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# SIP Message Information Export using IPFIX
# draft-trammell-ipfix-sip-msg-02

## Abstract

This draft defines a set of Information Elements and example Templates for IP Flow Information Export (IPFIX) based on the SIP Common Log Format data model, as well as additional useful SIP Information Elements, to allow IPFIX export of application-layer information about SIP messages.

## Status of this Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on April 29, 2012.

Table of Contents

## 1. Introduction

IPFIX [RFC5101] provides a standardized means of exporting flow information from IPFIX exporters to IPFIX collectors. This allows collectors to analyze flows from one or more sources for numerous uses, such as traffic patterns/trends, anomalies, failures, attacks, and much more. IPFIX supports exporting data in near real-time, in a secure manner, over multiple transports; as well as in local storage with a defined file format. The core IPFIX information model is maintained by IANA as a registry of Information Elements at http://www.iana.org/assignments/ipfix/. In addition to these, which cover many network measurement and management applications, enterprise-specific Information Elements may be defined, scoped to an SMI private enterprise number, for vendor-proprietary Information Elements.

Session Initiation Protocol (SIP), defined by [RFC3261] and its extensions, is used by many devices to perform a rendezvous service, initiate and manage real-time communication sessions, install and monitor state information, and more. In many deployments, SIP messages cross multiple systems managed by the same administrative entity, and thus providing a means of exporting and collecting SIP message information from such systems using a standard protocol is highly desirable.

This document defines a set of IPFIX Information Elements to enable SIP devices, such as user agents and proxies, to export SIP message information to IPFIX collectors using the IPFIX protocol. The purpose of doing so is to enable collectors to analyze the SIP "traffic", for similar purposes as those for any other IPFIX flows. Defining IANA-registered (i.e., well-known) IPFIX IE fields enables IPFIX records of SIP message information to be generated and consumed by different vendors. Within the context of this document's IPFIX IE fields, a single SIP message is a complete IPFIX Flow as defined in [RFC5101]

The SIPCLF Working Group has defined a data model [I-D.ietf-sipclf-problem-statement] for logging information about SIP messages to ASCII-based SIPCLF files. While useful for on-box storage and analysis with ASCII-based tools, SIPCLF does not provide a means of exporting such information, nor is that its goal. This document borrows the data model from SIPCLF and represents these in IPFIX Information Elements. It additionally provides examples for IPFIX representation of the example SIP Messages provided in the SIPCLF problem statement.

## 2. Base Information Elements for SIP Message Information Export

The following Information Elements represent SIP-specific mandatory fields defined in [I-D.ietf-sipclf-problem-statement], many themselves taken from [RFC3261]. Together with Information Elements already available in the IPFIX IANA Information Elements registry, these can be used to export information about SIP Messages.

### 2.1. sipObservationType

Description: Denotes whether the entry was corresponds to a SIP message received, sent, or merely seen by a passive observer, as follows:
0: unknown: The Metering Process does not specify the observation type.
1: receiver: The Metering Process is, or is co-located with, the receiver of the SIP message.
2: sender: The Metering Process is, or is co-located with, the sender of the SIP message.
3: passive: The Metering Process passively observed the SIP message.
Data Type: unsigned8
Data Type Semantics: identifier
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 419

### 2.2. sipMethod

Description: The SIP method from the CSeq header, encoded as per the IPFIX sipMethod subregistry.
Data Type: unsigned8
Data Type Semantics: identifier
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 402

### 2.3. sipSequenceNumber

Description: The sequence number from the CSeq header.
Data Type: unsigned32
Data Type Semantics: identifier
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 409

### 2.4. sipRequestURI

Description: The SIP Request URI, including any parameters, as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 403

### 2.5. sipFromURI

Description: The URI from the SIP From: header
Data Type: string
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 404

### 2.6. sipFromTag

Description: The Tag parameter value from the SIP From: header
Data Type: string
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 405

### 2.7. sipToURI

Description: The URI from the SIP To: header
Data Type: string
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 406

### 2.8. sipToTag

Description: The Tag parameter value from the SIP To: header
Data Type: string
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 407

### 2.9. sipCallId

Description: The value of the SIP Call-ID: header
Data Type: string
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 408

### 2.10. sipResponseStatus

Description: The SIP Response code. The presence of this Information Element in a SIP Message record marks it as describing a SIP response; if absent, the record describes a SIP request.
Data Type: unsigned16
Data Type Semantics: identifier
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 412

## 2.11. sipServerTransaction

Description: The transaction identifier associated with the server transaction.
Data Type: string
Data Type Semantics: identifier
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 413

## 2.12. sipClientTransaction

Description: The transaction identifier associated with the client transaction.
Data Type: string
Data Type Semantics: identifier
PEN (provisional): 35566 (trammell.ch)
ElementId (provisional): 414

## 2.13. sipMethod subregistry

The sipMethod subregistry assigns a number to encode each of the SIP methods encoded in the Methods and Response Codes registry at http://www.iana.org/assignments/sip-parameters in a 16-bit integer Information Element. These numbers are assigned from 1 in alphabetical order for the Methods defined as of the publication time of this document; subsequent Methods added to the Methods and Response Codes registry will be added to the IPFIX sipMethod subregistry at such time they are added to the Methods and Response Codes registry, using the lowest available unassigned number at the time of addition.

| Number | Method | Reference |
|---|---|---|
| 0 | Unknown | |
| 1 | ACK | [RFC3261] |
| 2 | BYE | [RFC3261] |
| 3 | CANCEL | [RFC3261] |
| 4 | INFO | [RFC6086] |
| 5 | INVITE | [RFC3261] |
| 6 | MESSAGE | [RFC3428] |
| 7 | NOTIFY | [RFC3265] |
| 8 | OPTIONS | [RFC3261] |
| 9 | PRACK | [RFC3262] |
| 10 | PUBLISH | [RFC3903] |
| 11 | REFER | [RFC3515] |
| 12 | REGISTER | [RFC3261] |
| 13 | SUBSCRIBE | [RFC3265] |
| 14 | UPDATE | [RFC3311] |
| 15-65535 | Unassigned | |

## 3. Additional Information Elements for SIP Message Information Export

[TODO frontmatter]

### 3.1. sipContactURI

Description: The addr-spec URI, including any URI parameters, of the first/top-most SIP Contact header, as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 415

### 3.2. sipRouteURI

Description: The addr-spec URI, including any URI parameters, of the first/top-most SIP Route header, as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566

ElementId (provisional): 416

### 3.3. sipPaiURI

Description: The addr-spec URI, including any URI parameters, of the first/top-most SIP P-Asserted-Identity header, as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 417

### 3.4. sipPpiURI

Description: The addr-spec URI, including any URI parameters, of the first/top-most SIP P-Preferred-Identity header, as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 418

### 3.5. sipPAssocURI

Description: The addr-spec URI, including any URI parameters, of the first/top-most SIP P-Associated-Identity header, as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 430

### 3.6. sipPCalledPartyURI

Description: The addr-spec URI, including any URI parameters, of the SIP P-Called-Party-ID header, as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 420

### 3.7. sipVia

Description: The value of the first/top-most Via header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 421

### 3.8. sipAuthUsername

Description: The value of the username field of the first/top-most Authorization header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 422

### 3.9. sipSubscriptionEvent

Description: The value of the Event header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 423

### 3.10. sipSubscriptionState

Description: The value of the Subscription-State header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 424

### 3.11. sipExpires

Description: The numeric value of the expires parameter of the first/top-most Contact header of a REGISTER request or response, or Subscription-State header of a SUBSCRIBE or NOTIFY request or response, or the Expires header if the expires parameter does not exist, as received by the metering process.

Data Type: unsigned32
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 425

### 3.12. sipPVisitedNetworkID

Description: The value of the first/top-most P-Visited-Network-ID header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 426

### 3.13. sipPAccessNetworkInfo

Description: The value of the P-Access-Network-Info header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 427

### 3.14. sipPChargingFunctionAddr

Description: The value of the first/top-most P-Charging-Function-Addresses header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 428

### 3.15. sipPChargingVector

Description: The value of the P-Charging-Vector header as a UTF-8 string, escaped according to SIP rules as received by the metering process.
Data Type: string
Data Type Semantics:
PEN (provisional): 35566
ElementId (provisional): 429

## 4. Recommended Templates for SIP Message Information Export

The SIPCLF data model represents SIP requests and SIP responses with separate records. The following Templates are defined as recommended base Templates for records describing requests and responses. Optional Information Elements MAY be added to them, and the IPv4 addresses within these Templates MUST be replaced with IPv6 addresses for logging IPv6 transport of SIP messages. A sipServerTransaction Information Element SHOULD be added for all messages logged by a User Agent Server, and a sipClientTransaction Information Element SHOULD be added for all messages logged by a User Agent Client. These templates follow the recommended fields for request and response logging in [I-D.ietf-sipclf-problem-statement], and are defined using the representation in section 9 of [I-D.trammell-ipfix-ie-doctors].

observationTimeMilliseconds(323)[8]
sipSequenceNumber(35566/409)[4]
sourceIPv4Address(8)[4]
destinationIPv4Address(12)[4]
sourceTransportPort(7)[2]
destinationTransportPort(11)[2]
protocolIdentifier(4)[1]
sipMethod(35566/402)[1]
sipObservationType(35566/419)[1]
sipRequestURI(35566/403)[v]
sipToURI(35566/406)[v]
sipToTag(35566/407)[v]
sipFromURI(35566/404)[v]
sipFromTag(35566/405)[v]
sipCallId(35566/408)[v]

Figure 1: Base Request Template (IPv4)

```
observationTimeMilliseconds(323)[8]
sipSequenceNumber(35566/409)[4]
sourceIPv4Address(8)[4]
destinationIPv4Address(12)[4]
sourceTransportPort(7)[2]
destinationTransportPort(11)[2]
protocolIdentifier(4)[1]
sipMethod(35566/402)[1]
sipObservationType(35566/419)[1]
sipResponseStatus(35566/412)[2]
sipToURI(35566/406)[v]
sipToTag(35566/407)[v]
sipFromURI(35566/404)[v]
sipFromTag(35566/405)[v]
sipCallId(35566/408)[v]
```

Figure 2: Base Response Template (IPv4)

Note that the Information Elements in these templates are ordered to place the fixed-length elements before the variable-length ones, which speeds random access to fixed-length elements. However, since element order within a record is unimportant in IPFIX, any ordering of the mandatory Information Elements within a record MUST be accepted by a Collecting Process as a valid SIP request or response record for that record type.

