Token Binding for Transport Layer Security (TLS) Version 1.3 Connections
draft-ietf-tokbind-tls13-03

Abstract

Negotiation of the Token Binding protocol is only defined for Transport Layer Security (TLS) versions 1.2 and earlier. Token Binding users may wish to use it with TLS 1.3; this document defines a backwards compatible way to negotiate Token Binding on TLS 1.3 connections.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at https://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on October 18, 2019.

Copyright Notice

Copyright (c) 2019 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to BCP 78 and the IETF Trust’s Legal Provisions Relating to IETF Documents (https://trustee.ietf.org/license-info) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document. Code Components extracted from this document must include Simplified BSD License text as described in Section 4.e of
1. Introduction

Negotiating Token Binding using a TLS [RFC8446] extension as described in [RFC8472] is fairly straightforward, but is restricted to TLS 1.2 and earlier. Only one minor change is needed to use this extension to negotiate Token Binding on connections using TLS 1.3 and later. Instead of the server putting the "token_binding" extension in the ServerHello like in TLS 1.2, in TLS 1.3 the server puts it in EncryptedExtensions instead.

This document also non-normatively provides a clarification for the definition of the TokenBinding.signature field from [RFC8471], since TLS 1.3 defines an alternate (but API-compatible) exporter mechanism to the one in [RFC5705] used in [RFC8471].

1.1. Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

2. Token Binding TLS Extension

In TLS 1.3, the "token_binding" TLS extension may be present only in ClientHello and EncryptedExtensions handshake messages. The format of the "token_binding" TLS extension remains the same as defined in [RFC8472].

A client puts the "token_binding" TLS extension in its ClientHello to indicate its support for the Token Binding protocol. The client should follow the same rules for when to send this extension and the contents of its data as in section 2 of [RFC8472]. Since the "token_binding" extension remains unchanged from TLS 1.2 to TLS 1.3 in the ClientHello, a client sending the "token_binding" extension in a TLS 1.3 ClientHello is backwards compatible with a server that only supports TLS 1.2.

A server puts the "token_binding" TLS extension in the EncryptedExtensions message following its ServerHello to indicate support for the Token Binding protocol and to select protocol version and key parameters. The server includes the extension following the same rules as section 3 of [RFC8472], with the following changes:
The "token_binding" TLS extension is in EncryptedExtensions instead of ServerHello.

The server MUST NOT include both the "token_binding" extension and the "early_data" extension on the same connection.

3. Interaction with 0-RTT Data

[RFC8446] requires that extensions define their interaction with 0-RTT. The "token_binding" extension MUST NOT be used with 0-RTT unless otherwise specified in another draft. A client MAY include both "early_data" and "token_binding" extensions in its ClientHello - this indicates that the client is willing to resume a connection and send early data (without Token Binding), or negotiate Token Binding on the connection and have early data rejected.

4. Clarification of TokenBinding.signature

This non-normative section provides a clarification on the definition of the TokenBinding.signature field when used on a TLS 1.3 connection.

The Token Binding protocol [RFC8471] defines the TokenBinding.signature field in terms of an exported keying material (EKM) value as defined in [RFC5705]. TLS 1.3 [RFC8446] provides an equivalent interface in section 7.5. For clarity, using the terminology from [RFC8446], the EKM used in section 3.3 of [RFC8471] in TLS 1.3 is the exporter value (section 7.5 of [RFC8446]) computed with the following parameters:

- Secret: exporter_master_secret.
- label: The ASCII string "EXPORTER-Token-Binding" with no terminating NUL.
- context_value: No context value is supplied.
- key_length: 32 bytes.

These are the same input values as specified in section 3.3 of [RFC8471].

5. Security Considerations

The consideration regarding downgrade attacks in [RFC8472] still apply here: The parameters negotiated in the "token_binding" extension are protected by the TLS handshake. An active network
attacker cannot modify or remove the "token_binding" extension without also breaking the TLS connection.

This extension cannot be used with 0-RTT data, so the concerns in [RFC8446] about replay do not apply here.

6. References

6.1. Normative References


6.2. Informative References


Author’s Address

Nick Harper
Google Inc.

Email: nharper@google.com