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Extensible Markup Language (XML) Format Extension for Representing Capacity Attributes in Resource Lists
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Abstract

This document specifies an XML extension to the resource list format for qualifiying resources with the capacity in which they are included in the resource list.

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1. Introduction

The Framework and Security Considerations for Session Initiation Protocol (SIP) URI-List Services [9] describes a generic framework for carrying Uniform Resource Identifier (URI)-lists in SIP [5] messages. Specifically the document provides a common framework for specific implementations of URI-list services, such as conferences initiated with INVITE requests [10] or Multiple-recipient MESSAGE requests [11].

Common to a multiple of URI-list services is the presence of a SIP request that contains a collection of resources, typically expressed as an XML resource list [7]. SIP requests carrying resource lists can appear either in requests received by the URI-list server, indicating the list of intended recipients; or in each of the requests that the URI-list server sends to recipients, indicating the list of recipients of the same SIP request.

Although the XML resource list [7] provides a powerful mechanism for indicating list of resources, it is usually beneficial to indicate the capacity in which a resource is receiving a SIP request. This is similar to common e-mail where the sender can assign each recipient the capacity of To, Cc, or Bcc, in which they are receiving an e-mail message.

This document addresses this problem by providing an extension to the XML resource list [7] that enables the sender to tag the capacity of the recipients, as 'to', 'cc', or 'bcc'. Additionally, we provide the sender with the capability of indicating in the URI-list that one or more resources should be anonymized, so that their URIs are not disclosed to the other recipients, but instead, they are replaced with anonymous URIs.

The rest of this document is organized as follows: Section 2 introduces a few new terms. Section 3 gives an overview of operation. Section 4 formally defines an extension to URI-lists. The XML schema definition is provided in Section 5. Section 6 shows examples of the URI-lists with the extensions defined in this document. Section 7 discusses the implications of carrying URI-lists in SIP messages.

2. Terminology

In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in BCP 14, RFC 2119 [1] and indicate requirement levels for

compliant implementations.

URI-list service: SIP application service that receives a SIP request containing a URI-list and sends a similar SIP request to each URI in the list.

Intended recipient: The intended final recipient of the request to be generated by URI-list service.

Capacity: The role assigned by the sender to a recipient. The sender is able to tag recipients with the 'to', 'cc', and 'bcc' capacity, which indicate, respectively, whether the recipients get a primary, carbon copy, or blind carbon copy of the SIP request.

3. Overview

Figure 1 depicts a general overview of the operation of a URI-list server. A SIP User Agent Client (UAC) issuer sends a SIP request (F1) to a URI-list server. The URI-list server generates a SIP request to each of the recipients, according to the specific method.

