

**Registration Event Package Extension for Session Initiation Protocol
(SIP) Globally Routable User Agent URIs (GRUU)
draft-ietf-sipping-gruu-reg-event-06**

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Abstract

[RFC 3680](#) defines a Session Initiation Protocol (SIP) event package for registration state. This package allows a watcher to learn about information stored by a SIP registrar, including its registered contact.

However, the registered contact is frequently unreachable and thus not useful for watchers. The Globally Routable User Agent URI (GRUU) has been defined for SIP as a URI that is capable of reaching a

particular contact, however this URI is not present in the format defined in [RFC 3680](#). This specification defines an extension to the registration event package to include a GRUU.

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1. Introduction

[RFC 3680](#) [2] defines a Session Initiation Protocol (SIP) event package for registration state. This package allows a watcher to learn about information stored by a SIP registrar, including the registered contacts.

However, a registered contact is frequently unreachable from hosts outside of the domain of the user agent. It is commonly a private address, or even when public, direct access to it may be blocked by firewalls.

The Globally Routable User Agent URI (GRUU) [3] has been defined as a URI that reaches a particular UA instance, but is reachable by any host on the Internet. The GRUU represents another piece of registration state. However, the GRUU is not included in the notifications provided by [RFC 3860](#). For many applications of the registration event package, the GRUU is needed, and not the registered contact.

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 GRUU will also be needed for the implicit registrations. While assigning the additional GRUU 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 GRUU 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 a child of the <contact> element.

Note that it is possible for multiple registered contacts to share the same instance ID. In such a case, each <contact> element will have a child <gruu> element, and the URI contained within those <gruu> elements will be identical. Since a particular contact can not be associated with more than one instance ID, a <contact> element will never have more than one <gruu> child element.

The content of the <gruu> element is the GRUU that is associated with the instance ID and AOR of the registered contact.

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>
    <allOneLine>
      <gr:gruu>sip:user@example.com
      ;gruu;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.

When the value of the Content-Length header field is "..." this means that the value should be whatever the computed length of the body is.

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;gruu;opaque=hha9s8d-999a SIP/2.0
To: <sip:user@example.com>
From: "SIPland Notifier" <sip:notifier@example.com>;tag=7xy8
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. Each of those implicitly registered AORs will have a unique GRUU assigned. The REGISTER response will not include those GRUU; it will only include the GRUU for the AOR and instance ID explicitly included in the registration.

```
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;gruu;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;gruu;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;gruu;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="registered"
        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
;gruu;opaque=hha9s8d-999a</gr:gruu>
</allOneLine>
```



```

        state="active">
        <contact id="93" 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:user_aor_2@example.net
    ;gruu;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
    ;gruu;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 GRUU for use when establishing dialogs using the corresponding AORs.

9. XML Schema Definition

The <gruu> element is defined within a new XML namespace URI. This

namespace is "urn:ietf:params:xml:ns:gruuinfo". The schema for the <gruu> element is:

```
<?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>
```

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/xhtml1-basic/xhtml1-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.

If the contact address is not reachable by the subscriber to the registration event package, then its disclosure may arguably be considered of minimal security risk. In that case the inclusion of the GRUU may be considered to increase the risk by providing a reachable address. On the other hand, requests addressed to the GRUU are always first processed by the servicing proxy before they reach the intended user agent. The proxy may control access as desired, just as it may for the AOR. In this respect disclosing the GRUU presents no more risk than disclosing the AOR.

12. Acknowledgements

The author would like to thank Jonathan Rosenberg for encouraging this draft, and Jari Urpalainen for assistance with the XML.

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-07](#) (work in progress), May 2006.

- [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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