

The Presence-Specific Static Dictionary  
for Signaling Compression (Sigcomp)

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

The Session Initiation Protocol (SIP) is a text-based protocol for initiating and managing communication sessions. The protocol is extended by the SIP-events notification framework to provide subscriptions and notifications of SIP events. One example of such event notification mechanism is presence, which is expressed in XML documents called presence documents. SIP can be compressed by using Signaling Compression (SigComp), which is enhanced by using the SIP/Session Description Protocol (SDP) dictionary to achieve better compression rates. However, the SIP/SDP dictionary is not able to increase the compression factor of (typically lengthy) presence documents. This memo defines the presence-specific static dictionary that SigComp can use in order to compress presence documents to achieve higher efficiency. The dictionary is compression-algorithm independent.

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## 1. Introduction

The Session Initiation Protocol (SIP) [4] is extended by the SIP-events framework [5] to provide subscriptions and notifications of SIP events. One example of such an event-notification mechanism is presence. The presence information is typically carried in Extensible Markup Language (XML) [22] documents that are compliant with a given XML schema [23]. The Presence Information Data Format (PIDF) [8] defines the format for the basic presence document that supplies presence information. Typically, PIDF is used in combination with other extensions to provide a richer user experience, among others: the Presence Data Model [10], Rich Presence Extensions to PIDF (RPID) [11], Contact Information in PIDF (CIPID) [12], the SIP Event Notification Extension for Resource Lists [19] and the SIP User Agent Capability Extensions to PIDF [20], or the Location Object in PIDF [16].

Typically, presence documents can contain large amounts of data. The size of this data is dependent on the number of presentities that a watcher is subscribed to and the amount of information supplied by the presentity. This can impose a problem in environments where resources are scarce (e.g., low bandwidth links with high latency) and the presence service is offered at low or no cost. This is the case, e.g., of some wireless networks and devices. It is reasonable to try to minimize the impact of bringing the presence service to wireless networks under these circumstances.

Work has been done to mitigate the impact of transferring large amounts of presence documents between endpoints. For example, the Partial PIDF [15] reduces the amount of data transferred between the endpoints.

On the other hand, the signaling compression mechanisms specified in the SigComp framework (RFC 3320) [2] provide a multiple compression/decompression algorithm framework to compress and decompress text-based protocols, such as SIP. When compression is used in SIP, the compression achieves its maximum rate once a few message exchanges have taken place. This is due to the fact that the first message the compressor sends to the decompressor is only partially compressed, as there is not a previously stored state to compress against. As the goal is to compress as much as possible, it seems sensible to investigate a mechanism to boost the compression rate from the first message.

RFC 3485 [7] defines a static dictionary for SIP [4] and SDP [9]. The dictionary is to be used in conjunction with SIP [4], SDP [9], and SigComp [2]. The static SIP/SDP dictionary constitutes a SigComp state that can be referenced in the first SIP message that the compressor sends out. The dictionary boosts the compression of SIP and SDP, but unfortunately does not have any effect in XML-based presence documents.

It sounds reasonable to define a presence-specific static dictionary that can be used in conjunction with SIP and Sigcomp. This dictionary can coexist with the static SIP/SDP dictionary defined in RFC 3485 [7]. Sigcomp endpoints will initially announce the availability of one or both dictionaries until the other end acknowledges that it has received the announcement.

Our initial simulations when developing this dictionary reveal that once the current mitigation mechanisms are applied (e.g., Sigcomp, partial notification, partial publication), a further compression factor of 10% can be achieved when Sigcomp uses the presence-specific static dictionary.

## 2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14, RFC 2119 [1] and indicate requirement levels for compliant implementations.

## 3. Design Considerations

The presence-specific static dictionary is a collection of well-known strings that appear in most of the presence documents used by SIP. The dictionary is not a comprehensive list of reserved words, but it includes many of the strings that appear in presence documents.

The presence static dictionary is unique and MAY be available in SigComp implementations for SIP that support the presence service. The dictionary is not intended to evolve as presence evolves. It is defined once, and it stays as is forever. This solves the problems of updating, upgrading, and finding out the dictionary that is supported at the remote end when several versions of the same dictionary coexist.

Appendix A contains the collection of strings that were contributed to the presence static dictionary. The appendix also includes references to the documents that define those strings.

While this appendix is of an informative nature, Section 4 gives the normative binary form of the presence-specific static dictionary. This is the dictionary that is included in the SigComp implementation. This dictionary has been formed from the collection of individual dictionaries given in Appendix A.

The input set is a collection of UTF-8 [6] encoded character strings. The appendix provides a table where each row represents an entry. Each entry contains the string that actually occurs in the dictionary, its priority (see below), its offset from the first octet and its length (both in hexadecimal), and one or more references that elucidate why this string is expected to occur in presence documents.

Note: Length in this document always refers to octets.

The columns in the table are described as follows:

String:

represents the UTF-8 string that is inserted into the dictionary. Note that the quotes (") are not part of the string itself.

Pr:

indicates the priority of this string within the dictionary. Some compression algorithms, such as DEFLATE [3], offer an increased efficiency when the most commonly used strings are located at the bottom of the dictionary. To facilitate generating a dictionary that has the most frequently occurring strings farther down at the bottom, we have decided to allocate a priority to each string in the dictionary. Priorities range from 1 to 5. A low value in the priority column (e.g., 1) indicates that we believe there is a high probability of finding the string in a presence document. A high value in the priority column (e.g., 5) indicates lower probability of finding the string in a presence document. This is typically the case for less frequent extensions or optional, infrequent XML elements or attributes.

**Off:**

indicates the hexadecimal offset of the entry with respect to the first octet in the dictionary. Note that several strings in the collections can share space in the dictionary if they exhibit suitable common substrings.

**Len:**

the length of the string in octets in hexadecimal.

**References:**

contains one or more references to the specification and the section within the specification where the string is defined. Note that the strings stored in the dictionary are case sensitive. (Again, the strings do not include the quotes ("), they are just shown here to increase the readability).

There are a few design considerations that require a bit more explanation:

- o Due to the fact that most compression algorithms have a break-even point around three or four characters, we have selected those static strings of characters that consist of four or more characters.
- o When a string appears as an XML element in an XML document, it is typically surrounded by the '<' and '>' signs, such as in '<foo>'. It would have been natural to include the '<' and '>' signs of the element in each input string. However, we made the decision to omit the '<' and '>' signs because then we can easily reuse the same string for start-tags (e.g., <foo>), start-tags that contain attributes (e.g., <foo attr="myattr">), empty-element tags (e.g., <foo/>), and end-tags (e.g., </foo>).
- o Whenever there is an enumerated string, the string does not contain quotes, following the same pattern as any other input string.
- o In a few cases, we have decided to split a string that appears a few times into a few substrings. This is the case of Uniform Resource Names (URNs) in the IETF address space, because this allows the dictionary to reuse the same substring in various URN strings.

#### 4. Binary Representation of the Presence-Specific Static Dictionary

This section contains the binary form of the presence-specific static dictionary that is loaded into SigComp as a state.

The binary SigComp dictionary is composed of two parts, the concatenation of which serves as the state value of the state item: A string subset, which contains all strings in the contributing collections as a substring (roughly ordered such that strings with low priority numbers occur at the end), and a table subset, which contains pairs of length and offset values for all the strings in the contributing collections. In each of these pairs, the length is stored as a one-byte value, and the offset is stored as a two-byte value that has had 1024 added to the offset (this allows direct referencing from the stored value if the dictionary state has been loaded at address 1024).

The intention is that all compression algorithms will be able to use the (or part of the) string subset, and some compression methods, notably those that are related to the LZ78 family, will also use the table in order to form an initial set of tokens for that compression method. The text below therefore gives examples for referencing both the table subset and the string subset of the dictionary state item.

As defined in Section 3.3.3 in the Signaling Compression specification [2], a SigComp state is characterized by a certain set of information. For the presence-specific static dictionary, the information in the following table, Table 2, fully characterizes the state item.

Note that the string subset of the dictionary can be accessed using:

```
STATE-ACCESS (%ps, 6, 0, 0x0955, %sa, 0),
```

and the table subset can be accessed using:

```
STATE-ACCESS (%ps, 6, 0x0955, 0x043E, %sa, 0),
```

where %ps points to Universal Decompressor Virtual Machine (UDVM) memory containing

```
0xd942297d0bb3
```

and %sa is the desired destination address in UDVM memory with UDVM byte copying rules applied.

