                        SIP Session Timer

Status of this Memo

Abstract

    This document proposes an extension to the SIP specification [1].
    This extension adds a new message header, Session-Expires, which is
    used to specify the duration of a requested session.

    A session timer can be used to control the duration of a session if,
    for instance, one of the participants in the session wants to limit
    the cost of the session. Stateful SIP Proxy Servers can also use a
    session timer to track the status of sessions for which session state
    exists on the servers. Currently a stateful SIP Proxy Server that is
    not handling the media stream(s) for the session has no mechanism to
    definitively determine the state of all sessions for which it has
    state. While the SIP Specification does provide the BYE method for
    terminating the session, there is no mechanism for a SIP Proxy Server
    to detect the end of a session when the BYE message is not sent or is
    lost due to network problems.

1.0 **Introduction**

   The need for the addition of a session timer was initially motivated
   by the realization that stateful proxy servers currently have no
   method of determining the end of a session in certain anomalous situ-
   ations. For instance, when a user agent fails to send a BYE message
   at the end of a session or the BYE message gets lost due to network
   problems. In this situation, the stateful proxy will retain state
   for the session and has no deterministic method of determining when
   the state no longer applies.

   With the addition of a session timer to the SIP protocol, the state-
   ful proxy server will have the option of tearing down the session
   upon the expiration of the session timer.

   A session timer can also be used for other purposes. For instance,
   it could be used in the implementation of a prepaid service. In this
   case all session related signaling would be routed through a SIP
   server that would control the session time based on a subscriber's
   prepaid account. The SIP server could use the session timer to force
   the tear down of the session within a specific time. The session
   timer could also be used by the user agent as a trigger to indicate
   to the subscriber that the prepaid account requires more funds to
   extend the call.

   This document proposes the addition of the Session-Expires header to
   various SIP messages. In addition, a new Request Failure message is
   proposed. This message would be used to indicate session timer prob-
   lems, including the need for a session-expires header in an INVITE
   message and the need for a smaller session-expires time.

2.0 **Session-Expires Header Field Definition**

   The Session-Expires header shall be used by user agents or proxy
   servers to indicate the maximum duration of a session.

   The format of the Session-Expires header shall be equivalent to the
   format of the Expires header (see section 6.20 in [1]). As such, the
   end of the session can be specified as either an absolute or delta
   time.

   The Session-Expires header shall be valid in INVITE and ACK requests.
   In addition it shall be valid in certain response messages. This
   includes the 200 OK response and the new Request Failure responses
   defined in this document.

   The called UA or any SPS in the path of the session signaling shall

have the option of rejecting an INVITE that does not contain the Ses-
sion-Expires header if the service context in which the session
request is made requires the use of the session timer.

The called UA has the option of adding the Session-Expires header to
the 200 OK response in the case where there was not Session-Expires
header in the INVITE message.

An SPS shall also have the option of adding the Session-Expires
header to an INVITE message.

In addition, the called UA and SPS shall have the option of modifying
the value in the Session-Expires header. This modification shall
only be to decrease the requested duration of the session.

The start time of the session shall be based on receipt of the 200 OK
message by the calling UA and receipt of the ACK message by the SPS
and called UA.

If the called UA or the SPS requires a session timer for a requested
session and the calling UA does not include the Session-Expires
header in the INVITE message, then the called UA or the SPS should
reject the request with a 487 request failure message.

If the use of a session timer is desirable but optional for the ses-
sion and the calling UA does not include the Session-Expires header
in the INVITE then the called UA or SPS should add a Session-Expires
header to the next session setup message. In this case the SPS shall
add the Session-Expires header to the INVITE message and the called
UA shall add the Session-Expires header to the 200 OK response mes-
sage.

The calling UA shall have the ability to request an extension to the
duration of the session by sending a re-INVITE message for the ses-
sion with a new Session-Expires header. See section 1.4.6, Changing
an Existing Session, in [1].

The calling UA or any SPS in the path of the session signaling shall
have the ability to reject the change in the session duration.

Upon expiration of the session timer, the calling UA and called UA
shall have the option of terminating the session using the normal BYE
method.

In addition, a SPS shall have the option of tearing down an expired
session by sending a BYE to both the called UA and the calling UA.

It is recommended that the SPS delay tearing down the session long
enough for a retry of a lost re-INVITE to be received by the SPS.
This will also reduce the possibility of both a UA and SPS attempting
to tear down the call simultaneously.

3.0 Behavior of SIP User Agents

3.1 Behavior of User Agent Clients

A User Agent Client (UAC) shall have the ability to include the Ses-
sion-Expires header in an INVITE message.

The UAC shall have the ability to request an extension of the session
timer by sending an INVITE message for an existing session with a
Session-Expires header. This should be done enough in advance of the
session timeout to prevent the called UA or the SPS from timing out
the session prior to receipt of the new INVITE.

When requesting an extension of the session, the UAC shall use a
value in the Session-Expires header that is less-than or equal to the
value of the Session-Expires header received in the 200 OK from the
original setup of the session.

