

SIP	J. Rosenberg	
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## **Indicating Support for Interactive Connectivity Establishment (ICE) in the Session Initiation Protocol (SIP)** **draft-ietf-sip-ice-option-tag-02**

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### **Abstract**

This specification defines a media feature tag and an option tag for use with the Session Initiation Protocol (SIP). The media feature tag allows a UA to communicate to its registrar that it supports ICE. The option tag allows a User Agent (UA) to require support for ICE in order for a call to proceed.

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## 1. Introduction

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RFC 3264 [\[RFC3264\]](#) (Rosenberg, J. and H. Schulzrinne, "An Offer/Answer Model with Session Description Protocol (SDP)," June 2002.) defines a two-phase exchange of Session Description Protocol (SDP) messages [\[RFC4566\]](#) (Handley, M., Jacobson, V., and C. Perkins, "SDP: Session Description Protocol," July 2006.) for the purposes of establishment of multimedia sessions. This offer/answer mechanism is used by protocols such as the [Session Initiation Protocol \(SIP\)](#) (Rosenberg, J., Schulzrinne, H., Camarillo, G., Johnston, A., Peterson, J., Sparks, R., Handley, M., and E. Schooler, "SIP: Session Initiation Protocol," June 2002.) [\[RFC3261\]](#).

Protocols using offer/answer are difficult to operate through Network Address Translators (NAT). Because their purpose is to establish a flow of media packets, they tend to carry IP addresses within their messages, which is known to be problematic through NAT [\[RFC3235\]](#) (Senie, D., "Network Address Translator (NAT)-Friendly Application Design Guidelines," January 2002.). To remedy this, an extension to SDP, called Interactive Connectivity Establishment (ICE) has been defined [\[I-D.ietf-mmusic-ice\]](#) (Rosenberg, J., "Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols," October 2007.). ICE defines procedures by which agents gather a multiplicity of addresses, include all of them in an SDP offer or answer, and then use peer-to-peer Simple Traversal Underneath NAT (STUN) [\[I-D.ietf-behave-rfc3489bis\]](#) (Rosenberg, J., Mahy, R., Matthews, P., and D. Wing, "Session Traversal Utilities for (NAT) (STUN)," July 2008.) connectivity checks to determine a valid address.

This specification defines a media feature tag, "sip.ice", and a SIP option tag, "ice", that can be used by SIP user agents that make use of ICE. [Section 3 \(Motivation\)](#) motivates the need for the media feature tag and option tag, and [Section 4 \(Media Feature Tag Definition\)](#) and [Section 5 \(Option Tag Definition\)](#) formally define them.

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## 2. Terminology

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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 \(Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels," March 1997.\)](#) [RFC2119].

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## 3. Motivation

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There are two primary motivations for defining an option tag and a media feature tag. They are support for gateways, and requiring ICE for a call.

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### 3.1. Gateways

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Unfortunately, ICE requires both endpoints to support it in order for it to be used. Within a domain, there will typically be user agents that do and do not support ICE. In order to facilitate deployment of ICE, it is anticipated that domains will make use of gateways which act as ICE agents on one side, and non-ICE agents on the other side. This would allow a call from domain A into domain B to make use of ICE, even if the device in domain B does not itself yet support ICE. However, when domain B receives a call, it will need to know whether the call needs to pass through such a gateway, or whether it can go to the terminating UA directly.

In order to make such a determination, this specification defines a media feature tag, "sip.ice", which can be included in the Contact header field of a REGISTER request [\[RFC3840\] \(Rosenberg, J., Schulzrinne, H., and P. Kyzivat, "Indicating User Agent Capabilities in the Session Initiation Protocol \(SIP\)," August 2004.\)](#). This allows the registrar to track whether a UA supports ICE or not. This information can be accessed by a proxy in order to determine whether a call needs to route through a gateway or not.

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### 3.2. Mandating Support for ICE

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Although ICE provides a built in fall back to non-ICE operation when the answerer doesn't support it, there are cases where the offerer would rather abort the call rather than proceed without ICE. Typically,

this is because they would like to choose a different m/c-line address for a non-ICE peer than they would for an ICE capable peer. To do this, the "ice" SIP option tag can be included in the Require header field of an INVITE request.

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#### 4. Media Feature Tag Definition

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The "sip.ice" media feature tag indicates support for ICE. An agent supports ICE if it is either a lite or full implementation, and consequently, is capable of including candidate attributes in an SDP offer or answer for at least one transport protocol. An agent that supports ICE SHOULD include this media feature tag in the Contact header field of its REGISTER requests and OPTION responses. An agent MAY include the media feature tag in the Contact header field of an INVITE or INVITE response; however, doing so is redundant with ICE attributes in the SDP which indicate the same thing. In cases where an INVITE omits an offer, the lack or presence of the media feature tag in the Contact header field cannot be used by the callee (which will be the offerer) to determine whether the caller supports ICE. In cases of third party call control [\[RFC3725\]](#) (Rosenberg, J., Peterson, J., Schulzrinne, H., and G. Camarillo, "Best Current Practices for Third Party Call Control (3pcc) in the Session Initiation Protocol (SIP)," April 2004.), the caller may be a controller that supports (or doesn't) ICE, while the answerer may be an agent which does (or doesn't) support ICE.

