

**Connection-Establishment Preconditions in the Session Initiation
Protocol (SIP)
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Abstract

This document defines the connection-establishment precondition type for the SIP preconditions framework. Connection-establishment preconditions are met when a transport connection (e.g., a TCP connection) is successfully established between two endpoints.

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1. Introduction

[RFC 3312](#) [3] defines a framework for preconditions for SIP [2], which is updated by [5]. This document defines a new precondition type for that framework: connection-establishment preconditions.

UAs (User Agents) use connection-establishment preconditions when they need to know whether a transport connection (e.g., a TCP connection) has been established successfully and is ready to carry user data.

We define the connection-establishment precondition type following the guidelines provided in [5] to extend the SIP preconditions framework.

2. Terminology

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

3. Precondition Tag

The precondition tag associated with the connection-establishment preconditions is "conn". This precondition tag is registered with the IANA in [Section 10](#).

4. Status Type

[RFC 3312](#) [3] defines two status types, end-to-end and segmented, but only the end-to-end status type applies to connection-establishment preconditions. So, connection-establishment preconditions MUST use the end-to-end status type and MUST NOT use the segmented status type.

5. Direction Tag

[RFC 3312](#) [3] defines four direction tags: none, send, recv, and sendrecv. Once a transport connection is established, they indicate in which directions the connection can carry user data. For example, a successfully-established TCP connection (i.e., in ESTABLISHED state) would have an associated direction tag of sendrecv because it can carry data in both directions.

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6. Precondition Strength

[RFC 3312](#) [3] defines optional and mandatory preconditions, but only mandatory preconditions apply to connection-establishment preconditions. So, connection-establishment preconditions MUST NOT use optional preconditions.

7. Suspending and Resuming Session Establishment

According to [5], documents defining new precondition types need to describe the behavior of UAs from the moment session establishment is suspended due to a set of preconditions until is resumed when these preconditions are met.

While session establishment is suspended due to connection-establishment preconditions, user agents SHOULD not send any user data over the media streams affected by the preconditions. Additionally, the UAS (User Agent Server) SHOULD NOT alert the called user.

Offers with connection-establishment preconditions in re-INVITES or UPDATES follow the rules given in [Section 6 of RFC 3312](#) [3].

Both user agents SHOULD continue using the old session parameters until all the mandatory preconditions are met. At that moment, the user agents can begin using the new session parameters.

8. Example

The following example uses connection-establishment preconditions. Both UAs use a radio access network that does not allow them to send any data (not even a TCP SYN) until a radio bearer has been setup for the connection. Figure 1 shows the message flow of this example (the PRACK transaction has been omitted for clarity):

```

A                                     B
|  INVITE                             |
|  a=curr:conn e2e none                |
|  a=des:conn mandatory e2e sendrecv  |
|  a=setup:holdconn                    |
|----->|
|                                     |
|  183 Session Progress                |
|  a=curr:conn e2e none                |
|  a=des:conn mandatory e2e sendrecv  |
|  a=setup:holdconn                    |
|<-----|