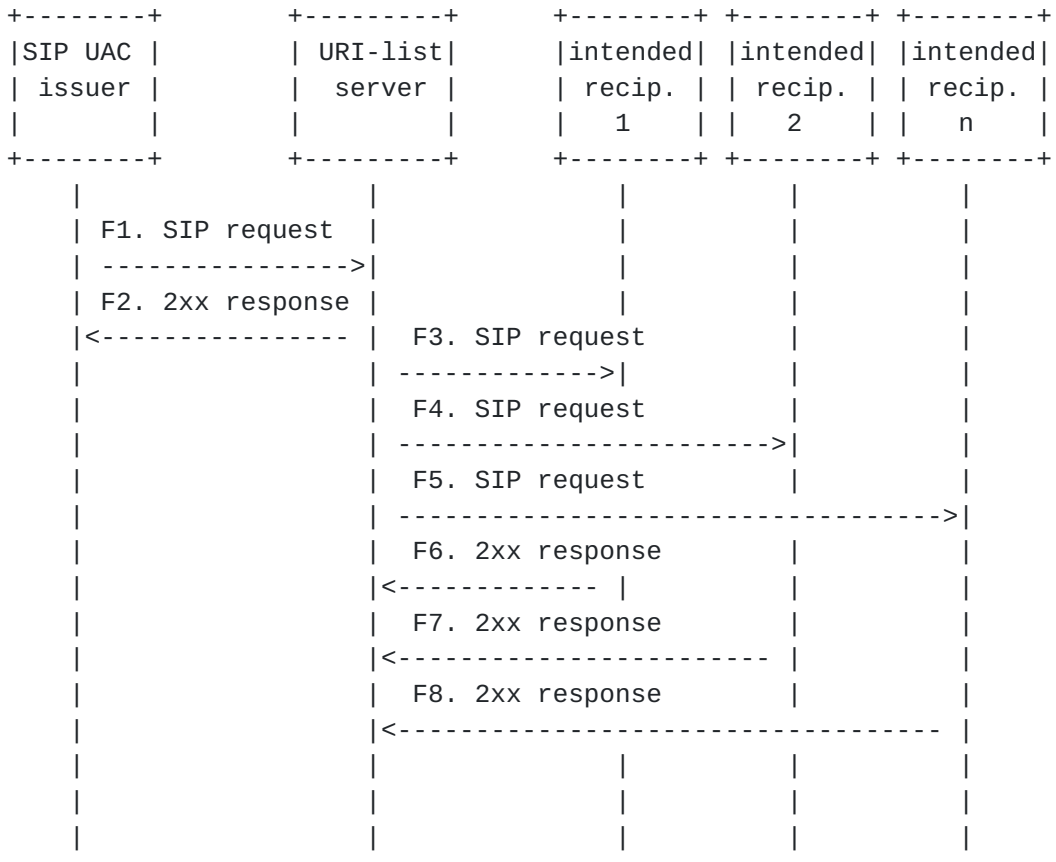

Figure 1: Example of operation

The URI-list mechanism allows a sender to specify multiple targets for a SIP request by including an XML resource list [7] in the body of the SIP request. This XML resource list includes the URIs of the targets of the SIP request (the actual procedures are method specific and outside the scope of this document). Each target URI may also be marked to indicate in what capacity (or role) the recipient is receiving the SIP request. The available capacities include 'to', 'cc', and 'bcc' (analogous to e-mail). Each target URI may also be marked with the 'anonymize' attribute. This allows the sender of the SIP request to indicate to the URI-list service that an intended recipient should receive the SIP request, but his URI should not be disclosed (for example, in a URI-list that the URI-list service could send to the recipients of the SIP request).

When the URI-list server expands the request for each recipient, it includes a new URI-list that contains only the targets originally listed in the "to" and "cc" capacities, excludes those listed in the 'bcc' capacity. Further more, those URIs tagged with the 'anonymize' attribute are replaced by an anonymous URI.

In case of multiple identical URIs the size of URI-list can be compressed by adding a 'count' attribute to a URI. The 'count' attribute indicates the number of repeated URIs. This is particularly useful with anonymized URIs. It is not expected to have value other than with anonymous URIs, although technically, it is possible to include the 'count' attribute to any URI.

The presence of a URI-list in each of the expanded SIP requests allows recipients to both see and reply to the non-anonymous "to" and "cc" targets, but not to the "bcc" or anonymous targets. The default capacity assumed, if one is not specified by the sender, is "bcc". This is discussed in greater detailed in Section 4

4. Extension to the resource lists data format

This document defines an extension to the XML resource list data format [7] that allows the sender to indicate the capacity or role in which a recipient is receiving a message. We define a new 'capacity' attribute to the <entry> element of the resource list document format [7]. The 'capacity' attribute has similar semantics to the type of destination address in e-mail systems. It can take the values "to", "cc", and "bcc". A "to" value of the 'capacity' attribute indicates that the resource is considered a primary recipient of the SIP request. A "cc" value indicates that the resource receives a carbon copy of the SIP request. A "bcc" value indicates that the resource

receives a blind carbon copy of the SIP request, i.e., this URI is not disclosed in a URI-list sent to the recipients. The default 'capacity' value is "bcc", that is, the absence of a 'capacity' attribute MUST be treated as if the 'capacity' was set to "bcc". URI-list servers can use URIs tagged with the "bcc" 'capacity' attribute for routing SIP requests, but MUST delete them if the URI-list service includes a URI-list in outgoing requests.

A new 'anonymize' attribute can be included in a <entry> element of the resource list document format [7]. If set to a "true" value, it provides an indication to the URI-list server for not disclosing the URI itself in a URI-list sent to the recipient, but instead, anonymize the URI. URI-list servers can use URIs tagged with the 'anonymize' attribute for routing SIP requests, but MUST convert them to an anonymized URI (such as sip:anonymous@anonymous.invalid) if the URI-list server includes a URI-list in outgoing requests. The default value of the 'anonymize' attribute is "false".

Processing of URIs tagged with a "bcc" 'capacity' has higher precedence of the 'anonymize' attribute, thus, if the 'capacity' of a URI is set to "bcc", the URI-list service will remove the URI from the list and the 'anonymize' attribute will be ignored. Therefore, the 'anonymize' attribute is only useful for those URIs tagged with a 'capacity' of "to" or "cc".

A new 'count' attribute can be also included in a <entry> element of the resource list document format [7]. It provides the number of equal URIs. Typically URI-lists created by UACs will not have equal (or duplicated) URI entries, thus, it is not expected to contain URIs tagged with the 'count' attributes. However, URI-lists created by URI-list servers can contain duplicated anonymized URIs, thus, it is expected that URI-list created by URI-list servers will contain 'count' attributes. The default value of the 'count' attribute is "1".

