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Updates for PCEPS

Abstract

RFC 8253 defines how to protect PCEP messages with TLS 1.2. This document updates RFC 8253 to address support requirements for TLS 1.2 and TLS 1.3 and the use of TLS 1.3's early data.

Discussion Venues

This note is to be removed before publishing as an RFC.

Discussion of this document takes place on the Path Computation Element Working Group mailing list (pce@ietf.org), which is archived at https://mailarchive.ietf.org/arch/browse/pce/.

Source for this draft and an issue tracker can be found at https://github.com/dhruvdhody/draft-dhody-pce-pceps-tls13.

Status of This Memo

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

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This Internet-Draft will expire on 14 September 2023.

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1. Introduction

[RFC8253] defines how to protect PCEP messages [RFC5440] with TLS 1.2 [RFC5246]. This document updates [RFC8253] to address support requirements for TLS 1.2 [RFC5246] and TLS 1.3 [I-D.ietf-tls-rfc8446bis] and the use of TLS 1.3's early data, which is also known as 0-RTT data. All other provisions set forth in [RFC8253] are unchanged, including connection initiation, message framing, connection closure, certificate validation, peer identity, and failure handling.

Editor's Note: The reference to [I-D.ietf-tls-rfc8446bis] could be changed to RFC 8446 incase the progress of the bis draft is slower than the progression of this document.

2. Conventions and Definitions

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.

3. Early Data

Early data (aka 0-RTT data) is a mechanism defined in TLS 1.3 [I-D.ietf-tls-rfc8446bis] that allows a client to send data ("early data") as part of the first flight of messages to a server. Note that TLS 1.3 can be used without early data as per Appendix F.5 of [I-D.ietf-tls-rfc8446bis]. In fact, early data is permitted by TLS 1.3 only when the client and server share a Pre-Shared Key (PSK), either obtained externally or via a previous handshake. The client uses the PSK to authenticate the server and to encrypt the early data.

As noted in Section 2.3 of [I-D.ietf-tls-rfc8446bis], the security properties for early data are weaker than those for subsequent TLS-protected data. In particular, early data is not forward secret, and there is no protection against the replay of early data between connections. Appendix E.5 of [I-D.ietf-tls-rfc8446bis] requires applications not use early data without a profile that defines its use. This document specifies that PCEPS implementations that support TLS 1.3 **MUST NOT** use early data.

4. Cipher Suites

Implementations **MUST** support TLS 1.2 [RFC5246] and are **REQUIRED** to support the TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 cipher suite [RFC9325].

Implementations **MAY** implement additional TLS 1.2 cipher suites that provide mutual authentication and confidentiality as required by PCEP.

Implementations **SHOULD** support TLS 1.3 [I-D.ietf-tls-rfc8446bis] and, if implemented, **MUST** prefer to negotiate TLS 1.3 over earlier versions of TLS.

Implementations that support TLS 1.3 [I-D.ietf-tls-rfc8446bis] are **REQUIRED** to support the mandatory-to-implement cipher suites listed in Section 9.1 of [I-D.ietf-tls-rfc8446bis].

Implementations that support TLS 1.3 **MAY** implement additional TLS 1.3 cipher suites that provide mutual authentication and confidentiality as required by PCEP.

PCEPS Implementations **SHOULD** follow the recommendations given in [RFC9325].

5. Security Considerations

The Security Considerations of PCEP [RFC5440], [RFC8231], [RFC8281], and [RFC8283]; TLS 1.2 [RFC5246]; TLS 1.3 [I-D.ietf-tls-rfc8446bis], and; [RFC9325] apply here as well.

The Path Computation Element (PCE) defined in [RFC4655] is an entity that is capable of computing a network path or route based on a network graph, and applying computational constraints. A Path Computation Client (PCC) may make requests to a PCE for paths to be computed. PCEP is the communication protocol between a PCC and PCE and is defined in [RFC5440]. Stateful PCE [RFC8231] specifies a set of extensions to PCEP to enable control of TE-LSPs by a PCE that retains the state of the LSPs provisioned in the network (a stateful PCE). [RFC8281] describes the setup, maintenance, and teardown of LSPs initiated by a stateful PCE without the need for local configuration on the PCC, thus allowing for a dynamic network that is centrally controlled. [RFC8283] introduces the architecture for PCE as a central controller

TLS mutual authentication is used to ensure that only authorized users and systems are able to send and receive PCEP messages. To this end, neither the PCC nor the PCE should establish a PCEPS with TLS connection with an unknown, unexpected, or incorrectly identified peer; see Section 3.5 of [RFC5440]. If deployments make use of a trusted list of Certification Authority (CA) certificates [RFC5280], then the listed CAs should only issue certificates to parties that are authorized to access the PCE. Doing otherwise will allow certificates that were issued for other purposes to be inappropriately accepted by a PCE.

6. IANA Considerations

There are no IANA considerations.

7. References

7.1. Normative References

[I-D.ietf-tls-rfc8446bis]
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7.2. Informative References

[RFC4655] Farrel, A., Vasseur, J.-P., and J. Ash, "A Path Computation Element (PCE)-Based Architecture", RFC 4655, DOI 10.17487/RFC4655, August 2006, <https://www.rfc-editor.org/rfc/rfc4655>.

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Model", RFC 8281, DOI 10.17487/RFC8281, December 2017, <https://www.rfc-editor.org/rfc/rfc8281>.

[RFC8283] Farrel, A., Ed., Zhao, Q., Ed., Li, Z., and C. Zhou, "An Architecture for Use of PCE and the PCE Communication Protocol (PCEP) in a Network with Central Control", RFC 8283, DOI 10.17487/RFC8283, December 2017, <https://www.rfc-editor.org/rfc/rfc8283>.

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