Abstract

SDP has been extended with a capability negotiation mechanism framework that allows the endpoints to negotiate transport protocols and attributes. This framework has been extended with a media capabilities negotiation mechanism that allows endpoints to negotiate additional media-related capabilities. This negotiation is embedded into the widely-used SDP offer/answer procedures.

This memo extends the SDP capability negotiation framework to allow endpoints to negotiate two additional SDP capabilities. In particular, this memo provides a mechanism to negotiate media titles ("i=" line for each media) and media bandwidth ("b=" line).

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1. Introduction

The Session Description Protocol (SDP) [RFC4566] is intended for describing multimedia sessions for the purposes of session announcement, session invitation, and other forms of multimedia session initiation. SDP has been extended with a capability negotiation mechanism framework [RFC5939] which allows the endpoints to negotiate capabilities, such as support for Realtime Transport Protocol (RTP) [RFC3550] and Secure Realtime Transport Protocol (SRTP) [RFC3711]. The SDP media capabilities [RFC5939] provides negotiation capabilities to media lines as well.

The capability negotiation is embedded into the widely used SDP offer/answer procedure [RFC3264]. This memo provides the means to negotiate further capabilities than those specified in the SDP capability negotiation mechanism framework [RFC5939] and the SDP media capabilities negotiation [I-D.ietf-mmusic-sdp-media-capabilities]. In particular, this memo provides a mechanism to negotiate media titles ("i=") and media bandwidth ("b=").

Since the two added capabilities are highly unconnected, it is not expected that implementations will support both at the same time. Instead, it is expected that applications will choose their needed capability for their specific purpose. Due to this, we are writing the normative part pertaining to both capabilities in a self-contained section: Section 3.1.1 describes the bandwidth capability extension, and Section 3.1.2 describes the media title capability extension. Separate option tags are defined for both capabilities.

2. Conventions Used in This Document

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 [RFC2119] and indicate requirement levels for compliant implementations.

3. Protocol Description

3.1. Extensions to SDP

The SDP Capability Negotiation Framework [RFC5939] and the SDP media capabilities negotiation [I-D.ietf-mmusic-sdp-media-capabilities] specify attributes for negotiating SDP capabilities. These documents specify new attributes (e.g., "acap", "tcap", "mcap") for achieving
their purpose. In this document we define two new additional capability attributes for SDP lines of the the general form:

\[
\text{type=value}
\]

for types "i" and "b". The corresponding capability attributes are defined as "icap" for media title capability, and "bcap" for bandwidth capability, respectively.

From the sub-rules of "a=" line in SDP [RFC4566], SDP attributes are of the form:

\[
\text{attribute} = (\text{att-field } "\text{:} \text{att-value}\) / \text{att-field}
\]
\[
\text{att-field} = \text{token}
\]
\[
\text{att-value} = \text{byte-string}
\]

Capability attributes use only the 'att-field:att-value' form.

The new attributes may be referenced in potential configurations ("a=pcfg") or in latent configurations ("a=lcfg"), as productions conforming to the extension-config-list as defined in [RFC5939].

\[
\text{extension-config-list} = [\text{"+"}] \text{ext-cap-name } \text{"=}\text{ ext-cap-list}
\]
\[
\text{ext-cap-name} = 1\text{*}\text{ALPHA} / \text{DIGIT}
\]
\[
\text{ext-cap-list} = 1\text{*}\text{VCHAR} \text{; defined in RFC5234}
\]

The optional "+" is used to indicate that the extension is mandatory and MUST be supported in order to use that potential configuration.

The attributes may be referenced in actual configurations as productions conforming to the sel-extension-config defined in [RFC5939].

\[
\text{sel-extension-config} = \text{ext-cap-name } \text{"=}\text{ 1*VCHAR}
\]

The specific parameters are defined in the individual description of each capability, below.

The "icap" and "bcap" capability attributes MUST appear only at the media level. Hence, bandwidth and media title capabilities referenced by any configuration attribute MUST be interpreted as media level attributes. (For this reason, we call the "icap" attribute the "media title capability" instead of "session title capability").
3.1.1. Bandwidth Capability

According to RFC 4566 [RFC4566] the bandwidth field denotes the proposed bandwidth to be used by the session or media. In this memo, we specify the bandwidth at the media level. The bandwidth field is specified in RFC 4566 [RFC4566] with the following syntax:

\[ b=<bwtype>:<bandwidth> \]

where \(<bwtype>\) is an alphanumeric modifier giving the meaning of the \(<bandwidth>\) figure.

In this document, we define a new capability attribute: the bandwidth capability attribute "bcap". This attribute lists bandwidth as capabilities according to the following definition:

\[ "a=bcap:" \ bw-cap-num 1*WSP bwtype ":" bandwidth CRLF \]

where \(<bw-cap-num>\) is a unique integer between 1 and 2^31-1 (both included) used to number the bandwidth capability, and the other elements are as defined for the "b=" field in [RFC4566].