The record type is determined by the presence of the sipResponseStatus field. If present in the Template, the Template describes a response record. If absent, it describes a request record.

## 5. Examples

This section presents several views of an example SIP messages exported using the IPFIX templates described in this document. We present both binary and textual forms. The tools to generate this section are based upon the open-source ripfix [ripfix] implementation of IPFIX, maintained by one of the authors of this draft.

Here we show the IPFIX Messages generated by the situations in sections 9.1 through 9.4 of [I-D.ietf-sipclf-problem-statement].

### 5.1. Base Template Export

Before exporting any Request or Response records, the Templates describing them must be exported. In this example, the templates These Templates are derived from the base Templates as shown in

Figure 1 and Figure 2, with the sipClientTransaction and sipServerTransaction Information Elements appended. We use two templates here, one each for request and response for IPv4.

Exporting these Templates results in the following IPFIX message, illustrated as an annotated hexdump in Figure 3.

```
0000: 00 0a 00 fc 4c c0 2a a2 00 00 00 00 00 00 30 39  ....L.*.......09
     [ IPFIX message header, length 252              ]
0010: 00 02 00 ec                                        ....
     [ Template set (ID 2) header, length 236 ]
0014:             01 01 00 11 01 43 00 08 81 99 00 04      .....C......
0020: 00 00 8a ee 00 08 00 04 00 0c 00 04 00 07 00 02  ................
0030: 00 0b 00 02 00 04 00 01 81 92 00 01 00 00 8a ee  ................
0040: 81 a3 00 01 00 00 8a ee 81 93 ff ff 00 00 8a ee  ................
0050: 81 96 ff ff 00 00 8a ee 81 97 ff ff 00 00 8a ee  ................
0060: 81 94 ff ff 00 00 8a ee 81 95 ff ff 00 00 8a ee  ................
0070: 81 98 ff ff 00 00 8a ee 81 9e ff ff 00 00 8a ee  ................
0080: 81 9d ff ff 00 00 8a ee                          ........
     [ Template 257, 17 elements (v4 request)        ]
0088:                         01 02 00 11 01 43 00 08          .....C..
0090: 81 99 00 04 00 00 8a ee 00 08 00 04 00 0c 00 04  ................
00a0: 00 07 00 02 00 0b 00 02 00 04 00 01 81 92 00 01  ................
00b0: 00 00 8a ee 81 a3 00 01 00 00 8a ee 81 9c 00 02  ................
00c0: 00 00 8a ee 81 96 ff ff 00 00 8a ee 81 97 ff ff  ................
00d0: 00 00 8a ee 81 94 ff ff 00 00 8a ee 81 95 ff ff  ................
00e0: 00 00 8a ee 81 98 ff ff 00 00 8a ee 81 9e ff ff  ................
00f0: 00 00 8a ee 81 9d ff ff 00 00 8a ee              ............
     [ Template 258, 17 elements (v4 response)       ]
```

Figure 3: Base template message export

## 5.2. UAC registration

Having exported templates, now we create a simple IPFIX Message representing a UAC registration as seen from the UAC, corresponding to example 9.1 in [I-D.ietf-sipclf-problem-statement]. This message contains two records, including the UAS registration request, and the response received. This is shown in the annotated hexdump in Figure 4.

```
0000: 00 0a 00 d8 4c 90 7f c1 00 00 00 00 00 00 30 39  ....L.........09
     [ IPFIX message header, length 218              ]
0010: 01 01 00 6b                                      ...k
     [ Data set (ID 257) header, length 107 ]
0014:             00 00 01 29 13 66 13 93 00 00 00 01      ...).f......
0020: c6 33 64 01 c6 33 64 0a 13 c4 13 c4 11 0c 02 0f  .3d..3d.........
0030: 73 69 70 3a 65 78 61 6d 70 6c 65 2e 63 6f 6d 00  sip:example.com.
0040: 00 15 73 69 70 3a 61 6c 69 63 65 40 65 78 61 6d  ..sip:alice@exam
0050: 70 6c 65 2e 63 6f 6d 05 37 36 79 68 68 15 66 38  ple.com.76yhh.f8
0060: 31 2d 64 34 2d 66 36 40 65 78 61 6d 70 6c 65 2e  1-d4-f6@example.
0070: 63 6f 6d 06 63 2d 74 72 2d 31 00                 com.c-tr-1.
     [ Request record content                        ]
007b:                                  01 02 00 5d               ...]
           [ Data set (ID 258) header, length 93 ]
007f:                                                 00                .
0080: 00 01 29 13 66 15 24 00 00 00 01 c6 33 64 0a c6  ..).f.$.....3d..
0090: 33 64 01 13 c4 13 c4 11 0c 01 00 c8 00 00 15 73  3d.............s
00a0: 69 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c 65  ip:alice@example
00b0: 2e 63 6f 6d 05 37 36 79 68 68 15 66 38 31 2d 64  .com.76yhh.f81-d
00c0: 34 2d 66 36 40 65 78 61 6d 70 6c 65 2e 63 6f 6d  4-f6@example.com
00d0: 06 63 2d 74 72 2d 31 00                          .c-tr-1.
     [ Response record content                       ]
```

Figure 4: Message containing two log entries for UAC registration

While this demonstrates the binary nature of the SIPCLF-IPFIX format, and shows the content framing for this message, it is not readable for illustration purposes. In Figure 5, we run the message through the ripcollect tool provided with ripfix to provide a more human-readable view. Note that the sipMethod and sipObservationType are encoded according to the registries in Section 2.

```
==== message sequence 0 in domain 12345 at 2010-08-11 11:53:27 UTC ====
---- record 12345/257 ----
observationTimeMilliseconds => 2010-06-07 17:12:23 UTC
sipSequenceNumber => 1
sourceIPv4Address => 198.51.100.1
destinationIPv4Address => 198.51.100.10
sourceTransportPort => 5060
destinationTransportPort => 5060
protocolIdentifier => 17
sipMethod => 12
sipObservationType => 2
sipRequestURI => sip:example.com
sipToURI =>
sipToTag =>
sipFromURI => sip:alice@example.com
sipFromTag => 76yhh
sipCallId => f81-d4-f6@example.com
sipClientTransaction => c-tr-1
sipServerTransaction =>
---- record 12345/258 ----
observationTimeMilliseconds => 2010-06-07 17:12:24 UTC
sipSequenceNumber => 1
sourceIPv4Address => 198.51.100.10
destinationIPv4Address => 198.51.100.1
sourceTransportPort => 5060
destinationTransportPort => 5060
sipResponseStatus => 200
protocolIdentifier => 17
sipMethod => 12
sipObservationType => 1
sipToURI =>
sipToTag =>
sipFromURI => sip:alice@example.com
sipFromTag => 76yhh
sipCallId => f81-d4-f6@example.com
sipClientTransaction => c-tr-1
sipServerTransaction =>
```

Figure 5: Message containing two log entries for UAC registration

### 5.3. Direct Call

This example demonstrates the export of a direct call from Alice to Bob, as seen by Bob's agent, corresponding to example 9.2 in [I-D.ietf-sipclf-problem-statement]. Here we have four records: an INVITE received from Alice, a 180 Ringing sent back followed by a 200 OK, and an ACK received from Alice. This is shown in the ripfix dump in Figure 6 and the hexdump in Figure 7. In the hexdump, message

```
   headers, set headers, and data records are separated by '|'
   characters for compactness.  Note here that each record has its own
   data set to support high-speed seeking to a specific record, even
   when two messages using the same template are adjacent in the
   message.

   ===== message 12345/0 @2010-10-21 13:11:43 UTC (#2) =====
     --- record 12345/257 (#1)---
   observationTimeMilliseconds => 2010-06-07 17:12:23 UTC
   sipSequenceNumber => 32
   sourceIPv4Address => 198.51.100.1
   destinationIPv4Address => 203.0.113.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipRequestURI => sip:bob@bob1.example.net
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => 76yhh
   sipCallId => f82-d4-f7@example.com
   sipClientTransaction => c-1-xt6
   sipServerTransaction =>
     --- record 12345/258 (#2)---
   observationTimeMilliseconds => 2010-06-07 17:12:25 UTC
   sipSequenceNumber => 32
   sourceIPv4Address => 203.0.113.1
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 180
   sipToURI => sip:bob@example.net
   sipToTag => b-in6-iu
   sipFromURI => sip:alice@example.com
   sipFromTag => 76yhh
   sipCallId => f82-d4-f7@example.com
   sipClientTransaction => c-1-xt6
   sipServerTransaction =>
     --- record 12345/258 (#3)---
   observationTimeMilliseconds => 2010-06-07 17:12:26 UTC
   sipSequenceNumber => 32
   sourceIPv4Address => 203.0.113.1
   destinationIPv4Address => 198.51.100.1
```

```
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 200
   sipToURI => sip:bob@example.net
   sipToTag => b-in6-iu
   sipFromURI => sip:alice@example.com
   sipFromTag => 76yhh
   sipCallId => f82-d4-f7@example.com
   sipClientTransaction => c-1-xt6
   sipServerTransaction =>
     --- record 12345/257 (#4)---
   observationTimeMilliseconds => 2010-06-07 17:12:26 UTC
   sipSequenceNumber => 32
   sourceIPv4Address => 198.51.100.1
   destinationIPv4Address => 203.0.113.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 1
   sipObservationType => 2
   sipRequestURI => sip:bob@bob1.example.net
   sipToURI => sip:bob@example.net
   sipToTag => b-in6-iu
   sipFromURI => sip:alice@example.com
   sipFromTag => 76yhh
   sipCallId => f82-d4-f7@example.com
   sipClientTransaction => c-1-xt6
   sipServerTransaction =>
```

