                      Indicating Fax over IP Capability
                    in the Session Initiation Protocol (SIP)

Abstract

   This document defines and registers with IANA the new "fax" media
   feature tag for use with the Session Initiation Protocol (SIP).
   Currently, fax calls are indistinguishable from voice calls at call
   initiation. Consequently, fax calls can be routed to SIP user agents
   that are not fax capable. A "fax" media feature tag implemented in
   conjunction with caller preferences allows for more accurate fax call
   routing.

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1. Introduction

   Fax communications in the Session Initiation Protocol (SIP) [RFC3261]
   are handled in a "voice first" manner. Indications that a user
   desires to use a fax transport protocol, such as ITU-T T.38 [T38], to
   send a fax are not known when the initial INVITE message is sent.
   The call is set up as a voice call first, and then, only after it is
   connected, does a switchover to the T.38 [T38] protocol occur. This
   is problematic in that fax calls can be routed inadvertently to SIP
   user agents (UAs) that are not fax capable.

   To ensure that fax calls are routed to fax-capable SIP UAs, an
   implementation of caller preferences defined in RFC 3841 [RFC3841]
   can be used. Feature preferences are a part of RFC 3841 [RFC3841]
   that would allow UAs to express their preference for receiving fax
   communications. Subsequently, SIP servers take these preferences
   into account to increase the likelihood that fax calls are routed to
   fax-capable SIP UAs.

This document defines the "fax" media feature tag for use in the SIP tree, as per Section 12.1 of RFC 3840 [RFC3840]. This feature tag will be applied per RFC 3841 [RFC3841] as a feature preference for fax-capable UAs.

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 RFC 2119 [RFC2119].

3. Motivation

In the majority of circumstances, it is preferred that capabilities be handled in the Session Description Protocol (SDP) portion of the SIP [RFC3261] communication. However, fax is somewhat unique in that the ultimate intention of the call is not accurately signaled in the initial SDP exchange. Specifically, indications of T.38 [T38] or any other fax transport protocol in the call are not known when the call is initiated by an INVITE message. Fax calls are always considered voice calls until after they are connected. This results in the possibility of fax calls being received by SIP UAs that are not capable of handling fax transmissions.

For example, Alice wants to send a fax to Bob. Bob has registered two SIP UAs. The first SIP UA is not fax capable, but the second one supports the T.38 [T38] fax protocol. Currently, SIP servers are unable to know at the time that the call starts that Alice prefers a fax-capable SIP UA to handle her call. Additionally, the SIP servers are also not aware of which of Bob's SIP UAs are fax capable.

To resolve this issue of calls not arriving at a UA that supports fax, this document defines a new media feature tag specific to fax, per RFC 3840 [RFC3840]. Caller preferences, as defined in RFC 3841 [RFC3841], can then be used for registering UAs that support fax and for routing fax calls to these UAs. Thus, Alice can express up front that she prefers a T.38 [T38] fax-capable SIP UA for this call. At the same time, Bob's SIP UAs have expressed their fax capabilities as well during registration. Now, when Alice places a fax call to Bob, the call is appropriately routed to Bob's fax-capable SIP UA.

4. Usage of the "sip.fax" Parameter

   The "sip.fax" media feature tag is a new string parameter, defined in
   this document, that allows a call to indicate a fax preference. A
   receiving UA includes the "sip.fax" media feature tag in the Contact
   header field of REGISTER messages to indicate that it is fax capable,
   and a SIP Registrar includes this tag in the Contact header field of
   its 200 OK response to confirm the registration of this preference,
   all as per RFC 3840 [RFC3840].

   A calling UA SHOULD include the "sip.fax" media feature tag in the
   Accept-Contact header of an INVITE request in order to express its
   desire for a call to be routed to a fax-capable UA. Otherwise,
   without this tag, fax call determination is not possible until after
   the call is connected. If a calling UA includes the "sip.fax" tag
   and the SIP network elements that process the call (including the
   called UAs) implement the procedures of RFC 3840 and RFC 3841, the
   call will be preferentially routed to UAs that have advertised their
   support for this feature (by including it in the Contact header of
   their REGISTER requests, as documented above).

   It is possible for the calling UA to utilize additional procedures
   defined in RFC 3840 and RFC 3841 to express a requirement (instead of
   a preference) that its call be delivered to fax-capable UAs.
   However, the calling UA SHOULD NOT require the "sip.fax" media type.
   Doing so could result in call failure for a number of reasons, not
   only because there may not be any receiving UAs registered that have
   advertised their support for this feature, but also because one or
   more SIP network elements that process the call may not support the
   processing defined in RFC 3840 and RFC 3841. A calling UA that
   wishes to express this requirement should be prepared to relax it to
   a preference if it receives a failure response indicating that the
   requirement mechanism itself is not supported by the called UAs,
   their proxies, or other SIP network elements.