The UAC shall have the ability to receive a Session-Expires header in
a 200 OK message. This is independent of whether or not a Session-
Expires was included in the original INVITE message.

The UAC shall have the ability to accept the session time indicated
in the 200 OK Session-Expires header by including unchanged Session-
Expires header in the ACK to the 200 OK.

The UAC shall have the ability to reject the session time indicated
in the 200 OK message by not including a Session-Expires header in
the ACK to the 200 OK message.

In general, if the UAC is able to support session timers then it
should accept the session time included in the 200 OK, even if it
changed between the INVITE and the 200 OK.

3.2 Behavior of User Agent Servers

The User Agent Server shall have the ability to reject an INVITE mes-
sage that does not contain a Session-Expires header if the INVITE is
received in a service context that requires a session timer. The UAS
shall reject the INVITE using the following response:

487 Session-Expires Header Problem
        Session-Expires: n

    The UAS shall have the ability to provisionally reject an INVITE
    request based on the contents of the Session-Expires header received
    in the INVITE message. For instance, the UAS may choose to reject
    the INVITE if the requested session time is longer than the UAS
    desires to participate in the session. The UAS shall use the follow-
    ing message to reject the request:

        487 Session-Expires Header Problem
        Session-Expires: n

    In both cases, the UAS shall include in the 487 response an accept-
    able delta time for the session.

    If the Session-Expires header contains a delta time then the UAS
    shall calculate the end of the session based on receipt of the ACK
    message that completes a successful session initiation:

       End of session time = Receipt of ACK time + Session-Expires time

    The UAS shall have the ability to reject a request to extend the
    length of the session. The UAS shall do so by sending the following
    response:

        487 Session Time Request Problem
        Session-Expires: n

    A value of zero (0) in the Session-Expires header shall indicate that
    the extension request is rejected. Any other value should be less
    than that received in the re-INVITE message and should indicate an
    acceptable extension to the session timer.

    If the Session-Expires header in the re-INVITE contains a delta time
    then the UAS shall calculate the new end of the session from the pre-
    vious end of session time:

     New end of session time = Previous end of session time + delta time

    If a request to extend the session time is rejected by the UAS then
    the end of session time that existed prior to the extension request
    shall be remain in effect.

The UAS shall have the ability to add a Session-Expires header to a 200 OK response for an INVITE request that did not contain a session-Expires header.

If the UAS adds a Session-Expires header to the 200 OK response and the resulting ACK does not contain a Session-Expires header then the UAS has the following options:

The UAS can choose to participate in the session without a session timer. The UAS can choose to not participate in the session. In this case, the UAS shall send a BYE message to tear down the session.

The UAS shall have the ability to decrease the requested session time in the INVITE Session-Expires header.

If the UAS is sending a 200 OK to an INVITE that contained a Session-Expires header then the UAS shall include a Session-Expires header in the 200 OK. The content of the Session-Expires header shall be either the content of the Session-Expires header contained in the INVITE request, if the UAS accepts the requested duration, or a

decreased value of the session timer desired by the UAS.

[4.0](4.0) Behavior of SIP Proxy Servers

A SIP Proxy Server has the option of tracking the duration of ses-sions for which it is a proxy.

If the SPS receives an INVITE without a Session-Expires header, it has the option of sending the following request failure response indicating that the Session-Expires header is required:

        487 Session-Expires Header Problem
        Session-Expires: n

A SPS has the option of rejecting an INVITE with a Session-Expires header based on the time specified in the header. For instance, if the time specified is too long. The proxy server shall do so by send-ing the following request failure response:

        487 Session-Expires Header Problem
        Session-Expires: n

In both cases, the SPS shall include in the 487 response an accept-able delta time for the session.

If the Session-Expires header contains a delta time then the SPS
shall use the method of calculating the session time specified in
[section 3.2](#).

A SPS has the option of rejecting a request for an extension of the
session timer for an existing session by sending the following
request failure response:

```
487 Session-Expires Header Problem
Session-Expires: n
```

A value of zero (0) in the Session-Expires header shall indicate that
the extension request is rejected. Any other value should be less
than that received in the re-INVITE message and should indicate an
acceptable extension to the session timer.

If the SPS accepts the request to extend the session timer then it
shall use the method of calculating the new end of session time spec-
ified in [section 3.2](#).

The SPS shall have the ability to add a Session-Expires header to an
INVITE request that does not contain a Session-Expires header.

The SPS shall have the ability to decrease the requested session time
in the INVITE Session-Expires header.

The content of the Session-Expires header included in the INVITE sent
by the SPS shall be either the content of the Session-Expires header
contained in the INVITE request, if the UAS accepts the requested
duration, or a decreased value of the session timer desired by the
SPS.

If the SPS adds a Session-Expires header to the 200 OK response and
the resulting ACK does not contain a Session-Expires header then the
SPS has the following options:

- The SPS can choose to allow the session without a session timer.

- The SPS can choose to not allow the session.

A SPS shall have the option of tearing down sessions that have
expired. Note that the SPS should wait for the calling UA or called
UA to terminate the call using normal mechanisms. If the calling UA
and the called UA fail to send a BYE as a result of session expira-
tion then the SPS can choose to end the call.

