Channel Bindings for TLS 1.3

Abstract

This document defines a channel binding type, tls-exporter, that is compatible with TLS 1.3 in accordance with RFC 5056, On Channel Binding. Furthermore it updates the "default" channel binding to the new binding for versions of TLS greater than 1.2. This document updates RFC5801, RFC5802, RFC5929, and RFC8446.

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 4 April 2022.

Copyright Notice

Copyright (c) 2021 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
1. Introduction

The "unique" channel binding types defined in [RFC5929] were found to be vulnerable to the "triple handshake vulnerability" [TRIPLE-HANDSHAKE] without the extended master secret extension defined in [RFC7627]. While TLS 1.3 uses a complete transcript hash akin to the extended master secret procedures, the safety of channel bindings with TLS 1.3 was not analyzed as part of the core protocol work, and so the specification of channel bindings for TLS 1.3 was deferred. [RFC8446] section C.5 notes the lack of channel bindings for TLS 1.3; as this document defines such channel bindings, it updates [RFC8446] to note that this gap has been filled. Furthermore, this document updates [RFC5929] by adding an additional unique channel binding type that replaces some usage of "tls-unique".

1.1. Conventions and Terminology

Throughout this document the acronym "EKM" is used to refer to Exported Keying Material as defined in [RFC5705].

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. The 'tls-exporter' Channel Binding Type

Channel binding mechanisms are not useful until TLS implementations expose the required data. To facilitate this, "tls-exporter" uses exported keying material (EKM) which is already widely exposed by TLS implementations. The EKM is obtained using the keying material
exporters for TLS as defined in [RFC5705] and [RFC8446] section 7.5 by supplying the following inputs:

**Label:** The ASCII string "EXPORTER-Channel-Binding" with no terminating NUL.

**Context value:** Empty context value.

**Length:** 32 bytes.

SCRAM [RFC5802] and GSS-API over SASL [RFC5801] define "tls-unique" as the default channel binding to use over TLS. As "tls-unique" is not defined for TLS 1.3 (and greater), this document updates [RFC5801] and [RFC5802] to use "tls-exporter" as the default channel binding over TLS 1.3 (and greater).

3. Security Considerations

The channel binding type defined in this document is constructed so that disclosure of the channel binding data does not leak secret information about the TLS channel and does not affect the security of the TLS channel. Implementations MUST NOT use the channel binding to protect secret information.

The Security Considerations sections of [RFC5056], [RFC5705], and [RFC8446] apply to this document.

3.1. Use with Legacy TLS

While it is possible to use this channel binding mechanism with TLS versions below 1.3, extra precaution must be taken to ensure that the chosen cipher suites always result in unique master secrets. For more information see [RFC7627] and the Security Considerations section of [RFC5705].

When TLS renegotiation is enabled on a connection the "tls-exporter" channel binding type is not defined for that connection and implementations MUST NOT support it.

In general, users wishing to take advantage of channel binding should upgrade to TLS 1.3 or later.

The derived data MUST NOT be used for any purpose other than channel bindings as described in [RFC5056].
4. IANA Considerations

4.1. Registration of Channel Binding Type

This document adds the following registration in the "Channel-Binding Types" registry:

**Subject:** Registration of channel binding tls-exporter

**Channel binding unique prefix:** tls-exporter

**Channel binding type:** unique

**Channel type:** TLS [RFC8446]

**Published specification:** draft-ietf-kitten-tls-channel-bindings-for-tls13-09

**Channel binding is secret:** no

**Description:** The EKM value obtained from the current TLS connection.

**Intended usage:** COMMON

**Person and email address to contact for further information:** Sam Whited <sam@samwhited.com>.

**Owner/Change controller name and email address:** IESG.

**Expert reviewer name and contact information:** IETF KITTEN or TLS WG (kitten@ietf.org or tls@ietf.org, failing that, ietf@ietf.org).

**Note:** See the published specification for advice on the applicability of this channel binding type.

4.2. Registration of Channel Binding TLS Exporter Label

This document adds the following registration in the "TLS Exporter Labels" registry:

**Value:** EXPORTER-Channel-Binding

**DTLS-OK:** Y

**Recommended:** Y

**Reference:** This document
5. References

5.1. Normative References


5.2. Informative References


[TRIPLE-HANDSHAKE]


Author's Address

Sam Whited
Atlanta, GA
United States of America

Email: sam@samwhited.com
URI: https://blog.samwhited.com/