Figure 6: Message containing four records for a simple call (ripfix dump)

```
0000: 00 0a 02 1a 4c c0 2c b3 00 00 00 00 00 00 30 39| ....L.,.......09
0010: 01 01 00 88|00 00 01 29 13 66 13 93 00 00 00 20  .......).f.....
0020: c6 33 64 01 cb 00 71 01 13 c4 13 c4 11 05 02 18  .3d...q.........
0030: 73 69 70 3a 62 6f 62 40 62 6f 62 31 2e 65 78 61  sip:bob@bob1.exa
0040: 6d 70 6c 65 2e 6e 65 74 13 73 69 70 3a 62 6f 62  mple.net.sip:bob
0050: 40 65 78 61 6d 70 6c 65 2e 6e 65 74 00 15 73 69  @example.net..si
0060: 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c 65 2e  p:alice@example.
0070: 63 6f 6d 05 37 36 79 68 68 15 66 38 32 2d 64 34  com.76yhh.f82-d4
0080: 2d 66 37 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 07  -f7@example.com.
0090: 63 2d 31 2d 78 74 36 00|01 02 00 79|00 00 01 29  c-1-xt6....y...)
00a0: 13 66 18 aa 00 00 00 20 cb 00 71 01 c6 33 64 01  .f..... ..q..3d.
00b0: 13 c4 13 c4 11 05 01 00 b4 13 73 69 70 3a 62 6f  ..........sip:bo
00c0: 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74 08 62 2d  b@example.net.b-
00d0: 69 6e 36 2d 69 75 15 73 69 70 3a 61 6c 69 63 65  in6-iu.sip:alice
00e0: 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 05 37 36 79  @example.com.76y
00f0: 68 68 15 66 38 32 2d 64 34 2d 66 37 40 65 78 61  hh.f82-d4-f7@exa
0100: 6d 70 6c 65 2e 63 6f 6d 07 63 2d 31 2d 78 74 36  mple.com.c-1-xt6
0110: 00|01 02 00 79|00 00 01 29 13 66 1c f4 00 00 00  ....y...).f.....
0120: 20 cb 00 71 01 c6 33 64 01 13 c4 13 c4 11 05 01   ..q..3d........
0130: 00 c8 13 73 69 70 3a 62 6f 62 40 65 78 61 6d 70  ...sip:bob@examp
0140: 6c 65 2e 6e 65 74 08 62 2d 69 6e 36 2d 69 75 15  le.net.b-in6-iu.
0150: 73 69 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c  sip:alice@exampl
0160: 65 2e 63 6f 6d 05 37 36 79 68 68 15 66 38 32 2d  e.com.76yhh.f82-
0170: 64 34 2d 66 37 40 65 78 61 6d 70 6c 65 2e 63 6f  d4-f7@example.co
0180: 6d 07 63 2d 31 2d 78 74 36 00|01 01 00 90|00 00  m.c-1-xt6.......
0190: 01 29 13 66 1d 08 00 00 00 20 c6 33 64 01 cb 00  .).f..... .3d...
01a0: 71 01 13 c4 13 c4 11 01 02 18 73 69 70 3a 62 6f  q.........sip:bo
01b0: 62 40 62 6f 62 31 2e 65 78 61 6d 70 6c 65 2e 6e  b@bob1.example.n
01c0: 65 74 13 73 69 70 3a 62 6f 62 40 65 78 61 6d 70  et.sip:bob@examp
01d0: 6c 65 2e 6e 65 74 08 62 2d 69 6e 36 2d 69 75 15  le.net.b-in6-iu.
01e0: 73 69 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c  sip:alice@exampl
01f0: 65 2e 63 6f 6d 05 37 36 79 68 68 15 66 38 32 2d  e.com.76yhh.f82-
0200: 64 34 2d 66 37 40 65 78 61 6d 70 6c 65 2e 63 6f  d4-f7@example.co
0210: 6d 07 63 2d 31 2d 78 74 36 00                    m.c-1-xt6.
```

Figure 7: Message containing four records for a simple call (hexdump)

## 5.4. Single Downstream Branch Call

The example in Figure 8and Figure 9 demonstrates the export of a call with a downstream branch to Bob, as seen by the proxy which the call traverses, corresponding to example 9.3 in [I-D.ietf-sipclf-problem-statement]. See this example in the problem statement for more details.

```
===== message 12345/0 @2010-10-21 13:12:42 UTC (#2) =====
  --- record 12345/257 (#1)---
observationTimeMilliseconds => 2010-06-07 17:12:23 UTC
```

```
   sipSequenceNumber => 43
   sourceIPv4Address => 198.51.100.1
   destinationIPv4Address => 198.51.100.10
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipRequestURI => sip:bob@example.net
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction =>
   sipServerTransaction => s-x-tr
     --- record 12345/258 (#2)---
   observationTimeMilliseconds => 2010-06-07 17:12:24 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 198.51.100.10
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipResponseStatus => 100
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction =>
   sipServerTransaction => s-x-tr
     --- record 12345/257 (#3)---
   observationTimeMilliseconds => 2010-06-07 17:12:24 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 198.51.100.10
   destinationIPv4Address => 203.0.113.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipRequestURI => sip:bob@bob1.example.net
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
```

```
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
     --- record 12345/258 (#4)---
   observationTimeMilliseconds => 2010-06-07 17:12:25 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.1
   destinationIPv4Address => 198.51.100.10
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 100
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
     --- record 12345/258 (#5)---
   observationTimeMilliseconds => 2010-06-07 17:12:25 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.1
   destinationIPv4Address => 198.51.100.10
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 180
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
     --- record 12345/258 (#6)---
   observationTimeMilliseconds => 2010-06-07 17:12:26 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 198.51.100.10
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
```

```
   sipMethod => 5
   sipObservationType => 2
   sipResponseStatus => 180
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
     --- record 12345/258 (#7)---
   observationTimeMilliseconds => 2010-06-07 17:12:27 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.1
   destinationIPv4Address => 198.51.100.10
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 200
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
     --- record 12345/258 (#8)---
   observationTimeMilliseconds => 2010-06-07 17:12:27 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 198.51.100.10
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipResponseStatus => 200
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
     --- record 12345/257 (#9)---
   observationTimeMilliseconds => 2010-06-07 17:12:29 UTC
```

```
   sipSequenceNumber => 43
   sourceIPv4Address => 198.51.100.1
   destinationIPv4Address => 198.51.100.10
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 1
   sipObservationType => 1
   sipRequestURI => sip:bob@example.net
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
     --- record 12345/257 (#10)---
   observationTimeMilliseconds => 2010-06-07 17:12:29 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 198.51.100.10
   destinationIPv4Address => 203.0.113.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 1
   sipObservationType => 2
   sipRequestURI => sip:bob@example.net
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => al-1
   sipCallId => tr-87h@example.com
   sipClientTransaction => c-x-tr
   sipServerTransaction => s-x-tr
```