If only a subset of the dictionary up to a specific priority is desired (e.g., to save UDVM space), the values for the third and forth operand in these STATE-ACCESS instructions can be changed to:

| Priorities<br>desired | String<br>offset | String<br>length | Table<br>offset | Table<br>length |
|-----------------------|------------------|------------------|-----------------|-----------------|
| 1 only                | 0x07AB           | 0x01AA           | 0x0955          | 0x0039          |
| 1..2                  | 0x06BE           | 0x0297           | 0x0955          | 0x0066          |
| 1..3                  | 0x035A           | 0x05FB           | 0x0955          | 0x013E          |
| 1..4                  | 0x0254           | 0x0701           | 0x0955          | 0x01AA          |
| 1..5                  | 0x0000           | 0x0955           | 0x0955          | 0x043E          |

Table 1: Priority Table

The state item consists of the following elements:

| Name                  | Value                                      |
|-----------------------|--------------------------------------------|
| state_identifier      | 0xd942297d0bb38fc01d6741d6b3b48157ac8e1be0 |
| state_length          | 0x0D93                                     |
| state_address         | 0 (not relevant for the dictionary)        |
| state_instruction     | 0 (not relevant for the dictionary)        |
| minimum_access_length | 6                                          |
| state_value           | Representation of the table of Figure 1    |

Table 2: State Item Table

|      |      |      |      |      |      |      |      |      |                  |
|------|------|------|------|------|------|------|------|------|------------------|
| 0000 | 636f | 6e76 | 656e | 7469 | 6f6e | 2d63 | 656e | 7465 | convention-cente |
| 0010 | 726d | 696e | 6174 | 6564 | 6570 | 7265 | 7373 | 6564 | rminatedepressed |
| 0020 | 6973 | 6775 | 7374 | 6564 | 696e | 6475 | 7374 | 7269 | isgustedindustri |
| 0030 | 616c | 6173 | 742d | 696e | 7075 | 743d | 6875 | 6d69 | alast-input=hum  |
| 0040 | 6c69 | 6174 | 6564 | 6f6d | 6169 | 6e3d | 6175 | 746f | liatedomain=auto |
| 0050 | 6d6f | 6269 | 6c65 | 6375 | 7269 | 6f75 | 7370 | 6972 | mobilecuriouspir |
| 0060 | 6974 | 732d | 494e | 4450 | 7365 | 6e64 | 2d6f | 6e6c | its-INDPsend-onl |
| 0070 | 7970 | 6174 | 6865 | 6174 | 6572 | 6573 | 746c | 6573 | ypatheaterestles |
| 0080 | 736c | 6565 | 7079 | 696e | 2d70 | 6572 | 736f | 6e61 | sleepyin-persona |
| 0090 | 6c6f | 6e65 | 6c79 | 706c | 6179 | 6675 | 6c6f | 7765 | lonelyplayfulowe |
| 00A0 | 7274 | 6861 | 6e6e | 6f79 | 6564 | 756e | 636f | 6d66 | rthannoyeduncomf |
| 00B0 | 6f72 | 7461 | 626c | 6578 | 636c | 7564 | 653d | 636f | ortablexclude=co |
| 00C0 | 6e66 | 7573 | 6564 | 7661 | 6361 | 7469 | 6f6e | 636c | nfusedvacationcl |
| 00D0 | 7562 | 7573 | 2d73 | 7461 | 7469 | 6f6e | 6169 | 7263 | ubus-stationairc |
| 00E0 | 7261 | 6674 | 6869 | 7273 | 7479 | 636f | 7572 | 6965 | rafthirstycourie |

|      |      |      |      |      |      |      |      |      |                   |
|------|------|------|------|------|------|------|------|------|-------------------|
| 00F0 | 7265 | 6a65 | 6374 | 6564 | 6869 | 7374 | 696e | 666f | rejectedhistinfo  |
| 0100 | 6666 | 6963 | 6572 | 656d | 6f76 | 653d | 6172 | 656e | fficerremove=aren |
| 0110 | 6162 | 6c65 | 643d | 5245 | 4645 | 5245 | 4749 | 5354 | abled=REFEREGIST  |
| 0120 | 4552 | 7761 | 6974 | 696e | 6772 | 756d | 7079 | 7072 | ERwaitingrumpypr  |
| 0130 | 6566 | 6978 | 3d68 | 616c | 6672 | 6569 | 6768 | 746d | efix=halfreightm  |
| 0140 | 6561 | 6e67 | 7279 | 5355 | 4253 | 4352 | 4942 | 4570 | eangrySUBSCRIBEp  |
| 0150 | 726f | 7661 | 7469 | 6f6e | 696e | 636c | 7564 | 653d | rovationinclude=  |
| 0160 | 6170 | 7072 | 6f76 | 6564 | 686f | 6c69 | 6461 | 7975 | approvedholidayu  |
| 0170 | 6e6b | 6e6f | 776e | 7061 | 726b | 696e | 674d | 4553 | nknownparkingMES  |
| 0180 | 5341 | 4745 | 776f | 7272 | 6965 | 6468 | 756d | 626c | SAGEworriedhumbl  |
| 0190 | 6564 | 6169 | 7270 | 6f72 | 7461 | 7368 | 616d | 6564 | edairportashamed  |
| 01A0 | 706c | 6179 | 696e | 6750 | 5542 | 4c49 | 5348 | 6875 | playingPUBLISHhu  |
| 01B0 | 6e67 | 7279 | 6372 | 616e | 6b79 | 616d | 617a | 6564 | ngrycrankyamazd   |
| 01C0 | 6166 | 7261 | 6964 | 5550 | 4441 | 5445 | 4e4f | 5449 | afraidUPDATENOTI  |
| 01D0 | 4659 | 494e | 5649 | 5445 | 4341 | 4e43 | 454c | 6672 | FYINVITECANCELfr  |
| 01E0 | 6965 | 6e64 | 706f | 7374 | 616c | 6661 | 6d69 | 6c79 | iendpostalfamily  |
| 01F0 | 7072 | 6973 | 6f6e | 696e | 5f61 | 7765 | 6272 | 6176 | prisonin_awebrav  |
| 0200 | 6571 | 7569 | 6574 | 626f | 7265 | 6450 | 5241 | 434b | equietboredPRACK  |
| 0210 | 7072 | 6f75 | 6466 | 6978 | 6564 | 686f | 7465 | 6c68 | proudfixedhotelh  |
| 0220 | 6170 | 7079 | 6361 | 6665 | 6369 | 643d | 6261 | 6e6b | appycafecid=bank  |
| 0230 | 6d69 | 6e3d | 6177 | 6179 | 6d61 | 783d | 6d65 | 616c | min=awaymax=meal  |
| 0240 | 6275 | 7379 | 776f | 726b | 7572 | 6e3d | 636f | 6c64 | busyworkurn=cold  |
| 0250 | 6875 | 7274 | 6a65 | 616c | 6f75 | 7370 | 6972 | 6974 | hurtjealouspirit  |
| 0260 | 732d | 7573 | 6572 | 2d70 | 726f | 676f | 7665 | 726e | s-user-progovern  |
| 0270 | 6d65 | 6e74 | 7261 | 696e | 2d73 | 7461 | 7469 | 6f6e | mentrain-station  |
| 0280 | 6f72 | 6566 | 6572 | 7375 | 6273 | 6372 | 6962 | 6566 | orefersubscribef  |
| 0290 | 6f72 | 6574 | 7261 | 6e73 | 6d69 | 7373 | 696f | 6e2d | oretransmission-  |
| 02A0 | 616c | 6c6f | 7765 | 6475 | 7261 | 7469 | 6f6e | 2d73 | alloweduration-s  |
| 02B0 | 7562 | 7363 | 7269 | 6265 | 643d | 6869 | 6768 | 6572 | ubscribed=higher  |
| 02C0 | 7468 | 616e | 7869 | 6f75 | 7365 | 7276 | 6963 | 652d | thanxiouservice-  |
| 02D0 | 6465 | 7363 | 7269 | 7074 | 696f | 6e3d | 6272 | 6561 | description=brea  |
| 02E0 | 6b66 | 6173 | 7461 | 6469 | 756d | 7367 | 2d74 | 616b | kfastadiumsg-tak  |
| 02F0 | 6572 | 656d | 6f72 | 7365 | 6675 | 6c6c | 3a63 | 6976 | eremorsefull:civ  |
| 0300 | 6963 | 4c6f | 636f | 6e66 | 6572 | 656e | 6365 | 7175 | icLoconferencequ  |
| 0310 | 616c | 7374 | 7265 | 7373 | 6564 | 7761 | 7465 | 7263 | alstressedwaterc  |
| 0320 | 7261 | 6674 | 6572 | 616e | 6765 | 3a62 | 6173 | 6963 | rafterange:basic  |
| 0330 | 506f | 6c69 | 6379 | 636c | 6563 | 6f75 | 6e74 | 7279 | Polycyclecountry  |
| 0340 | 6368 | 616e | 6765 | 6475 | 6e74 | 696c | 3d61 | 6464 | changeduntil=add  |
| 0350 | 6564 | 7572 | 693d | 7768 | 6174 | 7065 | 726d | 616e | eduri=whatperman  |
| 0360 | 656e | 742d | 6162 | 7365 | 6e63 | 656d | 6261 | 7272 | ent-absencembarr  |
| 0370 | 6173 | 7365 | 6465 | 6163 | 7469 | 7661 | 7465 | 6469 | assedeactivatedi  |
| 0380 | 7374 | 7261 | 6374 | 6564 | 696e | 6e65 | 7276 | 6f75 | stractedinnervou  |
| 0390 | 7365 | 6c66 | 696c | 7465 | 7265 | 6c69 | 6576 | 6564 | selfilterrelieved |
| 03A0 | 666c | 6972 | 7461 | 7469 | 6f75 | 7361 | 6765 | 2d72 | flirtatiousage-r  |
| 03B0 | 756c | 6573 | 6572 | 7663 | 6170 | 7370 | 6865 | 7265 | uleservcapsphere  |
| 03C0 | 6769 | 7374 | 7261 | 7469 | 6f6e | 2d73 | 7461 | 7465 | gistration-state  |
| 03D0 | 3d62 | 6172 | 7269 | 6e67 | 2d73 | 7461 | 7465 | 7874 | =barring-statext  |
| 03E0 | 6572 | 6e61 | 6c2d | 7275 | 6c65 | 7365 | 7469 | 6d65 | ernal-rulesetime  |



