           Mapping of Media Streams to Resource Reservation Flows

Status of this Memo

   This document specifies an Internet standards track protocol for the
   Internet community, and requests discussion and suggestions for
   improvements. Please refer to the current edition of the "Internet
   Official Protocol Standards" (STD 1) for the standardization state
   and status of this protocol. Distribution of this memo is unlimited.

Abstract

   This document defines an extension to the Session Description
   Protocol (SDP) grouping framework. It allows requesting a group of
   media streams to be mapped into a single resource reservation flow.
   The SDP syntax needed is defined, as well as a new "semantics"
   attribute called Single Reservation Flow (SRF).

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1. Introduction

   Resource reservation protocols assign network resources to particular
   flows of IP packets. When a router receives an IP packet, it applies
   a filter in order to map the packet to the flow it belongs. The
   router provides the IP packet with the Quality of Service (QoS)
   corresponding to its flow. Routers typically use the source and the
   destination IP addresses and port numbers to filter packets.

   Multimedia sessions typically contain multiple media streams (e.g. an
   audio stream and a video stream). In order to provide QoS for a
   multimedia session it is necessary to map all the media streams to
   resource reservation flows. This mapping can be performed in
   different ways. Two possible ways are to map all the media streams
   to a single resource reservation flow or to map every single media
   stream to a different resource reservation flow. Some applications
   require that the former type of mapping is performed while other
   applications require the latter. It is even possible that a mixture
   of both mappings is required for a particular media session. For
   instance, a multimedia session with three media streams might require
   that two of them are mapped into a single reservation flow while the
   third media stream uses a second reservation flow.

   This document defines the SDP [1] syntax needed to express how media
   streams need to be mapped into reservation flows. For this purpose,
   we use the SDP grouping framework [2] and define a new "semantics"
   attribute called Single Reservation Flow (SRF).

1.1 Terminology

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

2. SRF Semantics

   We define a new "semantics" attribute within the SDP grouping
   framework [2]: Single Reservation Flow (SRF).

   Media lines grouped using SRF semantics SHOULD be mapped into the
   same resource reservation flow. Media lines that do not belong to a
   particular SRF group SHOULD NOT be mapped into the reservation flow
   used for that SRF group.

Note that an SRF group MAY consist of a single media line. In that
case, following the definition above, that media line will be mapped
into one reservation flow. That reservation flow will carry traffic
from that media line, and from no other media lines.

3. Applicability Statement

The way resource reservation works in some scenarios makes it
unnecessary to use the mechanism described in this document. Some
resource reservation protocols allow the entity generating the SDP
session description to allocate resources in both directions (i.e.,
sendrecv) for the session. In this case, the generator of the
session description can chose any particular mapping of media flows
and reservation flows.

The mechanism described in this document is useful when the remote
party needs to be involved in the resource reservation.

4. Examples

For this example, we have chosen to use SIP [4] to transport SDP
sessions and RSVP [5] to establish reservation flows. However, other
protocols or mechanisms could be used instead without affecting the
SDP syntax.

A user agent receives a SIP INVITE with the SDP below:

```
v=0
o=Laura 289083124 289083124 IN IP4 one.example.com
t=0 0
c=IN IP4 192.0.0.1
a=group:SRF 1 2
m=audio 30000 RTP/AVP 0
a=mid:1
m=video 30002 RTP/AVP 31
a=mid:2
```

This user agent uses RSVP to perform resource reservation. Since
both media streams are part of an SRF group, the user agent will
establish a single RSVP session. An RSVP session is defined by the
triple: (DestAddress, ProtocolId[, DstPort]). Table 1 shows the
parameters used to establish the RSVP session.

If the same user agent received an SDP session description with the
same media streams but without the group line, it would be free to
map the two media streams into two different RSVP sessions.

```
       Session Number  DestAddress  ProtocolId  DstPort
      _____
            1              192.0.0.1      UDP        any
```

       Table 1: Parameters needed to establish the RSVP session

5. IANA Considerations

   IANA has registered the following new "semantics" attribute for the
   SDP grouping framework [2]. It has been registered in the SDP
   parameters registry (http://www.iana.org/assignments/sdp-parameters)
   under Semantics for the "group" SDP Attribute:

```
   Semantics                  Token       Reference
   -------------------        -----       ---------
   Single Reservation flow     SRF        [RFC3524]
```

6. Security Considerations

   An attacker adding group lines using the SRF semantics to an SDP
   session description could force a user agent to establish a larger or
   a smaller number of resource reservation flows than needed. This
   could consume extra resources in the end-point or degrade the quality
   of service for a particular session. It is thus STRONGLY RECOMMENDED
   that integrity protection be applied to the SDP session descriptions.
   For session descriptions carried in SIP, S/MIME is the natural choice
   to provide such end-to-end integrity protection, as described in RFC
   3261 [4]. Other applications MAY use a different form of integrity
   protection.

7. Acknowledgements

   Jonathan Rosenberg provided useful comments about the applicability
   of the mechanism described in this document.

8. Normative References

   [1] Handley, M. and V. Jacobson, "SDP: Session Description
        Protocol", RFC 2327, April 1998.

   [2] Camarillo, G., Eriksson, G., Holler, J. and H. Schulzrinne,
        "Grouping of Media Lines in the Session Description Protocol
        (SDP)", December 2002.

   [3] Bradner, S., "Key words for use in RFCs to indicate requirement
        levels", BCP 14, RFC 2119, March 1997.

9. Informative References

   [4] 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.

   [5] Braden, R., Zhang, L., Berson, S., Herzog, S. and S. Jamin,
        "Resource ReSerVation protocol (RSVP) -- Version 1 Functional
        Specification", RFC 2205, September 1997.

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