Figure 8: Message containing ten records for a downstream branch call (ripfix dump)

```
0000: 00 0a 04 e1|4c c0 2c e5 00 00 00 00 00 00 30 39| ....L.,.......09
0010: 01 01 00 7e|00 00 01 29 13 66 13 93 00 00 00 2b  ...~...).f.....+
0020: c6 33 64 01 c6 33 64 0a 13 c4 13 c4 11 05 01 13  .3d..3d.........
0030: 73 69 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e  sip:bob@example.
0040: 6e 65 74 13 73 69 70 3a 62 6f 62 40 65 78 61 6d  net.sip:bob@exam
0050: 70 6c 65 2e 6e 65 74 00 15 73 69 70 3a 61 6c 69  ple.net..sip:ali
0060: 63 65 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61  ce@example.com.a
0070: 6c 2d 31 12 74 72 2d 38 37 68 40 65 78 61 6d 70  l-1.tr-87h@examp
0080: 6c 65 2e 63 6f 6d 00 06 73 2d 78 2d 74 72|01 02  le.com..s-x-tr..
```

```
0090: 00 6c|00 00 01 29 13 66 14 c1 00 00 00 2b c6 33  .l...).f.....+.3
00a0: 64 0a c6 33 64 01 13 c4 13 c4 11 05 02 00 64 13  d..3d.........d.
00b0: 73 69 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e  sip:bob@example.
00c0: 6e 65 74 00 15 73 69 70 3a 61 6c 69 63 65 40 65  net..sip:alice@e
00d0: 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 6c 2d 31 12  xample.com.al-1.
00e0: 74 72 2d 38 37 68 40 65 78 61 6d 70 6c 65 2e 63  tr-87h@example.c
00f0: 6f 6d 00 06 73 2d 78 2d 74 72|01 01 00 89|00 00  om..s-x-tr......
0100: 01 29 13 66 18 a6 00 00 00 2b c6 33 64 0a cb 00  .).f.....+.3d...
0110: 71 01 13 c4 13 c4 11 05 02 18 73 69 70 3a 62 6f  q.........sip:bo
0120: 62 40 62 6f 62 31 2e 65 78 61 6d 70 6c 65 2e 6e  b@bob1.example.n
0130: 65 74 13 73 69 70 3a 62 6f 62 40 65 78 61 6d 70  et.sip:bob@examp
0140: 6c 65 2e 6e 65 74 00 15 73 69 70 3a 61 6c 69 63  le.net..sip:alic
0150: 65 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 6c  e@example.com.al
0160: 2d 31 12 74 72 2d 38 37 68 40 65 78 61 6d 70 6c  -1.tr-87h@exampl
0170: 65 2e 63 6f 6d 06 63 2d 78 2d 74 72 06 73 2d 78  e.com.c-x-tr.s-x
0180: 2d 74 72|01 02 00 76|00 00 01 29 13 66 19 70 00  -tr...v...).f.p.
0190: 00 00 2b cb 00 71 01 c6 33 64 0a 13 c4 13 c4 11  ..+..q..3d......
01a0: 05 01 00 64 13 73 69 70 3a 62 6f 62 40 65 78 61  ...d.sip:bob@exa
01b0: 6d 70 6c 65 2e 6e 65 74 04 62 31 2d 31 15 73 69  mple.net.b1-1.si
01c0: 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c 65 2e  p:alice@example.
01d0: 63 6f 6d 04 61 6c 2d 31 12 74 72 2d 38 37 68 40  com.al-1.tr-87h@
01e0: 65 78 61 6d 70 6c 65 2e 63 6f 6d 06 63 2d 78 2d  example.com.c-x-
01f0: 74 72 06 73 2d 78 2d 74 72|01 02 00 76|00 00 01  tr.s-x-tr...v...
0200: 29 13 66 1b c8 00 00 00 2b cb 00 71 01 c6 33 64  ).f.....+..q..3d
0210: 0a 13 c4 13 c4 11 05 01 00 b4 13 73 69 70 3a 62  ...........sip:b
0220: 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74 04 62  ob@example.net.b
0230: 31 2d 31 15 73 69 70 3a 61 6c 69 63 65 40 65 78  1-1.sip:alice@ex
0240: 61 6d 70 6c 65 2e 63 6f 6d 04 61 6c 2d 31 12 74  ample.com.al-1.t
0250: 72 2d 38 37 68 40 65 78 61 6d 70 6c 65 2e 63 6f  r-87h@example.co
0260: 6d 06 63 2d 78 2d 74 72 06 73 2d 78 2d 74 72|01  m.c-x-tr.s-x-tr.
0270: 02 00 76|00 00 01 29 13 66 1c 98 00 00 00 2b c6  ..v...).f.....+.
0280: 33 64 0a c6 33 64 01 13 c4 13 c4 11 05 02 00 b4  3d..3d..........
0290: 13 73 69 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65  .sip:bob@example
02a0: 2e 6e 65 74 04 62 31 2d 31 15 73 69 70 3a 61 6c  .net.b1-1.sip:al
02b0: 69 63 65 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 04  ice@example.com.
02c0: 61 6c 2d 31 12 74 72 2d 38 37 68 40 65 78 61 6d  al-1.tr-87h@exam
02d0: 70 6c 65 2e 63 6f 6d 06 63 2d 78 2d 74 72 06 73  ple.com.c-x-tr.s
02e0: 2d 78 2d 74 72|01 02 00 76|00 00 01 29 13 66 20  -x-tr...v...).f
02f0: f0 00 00 00 2b cb 00 71 01 c6 33 64 0a 13 c4 13  ....+..q..3d....
0300: c4 11 05 01 00 c8 13 73 69 70 3a 62 6f 62 40 65  .......sip:bob@e
0310: 78 61 6d 70 6c 65 2e 6e 65 74 04 62 31 2d 31 15  xample.net.b1-1.
0320: 73 69 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c  sip:alice@exampl
0330: 65 2e 63 6f 6d 04 61 6c 2d 31 12 74 72 2d 38 37  e.com.al-1.tr-87
0340: 68 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 06 63 2d  h@example.com.c-
0350: 78 2d 74 72 06 73 2d 78 2d 74 72|01 02 00 76|00  x-tr.s-x-tr...v.
0360: 00 01 29 13 66 21 a4 00 00 00 2b c6 33 64 0a c6  ..).f!....+.3d..
0370: 33 64 01 13 c4 13 c4 11 05 02 00 c8 13 73 69 70  3d...........sip
0380: 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74  :bob@example.net
```

```
0390: 04 62 31 2d 31 15 73 69 70 3a 61 6c 69 63 65 40  .b1-1.sip:alice@
03a0: 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 6c 2d 31  example.com.al-1
03b0: 12 74 72 2d 38 37 68 40 65 78 61 6d 70 6c 65 2e  .tr-87h@example.
03c0: 63 6f 6d 06 63 2d 78 2d 74 72 06 73 2d 78 2d 74  com.c-x-tr.s-x-t
03d0: 72|01 01 00 88|00 00 01 29 13 66 28 ac 00 00 00  r.......).f(....
03e0: 2b c6 33 64 01 c6 33 64 0a 13 c4 13 c4 11 01 01  +.3d..3d........
03f0: 13 73 69 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65  .sip:bob@example
0400: 2e 6e 65 74 13 73 69 70 3a 62 6f 62 40 65 78 61  .net.sip:bob@exa
0410: 6d 70 6c 65 2e 6e 65 74 04 62 31 2d 31 15 73 69  mple.net.b1-1.si
0420: 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c 65 2e  p:alice@example.
0430: 63 6f 6d 04 61 6c 2d 31 12 74 72 2d 38 37 68 40  com.al-1.tr-87h@
0440: 65 78 61 6d 70 6c 65 2e 63 6f 6d 06 63 2d 78 2d  example.com.c-x-
0450: 74 72 06 73 2d 78 2d 74 72|01 01 00 88|00 00 01  tr.s-x-tr.......
0460: 29 13 66 28 ac 00 00 00 2b c6 33 64 0a cb 00 71  ).f(....+.3d...q
0470: 01 13 c4 13 c4 11 01 02 13 73 69 70 3a 62 6f 62  .........sip:bob
0480: 40 65 78 61 6d 70 6c 65 2e 6e 65 74 13 73 69 70  @example.net.sip
0490: 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74  :bob@example.net
04a0: 04 62 31 2d 31 15 73 69 70 3a 61 6c 69 63 65 40  .b1-1.sip:alice@
04b0: 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 6c 2d 31  example.com.al-1
04c0: 12 74 72 2d 38 37 68 40 65 78 61 6d 70 6c 65 2e  .tr-87h@example.
04d0: 63 6f 6d 06 63 2d 78 2d 74 72 06 73 2d 78 2d 74  com.c-x-tr.s-x-t
04e0: 72                                               r
```

Figure 9: Message containing ten log entries for a downstream branch call (hexdump)

## 5.5. Forked Call

The example in Figure 11 and Figure 12 demonstrates the export of forked call to Bob, as seen by one of Bob's instances which forks the call traverses, corresponding to example 9.4 in [I-D.ietf-sipclf-problem-statement]. See this example for more details. Note that, since Bob's first instance is multihomed IPv4-IPv6, this example requires additional templates: request and response templates for IPv4 to IPv6 and back, these are shown in Figure 10.

```
0000: 00 0a 01 e4 4c c0 2d 9b 00 00 00 00 00 00 30 39  ....L.-.......09
0010: 00 02 01 d4 01 05 00 11 01 43 00 08 81 99 00 04  .........C......
0020: 00 00 8a ee 00 08 00 04 00 1c 00 10 00 07 00 02  ................
0030: 00 0b 00 02 00 04 00 01 81 92 00 01 00 00 8a ee  ................
0040: 81 a3 00 01 00 00 8a ee 81 93 ff ff 00 00 8a ee  ................
0050: 81 96 ff ff 00 00 8a ee 81 97 ff ff 00 00 8a ee  ................
0060: 81 94 ff ff 00 00 8a ee 81 95 ff ff 00 00 8a ee  ................
0070: 81 98 ff ff 00 00 8a ee 81 9e ff ff 00 00 8a ee  ................
0080: 81 9d ff ff 00 00 8a ee 01 06 00 11 01 43 00 08  .............C..
0090: 81 99 00 04 00 00 8a ee 00 08 00 04 00 1c 00 10  ................
00a0: 00 07 00 02 00 0b 00 02 00 04 00 01 81 92 00 01  ................
00b0: 00 00 8a ee 81 a3 00 01 00 00 8a ee 81 9c 00 02  ................
00c0: 00 00 8a ee 81 96 ff ff 00 00 8a ee 81 97 ff ff  ................
00d0: 00 00 8a ee 81 94 ff ff 00 00 8a ee 81 95 ff ff  ................
00e0: 00 00 8a ee 81 98 ff ff 00 00 8a ee 81 9e ff ff  ................
00f0: 00 00 8a ee 81 9d ff ff 00 00 8a ee 01 07 00 11  ................
0100: 01 43 00 08 81 99 00 04 00 00 8a ee 00 1b 00 10  .C..............
0110: 00 0c 00 04 00 07 00 02 00 0b 00 02 00 04 00 01  ................
0120: 81 92 00 01 00 00 8a ee 81 a3 00 01 00 00 8a ee  ................
0130: 81 93 ff ff 00 00 8a ee 81 96 ff ff 00 00 8a ee  ................
0140: 81 97 ff ff 00 00 8a ee 81 94 ff ff 00 00 8a ee  ................
0150: 81 95 ff ff 00 00 8a ee 81 98 ff ff 00 00 8a ee  ................
0160: 81 9e ff ff 00 00 8a ee 81 9d ff ff 00 00 8a ee  ................
0170: 01 08 00 11 01 43 00 08 81 99 00 04 00 00 8a ee  .....C..........
0180: 00 1b 00 10 00 0c 00 04 00 07 00 02 00 0b 00 02  ................
0190: 00 04 00 01 81 92 00 01 00 00 8a ee 81 a3 00 01  ................
01a0: 00 00 8a ee 81 9c 00 02 00 00 8a ee 81 96 ff ff  ................
01b0: 00 00 8a ee 81 97 ff ff 00 00 8a ee 81 94 ff ff  ................
01c0: 00 00 8a ee 81 95 ff ff 00 00 8a ee 81 98 ff ff  ................
01d0: 00 00 8a ee 81 9e ff ff 00 00 8a ee 81 9d ff ff  ................
01e0: 00 00 8a ee                                      ....
```