|      |      |      |      |      |      |      |      |      |                      |
|------|------|------|------|------|------|------|------|------|----------------------|
| 03F0 | 2d6f | 6666 | 7365 | 7464 | 6961 | 6c6f | 6769 | 6e5f | -offsetdialogin_     |
| 0400 | 6c6f | 7665 | 7272 | 6964 | 696e | 672d | 7769 | 6c6c | loverriding-will     |
| 0410 | 696e | 676e | 6573 | 7370 | 6563 | 7461 | 746f | 7265 | ingnessspectatore    |
| 0420 | 7369 | 6465 | 6e63 | 6576 | 656e | 742d | 7061 | 636b | sidencevent-pack     |
| 0430 | 6167 | 6573 | 7570 | 6572 | 7669 | 736f | 7265 | 7374 | agesupervisorest     |
| 0440 | 6175 | 7261 | 6e74 | 7275 | 636b | 706c | 6d6f | 6269 | aurantruckplmobi     |
| 0450 | 6c69 | 7479 | 6a6f | 696e | 6170 | 7072 | 6f70 | 7269 | lityjoinappropri     |
| 0460 | 6174 | 6576 | 656e | 746c | 6973 | 7465 | 6572 | 696e | ateventlisteerin     |
| 0470 | 6769 | 7665 | 7570 | 7269 | 6e63 | 6970 | 616c | 616e | giveupprincipalan    |
| 0480 | 6775 | 6167 | 6573 | 6368 | 656d | 6573 | 7361 | 6765 | guageschemessage     |
| 0490 | 2d73 | 756d | 6d61 | 7279 | 706c | 6163 | 652d | 6f66 | -summaryplace-of     |
| 04A0 | 2d77 | 6f72 | 7368 | 6970 | 6c61 | 6365 | 2d74 | 7970 | -worshipplace-typ    |
| 04B0 | 653d | 3a74 | 696d | 6564 | 2d73 | 7461 | 7475 | 732d | e=:timed-status-     |
| 04C0 | 6963 | 6f6e | 7374 | 7275 | 6374 | 696f | 6e65 | 7574 | iconstructioneut     |
| 04D0 | 7261 | 6c49 | 4e46 | 4f50 | 5449 | 4f4e | 5369 | 656d | ralINFOPTIONSiem     |
| 04E0 | 656e | 732d | 5254 | 502d | 5374 | 6174 | 7365 | 7276 | ens-RTP-Statserv     |
| 04F0 | 6963 | 652d | 6964 | 6c65 | 2d74 | 6872 | 6573 | 686f | ice-idle-thresho     |
| 0500 | 6c64 | 3d70 | 7562 | 6c69 | 632d | 7472 | 616e | 7370 | ld=public-transp     |
| 0510 | 6f72 | 746f | 6f62 | 7269 | 6768 | 7472 | 6967 | 6765 | ortoobrighttrigge    |
| 0520 | 7265 | 736f | 7572 | 6365 | 3d3a | 6765 | 6f70 | 7269 | resource=:geopri     |
| 0530 | 7631 | 3030 | 7265 | 6c61 | 7469 | 6f6e | 7368 | 6970 | vl00relationship     |
| 0540 | 6f63 | 2d73 | 6574 | 7469 | 6e67 | 7375 | 7270 | 7269 | oc-settingsurpri     |
| 0550 | 7365 | 6461 | 726b | 7572 | 6e3a | 6f6d | 613a | 786d | sedarkurn:oma:xm     |
| 0560 | 6c3a | 7072 | 733a | 7069 | 6466 | 3a6f | 6d61 | 2d70 | l:prs:pidf:oma-p     |
| 0570 | 7265 | 7365 | 6e74 | 6174 | 696f | 6e6f | 6973 | 793a | representationnoisy: |
| 0580 | 7369 | 6d70 | 6c65 | 2d66 | 696c | 7465 | 722d | 7365 | simple-filter-se     |
| 0590 | 7469 | 6d65 | 6f75 | 7464 | 6f6f | 7273 | 6368 | 6f6f | timeoutdoorschoo     |
| 05A0 | 6c70 | 6172 | 7469 | 616c | 6f63 | 6174 | 696f | 6e2d | lpartialocation-     |
| 05B0 | 696e | 666f | 726d | 6174 | 696f | 6e61 | 6d65 | 6574 | informationameet     |
| 05C0 | 696e | 6763 | 616c | 6d65 | 7468 | 6f64 | 7374 | 6f72 | ingcalmethodstor     |
| 05D0 | 6574 | 656e | 7469 | 6f6e | 2d65 | 7870 | 6972 | 793a | etention-expiry:     |
| 05E0 | 7761 | 7463 | 6865 | 7269 | 6e66 | 6f66 | 6665 | 6e64 | watcherinoffend      |
| 05F0 | 6564 | 636f | 6e74 | 726f | 6c6f | 6f6b | 696e | 672d | edcontrolooking-     |
| 0600 | 666f | 722d | 776f | 726b | 696e | 6777 | 6174 | 6368 | for-workingwatch     |
| 0610 | 6572 | 2d6c | 6973 | 7472 | 6565 | 7470 | 6c61 | 6365 | er-listreetplace     |
| 0620 | 2d69 | 7366 | 6f63 | 7573 | 6f75 | 6e64 | 6572 | 7761 | -isfocusounderwa     |
| 0630 | 7968 | 6f6d | 6570 | 6167 | 6570 | 7269 | 7661 | 6379 | yhomepageprivacy     |
| 0640 | 7761 | 7265 | 686f | 7573 | 6572 | 2d69 | 6e70 | 7574 | warehouser-input     |
| 0650 | 7261 | 7665 | 6c62 | 6f74 | 6865 | 7265 | 6365 | 6976 | ravelbothereceiv     |
| 0660 | 652d | 6f6e | 6c79 | 3a72 | 6c6d | 696e | 7661 | 6c75 | e-only:rlminvalu     |
| 0670 | 653d | 3a63 | 6170 | 736c | 6565 | 7069 | 6e67 | 7569 | e=:capsleepingui     |
| 0680 | 6c74 | 7969 | 6e76 | 696e | 6369 | 626c | 6576 | 656e | ltyinvincibleven     |
| 0690 | 743d | 6d6f | 6f64 | 7970 | 6163 | 6b61 | 6765 | 3d70 | t=moodypackage=p     |
| 06A0 | 7269 | 6f72 | 6974 | 7976 | 6964 | 656f | 6672 | 6f6d | riorityvideofrom     |
| 06B0 | 3d61 | 7564 | 696f | 6361 | 7264 | 706f | 733d | 6175 | =audiocardpos=au     |
| 06C0 | 746f | 6d61 | 7461 | 7070 | 6c69 | 6361 | 7469 | 6f6e | tomatapplication     |
| 06D0 | 6f74 | 7375 | 7070 | 6f72 | 7465 | 6465 | 7669 | 6365 | otsupportedevice     |
| 06E0 | 4944 | 696d | 7072 | 6573 | 7365 | 6469 | 7361 | 7070 | IDimpressedisapp     |

