. When the registering device is using the GRUU extension, it is likely that the registered contact address will not be globally addressable, and the GRUU should be used as the target address for the MESSAGE.

Another case where this feature may be helpful is within the 3GPP IP Multimedia Subsystem (IMS). IMS employs a technique where a REGISTER of a contact address to one Address of Record (AOR) causes the implicit registration of the same contact to other associated AORs. If a GRUU is requested and obtained as part of the registration request, then additional GRUUs will also be needed for the implicit registrations. While assigning the additional GRUUs is straightforward, informing the registering UA of them is not. In IMS, UAs typically subscribe to the 'reg' event, and subscriptions to the 'reg' event for an AOR result in notifications containing registration state for all the associated AORs. The proposed extension provides a way to easily deliver the GRUUs for the associated AORs.

The reg event package has provision for including extension elements within the <contact> element. This document defines a new element that may be used in that context to deliver the GRUU corresponding to the contact.

2. 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 RFC 2119. [1]

3. Description

A new element (<gruu>) is defined which contains a GRUU.

This optional element is included within the body of a NOTIFY for the "reg" event package when a GRUU is associated with the contact. The contact URI and the GRUU are then both available to the watcher.

4. Notifier Processing of SUBSCRIBE Requests

Unchanged from [RFC 3680](#) [2].

5. Notifier Generation of NOTIFY Requests

A notifier for the "reg" event package [2] SHOULD include the <gruu> element when a contact has an Instance ID and a GRUU is associated with the combination of the AOR and the Instance ID. When present, the <gruu> element MUST be positioned as an instance of the <any> element within the <contact> element.

6. Subscriber Processing of NOTIFY Requests

When a subscriber receives a "reg" event notification [2] with a <contact> containing a <gruu>, it SHOULD use the GRUU in preference to the corresponding <uri> when sending SIP requests to the contact.

Subscribers that are unaware of this extension will, as required by [2], ignore the <gruu> element.

7. Sample reginfo Document

Note: This example and others in the following section are indented for readability by the addition of a fixed amount of whitespace to the beginning of each line. This whitespace is not part of the example. The conventions of [8] are used to describe representation of long message lines.

The following is an example registration information document including the new element:


```
<?xml version="1.0"?>
  <reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
    xmlns:gr="urn:ietf:params:xml:ns:gruuinfo"
    version="0" state="full">
    <registration aor="sip:user@example.com" id="as9"
      state="active">
      <contact id="76" state="active" event="registered"
        duration-registered="7322"
        q="0.8">
        <uri>sip:user@192.0.2.1</uri>
      <allOneLine>
        <unknown-param name="+sip.instance">
          "<urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>";"
        </unknown-param>
      </allOneLine>
      <allOneLine>
        <gr:gruu>sip:user@example.com
        ;opaque=hha9s8d-999a</gr:gruu>
      </allOneLine>
    </contact>
  </registration>
</reginfo>
```

8. Examples

Note: In the following examples the SIP messages have been simplified, removing headers that are not pertinent to the example.

8.1. Example: Welcome Notice

Consider the Welcome Notices example in [2]. When the application server receives a notification of a new registration containing the reginfo shown in [Section 7](#) it should address messages using the contained GRUU as follows:

```
MESSAGE sip:user@example.com;opaque=hha9s8d-999a SIP/2.0
To: <sip:user@example.com>
From: "SIPland Notifier" <sip:notifier@example.com>
Content-Type: text/plain
Content-Length: ...
```

```
Welcome to SIPland!
Blah, blah, blah.
```


8.2. Example: Implicit Registration

In an 3GPP IMS setting, a UA may send a single register message, requesting assignment of a GRUU, as follows:

```
REGISTER sip:example.net SIP/2.0
From: <sip:user_aor_1@example.net>;tag=5ab4
To: <sip:user_aor_1@example.net>
Contact: <sip:ua.example.com>
       ;expires=3600
       ;+sip.instance="urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6"
Supported: path, gruu
Content-Length: 0
```

