        The Reason Header Field for the Session Initiation Protocol (SIP)

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

   For creating services, it is often useful to know why a Session
   Initiation Protocol (SIP) request was issued. This document defines
   a header field, Reason, that provides this information. The Reason
   header field is also intended to be used to encapsulate a final
   status code in a provisional response. This functionality is needed
   to resolve the "Heterogeneous Error Response Forking Problem", or
   HERFP.

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1. Introduction

   The same SIP [1] request can be issued for a variety of reasons. For
   example, a SIP CANCEL request can be issued if the call has completed
   on another branch or was abandoned before answer. While the protocol
   and system behavior is the same in both cases, namely, alerting will
   cease, the user interface may well differ. In the second case, the
   call may be logged as a missed call, while this would not be
   appropriate if the call was picked up elsewhere.

   Third party call controllers sometimes generate a SIP request upon
   reception of a SIP response from another dialog. Gateways generate
   SIP requests after receiving messages from a different protocol than
   SIP. In both cases the client may be interested in knowing what
   triggered the SIP request.

   SIP responses already offer a means of informing the user of why a
   request failed. The simple mechanism in this document accomplishes
   something roughly similar for requests.

   An INVITE can sometimes be rejected not because the session
   initiation was declined, but because some aspect of the request was
   not acceptable. If the INVITE forked and resulted in a rejection,
   the error response may never be forwarded to the client unless all
   the other branches also reject the request. This problem is known as
   the "Heterogeneous Error Response Forking Problem", or HERFP. It is
   foreseen that a solution to this problem may involve encapsulating
   the final error response in a provisional response. The Reason header
   field is a candidate to be used for such encapsulation.

   Initially, the Reason header field defined here appears to be most
   useful for BYE and CANCEL requests, but it can appear in any request
   within a dialog, in any CANCEL request and in any response whose
   status code explicitly allows the presence of this header field.

   Note that the Reason header field is usually not needed in responses
   because the status code and the reason phrase already provide
   sufficient information.

   Clients and servers are free to ignore this header field. It has no
   impact on protocol processing.

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
   [2] and indicate requirement levels for compliant SIP
   implementations.

2. The Reason Header Field

   The Reason header field MAY appear in any request within a dialog, in
   any CANCEL request and in any response whose status code explicitly
   allows the presence of this header field. The syntax of the header
   field follows the standard SIP parameter syntax.

```
 Reason            =  "Reason" HCOLON reason-value *(COMMA reason-value)
 reason-value      =  protocol *(SEMI reason-params)
 protocol          =  "SIP" / "Q.850" / token
 reason-params     =  protocol-cause / reason-text
                      / reason-extension
 protocol-cause    =  "cause" EQUAL cause
 cause             =  1*DIGIT
 reason-text       =  "text" EQUAL quoted-string
 reason-extension  =  generic-param
```

   The following values for the protocol field have been defined:

      SIP: The cause parameter contains a SIP status code.

      Q.850: The cause parameter contains an ITU-T Q.850 cause value
            in decimal representation.

Examples are:

       Reason: SIP ;cause=200 ;text="Call completed elsewhere"
       Reason: Q.850 ;cause=16 ;text="Terminated"
       Reason: SIP ;cause=600 ;text="Busy Everywhere"
       Reason: SIP ;cause=580 ;text="Precondition Failure"

   Proxies generating a CANCEL request upon reception of a CANCEL from
   the previous hop that contains a Reason header field SHOULD copy it
   into the new CANCEL request.

   In normal SIP operation, a SIP status code in a response provides the
   client with information about the request that triggered the
   response, the session parameters, or the user. For example, a 405
   (Method not allowed) response indicates that the request contained an
   unsupported method. A 488 (Not Acceptable Here) indicates that the
   session parameters are unacceptable and a 486 (Busy Here) provides
   information about the status of the user.

   Any SIP status code MAY appear in the Reason header field of a
   request. However, status codes that provide information about the
   user and about session parameters are typically useful for
   implementing services whereas status codes intended to report errors
   about a request are typically useful for debugging purposes.

   A SIP message MAY contain more than one Reason value (i.e., multiple
   Reason lines), but all of them MUST have different protocol values
   (e.g., one SIP and another Q.850). An implementation is free to
   ignore Reason values that it does not understand.

3. Examples

   This section contains a number of examples that illustrate the use of
   the Reason header field.

3.1 Call Completed Elsewhere

   A proxy forks an INVITE request and one of the branches returns a 200
   (OK). The forking proxy includes this status code in a Reason header
   field in the CANCEL request that it sends to the rest of the
   branches.

3.2 Refusing an Offer that Comes in a Response

   A client sends an empty INVITE and receives an unacceptable offer in
   a 200 (OK) response. The client sends an ACK with a correctly
   formatted answer and immediately sends a BYE to terminate the

session. The client includes a 488 (Not Acceptable Here) status code
in a Reason header field.