|      |      |      |      |      |      |      |      |      |                     |
|------|------|------|------|------|------|------|------|------|---------------------|
| 06F0 | 6f69 | 6e74 | 6564 | 6e6f | 7465 | 2d77 | 656c | 6c69 | ointednote-welli    |
| 0700 | 6272 | 6172 | 793a | 6461 | 7461 | 2d6d | 6f64 | 656c | brary:data-model    |
| 0710 | 6563 | 7472 | 6f6e | 6963 | 6976 | 6963 | 4164 | 6472 | ectronicivicAddr    |
| 0720 | 6573 | 7361 | 7263 | 6173 | 7469 | 636f | 6e74 | 656e | essarcasticonten    |
| 0730 | 7465 | 6469 | 6e64 | 6967 | 6e61 | 6e74 | 696d | 6572 | tedindignantimer    |
| 0740 | 6570 | 6c61 | 6365 | 7368 | 6f63 | 6b65 | 6463 | 6c61 | eplaceshockedcla    |
| 0750 | 7373 | 6973 | 7461 | 6e74 | 696d | 6573 | 7461 | 6d70 | ssistantimestamp    |
| 0760 | 726f | 7669 | 6465 | 642d | 6279 | 3a63 | 6970 | 6964 | rovided-by:cipid    |
| 0770 | 662d | 6675 | 6c6c | 5374 | 6174 | 653d | 6163 | 746f | f-fullState=acto    |
| 0780 | 7265 | 6d6f | 7665 | 6462 | 7573 | 696e | 6573 | 7365 | removedbusinesse    |
| 0790 | 7269 | 6f75 | 7365 | 6c3d | 3a73 | 6368 | 656d | 6178 | riousel=:schemax    |
| 07A0 | 7661 | 6c75 | 653d | 3a72 | 7069 | 6475 | 726e | 3a69 | value=:rpidurn:i    |
| 07B0 | 6574 | 663a | 7061 | 7261 | 6d73 | 3a78 | 6d6c | 2d70 | etf:params:xml-p    |
| 07C0 | 6174 | 6368 | 2d6f | 7073 | 6563 | 2d61 | 6772 | 6565 | atch-opsec-agree    |
| 07D0 | 6172 | 6c79 | 2d73 | 6573 | 7369 | 6f6e | 2d70 | 6174 | arly-session-pat    |
| 07E0 | 6963 | 6970 | 6174 | 696f | 6e2d | 7468 | 652d | 7068 | icipation-the-ph    |
| 07F0 | 6f6e | 6574 | 776f | 726b | 2d61 | 7661 | 696c | 6162 | onetwork-availab    |
| 0800 | 696c | 6974 | 7970 | 6572 | 666f | 726d | 616e | 6365 | ilityperformance    |
| 0810 | 7863 | 6974 | 6564 | 7072 | 6563 | 6f6e | 6469 | 7469 | xcitedpreconditi    |
| 0820 | 6f6e | 6f72 | 6573 | 6f75 | 7263 | 652d | 7072 | 696f | onoresource-prio    |
| 0830 | 7269 | 7479 | 3d66 | 616c | 7365 | 7276 | 6963 | 652d | rity=falsevice-     |
| 0840 | 636c | 6173 | 7372 | 6f6f | 6d75 | 7374 | 556e | 6465 | classroomustUnde    |
| 0850 | 7273 | 7461 | 6e64 | 6973 | 706c | 6179 | 2d6e | 616d | rstandisplay-nam    |
| 0860 | 653d | 696e | 7374 | 616e | 6365 | 7874 | 656e | 7369 | e=instancextensi    |
| 0870 | 6f6e | 732d | 6269 | 6e64 | 696e | 6773 | 6470 | 2d61 | ons-bindingsdp-a    |
| 0880 | 6e61 | 7474 | 656e | 6461 | 6e74 | 7275 | 653a | 7069 | nattendantrue:pi    |
| 0890 | 6466 | 2d64 | 6966 | 6672 | 7573 | 7472 | 6174 | 6564 | df-difffrustrated   |
| 08A0 | 7570 | 6c65 | 7870 | 6972 | 6174 | 696f | 6e3d | 636f | uplexpiration=co    |
| 08B0 | 6e74 | 6163 | 7469 | 7669 | 7469 | 6573 | 686f | 7070 | ntactivitieshopp    |
| 08C0 | 696e | 672d | 6172 | 6561 | 736f | 6e3d | 6170 | 706f | ing-areason=appo    |
| 08D0 | 696e | 746d | 656e | 7469 | 7479 | 3d61 | 7373 | 6f63 | intmentity=assoc    |
| 08E0 | 6961 | 7465 | 6e63 | 6f64 | 696e | 673d | 696e | 7465 | iatencoding=inte    |
| 08F0 | 7265 | 7374 | 6564 | 6576 | 6361 | 7073 | 7461 | 7475 | restedevcapstatu    |
| 0900 | 733d | 6163 | 7469 | 7665 | 7273 | 696f | 6e3d | 7769 | s=activerversion=wi |
| 0910 | 6e66 | 6f70 | 656e | 6469 | 6e67 | 696e | 2d74 | 7261 | nfopeningin-tra     |
| 0920 | 6e73 | 6974 | 7570 | 6c65 | 686f | 7370 | 6974 | 616c | nsituplehospital    |
| 0930 | 616e | 673d | 3c3f | 786d | 6c6e | 733d | 7369 | 636b | ang=<?xmlns=sick    |
| 0940 | 7072 | 6573 | 656e | 6365 | 5554 | 462d | 383f | 3e63 | presenceUTF-8?>c    |
| 0950 | 6c6f | 7365 | 6405 | 0d34 | 080d | 0609 | 0ce3 | 070d | losed..4.....       |
| 0960 | 4806 | 0d36 | 130b | ab05 | 0965 | 070c | d408 | 0d40 | H..6.....e.....@    |
| 0970 | 050d | 2305 | 0c35 | 070c | ae05 | 0d2f | 0608 | b905 | ..#..5...../....    |
| 0980 | 072b | 040d | 1206 | 0d4f | 090c | 2c04 | 0c89 | 040a | ..+.....0.....,     |
| 0990 | f609 | 0b57 | 0b0b | 0508 | 0ada | 060a | da06 | 0489 | ...W.....           |
| 09A0 | 050b | a604 | 0b94 | 0605 | 0507 | 0b3f | 0e0b | ba07 | .....?.....         |
| 09B0 | 0b98 | 0a0c | 8d09 | 0b6d | 090c | 8e0e | 0c48 | 0a0c | .....m.....H..      |
| 09C0 | b21d | 0956 | 0d0c | 3806 | 07ba | 0b08 | b90b | 07ec | ...V..8.....        |
| 09D0 | 060d | 020a | 0a46 | 0408 | f406 | 0b6a | 040a | b60c | .....F.....j....    |
| 09E0 | 0c55 | 080a | 3104 | 0a92 | 080a | 1b05 | 0ab1 | 0408 | .U..1.....          |