Figure 10: Message containing templates for IPv4 to IPv6 requests and responses, and vice versa

```
===== message 12345/0 @2010-10-21 13:13:01 UTC (#3) =====
  --- record 12345/257 (#1)---
observationTimeMilliseconds => 2010-06-07 17:12:23 UTC
sipSequenceNumber => 43
sourceIPv4Address => 198.51.100.1
destinationIPv4Address => 203.0.113.200
sourceTransportPort => 5060
destinationTransportPort => 5060
protocolIdentifier => 17
sipMethod => 5
sipObservationType => 1
sipRequestURI => sip:bob@example.net
```

```
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction =>
   sipServerTransaction => s-1-tr
     --- record 12345/258 (#2)---
   observationTimeMilliseconds => 2010-06-07 17:12:24 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipResponseStatus => 100
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction =>
   sipServerTransaction => s-1-tr
     --- record 12345/257 (#3)---
   observationTimeMilliseconds => 2010-06-07 17:12:24 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv4Address => 203.0.113.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipRequestURI => sip:bob@bob1.example.net
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-1-tr
   sipServerTransaction => s-1-tr
     --- record 12345/261 (#4)---
   observationTimeMilliseconds => 2010-06-07 17:12:25 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv6Address => 2001:db8::9
```

```
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipRequestURI => sip:bob@bob2.example.net
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
   sipServerTransaction => s-1-tr
     --- record 12345/258 (#5)---
   observationTimeMilliseconds => 2010-06-07 17:12:25 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.1
   destinationIPv4Address => 203.0.113.200
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 100
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-1-tr
   sipServerTransaction => s-1-tr
     --- record 12345/264 (#6)---
   observationTimeMilliseconds => 2010-06-07 17:12:26 UTC
   sipSequenceNumber => 43
   sourceIPv6Address => 2001:db8::9
   destinationIPv4Address => 203.0.113.200
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 100
   sipToURI => sip:bob@example.net
   sipToTag => b2-2
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
```

```
   sipServerTransaction => s-1-tr
     --- record 12345/264 (#7)---
   observationTimeMilliseconds => 2010-06-07 17:12:26 UTC
   sipSequenceNumber => 43
   sourceIPv6Address => 2001:db8::9
   destinationIPv4Address => 203.0.113.200
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 180
   sipToURI => sip:bob@example.net
   sipToTag => b2-2
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
   sipServerTransaction => s-1-tr
     --- record 12345/258 (#8)---
   observationTimeMilliseconds => 2010-06-07 17:12:26 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipResponseStatus => 180
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
   sipServerTransaction => s-1-tr
     --- record 12345/258 (#9)---
   observationTimeMilliseconds => 2010-06-07 17:12:27 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipResponseStatus => 180
```

```
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-1-tr
   sipServerTransaction => s-1-tr
     --- record 12345/258 (#10)---
   observationTimeMilliseconds => 2010-06-07 17:12:27 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.1
   destinationIPv4Address => 203.0.113.200
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 200
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-1-tr
   sipServerTransaction => s-1-tr
     --- record 12345/258 (#11)---
   observationTimeMilliseconds => 2010-06-07 17:12:28 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv4Address => 198.51.100.1
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 2
   sipResponseStatus => 200
   sipToURI => sip:bob@example.net
   sipToTag => b1-1
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-1-tr
   sipServerTransaction => s-1-tr
     --- record 12345/261 (#12)---
   observationTimeMilliseconds => 2010-06-07 17:12:28 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv6Address => 2001:db8::9
```

```
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 3
   sipObservationType => 2
   sipRequestURI => sip:bob@bob2.example.net
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
   sipServerTransaction => s-1-tr
     --- record 12345/264 (#13)---
   observationTimeMilliseconds => 2010-06-07 17:12:28 UTC
   sipSequenceNumber => 43
   sourceIPv6Address => 2001:db8::9
   destinationIPv4Address => 203.0.113.200
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 5
   sipObservationType => 1
   sipResponseStatus => 487
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
   sipServerTransaction => s-1-tr
     --- record 12345/261 (#14)---
   observationTimeMilliseconds => 2010-06-07 17:12:29 UTC
   sipSequenceNumber => 43
   sourceIPv4Address => 203.0.113.200
   destinationIPv6Address => 2001:db8::9
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 1
   sipObservationType => 2
   sipRequestURI => sip:bob@bob2.example.net
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
```

```
   sipServerTransaction => s-1-tr
     --- record 12345/264 (#15)---
   observationTimeMilliseconds => 2010-06-07 17:12:30 UTC
   sipSequenceNumber => 43
   sourceIPv6Address => 2001:db8::9
   destinationIPv4Address => 203.0.113.200
   sourceTransportPort => 5060
   destinationTransportPort => 5060
   protocolIdentifier => 17
   sipMethod => 3
   sipObservationType => 1
   sipResponseStatus => 200
   sipToURI => sip:bob@example.net
   sipToTag =>
   sipFromURI => sip:alice@example.com
   sipFromTag => a1-1
   sipCallId => tr-88h@example.com
   sipClientTransaction => c-2-tr
   sipServerTransaction => s-1-tr
```