This format satisfies the general attribute production rules in [RFC4566] according to the following Augmented Backus-Naur Form (ABNF) [RFC5234] syntax:

```
att-field       = "bcap"
att-value       = bw-cap-num 1*WSP bwtype ":" bandwidth
bw-cap-num      = 1*10(DIGIT)   ; defined in RFC5234
```

Negotiation of bandwidth per media stream can be useful when negotiating media encoding capabilities with different bandwidths.

3.1.1.1. Configuration Parameters

The SDP capability negotiation framework [RFC5939] provides for the existence of the "pcfg" and "acfg" attributes. The concept is extended by the the SDP media capabilities negotiation [I-D.ietf-mmusic-sdp-media-capabilities] with an "lcfg" attribute that conveys latent configurations.

Extensions to the "pcfg" and "lcfg" attributes are defined through <extension-config-list>, and extensions to the "acfg" attribute are defined through the <sel-extension-config> as defined in [RFC5939].

In this document we extend the <extension-config-list> field to be able to convey lists of bandwidth capabilities in latent or potential configurations, according to the following Augmented Backus-Naur Form
(ABNF) [RFC5234] syntax:
extension-config-list = bandwidth-config-list
bandwidth-config-list = ["+"] "b=" bw-cap-list *(BAR bw-cap-list)
bw-cap-list = bw-cap-num *("," bw-cap-num)
bw-cap-num = 1*10(DIGIT) ; defined in RFC5234

Figure 1: Syntax of the bandwidth parameter in lcfg and pcfg attributes

Each bandwidth capability configuration is a comma-separated list of bandwidth capability attribute numbers where ‘bw-cap-num’ refers to the bw-cap-num bandwidth capability numbers defined explicitly earlier in this document, and hence must be between 1 and 2^31-1 (both included). Alternative bandwidth configurations are separated by a vertical bar ("|").

The above syntax is very flexible, allowing referencing to multiple "b=" lines per configuration, also for the same bwtype. While we don’t see a need for such definition, we have not restricted this, as it is not restricted in [RFC4566] either.

The bandwidth parameter to the actual configuration attribute ("a=acfg") is formulated as a sel-extension-config with

    ext-cap-name = "b"

hence

    sel-extension-config = sel-bandwidth-config
    sel-bandwidth-config = "b=" bw-cap-list ; bw-cap-list as above.

Figure 2: Syntax of the bandwidth parameter in acfg attributes

3.1.1.2. Option tag

The SDP capability negotiation framework [RFC5939] allows for capability negotiation extensions to be defined. Associated with each such extension is an option tag that identifies the extension in question. Hereby, we define a new option tag "bcap-v0" that identifies support for the bandwidth capability. This option tag SHOULD be added to other existing option tags present in the "csup" and "creq" attributes in SDP, according to the procedures defined in the SDP Capability Negotiation Framework [RFC5939].
3.1.2. Media title Capability

RFC 4566 [RFC4566] provides for the existence of an information field expressed in the format of the "i=" line, which can appear either at the session level or at the media level. An "i=" line that is present at the session level is known as the "session name", and its purpose is to convey a human-readable textual information about the session. We don’t see much usage of capabilities related to the "i=" line at the session level.

The "i=" line in SDP can also appear at the media level, in which case it is used to provide human-readable information about the media stream to which it is related, e.g., it may indicate the purpose of the media stream. The media title field is not to be confused with the label attribute ("a=label:") [RFC4574]) which provides a machine-readable tag. It is foreseen that applications declaring capabilities related to different configurations of a media stream may need to provide different identifying information for each of those configurations. That is, a party might offer alternative media configurations for a stream, each of which represents a different presentation of the same or similar information. For example, an audio stream might offer English or Spanish configurations, or a video stream might offer a choice of video source such as speaker camera, group camera, or document viewer. The media title capability is needed to inform the answering user in order to select the proper choice, and the label is used to inform the offering machine which choice the answerer has selected. Hence, there is value in defining a mechanism to provide titles of media streams as capabilities.

According to SDP [RFC4566], the media label has the following syntax:

"i="text

where "text" represents a human-readable text indicating the purpose of the media stream.

In this document we define a new capability attribute: the media title capability, "icap". This attribute lists media title labels as capabilities, according to the following definition:

"a=icap:" mtitle-cap-num 1*WSP text

where <mtitle-cap-num> is a unique integer between 1 and 2^31-1 (both included) user to number the the unique ordinal identifier of the particular media title capability and <text> is a human-readable text that indicates the purpose of the media stream it is supposed to characterize.
As an example, one might use:

```
a=icap:1 Document Camera
```

to represent a purpose of a media stream identified with the capability number 1.