The 'capacity', 'anonymize', and 'count' attributes SHOULD be included as modifiers of any of the child elements included in the <list> element of a resource list (e.g., attribute of the <entry> or <external> elements).

Section 5 describes the format of the 'capacity', 'anonymize', and 'count' attributes. Implementations according to this specification MUST support this XML Schema.

5. XML Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:ietf:params:xml:ns:capacity"
    xmlns="urn:ietf:params:xml:ns:capacity"
    xmlns:rls="urn:ietf:params:xml:ns:resource-lists"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    elementFormDefault="qualified"
    attributeFormDefault="unqualified">

    <xs:annotation>
      <xs:documentation xml:lang="en">
         Adds the capacity, anonymize, and count attributes
         to URIs included in a resource list.
      </xs:documentation>
    </xs:annotation>

   <xs:import namespace="urn:ietf:params:xml:ns:resource-lists"
          schemaLocation="urn:ietf:params:xml:schema:resource-lists"/>

    <xs:attribute name="capacity">
       <xs:simpleType>
          <xs:restriction base="xs:string">
             <xs:enumeration value="to"/>
             <xs:enumeration value="cc"/>
             <xs:enumeration value="bcc"/>
          </xs:restriction>
       </xs:simpleType>
    </xs:attribute>

   <xs:attribute name="anonymize" type="xs:boolean" default="false"/>
   <xs:attribute name="count" type="xs:nonNegativeInteger"
                              default="1"/>

</xs:schema>
```

Figure 2: XML Schema of the extension to the resource list format

6. Examples

This section shows two examples of URI-lists that can be included in SIP requests. The first example in Figure 3 shows a URI-list that the UAC sends to the URI-list server. This corresponds to a list that will be included in the flow F2 in Figure 1. The list contains a flat list according to the resource list data format [7]. Each resource indicates the capacity of a resource. Some of the resources are also attributed with the 'anonymize' attribute. This provides an

indication to the URI-list service for not disclosing their URIs in a URI-list. The last two <entry> elements are attributed with a "bcc" 'capacity'. This provides an indication to the URI-list service for removing these URIs from the outgoing URI-lists.

```
<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns="urn:ietf:params:xml:ns:resource-lists"
          xmlns:cp="urn:ietf:params:xml:ns:capacity">
  <list>
    <entry uri="sip:bill@example.com" cp:capacity="to" />
    <entry uri="sip:randy@example.net" cp:capacity="to"
                                        cp:anonymize="true"/>
    <entry uri="sip:eddy@example.com" cp:capacity="to"
                                       cp:anonymize="true"/>
    <entry uri="sip:joe@example.org" cp:capacity="cc" />
    <entry uri="sip:carol@example.net" cp:capacity="cc"
                                        cp:anonymize="true"/>
    <entry uri="sip:ted@example.net" cp:capacity="bcc" />
    <entry uri="sip:andy@example.com" cp:capacity="bcc" />
  </list>
</resource-lists>
```

Figure 3: URI-list sent from the UAC to the URI-list server

Upon reception of the SIP request containing the URI-list of Figure 3 the URI-list service creates a SIP request for each of the URIs listed in the URI-list (so, in our example, it creates 7 SIP requests). Each outgoing SIP request contains a copy of the same processed outgoing URI-list. The process is as follows: the URI-list service creates a new URI-list, based on the received one, but with changes. First it copies all the URIs (<entry> elements) tagged with the "to" or "cc" 'capacity' which do not contain an 'anonymize' attribute (or when the 'anonymize' attribute is set to "false"). Then all the URIs tagged with a 'capacity' attribute set to "to" and 'anonymize' set to "true" are replaced by an anonymous URI, such as "sip:anonymous@anonymous.invalid". In this entry it also adds the original 'capacity' attribute ("to" in our example), and it adds a 'count' attribute with the number of anonymous entries with this capacity ("2" in our example). Then the URI-list service does the same operation to the URIs tagged with the 'capacity' attribute set to "cc" and 'anonymize' attribute set to "true", adding also the 'count' attribute containing the number of anonymous attributes with this capacity ("1" in the example). Last, the URI-list service completely removes URIs tagged with the "bcc" 'capacity'. The result URI-list if shown in Figure 4.