The response reports success of the registration and returns the GRUU assigned for the combination of AOR, Instance ID, and Contact. It also indicates (via the P-Associated-URI header [6]) that there are two other associated AORs that may have been implicitly registered using the same contact. But each of those implicitly registered AORs will have had a unique GRUU assigned, and there is no way defined to report that assignment in the response.

```
SIP/2.0 200 OK
From: <sip:user_aor_1@example.net>;tag=5ab4
To: <sip:user_aor_1@example.net>;tag=373392
Path: <sip:proxy.example.net;lr>
Service-Route: <sip:proxy.example.net;lr>
Contact: <sip:ua.example.com>
       ;expires=3600
       ;+sip.instance="urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6"
       ;gruu="sip:user_aor_1@example.net;opaque=hha9s8d-999a"
P-Associated-URI: <sip:user_aor_2@example.net>,
                  <sip:+358504821437@example.net;user=phone>
Content-Length: 0
```

The UA then subscribes to the 'reg' event package as follows:

```
SUBSCRIBE sip:user_aor_1@example.net SIP/2.0
From: <sip:user_aor_1@example.net>;tag=27182
To: <sip:user_aor_1@example.net>
Route: <sip:proxy.example.net;lr>
Event: reg
Expires: 3600
Accept: application/reginfo+xml
Contact: <sip:user_aor_1@example.net;opaque=hha9s8d-999a>
Content-Length: 0
```

(The successful response to the subscription is not shown.) Once the

subscription is established an initial notification is sent giving registration status. In IMS deployments the response includes, in addition to the status for the requested URI, the status for the other associated URIs.

```
NOTIFY sip:user_aor_1@example.net;opaque=hha9s8d-999a SIP/2.0
From: <sip:user_aor_1@example.net>;tag=27182
To: <sip:user_aor_1@example.net>;tag=262281
Subscription-State: active;expires=3600
Event: reg
Content-Type: application/reginfo+xml
Contact: <sip:registrar.example.net>
Content-Length: (...)
```

```
<?xml version="1.0"?>
  <reginfo xmlns="urn:ietf:params:xml:ns:reginfo"
    xmlns:gr="urn:ietf:params:xml:ns:gruuinfo"
    version="1" state="full">
    <registration aor="sip:user_aor_1@example.net" id="a7"
      state="active">
      <contact id="92" state="active" event="registered"
        duration-registered="1" expires="3599">
        <uri>
          sip:ua.example.com
        </uri>
      </contact>
    </registration>
    <registration aor="sip:user_aor_2@example.net" id="a8"
      state="active">
      <contact id="93" state="active" event="created"
        duration-registered="1" expires="3599">
        <uri>
          sip:ua.example.com
        </uri>
      </contact>
    </registration>
  </reginfo>
  <allOneLine>
    <unknown-param name="+sip.instance">
      "<urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>";
    </unknown-param>
  </allOneLine>
  <allOneLine>
    <gr:gruu>sip:user_aor_1@example.net
    ;opaque=hha9s8d-999a</gr:gruu>
  </allOneLine>
  <allOneLine>
    <unknown-param name="+sip.instance">
      "<urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>";
    </unknown-param>
  </allOneLine>
```



```
<allOneLine>
    <gr:gruu>sip:user_aor_2@example.net
;opaque=hha9s8d-999b</gr:gruu>
</allOneLine>
    </contact>
</registration>
<registration
    aor="sip:+358504821437@example.net;user=phone"
    id="a9"
    state="active">
    <contact id="94" state="active" event="created"
    duration-registered="1" expires="3599">
        <uri>
            sip:ua.example.com
        </uri>
</allOneLine>
    <unknown-param name="+sip.instance">
"<urn:uuid:f81d4fae-7dec-11d0-a765-00a0c91e6bf6>";
</unknown-param>
</allOneLine>
<allOneLine>
    <gr:gruu>sip:+358504821437@example.net;user=phone
;opaque=hha9s8d-999c</gr:gruu>
</allOneLine>
    </contact>
</registration>
</reginfo>
```

The status indicates that the associated URIs all have the same contact registered. It also includes the unique GRUU that has been assigned to each. The UA may then retain those GRUUs for use when establishing dialogs using the corresponding AORs.