|      |      |      |      |      |      |      |      |      |                    |
|------|------|------|------|------|------|------|------|------|--------------------|
| 09F0 | c005 | 0a27 | 050a | a705 | 0aac | 040a | ba04 | 07dc | ...'               |
| 0A00 | 0508 | ad0a | 0929 | 0a08 | a705 | 0a56 | 050b | 4d07 | .....).....V..M.   |
| 0A10 | 092a | 0d09 | a70b | 07a9 | 0609 | c60b | 0b5f | 0c09 | .*....._..         |
| 0A20 | df0b | 09e0 | 0607 | cb0c | 0a0b | 0909 | 2008 | 0a97 | .....              |
| 0A30 | 0709 | e007 | 0cfb | 060a | 8c0e | 097f | 0a09 | 870b | .....              |
| 0A40 | 0c71 | 0a0c | 7106 | 0793 | 050a | 6604 | 0867 | 0409 | .q..q.....f..g..   |
| 0A50 | ba08 | 0920 | 0a0b | 7205 | 0a72 | 0807 | b30b | 0ac5 | ... ..r..r.....    |
| 0A60 | 0709 | f207 | 0889 | 0408 | ad08 | 0abe | 060c | 9f0b | .....              |
| 0A70 | 06d0 | 0e08 | 2608 | 0a9f | 0709 | c60a | 0c69 | 0708 | ....&.....i..      |
| 0A80 | 8505 | 0b7c | 070a | 390c | 0934 | 070a | 2109 | 087d | ... ..9...4...!..} |
| 0A90 | 070c | f50b | 0ca3 | 1406 | a60d | 08b2 | 0c07 | 2a0c | .....*             |
| 0AA0 | 08b3 | 0407 | 5607 | 091a | 0407 | 5207 | 0740 | 0507 | ....V.....R..@..   |
| 0AB0 | 4d07 | 0b80 | 0607 | 4716 | 0691 | 080c | 6210 | 09cf | M.....G.....b...   |
| 0AC0 | 1007 | dd09 | 0af6 | 0906 | fc0c | 0b17 | 0707 | 3904 | .....9..           |
| 0AD0 | 06f8 | 0709 | a106 | 068d | 0507 | 2104 | 0a55 | 090a | .....!..U..        |
| 0AE0 | d20c | 0acf | 1306 | c80a | 08ec | 070d | 060b | 080c | .....              |
| 0AF0 | 140b | d512 | 07be | 0d07 | d116 | 0801 | 140b | f106 | .....              |
| 0B00 | 05b4 | 0704 | 5609 | 0417 | 0c0a | ea09 | 041f | 0a07 | ....V.....         |
| 0B10 | 7e0b | 076a | 070c | 0f0b | 07a0 | 0a0c | 9606 | 0528 | ~..j.....(         |
| 0B20 | 060a | 7d05 | 061f | 0705 | 8b0a | 043c | 0605 | ae04 | ..}.....<....      |
| 0B30 | 0650 | 090a | e206 | 05f6 | 0707 | fd09 | 0b33 | 0a0c | .P.....3..         |
| 0B40 | ec0a | 0a83 | 0706 | 5406 | 0490 | 0405 | 3f05 | 0a92 | .....T.....?...    |
| 0B50 | 0707 | 8a07 | 08cc | 0809 | ea07 | 0496 | 0506 | 1008 | .....              |
| 0B60 | 0798 | 0a06 | f108 | 0479 | 090b | 2207 | 0b8e | 070b | .....y..".         |
| 0B70 | 4604 | 0d3c | 0604 | 8008 | 0712 | 0909 | 4a07 | 04e3 | F..<.....J...      |
| 0B80 | 0705 | 8405 | 097a | 0506 | 0109 | 0912 | 0409 | 520d | .....z.....R.      |
| 0B90 | 04aa | 0d08 | 5608 | 04dc | 0705 | 9205 | 050c | 0a04 | ....V.....         |
| 0BA0 | 4c04 | 062c | 0b04 | d104 | 0624 | 090c | 4004 | 04ce | L.,.....\$.@...    |
| 0BB0 | 0c08 | c111 | 0400 | 0507 | 340a | 066a | 080d | 2805 | .....4..j..(.      |
| 0BC0 | 061a | 0a04 | 2807 | 0afe | 0604 | ff08 | 0994 | 0705 | ....(.....         |
| 0BD0 | 7610 | 0898 | 0605 | f006 | 0903 | 1009 | 0309 | 081e | v.....             |
| 0BE0 | 0a08 | 3c06 | 099b | 0d0c | bb07 | 06e3 | 0509 | cc06 | ..<.....           |
| 0BF0 | 0a15 | 0704 | 7305 | 0673 | 0d06 | 7305 | 0845 | 080a | ....s..s..s..E..   |
| 0C00 | 2909 | 0a40 | 0507 | 1a0a | 071a | 090b | 4f09 | 0cdb | )..@.....O...      |
| 0C10 | 0605 | ea06 | 05de | 0a04 | 0e0a | 0b0e | 0906 | 8608 | .....              |
| 0C20 | 0560 | 0b07 | 7409 | 054f | 0804 | f007 | 0990 | 0608 | ..'.t..O.....      |
| 0C30 | 700a | 0c21 | 0705 | 6f0b | 0ccc | 0407 | 9007 | 04ea | p..!..o.....       |
| 0C40 | 0a08 | 3304 | 0634 | 0906 | dc04 | 0640 | 0705 | 2e04 | ..3..4.....@....   |
| 0C50 | 0648 | 0607 | 8707 | 0568 | 0a0d | 1a07 | 0445 | 0705 | .H.....h.....E..   |
| 0C60 | 0508 | 050e | 0805 | 5808 | 04b6 | 1009 | f804 | 063c | .....X.....<       |
| 0C70 | 0709 | bc0c | 06d0 | 0c0b | e704 | 0644 | 040a | 310b | .....D..1.         |
| 0C80 | 0c05 | 0406 | 2811 | 075a | 070c | c507 | 05a0 | 0c09 | ....(..Z.....      |
| 0C90 | 6f08 | 0cbb | 080a | 7609 | 0816 | 0808 | 6906 | 05e4 | o.....v.....i...   |
| 0CA0 | 0904 | 8607 | 0538 | 060a | 4f08 | 04c6 | 0f08 | f40b | .....8..O.....     |
| 0CB0 | 0431 | 070a | 0407 | 08a1 | 0d0c | 5506 | 05c0 | 0605 | .1.....U.....      |
| 0CC0 | ba05 | 0541 | 080b | 8708 | 0489 | 0405 | 350c | 0a5a | ...A.....5..Z      |
| 0CD0 | 0904 | 6809 | 049c | 0a06 | ba06 | 070d | 0507 | 2509 | ..h.....%.         |
| 0CE0 | 0b9d | 090a | 6906 | 0a6c | 0406 | 3804 | 0630 | 070d | ....i..l..8..0..   |

```

0CF0 1308 084c 0506 1506 0450 0a07 0406 07f7 ...L.....P.....
0D00 0408 490f 0889 0c09 3f05 0681 1108 dc0d ..I.....?.....
0D10 045c 1106 5a05 0d0e 0605 d804 08d3 0605 .\e..Z.....
0D20 d207 057d 0605 cc07 08d6 0506 0b07 05a7 ...}.....
0D30 0505 1608 051a 0905 4606 05c6 0609 310d .....F.....1.
0D40 0bcf 0908 6208 04f8 0408 540a 067f 0404 ....b.....T.....
0D50 710c 0c16 0405 2e08 0b3f 110c 2308 0c7b q.....?..#...{
0D60 090b c707 07f6 050b 3b09 0875 090c 8109 ...../..u....
0D70 06e9 0b09 b007 0522 0704 a307 06c2 0705 ....."......
0D80 9905 0606 0505 fc04 09c3 0406 4c08 04be .....L....
0D90 090b 2a ..*

```

Figure 1: Binary Representation of the Dictionary

## 5. Security Considerations

This document defines a presence-specific static dictionary for the Sigcomp framework [2]. Therefore, the security considerations of RFC 3320 [2] apply. This memo does not introduce any known additional security risk.

## 6. Acknowledgements

The author would like to thank Miraj Mostafa, Pekka Pessi, and Catalin Ionescu for their persistent convincing arguments to demonstrate the benefit of this dictionary. Thanks to Carsten Bormann and Adam Roach for providing assistance with the software that automatically generates the binary dictionary. Adam Roach, Cristian Constantin, and Avshalom Hourli, and Krisztian Kiss reviewed the document and provided helpful comments.

## Appendix A. Input Strings to the Presence-Specific Static Dictionary

| String                 | Pr | Off  | Len  | References                                                                                                             |
|------------------------|----|------|------|------------------------------------------------------------------------------------------------------------------------|
| =====                  | == | ==== | ==== | =====                                                                                                                  |
| "<?xml "               | 1  | 0934 | 0005 |                                                                                                                        |
| "version="             | 1  | 0906 | 0008 |                                                                                                                        |
| "encoding="            | 1  | 08E3 | 0009 |                                                                                                                        |
| "UTF-8?>"              | 1  | 0948 | 0007 |                                                                                                                        |
| "xmlns="               | 1  | 0936 | 0006 |                                                                                                                        |
| "urn:ietf:params:xml " | 1  | 07AB | 0013 | [8] 4.4<br>[10] 5.1<br>[11] 5<br>[12] 5<br>[13] 5<br>[14] 9<br>[15] 7<br>[17] 6<br>[18] 7<br>[19] 5.1<br>[20] 3.2, 3.3 |
| ":pidf"                | 1  | 0565 | 0005 | [8] 4.4<br>[10] 5.1<br>[11] 5<br>[12] 5<br>[13] 5<br>[20] 3.2, 3.3                                                     |
| "entity="              | 1  | 08D4 | 0007 | [8] 4.4, [15] 7                                                                                                        |
| "presence"             | 1  | 0940 | 0008 | [8] 4.4<br>[20] 3.2.14                                                                                                 |
| "tuple"                | 1  | 0923 | 0005 | [8] 4.4                                                                                                                |
| "note"                 | 2  | 06F6 | 0004 | [8] 4.4<br>[10] 5.1<br>[11] 5<br>[13] 5                                                                                |
| "contact "             | 1  | 08AE | 0007 | [8] 4.4                                                                                                                |
| "timestamp"            | 2  | 0757 | 0009 | [8] 4.4<br>[10] 5.1                                                                                                    |
| "status"               | 1  | 04B9 | 0006 | [8] 4.4                                                                                                                |
| "basic"                | 1  | 032B | 0005 | [8] 4.4<br>[13] 5<br>[21]                                                                                              |
| "open"                 | 1  | 0912 | 0004 | [8] 4.4, [21]                                                                                                          |
| "closed"               | 1  | 094F | 0006 | [8] 4.4, [21]                                                                                                          |
| "priority="            | 1  | 082C | 0009 | [8] 4.4                                                                                                                |
| "mustUnderstand"       | 3  | 0848 | 000E | [8] 4.4                                                                                                                |
| "true"                 | 1  | 0889 | 0004 | [8] 4.4<br>[16] 2.2.5<br>[18] 7                                                                                        |