```
<?xml version="1.0" encoding="UTF-8"?>
<resource-lists xmlns="urn:ietf:params:xml:ns:resource-lists"
          xmlns:cp="urn:ietf:params:xml:ns:capacity">
  <list>
    <entry uri="sip:bill@example.com" cp:capacity="to" />
    <entry uri="sip:anonymous@anonymous.invalid" cp:capacity="to"
                                                 cp:count="2"/>
    <entry uri="sip:joe@example.org" cp:capacity="cc" />
    <entry uri="sip:anonymous@anonymous.invalid" cp:capacity="cc"
                                                 cp:count="1"/>
  </list>
</resource-lists>
```

Figure 4: URI-List sent from the URI-list server to each recipient

7. Carrying URI-lists in SIP

A SIP User Agent Client (UAC) that composes a SIP request can include a URI-list with the extensions specified in this document to indicate the list of intended recipients. On doing so, as specified in the Framework and Security Considerations for SIP URI-List Services [9], the UAC adds a Content-Disposition [2] header field set to the value 'recipient-list'. Typically UACs send these 'recipient-list' bodies to URI-list services (this corresponds to flow F1 in Figure 1). A body whose Content-Disposition type is 'recipient-list' contains a URI-list with list of intended recipients of the SIP request. The <entry> element in the URI-list MAY also include a 'capacity' and 'anonymize' attributes, as specified in Section 4.

To enable the capability of the intended recipients to become aware of who else is receiving a copy of the SIP request, we define a new mail disposition type to be included in a Content-Disposition [2] header field of a SIP request. The value of this new disposition type is 'recipient-list-history' and its purpose is to indicate a list of recipients that a SIP request was sent to. A body whose Content-Disposition type is 'recipient-list-history' contains a URI-list with the visible (including anonymized) recipients of the SIP request. The <entry> element in the URI-list MAY also include a 'capacity' and 'count' attributes, as specified in Section 4.

It is often desired that, if the intended recipient of the SIP request does not support this specification, still the SIP request does not fail. In order to provide the maximum probability of success of those requests that include 'recipient-list-history' bodies, User Agents (such as URI-list services) that build SIP requests with the Content-Disposition header field set to 'recipient-list-history' SHOULD add a 'handling' parameter [4] set to

"optional".

8. Security Considerations

The Framework and Security Considerations for SIP URI-List Services [9] discusses issues related to SIP URI-list services. Implementations of this specification MUST follow the security-related rules in the Framework and Security Considerations for SIP URI-List Services [9]. These rules include mandatory authentication and authorization of clients, and opt-in lists.

User Agent Clients SHOULD NOT hand SIP requests containing URI-list services to unauthenticated and untrusted parties. This is to avoid man-in-the-middle attacks or acquiring URI-lists for performing SPAM attacks.

URI-lists may contain private information, such as SIP URIs. It is therefore not desirable that these URI-lists are known by third parties. Eavesdroppers are able to watch URI-lists contained in SIP requests unless the SIP message was sent over a secured channel with Transport Layer Security (TLS) [3] or unless the URI-list body itself is encrypted with S/MIME [8]. Therefore, it is RECOMMENDED that URI-list bodies are encrypted with S/MIME [8] or that the SIP request is encrypted with TLS [3].

Note that this URI-list does not indicate the actual participants in the session. It indicates only the URIs invited and that might accept the request. It does not assert that these parties actually exist, that they are reachable at the given URI, or that they have accepted the invitation. No inferences about billing should be made from this information. It is subject to spoofing by loading the list with falsified content.

9. IANA Considerations

The following sections instruct the IANA to register: a new disposition type, a new SIP option-tag, a new XML namespace, and a new XML schema.

9.1. Disposition Type Registration

Section 7 defines a new 'recipient-list-history' value of the Mail Content Disposition Values registry. This value should be registered in the IANA registry of Mail Content Disposition Values with the following registration data:

Name	Description	Reference
recipient-list-history	the body contains a list of URIs that indicates the recipients of the SIP request	[RFCXXXX]

Table 1: Registration of the 'recipient-list-history' Mail Content Disposition Value

Note to IANA and the RFC editor: replace RFCXXXX above with the RFC number of this specification.

9.2. XML Namespace Registration

This section registers a new XML namespace in the XML registry, as per the guidelines in RFC 3688 [6].

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

Registrant Contact: IETF, SIPPING working group, (sipping@ietf.org), Miguel Garcia-Martin (miguel.an.garcia@nokia.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>Capacity Namespace</title>
</head>
<body>
  <h1>Namespace for the Capacity Attribute Extension
  in Resource Lists</h1>
  <h2>urn:ietf:params:xml:ns:capacity</h2>
  <p>See <a href="[URL of published RFC]">RFCXXXX
  [NOTE TO IANA/RFC-EDITOR: Please replace XXXX with
  the RFC number of this specification.]</a>.</p>
</body>
</html>
END
```

9.3. XML Schema Registration

This section registers a new XML schema in the XML registry per the procedures in RFC 3688 [6].

URI: urn:ietf:params:xml:schema:capacity

Registrant Contact: IETF, SIPPING working group, (sipping@ietf.org), Miguel Garcia-Martin (miguel.an.garcia@nokia.com).

The XML for this schema can be found as the sole content of Section 5.

10. Acknowledgements

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11. References

11.1. Normative References

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11.2. Informational References

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