```

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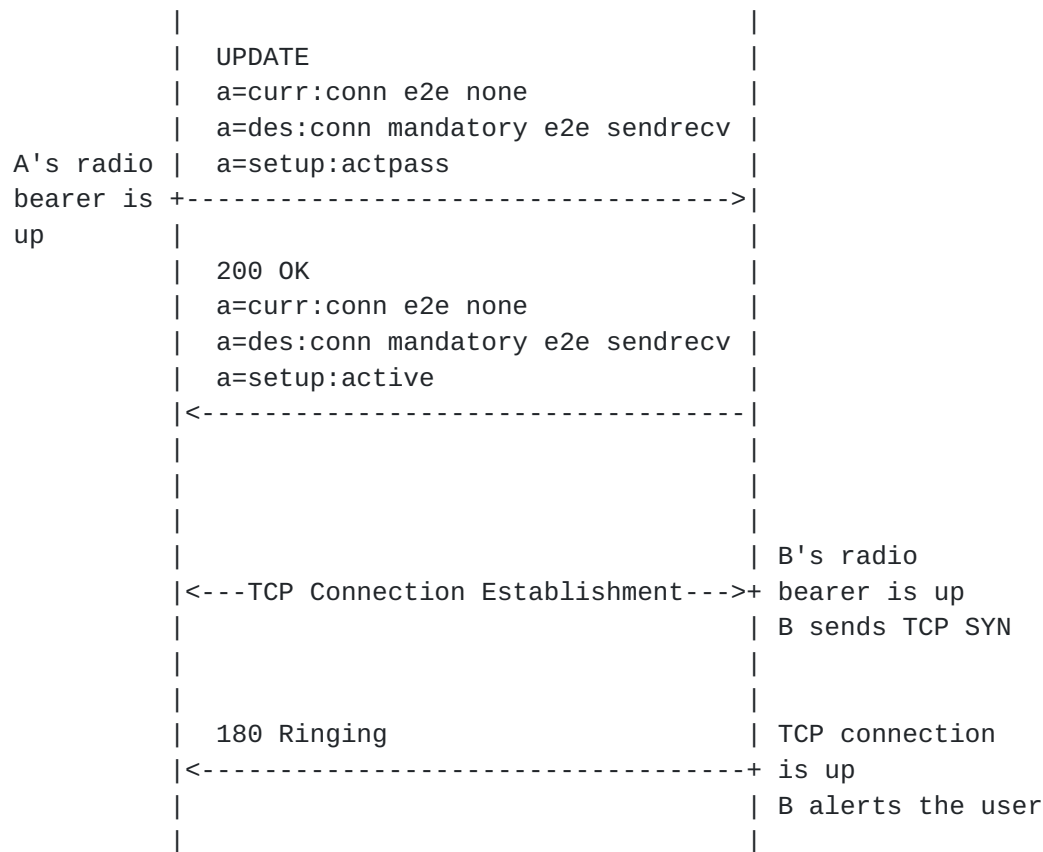


Figure 1: Message flow with two types of preconditions

A sends an INVITE requesting connection-establishment preconditions. The setup attribute in the offer is set to holdconn because A cannot send or receive any data before setting up a radio bearer for the connection.

B agrees to use connection-establishment preconditions by sending a 183 (Session Progress) response. The setup attribute in the answer is also set to holdconn because B, like A, cannot send or receive any data before setting up a radio bearer for the connection.

When A's radio bearer is ready, A sends an UPDATE to B with a setup attribute with a value of actpass. This attribute indicates that A can perform an active or a passive TCP open. A is letting B choose which endpoint will initiate the connection.

Since B's radio bearer is not ready yet, B chooses to be the one initiating the connection and indicates so with a setup attribute with a value of active. At a later point, when B's radio bearer is ready, B initiates the TCP connection towards A.

Once the TCP connection is established successfully, B alerts the

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callee and sends a 180 (Ringing) response.

9. Security Considerations

An attacker adding preconditions to a session description or modifying existing preconditions could keep sessions from being established. An attacker removing preconditions from a session description could force sessions to be established without meeting mandatory preconditions.

It is thus strongly RECOMMENDED that integrity protection be applied to the SDP session descriptions. S/MIME [4] is the natural choice to provide such end-to-end integrity protection, as described in [RFC 3261](#) [2].

10. IANA Considerations

This document defines a new precondition type: connection-establishment. It needs to be registered by the IANA under the registry for Precondition Types used with SIP.

Precondition-Type	Description	Reference
-----	-----	-----
conn	Connection-establishment preconditions	[RFCXXXX]

11 Normative References

- [1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [2] Rosenberg, J., Schulzrinne, H., Camarillo, G., Johnston, A., Peterson, J., Sparks, R., Handley, M. and E. Schooler, "SIP: Session Initiation Protocol", [RFC 3261](#), June 2002.
- [3] Camarillo, G., Marshall, W. and J. Rosenberg, "Integration of Resource Management and Session Initiation Protocol (SIP)", [RFC 3312](#), October 2002.
- [4] Peterson, J., "S/MIME Advanced Encryption Standard (AES) Requirement for the Session Initiation Protocol (SIP)", [RFC 3853](#), July 2004.
- [5] Camarillo, G., "Update to the Session Initiation Protocol (SIP) Preconditions Framework", [draft-ietf-sip-rfc3312-update-03](#) (work in progress), September 2004.

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Author's Address

Gonzalo Camarillo
Ericsson
Hirsalantie 11
Jorvas 02420
Finland

EMail: Gonzalo.Camarillo@ericsson.com

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