|                     |   |           |      |          |
|---------------------|---|-----------|------|----------|
|                     |   |           | [19] | 5.1      |
|                     |   |           | [20] | 3.2, 3.3 |
| "false"             | 1 | 0835 0005 | [8]  | 4.4      |
|                     |   |           | [16] | 2.2.5    |
|                     |   |           | [18] | 7        |
|                     |   |           | [19] | 5.1      |
|                     |   |           | [20] | 3.2, 3.3 |
| ":data-model"       | 2 | 0705 000B | [10] | 5.1      |
| "deviceID"          | 2 | 06DA 0008 | [10] | 5.1      |
| "device"            | 2 | 06DA 0006 | [10] | 5.1      |
| "person"            | 2 | 0089 0006 | [10] | 5.1      |
| ":rpid"             | 2 | 07A6 0005 | [11] | 5        |
| "activities"        | 3 | 08B2 000A | [11] | 5        |
| "unknown"           | 5 | 016F 0007 | [11] | 5        |
| "appointment"       | 5 | 08CC 000B | [11] | 5        |
| "away"              | 5 | 0234 0004 | [11] | 5        |
| "breakfast"         | 5 | 02DC 0009 | [11] | 5        |
| "busy"              | 5 | 0240 0004 | [11] | 5        |
| "dinner"            | 5 | 0387 0006 | [11] | 5        |
| "holiday"           | 5 | 0168 0007 | [11] | 5        |
| "in-transit"        | 5 | 091A 000A | [11] | 5        |
| "looking-for-work"  | 5 | 05F8 0010 | [11] | 5        |
| "meal"              | 5 | 023C 0004 | [11] | 5        |
| "meeting"           | 5 | 05BC 0007 | [11] | 5        |
| "on-the-phone"      | 5 | 07E7 000C | [11] | 5        |
| "performance"       | 5 | 0805 000B | [11] | 5        |
| "permanent-absence" | 5 | 035A 0011 | [11] | 5        |
| "playing"           | 5 | 01A0 0007 | [11] | 5        |
| "presentation"      | 5 | 056F 000C | [11] | 5        |
| "shopping"          | 5 | 08BB 0008 | [11] | 5        |
| "sleeping"          | 5 | 0676 0008 | [11] | 5        |
| "spectator"         | 5 | 0416 0009 | [11] | 5        |
| "steering"          | 5 | 0469 0008 | [11] | 5        |
| "travel"            | 5 | 064F 0006 | [11] | 5        |
| "vacation"          | 5 | 00C6 0008 | [11] | 5        |
| "working"           | 5 | 0604 0007 | [11] | 5        |
| "worship"           | 5 | 04A1 0007 | [11] | 5        |
| "other"             | 3 | 0656 0005 | [11] | 5        |
| "class"             | 3 | 074D 0005 | [11] | 5        |
|                     |   |           | [20] | 3.2      |
| "afraid"            | 5 | 01C0 0006 | [11] | 5        |
| "amazed"            | 5 | 01BA 0006 | [11] | 5        |
| "angry"             | 5 | 0141 0005 | [11] | 5        |
| "annoyed"           | 5 | 00A3 0007 | [11] | 5        |
| "anxious"           | 5 | 02C2 0007 | [11] | 5        |
| "ashamed"           | 5 | 0199 0007 | [11] | 5        |
| "bored"             | 5 | 0206 0005 | [11] | 5        |
| "brave"             | 5 | 01FC 0005 | [11] | 5        |

|                |   |      |      |      |   |
|----------------|---|------|------|------|---|
| "calm"         | 5 | 05C3 | 0004 | [11] | 5 |
| "cold"         | 5 | 024C | 0004 | [11] | 5 |
| "confused"     | 5 | 00BE | 0008 | [11] | 5 |
| "contented"    | 5 | 072A | 0009 | [11] | 5 |
| "cranky"       | 5 | 01B4 | 0006 | [11] | 5 |
| "curious"      | 5 | 0056 | 0007 | [11] | 5 |
| "depressed"    | 5 | 0017 | 0009 | [11] | 5 |
| "disappointed" | 5 | 06EA | 000C | [11] | 5 |
| "disgusted"    | 5 | 001F | 0009 | [11] | 5 |
| "distracted"   | 5 | 037E | 000A | [11] | 5 |
| "embarrassed"  | 5 | 036A | 000B | [11] | 5 |
| "excited"      | 5 | 080F | 0007 | [11] | 5 |
| "flirtatious"  | 5 | 03A0 | 000B | [11] | 5 |
| "frustrated"   | 5 | 0896 | 000A | [11] | 5 |
| "grumpy"       | 5 | 0128 | 0006 | [11] | 5 |
| "guilty"       | 5 | 067D | 0006 | [11] | 5 |
| "happy"        | 5 | 021F | 0005 | [11] | 5 |
| "humbled"      | 5 | 018B | 0007 | [11] | 5 |
| "humiliated"   | 5 | 003C | 000A | [11] | 5 |
| "hungry"       | 5 | 01AE | 0006 | [11] | 5 |
| "hurt"         | 5 | 0250 | 0004 | [11] | 5 |
| "impressed"    | 5 | 06E2 | 0009 | [11] | 5 |
| "in_awe"       | 5 | 01F6 | 0006 | [11] | 5 |
| "in_love"      | 5 | 03FD | 0007 | [11] | 5 |
| "indignant"    | 5 | 0733 | 0009 | [11] | 5 |
| "interested"   | 5 | 08EC | 000A | [11] | 5 |
| "invincible"   | 5 | 0683 | 000A | [11] | 5 |
| "jealous"      | 5 | 0254 | 0007 | [11] | 5 |
| "lonely"       | 5 | 0090 | 0006 | [11] | 5 |
| "mean"         | 5 | 013F | 0004 | [11] | 5 |
| "moody"        | 5 | 0692 | 0005 | [11] | 5 |
| "nervous"      | 5 | 038A | 0007 | [11] | 5 |
| "neutral"      | 5 | 04CC | 0007 | [11] | 5 |
| "offended"     | 5 | 05EA | 0008 | [11] | 5 |
| "playful"      | 5 | 0096 | 0007 | [11] | 5 |
| "proud"        | 5 | 0210 | 0005 | [11] | 5 |
| "relieved"     | 5 | 0398 | 0008 | [11] | 5 |
| "remorseful"   | 5 | 02F1 | 000A | [11] | 5 |
| "restless"     | 5 | 0079 | 0008 | [11] | 5 |
| "sarcastic"    | 5 | 0722 | 0009 | [11] | 5 |
| "serious"      | 5 | 078E | 0007 | [11] | 5 |
| "shocked"      | 5 | 0746 | 0007 | [11] | 5 |
| "sick"         | 5 | 093C | 0004 | [11] | 5 |
| "sleepy"       | 5 | 0080 | 0006 | [11] | 5 |
| "stressed"     | 5 | 0312 | 0008 | [11] | 5 |
| "surprised"    | 5 | 054A | 0009 | [11] | 5 |
| "thirsty"      | 5 | 00E3 | 0007 | [11] | 5 |
| "worried"      | 5 | 0184 | 0007 | [11] | 5 |

|                     |   |      |      |      |     |
|---------------------|---|------|------|------|-----|
| "mood"              | 3 | 0692 | 0004 | [11] | 5   |
| "place-is"          | 3 | 061B | 0008 | [11] | 5   |
| "audio"             | 3 | 06B1 | 0005 | [11] | 5   |
|                     |   |      |      | [20] | 3.2 |
| "noisy"             | 5 | 057A | 0005 | [11] | 5   |
| "quiet"             | 5 | 0201 | 0005 | [11] | 5   |
| "video"             | 3 | 06A7 | 0005 | [11] | 5   |
|                     |   |      |      | [20] | 3.2 |
| "toobright"         | 5 | 0512 | 0009 | [11] | 5   |
| "dark"              | 5 | 0552 | 0004 | [11] | 5   |
| "text"              | 3 | 03DC | 0004 | [11] | 5   |
|                     |   |      |      | [20] | 3.2 |
| "uncomfortable"     | 5 | 00AA | 000D | [11] | 5   |
| "inappropriate"     | 5 | 0456 | 000D | [11] | 5   |
| "place-type"        | 3 | 04A7 | 000A | [11] | 5   |
| "aircraft"          | 5 | 00DC | 0008 | [11] | 5   |
| "airport"           | 5 | 0192 | 0007 | [11] | 5   |
| "arena"             | 5 | 010C | 0005 | [11] | 5   |
| "automobile"        | 5 | 004C | 000A | [11] | 5   |
| "bank"              | 5 | 022C | 0004 | [11] | 5   |
| "bus-station"       | 5 | 00D1 | 000B | [11] | 5   |
| "cafe"              | 5 | 0224 | 0004 | [11] | 5   |
| "classroom"         | 5 | 0840 | 0009 | [11] | 5   |
| "club"              | 5 | 00CE | 0004 | [11] | 5   |
| "construction"      | 5 | 04C1 | 000C | [11] | 5   |
| "convention-center" | 5 | 0000 | 0011 | [11] | 5   |
| "cycle"             | 5 | 0334 | 0005 | [11] | 5   |
| "government"        | 5 | 026A | 000A | [11] | 5   |
| "hospital"          | 5 | 0928 | 0008 | [11] | 5   |
| "hotel"             | 5 | 021A | 0005 | [11] | 5   |
| "industrial"        | 5 | 0028 | 000A | [11] | 5   |
| "library"           | 5 | 06FE | 0007 | [11] | 5   |
| "office"            | 5 | 00FF | 0006 | [11] | 5   |
| "outdoors"          | 5 | 0594 | 0008 | [11] | 5   |
| "parking"           | 5 | 0176 | 0007 | [11] | 5   |
| "place-of-worship"  | 5 | 0498 | 0010 | [11] | 5   |
| "prison"            | 5 | 01F0 | 0006 | [11] | 5   |
| "public"            | 5 | 0503 | 0006 | [11] | 5   |
| "public-transport"  | 5 | 0503 | 0010 | [11] | 5   |
| "residence"         | 5 | 041E | 0009 | [11] | 5   |
| "restaurant"        | 5 | 043C | 000A | [11] | 5   |
| "school"            | 5 | 059B | 0006 | [11] | 5   |
| "shopping-area"     | 5 | 08BB | 000D | [11] | 5   |
| "stadium"           | 5 | 02E3 | 0007 | [11] | 5   |
| "store"             | 5 | 05CC | 0005 | [11] | 5   |
| "street"            | 5 | 0615 | 0006 | [11] | 5   |
| "theater"           | 5 | 0073 | 0007 | [11] | 5   |
| "train"             | 5 | 0273 | 0005 | [11] | 5   |