9. XML Schema Definition

A GRUU document is an XML document that MUST be well-formed and SHOULD be valid. GRUU documents MUST be based on XML 1.0 and MUST be encoded using UTF-8. This specification makes use of XML namespaces for identifying GRUU documents. The namespace URI for elements defined for this purpose is a URN, using the namespace identifier 'ietf'. This URN is:

urn:ietf:params:xml:ns:gruuinfo


```
BEGIN
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:ietf:params:xml:ns:gruuinfo"
  elementFormDefault="qualified"
  attributeFormDefault="unqualified"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tns="urn:ietf:params:xml:ns:gruuinfo">
  <xs:element name="gruu" type="xs:anyURI"/>
</xs:schema>
END
```

10. IANA Considerations

There are two IANA considerations associated with this specification.

10.1. URN Sub-Namespace Registration

This section registers a new XML namespace, per the guidelines in [4].

URI: The URI for this namespace is urn:ietf:params:xml:ns:gruuinfo

Registrant Contact: IETF, SIPING working group, <sipping@ietf.org>, Paul Kyzivat <pkyzivat@cisco.com>

XML:

```
BEGIN
<?xml version="1.0"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML Basic 1.0//EN"
  "http://www.w3.org/TR/xhtml-basic/xhtml-basic10.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
  <meta http-equiv="content-type"
    content="text/html; charset=iso-8859-1"/>
  <title>Reg Information GRUU Extension Namespace</title>
</head>
<body>
  <h1>Namespace for Reg Information GRUU Extension</h1>
  <h2>urn:ietf:params:xml:ns:gruuinfo</h2>
  <p>See <a href="[URL of published RFC]">RFCXXXX [[NOTE
TO RFC-EDITOR/IANA: Please replace XXXX with the RFC Number of
this specification]]</a>.</p>
</body>
</html>
END
```


10.2. XML Schema Registration

This section registers an XML schema per the procedures in [\[4\]](#).

URI: urn:ietf:params:xml:schema:gruuinfo.

Registrant Contact: IETF, SIPING working group, <sipping@ietf.org>, Paul Kyzivat <pkyzivat@cisco.com>

The XML for this schema can be found in [Section 9](#).

11. Security Considerations

Security considerations for the registration event package is discussed in [RFC 3680](#) [\[2\]](#), and those considerations apply here.

The addition of GRUU information does not impact security negatively because the GRUU is less sensitive than the contact URI itself.

12. Acknowledgements

The author would like to thank Jonathan Rosenberg for encouraging this draft.

13. References

13.1. Normative References

- [1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [2] Rosenberg, J., "A Session Initiation Protocol (SIP) Event Package for Registrations", [RFC 3680](#), March 2004.
- [3] Rosenberg, J., "Obtaining and Using Globally Routable User Agent (UA) URIs (GRUU) in the Session Initiation Protocol (SIP)", [draft-ietf-sip-gruu-06](#) (work in progress), October 2005.
- [4] Mealling, M., "The IETF XML Registry", [BCP 81](#), [RFC 3688](#), January 2004.

13.2. Informative References

- [5] Rosenberg, J., Schulzrinne, H., Camarillo, G., Johnston, A., Peterson, J., Sparks, R., Handley, M., and E. Schooler, "SIP:

Session Initiation Protocol", [RFC 3261](#), June 2002.

- [6] Garcia-Martin, M., Henrikson, E., and D. Mills, "Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation Partnership Project (3GPP)", [RFC 3455](#), January 2003.
- [7] Rosenberg, J., Schulzrinne, H., and P. Kyzivat, "Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)", [RFC 3840](#), August 2004.
- [8] Sparks, R., "Session Initiation Protocol Torture Test Messages", [draft-ietf-sipping-torture-tests-09](#) (work in progress), November 2005.

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Acknowledgment

Funding for the RFC Editor function is currently provided by the Internet Society.