Figure 11: Message containing fifteen records for a forked call

```
0000: 00 0a 07 8c 4c c0 2d 9b 00 00 00 00 00 00 30 39| ....L.-.......09
0010: 01 01 00 7e|00 00 01 29 13 66 13 93 00 00 00 2b  ...~...).f.....+
0020: c6 33 64 01 cb 00 71 c8 13 c4 13 c4 11 05 01 13  .3d...q.........
0030: 73 69 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e  sip:bob@example.
0040: 6e 65 74 13 73 69 70 3a 62 6f 62 40 65 78 61 6d  net.sip:bob@exam
0050: 70 6c 65 2e 6e 65 74 00 15 73 69 70 3a 61 6c 69  ple.net..sip:ali
0060: 63 65 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61  ce@example.com.a
0070: 31 2d 31 12 74 72 2d 38 38 68 40 65 78 61 6d 70  1-1.tr-88h@examp
0080: 6c 65 2e 63 6f 6d 00 06 73 2d 31 2d 74 72|01 02  le.com..s-1-tr..
0090: 00 6c|00 00 01 29 13 66 14 c1 00 00 00 2b cb 00  .l...).f.....+..
00a0: 71 c8 c6 33 64 01 13 c4 13 c4 11 05 02 00 64 13  q..3d.........d.
00b0: 73 69 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e  sip:bob@example.
00c0: 6e 65 74 00 15 73 69 70 3a 61 6c 69 63 65 40 65  net..sip:alice@e
00d0: 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 31 2d 31 12  xample.com.a1-1.
00e0: 74 72 2d 38 38 68 40 65 78 61 6d 70 6c 65 2e 63  tr-88h@example.c
00f0: 6f 6d 00 06 73 2d 31 2d 74 72|01 01 00 89|00 00  om..s-1-tr......
0100: 01 29 13 66 18 a6 00 00 00 2b cb 00 71 c8 cb 00  .).f.....+..q...
0110: 71 01 13 c4 13 c4 11 05 02 18 73 69 70 3a 62 6f  q.........sip:bo
0120: 62 40 62 6f 62 31 2e 65 78 61 6d 70 6c 65 2e 6e  b@bob1.example.n
0130: 65 74 13 73 69 70 3a 62 6f 62 40 65 78 61 6d 70  et.sip:bob@examp
0140: 6c 65 2e 6e 65 74 00 15 73 69 70 3a 61 6c 69 63  le.net..sip:alic
0150: 65 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 31  e@example.com.a1
0160: 2d 31 12 74 72 2d 38 38 68 40 65 78 61 6d 70 6c  -1.tr-88h@exampl
0170: 65 2e 63 6f 6d 06 63 2d 31 2d 74 72 06 73 2d 31  e.com.c-1-tr.s-1
0180: 2d 74 72|01 05 00 95|00 00 01 29 13 66 1a 9c 00  -tr.......).f...
```

```
0190: 00 00 2b cb 00 71 c8 20 01 0d b8 00 00 00 00 00  ..+..q. ........
01a0: 00 00 00 00 00 00 09 13 c4 13 c4 11 05 02 18 73  ...............s
01b0: 69 70 3a 62 6f 62 40 62 6f 62 32 2e 65 78 61 6d  ip:bob@bob2.exam
01c0: 70 6c 65 2e 6e 65 74 13 73 69 70 3a 62 6f 62 40  ple.net.sip:bob@
01d0: 65 78 61 6d 70 6c 65 2e 6e 65 74 00 15 73 69 70  example.net..sip
01e0: 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c 65 2e 63  :alice@example.c
01f0: 6f 6d 04 61 31 2d 31 12 74 72 2d 38 38 68 40 65  om.a1-1.tr-88h@e
0200: 78 61 6d 70 6c 65 2e 63 6f 6d 06 63 2d 32 2d 74  xample.com.c-2-t
0210: 72 06 73 2d 31 2d 74 72|01 02 00 76|00 00 01 29  r.s-1-tr...v...)
0220: 13 66 1b c8 00 00 00 2b cb 00 71 01 cb 00 71 c8  .f.....+..q...q.
0230: 13 c4 13 c4 11 05 01 00 64 13 73 69 70 3a 62 6f  ........d.sip:bo
0240: 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74 04 62 31  b@example.net.b1
0250: 2d 31 15 73 69 70 3a 61 6c 69 63 65 40 65 78 61  -1.sip:alice@exa
0260: 6d 70 6c 65 2e 63 6f 6d 04 61 31 2d 31 12 74 72  mple.com.a1-1.tr
0270: 2d 38 38 68 40 65 78 61 6d 70 6c 65 2e 63 6f 6d  -88h@example.com
0280: 06 63 2d 31 2d 74 72 06 73 2d 31 2d 74 72|01 08  .c-1-tr.s-1-tr..
0290: 00 82|00 00 01 29 13 66 1c f4 00 00 00 2b 20 01  .....).f.....+ .
02a0: 0d b8 00 00 00 00 00 00 00 00 00 00 00 09 cb 00  ................
02b0: 71 c8 13 c4 13 c4 11 05 01 00 64 13 73 69 70 3a  q.........d.sip:
02c0: 62 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74 04  bob@example.net.
02d0: 62 32 2d 32 15 73 69 70 3a 61 6c 69 63 65 40 65  b2-2.sip:alice@e
02e0: 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 31 2d 31 12  xample.com.a1-1.
02f0: 74 72 2d 38 38 68 40 65 78 61 6d 70 6c 65 2e 63  tr-88h@example.c
0300: 6f 6d 06 63 2d 32 2d 74 72 06 73 2d 31 2d 74 72| om.c-2-tr.s-1-tr
0310: 01 08 00 82|00 00 01 29 13 66 1f 4c 00 00 00 2b  .......).f.L...+
0320: 20 01 0d b8 00 00 00 00 00 00 00 00 00 00 00 09   ...............
0330: cb 00 71 c8 13 c4 13 c4 11 05 01 00 b4 13 73 69  ..q...........si
0340: 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65  p:bob@example.ne
0350: 74 04 62 32 2d 32 15 73 69 70 3a 61 6c 69 63 65  t.b2-2.sip:alice
0360: 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 31 2d  @example.com.a1-
0370: 31 12 74 72 2d 38 38 68 40 65 78 61 6d 70 6c 65  1.tr-88h@example
0380: 2e 63 6f 6d 06 63 2d 32 2d 74 72 06 73 2d 31 2d  .com.c-2-tr.s-1-
0390: 74 72|01 02 00 72|00 00 01 29 13 66 20 6e 00 00  tr...r...).f n..
03a0: 00 2b cb 00 71 c8 c6 33 64 01 13 c4 13 c4 11 05  .+..q..3d.......
03b0: 02 00 b4 13 73 69 70 3a 62 6f 62 40 65 78 61 6d  ....sip:bob@exam
03c0: 70 6c 65 2e 6e 65 74 00 15 73 69 70 3a 61 6c 69  ple.net..sip:ali
03d0: 63 65 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 04 61  ce@example.com.a
03e0: 31 2d 31 12 74 72 2d 38 38 68 40 65 78 61 6d 70  1-1.tr-88h@examp
03f0: 6c 65 2e 63 6f 6d 06 63 2d 32 2d 74 72 06 73 2d  le.com.c-2-tr.s-
0400: 31 2d 74 72|01 02 00 76|00 00 01 29 13 66 21 a4  1-tr...v...).f!.
0410: 00 00 00 2b cb 00 71 c8 c6 33 64 01 13 c4 13 c4  ...+..q..3d.....
0420: 11 05 02 00 b4 13 73 69 70 3a 62 6f 62 40 65 78  ......sip:bob@ex
0430: 61 6d 70 6c 65 2e 6e 65 74 04 62 31 2d 31 15 73  ample.net.b1-1.s
0440: 69 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c 65  ip:alice@example
0450: 2e 63 6f 6d 04 61 31 2d 31 12 74 72 2d 38 38 68  .com.a1-1.tr-88h
0460: 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 06 63 2d 31  @example.com.c-1
0470: 2d 74 72 06 73 2d 31 2d 74 72|01 02 00 76|00 00  -tr.s-1-tr...v..
0480: 01 29 13 66 23 98 00 00 00 2b cb 00 71 01 cb 00  .).f#....+..q...
```

```
0490: 71 c8 13 c4 13 c4 11 05 01 00 c8 13 73 69 70 3a  q...........sip:
04a0: 62 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74 04  bob@example.net.
04b0: 62 31 2d 31 15 73 69 70 3a 61 6c 69 63 65 40 65  b1-1.sip:alice@e
04c0: 78 61 6d 70 6c 65 2e 63 6f 6d 04 61 31 2d 31 12  xample.com.a1-1.
04d0: 74 72 2d 38 38 68 40 65 78 61 6d 70 6c 65 2e 63  tr-88h@example.c
04e0: 6f 6d 06 63 2d 31 2d 74 72 06 73 2d 31 2d 74 72| om.c-1-tr.s-1-tr
04f0: 01 02 00 76|00 00 01 29 13 66 24 60 00 00 00 2b  ...v...).f$`...+
0500: cb 00 71 c8 c6 33 64 01 13 c4 13 c4 11 05 02 00  ..q..3d.........
0510: c8 13 73 69 70 3a 62 6f 62 40 65 78 61 6d 70 6c  ..sip:bob@exampl
0520: 65 2e 6e 65 74 04 62 31 2d 31 15 73 69 70 3a 61  e.net.b1-1.sip:a
0530: 6c 69 63 65 40 65 78 61 6d 70 6c 65 2e 63 6f 6d  lice@example.com
0540: 04 61 31 2d 31 12 74 72 2d 38 38 68 40 65 78 61  .a1-1.tr-88h@exa
0550: 6d 70 6c 65 2e 63 6f 6d 06 63 2d 31 2d 74 72 06  mple.com.c-1-tr.
0560: 73 2d 31 2d 74 72|01 05 00 95|00 00 01 29 13 66  s-1-tr.......).f
0570: 25 29 00 00 00 2b cb 00 71 c8 20 01 0d b8 00 00  %)...+..q. .....
0580: 00 00 00 00 00 00 00 00 09 13 c4 13 c4 11 03     ...............
0590: 02 18 73 69 70 3a 62 6f 62 40 62 6f 62 32 2e 65  ..sip:bob@bob2.e
05a0: 78 61 6d 70 6c 65 2e 6e 65 74 13 73 69 70 3a 62  xample.net.sip:b
05b0: 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74 00 15  ob@example.net..
05c0: 73 69 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c  sip:alice@exampl
05d0: 65 2e 63 6f 6d 04 61 31 2d 31 12 74 72 2d 38 38  e.com.a1-1.tr-88
05e0: 68 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 06 63 2d  h@example.com.c-
05f0: 32 2d 74 72 06 73 2d 31 2d 74 72|01 08 00 7e|00  2-tr.s-1-tr...~.
0600: 00 01 29 13 66 28 3f 00 00 00 2b 20 01 0d b8 00  ..).f(?...+ ....
0610: 00 00 00 00 00 00 00 00 00 00 09 cb 00 71 c8 13  .............q..
0620: c4 13 c4 11 05 01 01 e7 13 73 69 70 3a 62 6f 62  .........sip:bob
0630: 40 65 78 61 6d 70 6c 65 2e 6e 65 74 00 15 73 69  @example.net..si
0640: 70 3a 61 6c 69 63 65 40 65 78 61 6d 70 6c 65 2e  p:alice@example.
0650: 63 6f 6d 04 61 31 2d 31 12 74 72 2d 38 38 68 40  com.a1-1.tr-88h@
0660: 65 78 61 6d 70 6c 65 2e 63 6f 6d 06 63 2d 32 2d  example.com.c-2-
0670: 74 72 06 73 2d 31 2d 74 72|01 05 00 95|00 00 01  tr.s-1-tr.......
0680: 29 13 66 2a 0f 00 00 00 2b cb 00 71 c8 20 01 0d  ).f*....+..q. ..
0690: b8 00 00 00 00 00 00 00 00 00 00 00 09 13 c4 13  ................
06a0: c4 11 01 02 18 73 69 70 3a 62 6f 62 40 62 6f 62  .....sip:bob@bob
06b0: 32 2e 65 78 61 6d 70 6c 65 2e 6e 65 74 13 73 69  2.example.net.si
06c0: 70 3a 62 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65  p:bob@example.ne
06d0: 74 00 15 73 69 70 3a 61 6c 69 63 65 40 65 78 61  t..sip:alice@exa
06e0: 6d 70 6c 65 2e 63 6f 6d 04 61 31 2d 31 12 74 72  mple.com.a1-1.tr
06f0: 2d 38 38 68 40 65 78 61 6d 70 6c 65 2e 63 6f 6d  -88h@example.com
0700: 06 63 2d 32 2d 74 72 06 73 2d 31 2d 74 72|01 08  .c-2-tr.s-1-tr..
0710: 00 7e|00 00 01 29 13 66 2c 31 00 00 00 2b 20 01  .~...).f,1...+ .
0720: 0d b8 00 00 00 00 00 00 00 00 00 00 00 09 cb 00  ................
0730: 71 c8 13 c4 13 c4 11 03 01 00 c8 13 73 69 70 3a  q...........sip:
0740: 62 6f 62 40 65 78 61 6d 70 6c 65 2e 6e 65 74 00  bob@example.net.
0750: 15 73 69 70 3a 61 6c 69 63 65 40 65 78 61 6d 70  .sip:alice@examp
0760: 6c 65 2e 63 6f 6d 04 61 31 2d 31 12 74 72 2d 38  le.com.a1-1.tr-8
0770: 38 68 40 65 78 61 6d 70 6c 65 2e 63 6f 6d 06 63  8h@example.com.c
0780: 2d 32 2d 74 72 06 73 2d 31 2d 74 72              -2-tr.s-1-tr
```

Figure 12: Message containing sixteen log entries for a forked call

## 6. Security Considerations

[TODO]

## 7. IANA Considerations

This document defines the sipMethod subregistry for the IANA IPFIX Information Element registry at http://www.iana.org/assignments/ipfix for the values taken by the sipMethod Information Element. The initial content of this subregistry is specified in Section 2.13. Entries may be added to this subregistry subject to the same Standards Action [RFC5226] that adds new Methods to the Methods and Response Codes registry at http://www.iana.org/assignments/sip-parameters.

At such time as this document is prepared for publication as an RFC, the Information Elements defined herein will be defined for inclusion in the IANA IPFIX Information Element registry at http://www.iana.org/assignments/ipfix. Until such time, the Information Elements within this document are defined within Private Enterprise Number 35566, belonging to one of the authors.

## 8. Acknowledgments

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## Appendix A. Definition of Base SIP Message Information Elements in IANA XML Registry format