|                   |   |      |      |      |        |
|-------------------|---|------|------|------|--------|
| "train-station"   | 5 | 0273 | 000D | [11] | 5      |
| "truck"           | 5 | 0445 | 0005 | [11] | 5      |
| "underway"        | 5 | 0629 | 0008 | [11] | 5      |
| "warehouse"       | 5 | 0640 | 0009 | [11] | 5      |
| "water"           | 5 | 031A | 0005 | [11] | 5      |
| "watercraft"      | 5 | 031A | 000A | [11] | 5      |
| "privacy"         | 3 | 0639 | 0007 | [11] | 5      |
|                   |   |      |      | [20] | 3.2.17 |
| "relationship"    | 3 | 0534 | 000C | [11] | 5      |
| "assistant"       | 5 | 074F | 0009 | [11] | 5      |
| "associate"       | 5 | 08DB | 0009 | [11] | 5      |
| "family"          | 5 | 01EA | 0006 | [11] | 5      |
| "friend"          | 5 | 01DE | 0006 | [11] | 5      |
| "self"            | 5 | 0390 | 0004 | [11] | 5      |
| "supervisor"      | 5 | 0433 | 000A | [11] | 5      |
| "courier"         | 5 | 00EA | 0007 | [11] | 5      |
| "electronic"      | 5 | 070E | 000A | [11] | 5      |
| "freight"         | 5 | 0138 | 0007 | [11] | 5      |
| "in-person"       | 5 | 0086 | 0009 | [11] | 5      |
| "postal"          | 5 | 01E4 | 0006 | [11] | 5      |
| "service-class"   | 3 | 0838 | 000D | [11] | 5      |
| "sphere"          | 3 | 03BA | 0006 | [11] | 5      |
| "home"            | 5 | 0631 | 0004 | [11] | 5      |
| "work"            | 5 | 0244 | 0004 | [11] | 5      |
| "status-icon"     | 3 | 04B9 | 000B | [11] | 5      |
| "time-offset"     | 3 | 03EC | 000B | [11] | 5      |
| "description="    | 5 | 02D0 | 000C | [11] | 5      |
| "user-input"      | 3 | 0646 | 000A | [11] | 5      |
| "active"          | 3 | 0902 | 0006 | [11] | 5      |
|                   |   |      |      | [17] | 6      |
|                   |   |      |      | [19] | 5.1    |
|                   |   |      |      | [21] |        |
| "idle"            | 3 | 04F4 | 0004 | [11] | 5      |
| "idle-threshold=" | 5 | 04F4 | 000F | [11] | 5      |
| "last-input="     | 5 | 0031 | 000B | [11] | 5      |
| ":cipid"          | 3 | 076A | 0006 | [12] | 5      |
| "card"            | 3 | 06B6 | 0004 | [12] | 5      |
| "display-name"    | 3 | 0855 | 000C | [12] | 5      |
| "homepage"        | 3 | 0631 | 0008 | [12] | 5      |
| "icon"            | 3 | 04C0 | 0004 | [12] | 5      |
| "sound"           | 3 | 0627 | 0005 | [12] | 5      |
| ":timed-status"   | 4 | 04B2 | 000D | [13] | 5      |
| "timed-status"    | 4 | 04B3 | 000C | [13] | 5      |
| "from="           | 3 | 06AC | 0005 | [10] | 5.1    |
|                   |   |      |      | [11] | 5      |
|                   |   |      |      | [13] | 5      |
|                   |   |      |      | [18] | 7      |
| "until="          | 4 | 0347 | 0006 | [10] | 5.1    |

|                          |   |           |      |               |
|--------------------------|---|-----------|------|---------------|
|                          |   |           | [11] | 5             |
|                          |   |           | [13] | 5             |
| " :schema"               | 2 | 0798 0007 | [14] | 9             |
| " :xml-patch-ops"        | 2 | 07BA 000E | [14] | 9             |
| "replace"                | 2 | 073F 0007 | [14] | 9             |
| "remove"                 | 2 | 0105 0006 | [14] | 9             |
| "sel="                   | 2 | 0794 0004 | [14] | 9             |
| "pos="                   | 3 | 06BA 0004 | [14] | 9             |
| "type="                  | 3 | 04AD 0005 | [14] | 9, [18] 7     |
| "before"                 | 4 | 028D 0006 | [14] | 9             |
| "after"                  | 4 | 0321 0005 | [14] | 9             |
| "both"                   | 4 | 0655 0004 | [14] | 9             |
| " :pidf-diff"            | 2 | 088D 000A | [15] | 7             |
| "pidf-diff"              | 2 | 088E 0009 | [15] | 7             |
| "pidf-full"              | 2 | 076D 0009 | [15] | 7             |
| " :geopriv10"            | 3 | 0529 000A | [16] | 2.2.5         |
| " :basicPolicy"          | 4 | 032A 000C | [16] | 2.2.5         |
| "geopriv"                | 3 | 052A 0007 | [16] | 2.2.5         |
| "location-info"          | 3 | 05A7 000D | [16] | 2.2.5         |
| "usage-rules"            | 3 | 03A9 000B | [16] | 2.2.5         |
| "method"                 | 3 | 05C6 0006 | [16] | 2.2.5         |
| "provided-by"            | 3 | 075F 000B | [16] | 2.2.5         |
| "retransmission-allowed" | 4 | 0291 0016 | [16] | 2.2.5         |
| "retention-expiry"       | 4 | 05CF 0010 | [16] | 2.2.5         |
| "external-ruleset"       | 4 | 03DD 0010 | [16] | 2.2.5         |
| "note-well"              | 4 | 06F6 0009 | [16] | 2.2.5         |
| " :civicLoc"             | 4 | 02FC 0009 | [16] | 2.2.5         |
| "civicAddress"           | 4 | 0717 000C | [16] | 2.2.5         |
| "country"                | 4 | 0339 0007 | [16] | 2.2.5         |
| " :watcherinfo"          | 3 | 05DF 000C | [17] | 6             |
| "watcherinfo"            | 3 | 05E0 000B | [17] | 6             |
| "state="                 | 3 | 03CB 0006 | [17] | 6             |
|                          |   |           | [19] | 5.1           |
| "full"                   | 4 | 02F8 0004 | [17] | 6 [20] 3.2.12 |
| "partial"                | 4 | 05A1 0007 | [17] | 6             |
| "watcher-list"           | 3 | 060B 000C | [17] | 6             |
| "resource="              | 3 | 0520 0009 | [17] | 6             |
| "package="               | 3 | 0697 0008 | [17] | 6, [18] 7     |
| "watcher"                | 3 | 05E0 0007 | [17] | 6             |
| "display-name="          | 5 | 0855 000D | [17] | 6             |
| "status="                | 3 | 08FB 0007 | [17] | 6             |
| "pending"                | 5 | 0913 0007 | [17] | 6             |
|                          |   |           | [19] | 5.1           |
| "waiting"                | 5 | 0122 0007 | [17] | 6             |
| "terminated"             | 5 | 000E 000A | [17] | 6             |
|                          |   |           | [19] | 5.1           |
|                          |   |           | [21] |               |
| "event="                 | 3 | 068C 0006 | [17] | 6             |

|                        |   |      |      |      |          |
|------------------------|---|------|------|------|----------|
| "subscribe"            | 5 | 0286 | 0009 | [17] | 6        |
| "approved"             | 5 | 0160 | 0008 | [17] | 6        |
| "deactivated"          | 5 | 0374 | 000B | [17] | 6        |
| "provation"            | 5 | 014F | 0009 | [17] | 6        |
| "rejected"             | 5 | 00F0 | 0008 | [17] | 6        |
| "timeout"              | 5 | 0590 | 0007 | [17] | 6        |
| "giveup"               | 5 | 0470 | 0006 | [17] | 6        |
| "noresource"           | 5 | 0821 | 000A | [17] | 6        |
| "expiration="          | 4 | 08A3 | 000B | [17] | 6        |
| "duration-subscribed=" | 4 | 02A6 | 0014 | [17] | 6        |
| "lang="                | 1 | 092F | 0005 | [10] | 5.1      |
|                        |   |      |      | [16] | 2.2.5    |
|                        |   |      |      | [17] | 6        |
|                        |   |      |      | [19] | 5.1      |
| ":simple-filter"       | 3 | 057F | 000E | [18] | 7        |
| "filter-set"           | 3 | 0587 | 000A | [18] | 7        |
| "ns-bindings"          | 3 | 0871 | 000B | [18] | 7        |
| "ns-binding"           | 3 | 0871 | 000A | [18] | 7        |
| "filter"               | 3 | 0393 | 0006 | [18] | 7        |
| "prefix="              | 5 | 012E | 0007 | [18] | 7        |
| "urn="                 | 5 | 0248 | 0004 | [18] | 7        |
| "what"                 | 4 | 0356 | 0004 | [18] | 7        |
| "trigger"              | 4 | 051A | 0007 | [18] | 7        |
| "uri="                 | 4 | 0352 | 0004 | [18] | 7        |
|                        |   |      |      | [19] | 5.1      |
| "domain="              | 5 | 0045 | 0007 | [18] | 7        |
| "remove="              | 5 | 0105 | 0007 | [18] | 7        |
| "enabled="             | 5 | 010E | 0008 | [18] | 7        |
| "include="             | 5 | 0158 | 0008 | [18] | 7        |
| "exclude="             | 5 | 00B6 | 0008 | [18] | 7        |
| "changed"              | 4 | 0340 | 0007 | [18] | 7        |
| "added"                | 4 | 034D | 0005 | [18] | 7        |
| "removed"              | 4 | 0780 | 0007 | [18] | 7        |
| ":rlmi"                | 3 | 0666 | 0005 | [19] | 5.1      |
| "list"                 | 3 | 0467 | 0004 | [19] | 5.1      |
| "name"                 | 3 | 05BA | 0004 | [19] | 5.1      |
| "resource"             | 3 | 0520 | 0008 | [19] | 5.1      |
| "fullState="           | 3 | 0772 | 000A | [19] | 5.1      |
| "cid="                 | 5 | 0228 | 0004 | [19] | 5.1      |
| "instance"             | 4 | 0862 | 0008 | [19] | 5.1      |
| "reason="              | 5 | 08C5 | 0007 | [19] | 5.1      |
| ":caps"                | 3 | 0672 | 0005 | [20] | 3.2, 3.3 |
| "servcaps"             | 3 | 03B3 | 0008 | [20] | 3.2      |
| "application"          | 3 | 06C5 | 000B | [20] | 3.2      |
| "control"              | 3 | 05F2 | 0007 | [20] | 3.2      |
| "message"              | 3 | 0489 | 0007 | [20] | 3.2      |
| "type"                 | 3 | 04AD | 0004 | [20] | 3.2      |
| "automata"             | 3 | 06BE | 0008 | [20] | 3.2      |

