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ISUP Cause Location Parameter for the SIP Reason Header Field
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Abstract

The SIP Reason header field is defined for carrying ISUP (Integrated Services Digital Network User Part) cause values as well as SIP response codes. Some services in SIP networks may need to know the ISUP location where the call was released in the PSTN network to correctly interpret the reason of release. This document will update [RFC3326](#).

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Table of Contents

1.	Introduction	2
2.	Terminology	2
3.	Rationale	3
4.	Mechanism	3
5.	Example	4
6.	Privacy Considerations	5
7.	Security Considerations	5
8.	IANA Considerations	6
	8.1. Registration of location Parameter for Reason header field	6
9.	Acknowledgments	6
10.	Normative References	6
	Author's Address	7

[1.](#) Introduction

The SIP Reason header field specification [[RFC3326](#)] describes a SIP header field that is used to indicate that a SIP request is carrying the reason of release. The reason of release indicates why a SIP Dialog or a PSTN call, in case where the call was interworked to the PSTN, was terminated. This may be a normal termination or a termination based on a failure within an entity or other reasons like congestion. The reason may be an SIP response or ISUP release cause as specified within [[Q.850](#)]. [[RFC6432](#)] specifies that a ISUP [[Q.850](#)] cause code can be carried within a SIP response, but not the Q.850 location information. The [[Q.850](#)] location information identifies the part of the ISUP network where the call was released.

This document adds a location value parameter to the reason-extension parameter in [[RFC3326](#)] so that the [[Q.850](#)] location value can be interworked from the PSTN. The interworking from PTSN needs only to include the location received by the interworking gateway. [[Q.850](#)] describes the definition of cause code values and locations used in ISDN and DSS1 environment. The cause code is used for identifying the reason of release of a call and the location identifies where the call was released.

[2.](#) Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP

14 [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

3. Rationale

The primary intent of the parameter defined in this specification is for use in IMS (IP Multimedia Subsystem) networks defined by 3GPP but it is also open to be used by any other network that includes ISUP interworking gateways and uses Q.850 reason codes. The purpose of this parameter is to transport the location of call release from the originating PSTN entity to the SIP entity receiving the response or BYE message containing the location of the call release. The ISDN location is defined in [[Q.850](#)].

4. Mechanism

As defined by [[RFC6432](#)] any SIP Response message, with the exception of a 100 (Trying), MAY contain a Reason header field with a Q.850 [[Q.850](#)] cause code.

This specification adds a parameter with the ISUP location value defined in [[Q.850](#)] to the Reason header field that identifies the location of the call release in ISUP. The location is a 4 bit value which reflects the possible locations where an ISUP call is released. Some values are spare or reserved for national use. The Augmented BNF (ABNF) [[RFC5234](#)] for this parameter is shown in Figure 1.


```
reason-extension =/ isup-cause-location
isup-cause-location = "location" EQUAL isup-location-value

isup-location-value =
    %s"U" /           ; for 0 0 0 0 user
    %s"LPN" /         ; for 0 0 0 1 private network serving the local user
    %s"LN" /          ; for 0 0 1 0 public network serving the local user
    %s"TN" /          ; for 0 0 1 1 transit network
    %s"RLN" /         ; for 0 1 0 0 public network serving the remote user
    %s"RPN" /         ; for 0 1 0 1 private network serving the remote user
    %s"LOC-6" /       ; for 0 1 1 0 spare
    %s"INTL" /        ; for 0 1 1 1 international network
    %s"LOC-8" /       ; for 1 0 0 0 spare
    %s"LOC-9" /       ; for 1 0 0 1 spare
    %s"BI" /          ; for 1 0 1 0 network beyond interworking point
    %s"LOC-11" /      ; for 1 0 1 1 spare
    %s"LOC-12" /      ; for 1 1 0 0 reserved for national use
    %s"LOC-13" /      ; for 1 1 0 1 reserved for national use
    %s"LOC-14" /      ; for 1 1 1 0 reserved for national use
    %s"LOC-15" /      ; for 1 1 1 1 reserved for national use
```

Figure 1: isup-cause-location

Note: These are the values defined within [Q.850] as location. Thus other values are not within the scope of this document.

Depending on whether the message is a request or a response the UAC or UAS SHALL include the location parameter when setting up the Reason header field with a [Q.850] cause. This approach is only possible in cases when the ISUP [Q.850] location is available.

The use of the location parameter is restricted to Q850 cause values. Other values MUST be ignored if present.

5. Example

The following example shows a SIP 404 response message containing a Reason header field with a [Q.850] cause value and a isup-cause-location value. The 404 Response will be sent when a gateway receives an ISUP Release with a [Q.850] cause set to 1, meaning "Unallocated (unassigned) number", i.e., the number is not known in the PSTN.


```
SIP/2.0 404 Not Found
Via: SIP/2.0/TCP proxy.example.com:5060;branch=z9hG4bKx5st
Via: SIP/2.0/TCP 192.0.2.3:5060;branch=z9hG4bK4321
From: Alice <sips:alice@atlanta.example.com>;tag=1234567
To: Bob <sips:bob@biloxi.example.com>;tag=765432
Call-ID: 12345600@atlanta.example.com
CSeq: 1 INVITE
Reason: Q.850;cause=1;text="Unallocated (unassigned) number";
       location=LN
Content-Length: 0
```

Figure 2: Example Location in Reason header field.

6. Privacy Considerations

While the addition of the location parameter does provide an indicator of the entity that added the location in the signaling path this provides little more exposure than the [Q.850] cause itself. The ISUP location value itself will not reveal the identity of the originating or terminating party of the call. It shows only the ISUP network location of the device that released the call. The ISUP location does not show the physical location of the caller or callee.

7. Security Considerations

This document doesn't change any of the security considerations described in [RFC3326]. The addition of the location parameter does provide an indicator of the [Q.850] location where the call was released within the PSTN. This information may be used for specific location driven services but does not create any additional security constraints. But since the [Q.850] location is very imprecise the [Q.850] location value itself will not add any major security constraint. The use of this parameter is not restricted to a specific architecture.

[RFC3398] describes detailed security consideration due to interworking between ISUP and SIP. Beyond these considerations the addition of the location does not add additional security concerns. The location shows the network part where the call is released. Knowing this does not increase the possibilities of extended fraud scenarios.

8. IANA Considerations

8.1. Registration of location Parameter for Reason header field

This document calls for IANA to register a new SIP header parameter as per the guidelines in [RFC3968], which will be added to Header Field Parameters sub-registry under <http://www.iana.org/assignments/sip-parameters>.

Header Field: Reason

Parameter Name: location

Predefined Values: yes

Reference: RFCXXXX

Note to RFC Editor: Please replace RFC XXXX with the RFC number of this specification.

9. Acknowledgments

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10. Normative References

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