The SPS shall terminate the call by sending BYE requests to the call-
ing UA and the called UA.

5.0 Header Field Definitions

The following is an extension of tables 4 and 5 in [1] for the Ses-
sion-Expires header:

```
                 where  enc.  e-e  ACK  BYE  CAN  INV  OPT  REG
  Session-Expires    R            e    o    -    -    o    -    -
  Session-Expires  200            e    -    -    -    o    -    -
  Session-Expires  487            e    -    -    -    o    -    -
```

6.0 Request Failure Messages

6.1 487 Session-Expires Header Problem

The server received an INVITE request with one of the following prob-
lems:

- The server requires a Session-Expires header. In this case the
response should contain a Session-Expires header with an acceptable
session time.

- The server received an INVITE with a Session-Expires header with an
expiration time longer than the server is willing to accept. In this
case the response should contain a Session-Expires header with an
acceptable session time.

- The server received an INVITE with a Session-Expires header for an
existing session and the server does not wish to extend the session.
In this case the response should contain a Session-Expires header
with a value of zero (0).

- The server received an INVITE with a Session-Expires header for an
existing session with an expiration time longer than the server is
willing to accept. In this case the response should contain a Ses-
sion-Expires header with an acceptable session time.

7.0 Security Considerations

There are no security considerations unique to the Session-Expires
header.

8.0 Examples

The following examples are meant to illustrate the functionality
associated with the Session-Expires header. In the interest of
brevity, other headers are intentionally left out of the SIP mes-
sages.

[8.1](8.1) Basic session-timer setup with UAS detected timeout

```
Calling UA -> Called UA
        INVITE
        Session-Expires: 120

Calling UA <- Called UA
        200 OK
        Session-Expires: 120

Calling UA -> Called UA
        ACK                         Calling UA starts session timer
        Session-Expires: 120
        Called UA Receipt of ACK   Called UA starts session timer
```

```
        Calling UA determines need to extend session time

        Calling UA -> Called UA
                INVITE
                Session-Expires: 120

        Calling UA <- Called UA
                200 OK
                Session-Expires: 120

        Calling UA -> Called UA
                ACK                     Calling UA resets session end time
                Session-Expires: 120
                Called UA Receipt of ACK   Called UA resets session timer

        Session timeout detected by Called UA

        Calling UA <- Called UA
                BYE

        Calling UA -> Called UA
                200 OK
```

[8.2](8.2) Basic negotiation with SPS Detected timeout

```
        Calling UA -> SPS
                INVITE
                Session-Expires: 240

        SPS -> Called UA
                INVITE                  SPS wants a shorter timer
                Session-Expires: 180
```

```
SPS <- Called UA
        200 OK                      Called UA wants a shorter timer
        Session-Expires: 120

Calling UA <- SPS
        200 OK
        Session-Expires: 120

Calling UA -> SPS
        ACK                         Calling UA starts session timer
        Session-Expires: 120
        SPS Receipt of ACK          SPS starts session timer

SPS -> Called UA
        ACK                         Called UA starts session timer
        Session-Expires: 120

Session timeout detected by SPS

Calling UA <- SPS
         BYE

SPS -> Called UA
        BYE

Calling UA -> SPS
        200 OK

SPS <- Called UA
        200 OK
```

8.3 No Session-Expires Header Rejection by SPS

```
Calling UA -> SPS
        INVITE                      No Session-Expires header

Calling UA <- SPS
```

```
            4xx Session-Expires Header Required
            Session-Expires: 120        Suggested session time

    Calling UA -> SPS
            INVITE
            Session-Expires: 120

    Session setup continues
```

8.4 Invalid Session-Expires Header Rejection by SPS

```
    Calling UA -> SPS
            INVITE                      No Session-Expires header
            Session-Expires: 1000

    Calling UA <- SPS
            4xx Session Time Request Rejected
            Session-Expires: 120        Suggested session time

    Calling UA -> SPS
            INVITE
            Session-Expires: 120

    Session setup continues
```

8.5 Session-Expires Header Added by SPS, Rejected by UAC

```
    Calling UA -> SPS
```

```
            INVITE

    SPS -> Called UA
            INVITE                  SPS adds S-E header
            Session-Expires: 180

    SPS <- Called UA
            200 OK                  Called UA wants shorter timer
            Session-Expires: 120

    Calling UA <- SPS
            200 OK
            Session-Expires: 120

    Calling UA -> SPS
            ACK                     Calling UA does not include S-E header
```

   The SPS has the choice of allowing or not allowing the call as a
   result of the Calling UA not supporting the Session-Expires function.

9.0 Changes in this version

   The changes in this version of the document were primarily editorial
   in nature.

   It was also reworded to indicate that both the calling and the called
   user agents shall be able to request extensions to the session time.

10.0 References

[1] M. Handley, H. Schulzrinne, E. Schooler, and J. Rosenberg, "SIP:
   Session Initiation Protocol", RFC 2543, March 1999.

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