[EDITOR'S NOTE: frontmatter]

```
<registry xmlns="http://www.iana.org/assignments" id="ipfix">
  <registry id="ipfix-information-element-definitions">
    <record>
      <name>sipObservationType</name>
      <dataType>unsigned8</dataType>
      <dataTypeSemantics>identifier</dataTypeSemantics>
      <enterpriseId>35566</enterpriseId>
      <elementId>419</elementId>
      <status>current</status>
      <description>
        <paragraph>
            Denotes whether the entry was
            corresponds to a SIP message received, sent, or merely
            seen by a passive observer, as follows:
        </paragraph>
        <paragraph>0: unknown: The Metering Process does not
          specify the observation type.</paragraph>
        <paragraph>1: receiver: The Metering Process is, or is
          co-located with, the receiver of the SIP message.</paragraph>
        <paragraph>2: sender: The Metering Process is, or is
          co-located with, the sender of the SIP message.</paragraph>
```

```
        <paragraph>3: passive: The Metering Process passively
          observed the SIP message.</paragraph>
      </description>
    </record>
    <record>
      <name>sipMethod</name>
      <dataType>unsigned8</dataType>
      <dataTypeSemantics>identifier</dataTypeSemantics>
      <enterpriseId>35566</enterpriseId>
      <elementId>402</elementId>
      <status>current</status>
      <description>
        <paragraph>
          The SIP method from the CSeq header, encoded as per
          the IPFIX sipMethod subregistry.
          </paragraph>
      </description>
    </record>
    <record>
      <name>sipSequenceNumber</name>
      <dataType>unsigned32</dataType>
      <dataTypeSemantics>identifier</dataTypeSemantics>
      <enterpriseId>35566</enterpriseId>
      <elementId>409</elementId>
      <status>current</status>
      <description>
        <paragraph>The sequence number from the CSeq header.</paragraph>
      </description>
    </record>
    <record>
      <name>sipRequestURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>403</elementId>
      <status>current</status>
      <description>
        <paragraph>The SIP Request URI, including any parameters,
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipFromURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>404</elementId>
      <status>current</status>
      <description>
```

```
        <paragraph>The URI from the SIP From: header</paragraph>
      </description>
    </record>
    <record>
      <name>sipFromTag</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>405</elementId>
      <status>current</status>
      <description>
        <paragraph>The Tag parameter value from the SIP
          From: header</paragraph>
      </description>
    </record>
    <record>
      <name>sipToURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>406</elementId>
      <status>current</status>
      <description>
        <paragraph>The URI from the SIP To: header</paragraph>
      </description>
    </record>
    <record>
      <name>sipToTag</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>407</elementId>
      <status>current</status>
      <description>
        <paragraph>The Tag parameter value from the SIP To:
          header</paragraph>
      </description>
    </record>
    <record>
      <name>sipCallId</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>408</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the SIP Call-ID: header</paragraph>
      </description>
    </record>
    <record>
      <name>sipResponseStatus</name>
      <dataType>unsigned16</dataType>
```

```
      <dataTypeSemantics>identifier</dataTypeSemantics>
      <enterpriseId>35566</enterpriseId>
      <elementId>412</elementId>
      <status>current</status>
      <description>
        <paragraph>The SIP Response code. The presence of this
          Information Element in a SIP Message record marks it as
          describing a SIP response; if absent, the record describes
          a SIP request.</paragraph>
      </description>
    </record>
    <record>
      <name>sipServerTransaction</name>
      <dataType>string</dataType>
      <dataTypeSemantics>identifier</dataTypeSemantics>
      <enterpriseId>35566</enterpriseId>
      <elementId>413</elementId>
      <status>current</status>
      <description>
        <paragraph>The transaction identifier associated with
          the server transaction.</paragraph>
      </description>
    </record>
    <record>
      <name>sipClientTransaction</name>
      <dataType>string</dataType>
      <dataTypeSemantics>identifier</dataTypeSemantics>
      <enterpriseId>35566</enterpriseId>
      <elementId>414</elementId>
      <status>current</status>
      <description>
        <paragraph>The transaction identifier associated with
          the client transaction.</paragraph>
      </description>
    </record>
  </registry>
</registry>
```

SIP Message Information Element definitions

## Appendix B. Definition of sipMethod registry in IANA XML Registry format

[EDITOR'S NOTE: frontmatter]

```
<registry xmlns="http://www.iana.org/assignments" id="ipfix">
  <registry id="sipMethod">
```

```
      <title>IPFIX sipMethod</title>
      <registration_rule>Expert Review</registration_rule>
      <record>
        <value>0</value>
        <description>Unknown</description>
        <comments>The Metering Process did not
          recognize the SIP method.</comments>
      </record>
      <record>
        <value>1</value>
        <description>ACK</description>
        <comments/>
        <xref type="rfc" data="rfc3261"/>
      </record>
      <record>
        <value>2</value>
        <description>BYE</description>
        <comments/>
        <xref type="rfc" data="rfc3261"/>
      </record>
      <record>
        <value>3</value>
        <description>CANCEL</description>
        <comments/>
        <xref type="rfc" data="rfc3261"/>
      </record>
      <record>
        <value>4</value>
        <description>INFO</description>
        <comments/>
        <xref type="rfc" data="rfc6086"/>
      </record>
      <record>
        <value>5</value>
        <description>INVITE</description>
        <comments/>
        <xref type="rfc" data="rfc3261"/>
      </record>
      <record>
        <value>6</value>
        <description>MESSAGE</description>
        <comments/>
        <xref type="rfc" data="rfc3428"/>
      </record>
      <record>
        <value>7</value>
        <description>NOTIFY</description>
        <comments/>
```

```
        <xref type="rfc" data="rfc3265"/>
      </record>
      <record>
        <value>8</value>
        <description>OPTIONS</description>
        <comments/>
        <xref type="rfc" data="rfc3261"/>
      </record>
      <record>
        <value>9</value>
        <description>PRACK</description>
        <comments/>
        <xref type="rfc" data="rfc3262"/>
      </record>
      <record>
        <value>10</value>
        <description>PUBLISH</description>
        <comments/>
        <xref type="rfc" data="rfc3903"/>
      </record>
      <record>
        <value>11</value>
        <description>REFER</description>
        <comments/>
        <xref type="rfc" data="rfc3515"/>
      </record>
      <record>
        <value>12</value>
        <description>REGISTER</description>
        <comments/>
        <xref type="rfc" data="rfc3261"/>
      </record>
      <record>
        <value>13</value>
        <description>SUBSCRIBE</description>
        <comments/>
        <xref type="rfc" data="rfc3265"/>
      </record>
      <record>
        <value>14</value>
        <description>UPDATE</description>
        <comments/>
        <xref type="rfc" data="rfc3311"/>
      </record>
      <record>
        <value>15-65535</value>
        <description>Unassigned</description>
        <comments></comments>
```

```
      </record>
    </registry>
  </registry>
```

sipMethod subregistry

## Appendix C. Definition of Additional SIP Message Information Elements in IANA XML Registry format

[EDITOR'S NOTE: frontmatter]

```
<?xml version="1.0" encoding="UTF-8"?>

<registry xmlns="http://www.iana.org/assignments" id="ipfix">
  <registry id="ipfix-information-element-definitions">

    <record>
      <name>sipContactURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>415</elementId>
      <status>current</status>
      <description>
        <paragraph>The addr-spec URI, including any URI parameters,
          of the first/top-most SIP Contact header,
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipRouteURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>416</elementId>
      <status>current</status>
      <description>
        <paragraph>The addr-spec URI, including any URI parameters,
          of the first/top-most SIP Route header,
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPaiURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>417</elementId>
```

```
      <status>current</status>
      <description>
        <paragraph>The addr-spec URI, including any URI parameters,
          of the first/top-most SIP P-Asserted-Identity header,
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPpiURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>418</elementId>
      <status>current</status>
      <description>
        <paragraph>The addr-spec URI, including any URI parameters,
          of the first/top-most SIP P-Preferred-Identity header,
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPAssocURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>430</elementId>
      <status>current</status>
      <description>
        <paragraph>The addr-spec URI, including any URI parameters,
          of the first/top-most SIP P-Associated-Identity header,
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPCalledPartyURI</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>420</elementId>
      <status>current</status>
      <description>
        <paragraph>The addr-spec URI, including any URI parameters,
          of the SIP P-Called-Party-ID header,
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
```

```
      <name>sipVia</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>421</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the first/top-most Via header
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipAuthUsername</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>422</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the username field
          of the first/top-most Authorization header
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipSubscriptionEvent</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>423</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the Event header
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipSubscriptionState</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>424</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the Subscription-State header
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
```

```
    <record>
      <name>sipExpires</name>
      <dataType>unsigned32</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>425</elementId>
      <status>current</status>
      <description>
        <paragraph>The numeric value of the expires parameter of the
          first/top-most Contact header of a REGISTER request
          or response, or Subscription-State header of a SUBSCRIBE
          or NOTIFY request or response, or the Expires header
          if the expires parameter does not exist, as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPVisitedNetworkID</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>426</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the first/top-most P-Visited-Network-ID
          header as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPAccessNetworkInfo</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>427</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the P-Access-Network-Info header
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPChargingFunctionAddr</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>428</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the first/top-most
          P-Charging-Function-Addresses header
```

```
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
    <record>
      <name>sipPChargingVector</name>
      <dataType>string</dataType>
      <enterpriseId>35566</enterpriseId>
      <elementId>429</elementId>
      <status>current</status>
      <description>
        <paragraph>The value of the P-Charging-Vector header
          as a UTF-8 string, escaped according to SIP rules as
          received by the metering process.</paragraph>
      </description>
    </record>
  </registry>
  </registry>
```

Additional SIP Message Information Element definitions

## Appendix D. Example messages in base64

This section contains the example messages from this revision of this draft in base64 encoding, for ease of processing by automated tools.

The base templates are in this message:

```
AAoA/EzALZsAAAAAAAAwOQACAOwBAQARAUMACIGZAAQAAIruAAgABAAMAAQA
BwACAAsAAgAEAAGBkgABAACK7oGjAAEAAIrugZP//wAAiu6Blv//AACK7oGX
//8AAIrugZT//wAAiu6Blf//AACK7oGY//8AAIrugZ7//wAAiu6Bnf//AACK
7gECABEBQwAIgZkABAAAiu4ACAAEAAwABAAHAAIACwACAAQAAYGSAAEAAIru
gaMAAQAAiu6BnAACAACK7oGW//8AAIrugZf//wAAiu6BlP//AACK7oGV//8A
AIrugZj//wAAiu6Bnv//AACK7oGd//8AAIru
```

The extended 4to6 and 6to4 templates are in this message:

```
AAoB5EzALZsAAAAAAAAwOQACAdQBBQARAUMACIGZAAQAAIruAAgABAAcABAA
BwACAAsAAgAEAAGBkgABAACK7oGjAAEAAIrugZP//wAAiu6Blv//AACK7oGX
//8AAIrugZT//wAAiu6Blf//AACK7oGY//8AAIrugZ7//wAAiu6Bnf//AACK
7gEGABEBQwAIgZkABAAAiu4ACAAEABwAEAAHAAIACwACAAQAAYGSAAEAAIru
gaMAAQAAiu6BnAACAACK7oGW//8AAIrugZf//wAAiu6BlP//AACK7oGV//8A
AIrugZj//wAAiu6Bnv//AACK7oGd//8AAIruAQcAEQFDAAiBmQAEAACK7gAb
ABAADAAEAAcAAgALAAIABAABgZIAAQAAiu6BowABAACK7oGT//8AAIrugZb/
/wAAiu6Bl///AACK7oGU//8AAIrugZX//wAAiu6BmP//AACK7oGe//8AAIru gZ3//
wAAiu4BCAARAUMACIGZAAQAAIruABsAEAAMAAQABwACAAsAAgAEAAGB
kgABAACK7oGjAAEAAIrugZwAAgAAiu6Blv//AACK7oGX//8AAIrugZT//wAA iu6Blf//
```