3.3 Third Party Call Control

The third party call controller of figure 1 tries to establish a
session between A and B. However, user B is busy. The controller
sends a BYE with the status code 486 (Busy Here) in a Reason header
field.

```
    A                  Controller           B
    |   INV  no SDP     |                    |
    |<------------------|                    |
    |                   |                    |
    |    200 SDP A1     |                    |
    |----------------> |                     |
    |                   |                    |
    |   ACK   SDP held  |                    |
    |<------------------|                    |
    |                   |                    |
    |                   |   INV no SDP       |
    |                   |------------------->|
    |                   |                    |
    |                   |   486 Busy Here    |
    |                   |<----------------|
    |                   |                    |
    |                   |        ACK         |
    |                   |---------------->|
    |      BYE (486)    |                    |
    |<------------------|                    |
    |                   |                    |
    |     200 OK        |                    |
    |----------------> |                     |
    |                   |                    |
```
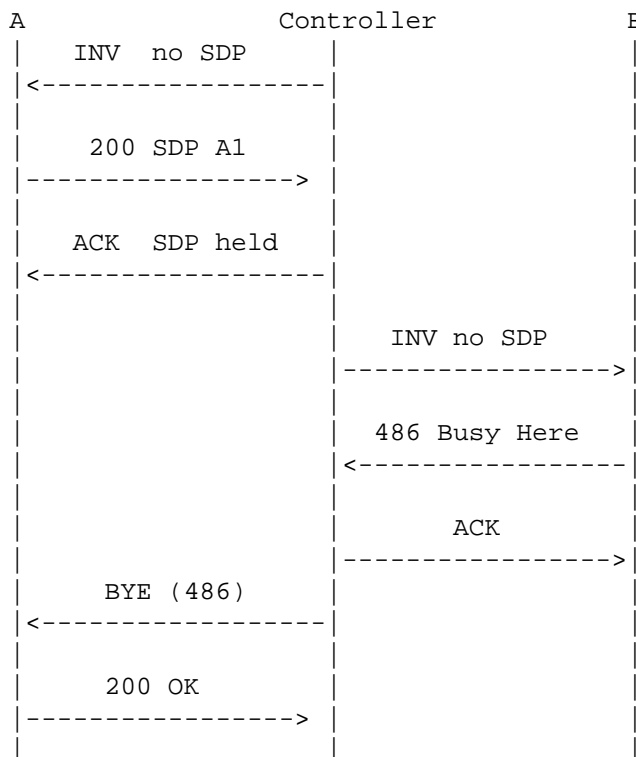
              Figure 1: Third Party Call Control

3.4 ISUP interworking

The PSTN gateway of figure 2 generates an INVITE that has to be
CANCELed when a REL (release) message is received from the ISUP side.
The CANCEL request contains the Q.850 cause value (16 Normal Call
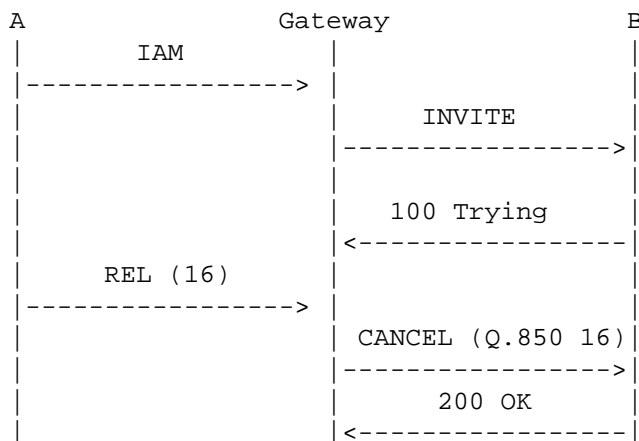Clearing) of the REL message.

```
         A                   Gateway              B
         |         IAM          |                 |
         |----------------->    |                 |
         |                      |       INVITE     |
         |                      |---------------->|
         |                      |                 |
         |                      |    100 Trying    |
         |                      |<----------------|
         |         REL (16)     |                 |
         |----------------->    |                 |
         |                      | CANCEL (Q.850 16)|
         |                      |---------------->|
         |                      |      200 OK      |
         |                      |<----------------|
```

                   Figure 2: ISUP Interworking

4. IANA Considerations

   This document defines a new SIP header field, "Reason", according to
   Section 27 of RFC 3261.

   Protocol values (and their associated protocol cause) to be used with
   this header field are registered by the IANA into a new sub-registry
   under http://www.iana.org/assignments/sip-parameters, labeled "Reason
   Protocols". Reason protocols MUST refer to either an ITU-T
   Recommendation number, an IETF protocol name or the recognized
   protocol identifier from another standardization organization.
   Protocol cause describes the source of the 'cause' field in the
   Reason header field.

   The only entries in the registry for the time being are:

   Protocol Value   Protocol Cause   Reference
   --------------   ---------------   -----------
   SIP   Status code   RFC 3261
   Q.850   Cause value in decimal   ITU-T Q.850
                     representation

5. Security Considerations

   Spoofing or removing the Reason header field from a response in a
   HERFP scenario can make it impossible for a client to update properly
   its previous request, making therefore session establishment
   impossible. Thus, it is RECOMMENDED that this header field is
   protected by a suitable integrity mechanism.

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6. Acknowledgments

   Jonathan Rosenberg, Rohan Mahy and Vijay K. Gurbani provided helpful
   comments and suggestions.

8. Normative References

   [1] 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.

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

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