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#### 5. Option Tag Definition

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This "ice" OPTION tag SHOULD NOT be used in conjunction with the Supported header field (this SHOULD NOT includes responses to OPTIONS requests) The media feature tag is used as the one and only mechanism for indicating support for ICE. The option tag is meant to be used only with the Require header field. When placed in the Require header field of an INVITE request, it indicates that the UAS must support ICE in order to process the call. An agent supports ICE if it is either a full or lite implementation, and consequently, is capable of including candidate attributes in an SDP offer or answer for at least one transport protocol.

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## 6. Security Considerations

A malicious intermediary might attempt to modify a SIP message by inserting a Require header field containing the "ice" option tag. If ICE were not supported on the UAS, this would cause the call to fail when it would otherwise succeed. Of course, this attack is not specific to ICE, and can be done using any option tag. This attack is prevented by usage of the SIPS mechanism as defined in RFC 3261.

Similarly, an intermediary might attempt to remove the media feature tag from a REGISTER request or OPTIONS request, which might cause a call to skip ICE processing when it otherwise might make use of it. This attack is also prevented using the SIPS mechanism.

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## 7. IANA Considerations

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This specification defines a new media feature tag and SIP option tag.

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### 7.1. Option Tag

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This section defines a new SIP option tag per the guidelines in Section 27.1 of RFC 3261.

**Name:** ice

**Description:** This option tag is used to identify the Interactive Connectivity Establishment (ICE) extension. When present in a Require header field, it indicates that ICE is required by an agent.

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### 7.2. Media Feature Tag

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This section registers a new media feature tag in the SIP tree, defined in Section 12.1 of RFC 3840 [\[RFC3840\] \(Rosenberg, J., Schulzrinne, H., and P. Kyzivat, "Indicating User Agent Capabilities in the Session Initiation Protocol \(SIP\)," August 2004.\)](#).

**Media feature tag name:**

sip.ice

**ASN.1 Identifier:** 1.3.6.1.8.4.22

**Summary of the media feature indicated by this tag:** This feature tag indicates that the device supports Interactive Connectivity Establishment (ICE).

**Values appropriate for use with this feature tag:** Boolean.

**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 describing the capabilities of a device, such as a phone or PDA.

**Examples of typical use:** Routing a call to a phone that can support ICE.

**Related standards or documents:** RFC XXXX [[Note to IANA: Please replace XXXX with the RFC number of this specification.]]

**Security Considerations:** Security considerations for this media feature tag are discussed in [Section 6 \(Security Considerations\)](#) of RFC XXXX . [[Note to IANA: Please replace XXXX with the RFC number of this specification.]]

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## 8. References

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### 8.1. Normative References

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[RFC2119]	<a href="#">Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels,"</a> BCP 14, RFC 2119, March 1997 ( <a href="#">TXT</a> , <a href="#">HTML</a> , <a href="#">XML</a> ).
[RFC3261]	Rosenberg, J., Schulzrinne, H., Camarillo, G., Johnston, A., Peterson, J., Sparks, R., Handley, M., and E. Schooler, " <a href="#">SIP: Session Initiation Protocol</a> ," RFC 3261, June 2002 ( <a href="#">TXT</a> ).
[RFC3264]	Rosenberg, J. and H. Schulzrinne, " <a href="#">An Offer/Answer Model with Session Description Protocol (SDP)</a> ," RFC 3264, June 2002 ( <a href="#">TXT</a> ).
[RFC3840]	

	Rosenberg, J., Schulzrinne, H., and P. Kyzivat, " <a href="#">Indicating User Agent Capabilities in the Session Initiation Protocol (SIP)</a> ," RFC 3840, August 2004 ( <a href="#">TXT</a> ).
[RFC4566]	Handley, M., Jacobson, V., and C. Perkins, " <a href="#">SDP: Session Description Protocol</a> ," RFC 4566, July 2006 ( <a href="#">TXT</a> ).
[I-D.ietf-mmusic-ice]	Rosenberg, J., " <a href="#">Interactive Connectivity Establishment (ICE): A Protocol for Network Address Translator (NAT) Traversal for Offer/Answer Protocols</a> ," draft-ietf-mmusic-ice-19 (work in progress), October 2007 ( <a href="#">TXT</a> ).

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## 8.2. Informative References

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[RFC3235]	Senie, D., " <a href="#">Network Address Translator (NAT)-Friendly Application Design Guidelines</a> ," RFC 3235, January 2002 ( <a href="#">TXT</a> ).
[RFC3725]	Rosenberg, J., Peterson, J., Schulzrinne, H., and G. Camarillo, " <a href="#">Best Current Practices for Third Party Call Control (3pcc) in the Session Initiation Protocol (SIP)</a> ," BCP 85, RFC 3725, April 2004 ( <a href="#">TXT</a> ).
[I-D.ietf-behave-rfc3489bis]	Rosenberg, J., Mahy, R., Matthews, P., and D. Wing, " <a href="#">Session Traversal Utilities for (NAT) (STUN)</a> ," draft-ietf-behave-rfc3489bis-18 (work in progress), July 2008 ( <a href="#">TXT</a> ).

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## Author's Address

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	Jonathan Rosenberg
	Cisco
	Edison, NJ
	US
Email:	<a href="mailto:jdrosen@cisco.com">jdrosen@cisco.com</a>
URI:	<a href="http://www.jdrosen.net">http://www.jdrosen.net</a>

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