AACK7oGY//8AAIrugZ7//wAAiu6Bnf//AACK7g==

The UAC registration in Section 5.2 is in this message:

AAoA2EzAO88AAAAAAAwOQEBAGsAAAEpE2YTkwAAAAHGM2QBxjNkChPEE8QR
DAIPc2lwOmV4YW1wbGUuY29tAAAVc2lwOmFsaWNlQGV4YW1wbGUuY29tBTc2
eWhoFWY4MS1kNC1mNkBleGFtcGxlLmNvbQZjLXRyLTEAAQIAXQAAASkTZhUk
AAAAAcYzZArGM2QBE8QTxBEMAQDIAAAVc2lwOmFsaWNlQGV4YW1wbGUuY29t
BTc2eWhoFWY4MS1kNC1mNkBleGFtcGxlLmNvbQZjLXRyLTEA

The direct call in Section 5.3 is in this message:

AAoCGkzAPA8AAAAAAAwOQEBAIgAAAEpE2YTkwAAACDGM2QBywBxARPEE8QR
BQIYc2lwOmJvYkBib2IxLmV4YW1wbGUubmV0E3NpcDpib2JAZXhhbXBsZS5u
ZXQAFXNpcDphbGljZUBleGFtcGxlLmNvbQU3NnloaBVmODItZDQtZjdAZXhh
bXBsZS5jb20HYy0xLXh0NgABAgB5AAABKRNmGKoAAAAgywBxAcYzZAETxBPE
EQUBALQTc2lwOmJvYkBleGFtcGxlLm5ldAhiLWluNi1pdRVzaXA6YWxpY2VA
ZXhhbXBsZS5jb20FNzZ5aGgVZjgyLWQ0LWY3QGV4YW1wbGUuY29tB2MtMS14
dDYAAQIAeQAAASkTZhz0AAAAIMsAcQHGM2QBE8QTxBEFAQDIE3NpcDpib2JA
ZXhhbXBsZS5uZXQIYi1pbjYtaXUVc2lwOmFsaWNlQGV4YW1wbGUuY29tBTc2
eWhoFWY4Mi1kNC1mN0BleGFtcGxlLmNvbQdjLTEteHQ2AAEBAJAAAAEpE2Yd
CAAAACDGM2QBywBxARPEE8QRAQIYc2lwOmJvYkBib2IxLmV4YW1wbGUubmV0
E3NpcDpib2JAZXhhbXBsZS5uZXQIYi1pbjYtaXUVc2lwOmFsaWNlQGV4YW1w
bGUuY29tBTc2eWhoFWY4Mi1kNC1mN0BleGFtcGxlLmNvbQdjLTEteHQ2AA==

The downstream branch call in Section 5.4 is in this message:

AAoE4UzAPEoAAAAAAAwOQEBAH4AAAEpE2YTkwAAACvGM2QBxjNkChPEE8QR
BQETc2lwOmJvYkBleGFtcGxlLm5ldBNzaXA6Ym9iQGV4YW1wbGUubmV0ABVz
aXA6YWxpY2VAZXhhbXBsZS5jb20EYWwtMRJ0ci04N2hAZXhhbXBsZS5jb20A
BnMteC10cgECAGwAAAEpE2YUwQAAACvGM2QKxjNkARPEE8QRBQIAZBNzaXA6
Ym9iQGV4YW1wbGUubmV0ABVzaXA6YWxpY2VAZXhhbXBsZS5jb20EYWwtMRJ0
ci04N2hAZXhhbXBsZS5jb20ABnMteC10cgEBAIkAAAEpE2YYpgAAACvGM2QK
ywBxARPEE8QRBQIYc2lwOmJvYkBib2IxLmV4YW1wbGUubmV0E3NpcDpib2JA
ZXhhbXBsZS5uZXQAFXNpcDphbGljZUBleGFtcGxlLmNvbQRhbC0xEnRyLTg3
aEBleGFtcGxlLmNvbQZjLXgtdHIGcy14LXRyAQIAdgAAASkTZhlwAAAAK8sA
cQHGM2QKE8QTxBEFAQBkE3NpcDpib2JAZXhhbXBsZS5uZXQEYjEtMRVzaXA6
YWxpY2VAZXhhbXBsZS5jb20EYWwtMRJ0ci04N2hAZXhhbXBsZS5jb20GYy14
LXRyBnMteC10cgECAHYAAAEpE2YbyAAAACvLAHEBxjNkChPEE8QRBQEAtBNz
aXA6Ym9iQGV4YW1wbGUubmV0BGIxLTEVc2lwOmFsaWNlQGV4YW1wbGUuY29t
BGFsLTESdHItODdoQGV4YW1wbGUuY29tBmMteC10cgZzLXgtdHIBAgB2AAAB
KRNmHJgAAAArxjNkCsYzZAETxBPEEQUCALQTc2lwOmJvYkBleGFtcGxlLm5l
dARiMS0xFXNpcDphbGljZUBleGFtcGxlLmNvbQRhbC0xEnRyLTg3aEBleGFt
cGxlLmNvbQZjLXgtdHIGcy14LXRyAQIAdgAAASkTZiDwAAAAK8sAcQHGM2QK
E8QTxBEFAQDIE3NpcDpib2JAZXhhbXBsZS5uZXQEYjEtMRVzaXA6YWxpY2VA
ZXhhbXBsZS5jb20EYWwtMRJ0ci04N2hAZXhhbXBsZS5jb20GYy14LXRyBnMt
eC10cgECAHYAAAEpE2YhpAAAACvGM2QKxjNkARPEE8QRBQIAyBNzaXA6Ym9i
QGV4YW1wbGUubmV0BGIxLTEVc2lwOmFsaWNlQGV4YW1wbGUuY29tBGFsLTES

dHItODdoQGV4YW1wbGUuY29tBmMteC10cgZzLXgtdHIBAQCIAAABKRNmKKwA
AAArxjNkAcYzZAoTxBPEEQEBE3NpcDpib2JAZXhhbXBsZS5uZXQTc2lwOmJv
YkBleGFtcGxlLm5ldARiMS0xFXNpcDphbGljZUBleGFtcGxlLmNvbQRhbC0x
EnRyLTg3aEBleGFtcGxlLmNvbQZjLXgtdHIGcy14LXRyAQEAiAAAASkTZiis
AAAAK8YzZArLAHEBE8QTxBEBAhNzaXA6Ym9iQGV4YW1wbGUubmV0E3NpcDpi
b2JAZXhhbXBsZS5uZXQEYjEtMRVzaXA6YWxpY2VAZXhhbXBsZS5jb20EYWwt
MRJ0ci04N2hAZXhhbXBsZS5jb20GYy14LXRyBnMteC10cg==

The forked call in Section 5.5 is in this message:

AAoHjEzAPF0AAAAAAAAwOQEBAH4AAAEpE2YTkwAAACvGM2QBywBxyBPEE8QR
BQETc2lwOmJvYkBleGFtcGxlLm5ldBNzaXA6Ym9iQGV4YW1wbGUubmV0ABVz
aXA6YWxpY2VAZXhhbXBsZS5jb20EYTEtMRJ0ci04OGhAZXhhbXBsZS5jb20A
BnMtMS10cgECAGwAAAEpE2YUwQAAACvLAHHIxjNkARPEE8QRBQIAZBNzaXA6
Ym9iQGV4YW1wbGUubmV0ABVzaXA6YWxpY2VAZXhhbXBsZS5jb20EYTEtMRJ0
ci04OGhAZXhhbXBsZS5jb20ABnMtMS10cgEBAIkAAAEpE2YYpgAAACvLAHHI
ywBxARPEE8QRBQIYc2lwOmJvYkBib2IxLmV4YW1wbGUubmV0E3NpcDpib2JA
ZXhhbXBsZS5uZXQAFXNpcDphbGljZUBleGFtcGxlLmNvbQRhMS0xEnRyLTg4
aEBleGFtcGxlLmNvbQZjLTEtdHIGcy0xLXRyAQUAlQAAASkTZhqcAAAAK8sA
ccggAQ24AAAAAAAAAAAAAAAJE8QTxBEFAhhzaXA6Ym9iQGJvYjIuZXhhbXBs
ZS5uZXQTc2lwOmJvYkBleGFtcGxlLm5ldAAVc2lwOmFsaWNlQGV4YW1wbGUu
Y29tBGExLTESdHItODhoQGV4YW1wbGUuY29tBmMtMi10cgZzLTEtdHIBAgB2
AAABKRNmG8gAAAArywBxAcsAccgTxBPEEQUBAGQTc2lwOmJvYkBleGFtcGxl
Lm5ldARiMS0xFXNpcDphbGljZUBleGFtcGxlLmNvbQRhMS0xEnRyLTg4aEBl
eGFtcGxlLmNvbQZjLTEtdHIGcy0xLXRyAQgAggAAASkTZhz0AAAAKyABDbgA
AAAAAAAAAAAAAAnLAHHIE8QTxBEFAQBkE3NpcDpib2JAZXhhbXBsZS5uZXQE
YjItMhVzaXA6YWxpY2VAZXhhbXBsZS5jb20EYTEtMRJ0ci04OGhAZXhhbXBs
ZS5jb20GYy0yLXRyBnMtMS10cgEIAIIAAAEpE2YfTAAAACsgAQ24AAAAAAAA
AAAAAAAJywBxyBPEE8QRBQEAtBNzaXA6Ym9iQGV4YW1wbGUubmV0BGIyLTIV
c2lwOmFsaWNlQGV4YW1wbGUuY29tBGExLTESdHItODhoQGV4YW1wbGUuY29t
BmMtMi10cgZzLTEtdHIBAgByAAABKRNmIG4AAArywBxyMYzZAETxBPEEQUC
ALQTc2lwOmJvYkBleGFtcGxlLm5ldAAVc2lwOmFsaWNlQGV4YW1wbGUuY29t
BGExLTESdHItODhoQGV4YW1wbGUuY29tBmMtMi10cgZzLTEtdHIBAgB2AAAB
KRNmIaQAAAArywBxyMYzZAETxBPEEQUCALQTc2lwOmJvYkBleGFtcGxlLm5l
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