The media title capability attribute satisfies the general attribute production rules in [RFC4566] according to the following Augmented Backus-Naur Form (ABNF) [RFC5234] syntax:

```
att-field       = "icap"
att-value       = mtitle-cap-num 1*WSP text
                  ; text is defined in RFC4566
mtitle-cap-num    = 1*10(DIGIT)   ; defined in RFC5234
```

3.1.2.1. Configuration Parameters

The SDP Capability Negotiation Framework [RFC5939] provides for the existence of the "pcfg" and "acfg" attributes. The concept is extended by the the SDP media capabilities negotiation [I-D.ietf-mmusic-sdp-media-capabilities] with an "lcfg" attribute that conveys latent configurations.

In this document, we define an <mtitle-config-list> parameter to be used to convey media title capabilities in a potential or latent configuration. This parameter is defined as an <extension-config-list> with the following associations:

```
ext-cap-name = "i"

ext-cap-list = mtitle-cap-list
```

This leads to the following definition for the media title capability parameter:

```
extension-config-list = mtitle-config-list
mtitle-config-list    = ["+"] "i=" mtitle-cap-list
mtitle-cap-list      = mtitle-cap-num *(BAR mtitle-cap-num); BAR defined in RFC5939
mtitle-cap-num        = 1*10(DIGIT) ; defined in RFC5234
```

Figure 3: Syntax of the media title capability parameter in lcfg and pcfg attributes

Each potential capability configuration contains a single media title capability attribute number where ‘mtitle-cap-num’ is the media title capability number defined explicitly earlier in this document, and hence must be between 1 and 2^31-1 (both included). The media title
capability allows the expression of only a single capability in each alternative, since no more than a single media title field is permitted per media block. Nevertheless, it is still allowed to express alternative potential media title configurations separated by a vertical bar ("|”).

For sake of consistency, we allow the configuration attribute to be prefixed with the plus ("+") sign, indicating that the extension is mandatory and MUST be supported in order to be used.

3.1.2.2. Option Tag

At present, it is difficult to envision a scenario in which the ‘icap’ attribute must be supported or the offer must be rejected. In most cases, if the icap attribute or its contents were to be ignored, an offered configuration could still be chosen based on other criteria such as configuration numbering. However, one might imagine an SDP offer that contained English and Spanish potential configurations for an audio stream. The session might be unintelligible if the choice is based on configuration numbering, rather than informed user selection. Based on such considerations, it may well prove useful to announce the ability to use the icap attribute and its contents to select media configurations, or to inform the user about the selected configuration(s). Therefore, we define a new option tag of "icap-v0" that identifies support for the media title capability. This option tag SHOULD be added to other existing option tags present in the "csup" and/or "creq" attributes in SDP, according to the procedures defined in the SDP Capability Negotiation Framework [RFC5939]. The discussion above suggests that "icap-v0" will typically appear in a "csup" attribute, but rarely in a "creq" attribute.

3.2. Session Level versus Media Level

The icap and bcap attributes can appear at the session level and/or at the media level, but MUST be interpreted as a media-level capability, i.e. the capabilities they provide can only result in media level types and values (not session level). To avoid confusion, the <type-attr-num> for each line must be unique across all capability attributes of the same type within the entire session description. As described below, these capability attributes may be referenced by acfg, pcfg and/or lcfg attributes.

3.3. Offer/Answer model extensions

To be completed.
4. Field Replacement Rules

To simplify the construction of SDP records, given the need to include fields within the media description in question for endpoints that do not support capabilities negotiation, we define some simple field-replacement rules for those fields invoked by potential or latent configurations. In particular, any i-field invoked by a configuration MUST replace the corresponding field, if present within the media description in question. Any b-field invoked by a configuration MUST replace any b-field of the same bandwidth type at the media level.

5. IANA Considerations

5.1. New SDP Attributes

IANA is hereby requested to register the following new SDP attributes:

- Attribute name: icap
  Long form name: Media Title Capability
  Type of attribute: Media-level
  Subject to charset: Yes
  Purpose: Negotiate human-readable information related to the media
  Appropriate values: See Section 3.1.2

- Attribute name: bcap
  Long form name: Bandwidth Capability
  Type of attribute: Media-level
  Subject to charset: No
  Purpose: Negotiate media-level bandwidths
  Appropriate values: See Section 3.1.1
5.2. New Option Tags

IANA is hereby requested to add the new option tags "bcap-v0" and "icap-v0", defined herein, to the SDP Capability Negotiation Option Tag Registry.

5.3. New SDP Capability Negotiation Configuration Parameters

IANA is hereby requested to add the new parameter identifiers "i" for "media title" and "b" for "bandwidth" to the Potential Configuration Parameter Registry. These parameters are permitted in ‘lcfg’, ‘acfg’, and ‘pcfg’ attributes.

6. Security Considerations

This document provides an extension on top of RFC 4566 [RFC4566], RFC 3264 [RFC3264], SDP Capability Negotiation Framework [RFC5939], and SDP media capabilities negotiation [I-D.ietf-mmusic-sdp-media-capabilities]. As such, the security considerations of those documents apply.

7. Acknowledgments

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8. References

8.1. Normative References

[I-D.ietf-mmusic-sdp-media-capabilities]


8.2. Informative References


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