   When calls do connect through the use of "sip.fax" either as a
   preference or a requirement, UAs should follow standard fax
   negotiation procedures documented in ITU-T T.38 [T38] for T.38 fax
   calls and ITU-T G.711 [G711] and ITU-T V.152 [V152], Sections 6 and
   6.1, for fax passthrough calls. Subsequently, the "sip.fax" feature
   tag has two allowed values: "t38" and "passthrough". The "t38" value
   indicates that the impending call will utilize the ITU-T T.38 [T38]
   protocol for the fax transmission. The "passthrough" value indicates
   that the ITU-T G.711 [G711] codec will be used to transport the fax
   call.

5. Example

   Bob registers with the fax media feature tag. The message flow is
   shown in Figure 1:

```
              SIP Registrar                    Bob's SIP UA
          ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
              |                                       |
              |              REGISTER F1              |
              |<--------------------------------      |
              |                                       |
              |              200 OK F2                |
              |-------------------------------->      |
              |                                       |
```

         Figure 1: Fax Media Feature Tag SIP Registration Example

   F1 REGISTER Bob -> Registrar

   REGISTER sip:example.com SIP/2.0
   Via: SIP/2.0/TCP bob-TP.example.com:5060;branch=z9hG4bK309475a2
   From: <sip:bob-tp@example.com>;tag=a6c85cf
   To: <sip:bob-tp@pexample.com>
   Call-ID: a84b4c76e66710
   Max-Forwards: 70
   CSeq: 116 REGISTER
   Contact: <sip:bob-tp@pc33.example.com;transport=tcp>;+sip.fax="t38"
   Expires: 3600

   The registrar responds with a 200 OK:

   F2 200 OK Registrar -> Bob

   SIP/2.0 200 OK
   From: <sip:bob-tp@example.com>;tag=a6c85cf
   To: <sip:bob-tp@example.com>;tag=1263390604
   Contact: <sip:bob-tp@example.com;transport=tcp>;+sip.fax="t38"
   Expires: 120
   Call-ID: a84b4c76e66710
   Via: SIP/2.0/TCP bob-TP.example.com:5060;branch=z9hG4bK309475a2
   CSeq: 116 REGISTER
   Expires: 3600

   Callers desiring to express a preference for fax will include the
   "sip.fax" media feature tag in the Accept-Contact header of their
   INVITE.

```
   INVITE sip:bob@biloxi.example.com SIP/2.0
   Via: SIP/2.0/TCP client.atlanta.example.com:5060;branch=z9hG4bK74b43
   Max-Forwards: 70
   From: Alice <sip:alice@atlanta.example.com>;tag=9fxced76sl
   To: Bob <sip:bob@biloxi.example.com>
   Accept-Contact: *;+sip.fax="t38"
   Call-ID: 3848276298220188511@atlanta.example.com
   CSeq: 1 INVITE
   Contact: <sip:alice@client.atlanta.example.com;transport=tcp>
   Content-Type: application/sdp
   Content-Length: 151
```

6. Security Considerations

The security considerations related to the use of media feature tags from Section 11.1 of RFC 3840 [RFC3840] apply.

7. IANA Considerations

This specification adds a new media feature tag to the SIP Media Feature Tag Registration Tree per the procedures defined in RFC 2506 [RFC2506] and RFC 3840 [RFC3840].

Media feature tag name: sip.fax

ASN.1 Identifier: 1.3.6.1.8.4.25

Summary of the media feature indicated by this tag: This feature tag indicates whether a communications device supports the ITU-T T.38 [T38] fax protocol ("t38") or the passthrough method of fax transmission using the ITU-T G.711 [G711] audio codec ("passthrough").

Values appropriate for use with this feature tag: Token with an equality relationship. Values are:

t38: The device supports the "image/t38" media type [RFC3326] and implements ITU-T T.38 [T38] for transporting the ITU-T T.30 [T30] and ITU-T T.4 [T4] fax data over IP.

passthrough: The device supports the "audio/pcmu" and "audio/ pcma" media types [RFC4856] for transporting ITU-T T.30 [T30] and ITU-T T.4 [T4] fax data using the ITU-T G.711 [G711] audio codec. Additional implementation recommendations are in ITU-T V.152 [V152], Sections 6 and 6.1.

The feature tag is intended primarily for use in the following
applications, protocols, services, or negotiation mechanisms:
This feature tag is most useful in a communications application
for the early identification of a Fax over IP (FoIP) call.

Examples of typical use: Ensuring a fax call is routed to a fax
capable SIP UA.

Related standards or documents: RFC 6913

Security Considerations: The security considerations related to the
use of media feature tags from Section 11.1 of RFC 3840 [RFC3840]
apply.

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