|                     |   |      |      |      |          |
|---------------------|---|------|------|------|----------|
| "duplex"            | 3 | 089F | 0006 | [20] | 3.2      |
| "description"       | 3 | 02D0 | 000B | [20] | 3.2, 3.3 |
|                     |   |      |      | [21] |          |
| "event-packages"    | 3 | 0426 | 000E | [20] | 3.2      |
| "priority"          | 3 | 069F | 0008 | [20] | 3.2, 3.3 |
| "methods"           | 3 | 05C6 | 0007 | [20] | 3.2      |
| "extensions"        | 3 | 0869 | 000A | [20] | 3.2      |
| "schemes"           | 3 | 0485 | 0007 | [20] | 3.2      |
| "actor"             | 3 | 077C | 0005 | [20] | 3.2      |
| "isfocus"           | 3 | 0621 | 0007 | [20] | 3.2      |
| "languages"         | 3 | 047D | 0009 | [20] | 3.2      |
| "supported"         | 4 | 06D2 | 0009 | [20] | 3.2, 3.3 |
| "notsupported"      | 4 | 06CF | 000C | [20] | 3.2, 3.3 |
| "business"          | 5 | 0787 | 0008 | [20] | 3.2.11   |
| "personal"          | 5 | 0089 | 0008 | [20] | 3.2.11   |
| "half"              | 5 | 0135 | 0004 | [20] | 3.2.12   |
| "receive-only"      | 5 | 065A | 000C | [20] | 3.2.12   |
| "send-only"         | 5 | 0068 | 0009 | [20] | 3.2.12   |
| "lowerthan"         | 5 | 009C | 0009 | [20] | 3.2, 3.3 |
| "higherthan"        | 5 | 02BA | 000A | [20] | 3.2, 3.3 |
| "equals"            | 5 | 030D | 0006 | [20] | 3.2, 3.3 |
| "range"             | 5 | 0325 | 0005 | [20] | 3.2, 3.3 |
| "maxvalue="         | 5 | 079D | 0009 | [20] | 3.2, 3.3 |
| "minvalue="         | 5 | 0669 | 0009 | [20] | 3.2, 3.3 |
| "value="            | 5 | 066C | 0006 | [20] | 3.2, 3.3 |
| "max="              | 5 | 0238 | 0004 | [20] | 3.2, 3.3 |
| "min="              | 5 | 0230 | 0004 | [20] | 3.2, 3.3 |
| "devcaps"           | 3 | 08F5 | 0007 | [20] | 3.3      |
| "mobility"          | 5 | 044C | 0008 | [20] | 3.3      |
| "fixed"             | 5 | 0215 | 0005 | [20] | 3.3.2    |
| "mobile"            | 5 | 0050 | 0006 | [20] | 3.3.2    |
| "conference"        | 5 | 0304 | 000A | [20] | 3.2.14   |
| "dialog"            | 5 | 03F7 | 0006 | [20] | 3.2.14   |
| "kplm"              | 5 | 0449 | 0004 | [20] | 3.2.14   |
| "message-summary"   | 5 | 0489 | 000F | [20] | 3.2.14   |
| "poc-settings"      | 5 | 053F | 000C | [20] | 3.2.14   |
| "refer"             | 5 | 0281 | 0005 | [20] | 3.2.14   |
| "Siemens-RTP-Stats" | 5 | 04DC | 0011 | [20] | 3.2.14   |
| "spirits-INDPs"     | 5 | 005C | 000D | [20] | 3.2.14   |
| "spirits-user-prog" | 5 | 025A | 0011 | [20] | 3.2.14   |
| "winfo"             | 5 | 090E | 0005 | [20] | 3.2.14   |
| "CANCEL"            | 5 | 01D8 | 0006 | [20] | 3.2.16   |
| "INFO"              | 5 | 04D3 | 0004 | [20] | 3.2.16   |
| "INVITE"            | 5 | 01D2 | 0006 | [20] | 3.2.16   |
| "MESSAGE"           | 5 | 017D | 0007 | [20] | 3.2.16   |
| "NOTIFY"            | 5 | 01CC | 0006 | [20] | 3.2.16   |
| "OPTIONS"           | 5 | 04D6 | 0007 | [20] | 3.2.16   |
| "PRACK"             | 5 | 020B | 0005 | [20] | 3.2.16   |

|                                 |   |      |      |      |        |
|---------------------------------|---|------|------|------|--------|
| "PUBLISH"                       | 5 | 01A7 | 0007 | [20] | 3.2.16 |
| "REFER"                         | 5 | 0116 | 0005 | [20] | 3.2.16 |
| "REGISTER"                      | 5 | 011A | 0008 | [20] | 3.2.16 |
| "SUBSCRIBE"                     | 5 | 0146 | 0009 | [20] | 3.2.16 |
| "UPDATE"                        | 5 | 01C6 | 0006 | [20] | 3.2.16 |
| "100rel"                        | 5 | 0531 | 0006 | [20] | 3.2.17 |
| "early-session"                 | 5 | 07CF | 000D | [20] | 3.2.17 |
| "eventlist"                     | 5 | 0462 | 0009 | [20] | 3.2.17 |
| "histinfo"                      | 5 | 00F8 | 0008 | [20] | 3.2.17 |
| "join"                          | 5 | 0454 | 0004 | [20] | 3.2.17 |
| "norefersub"                    | 5 | 027F | 000A | [20] | 3.2.17 |
| "path"                          | 5 | 0071 | 0004 | [20] | 3.2.17 |
| "precondition"                  | 5 | 0816 | 000C | [20] | 3.2.17 |
| "pref"                          | 5 | 012E | 0004 | [20] | 3.2.17 |
| "replaces"                      | 5 | 073F | 0008 | [20] | 3.2.17 |
| "resource-priority"             | 5 | 0823 | 0011 | [20] | 3.2.17 |
| "sdp-anat"                      | 5 | 087B | 0008 | [20] | 3.2.17 |
| "sec-agree"                     | 5 | 07C7 | 0009 | [20] | 3.2.17 |
| "tdialog"                       | 5 | 03F6 | 0007 | [20] | 3.2.17 |
| "timer"                         | 5 | 073B | 0005 | [20] | 3.2.17 |
| "principal"                     | 5 | 0475 | 0009 | [20] | 3.2.19 |
| "attendant"                     | 5 | 0881 | 0009 | [20] | 3.2.19 |
| "msg-taker"                     | 5 | 02E9 | 0009 | [20] | 3.2.19 |
| "information"                   | 5 | 05B0 | 000B | [20] | 3.2.19 |
| "urn:oma:xml:prs:pidf:oma-pres" | 3 | 0556 | 001D | [21] |        |
| "service-description"           | 4 | 02C8 | 0013 | [21] |        |
| "service-id"                    | 4 | 04EC | 000A | [21] |        |
| "version"                       | 4 | 0906 | 0007 | [21] |        |
| "willingness"                   | 4 | 040C | 000B | [21] |        |
| "session-participation"         | 4 | 07D5 | 0014 | [21] |        |
| "registration-state"            | 4 | 03BE | 0012 | [21] |        |
| "barring-state"                 | 4 | 03D1 | 000D | [21] |        |
| "overriding-willingness"        | 4 | 0401 | 0016 | [21] |        |
| "network-availability"          | 4 | 07F1 | 0014 | [21] |        |

Figure 2: Input Strings

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