

Bootstrapping WebSockets with HTTP/3

draft-ietf-httpbis-h3-websockets-04

Abstract

The mechanism for running the WebSocket Protocol over a single stream of an HTTP/2 connection is equally applicable to HTTP/3, but the HTTP-version-specific details need to be specified. This document describes how the mechanism is adapted for HTTP/3.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in [Section 2 of RFC 7841](#)¹.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at <https://www.rfc-editor.org/info/rfc9220>².

Copyright Notice

Copyright (c) 2022 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>)³ 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 Revised BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Revised BSD License.

ERROR: User-supplied boilerplate differs from auto-generated boilerplate (inserting auto-generated); Strings differ at position 367, 1st string ends in: [[[ection 2 of RFC 7841.Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at https://www.rfc-editor.org/info/rfc9220.Copyright NoticeCopyright (c) 2022 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 Revised BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Revised BSD License.]]], 2nd string ends in: [[[ection 2 of RFC 78

¹ <https://www.rfc-editor.org/rfc/rfc7841.html#section-2>

² <https://www.rfc-editor.org/info/rfc9220>

³ <https://trustee.ietf.org/license-info>

4111 <https://www.rfc-editor.org/rfc/rfc7841.html#section-2>. Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at <https://www.rfc-editor.org/info/rfc9220> <https://www.rfc-editor.org/info/rfc9220>. Copyright Notice Copyright (c) 2022 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> <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 Revised BSD License text as described in Section 4.e of the Trust Legal Provisions and are provided without warranty as described in the Revised BSD License.]]] (at line 6)

Table of Contents

1 Introduction	4
2 Conventions and Definitions	5
3 WebSockets Upgrade over HTTP/3	6
4 Security Considerations	7
5 IANA Considerations	8
6 Normative References	9
Acknowledgments.....	10
Author's Address	11

1. Introduction

"[Bootstrapping WebSockets with HTTP/2](#)" [RFC8441] defines an extension to HTTP/2 [HTTP/2] that is also useful in HTTP/3 [HTTP/3]. This extension makes use of an HTTP/2 setting. [Appendix A.3](#) of [HTTP/3] gives some guidance on what changes (if any) are appropriate when porting settings from HTTP/2 to HTTP/3.

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 [\[RFC2119\]](#) [\[RFC8174\]](#) when, and only when, they appear in all capitals, as shown here.

3. WebSockets Upgrade over HTTP/3

[RFC8441] defines a mechanism for running the WebSocket Protocol [RFC6455] over a single stream of an HTTP/2 connection. It defines an Extended CONNECT method that specifies a new ":protocol" pseudo-header field and new semantics for the ":path" and ":authority" pseudo-header fields. It also defines a new HTTP/2 setting sent by a server to allow the client to use Extended CONNECT.

The semantics of the pseudo-header fields and setting are identical to those in HTTP/2 as defined in [RFC8441]. [Appendix A.3](#) of [HTTP/3] requires that HTTP/3 settings be registered separately for HTTP/3. The SETTINGS_ENABLE_CONNECT_PROTOCOL value is 0x08 (decimal 8), as in HTTP/2.

If a server advertises support for Extended CONNECT but receives an Extended CONNECT request with a ":protocol" value that is unknown or is not supported, the server SHOULD respond to the request with a 501 (Not Implemented) status code ([Section 15.6.2](#) of [HTTP]). A server MAY provide more information via a "problem details" response [RFC7807].

The HTTP/3 stream closure is also analogous to the TCP connection closure of [RFC6455]. Orderly TCP-level closures are represented as a FIN bit on the stream ([Section 4.4](#) of [HTTP/3]). RST exceptions are represented with a stream error ([Section 8](#) of [HTTP/3]) of type H3_REQUEST_CANCELLED ([Section 8.1](#) of [HTTP/3]).

4. Security Considerations

This document introduces no new security considerations beyond those discussed in [\[RFC8441\]](#).

5. IANA Considerations

This document registers a new setting in the "HTTP/3 Settings" registry ([Section 11.2.2](#) of [HTTP/3]).

Value: 08

Setting: SETTINGS_ENABLE_CONNECT_PROTOCOL

Name:

Default:

Status: permanent

Specification: this document

Change: RFC

Controller:

Contact: HTTP Working Group (ietf-http-wg@w3.org)

6. Normative References

- [HTTP] Fielding, R., Ed., Nottingham, M., Ed., and J. Reschke, Ed., "[HTTP Semantics](#)", [STD 97](#), RFC 9110, [DOI 10.17487/RFC9110](#), June 2022, <<https://www.rfc-editor.org/info/rfc9110>>.
- [HTTP/2] Thomson, M., Ed. and C. Benfield, Ed., "[HTTP/2](#)", RFC 9113, [DOI 10.17487/RFC9113](#), June 2022, <<https://www.rfc-editor.org/info/rfc9113>>.
- [HTTP/3] Bishop, M., Ed., "[HTTP/3](#)", RFC 9114, [DOI 10.17487/RFC9114](#), June 2022, <<https://www.rfc-editor.org/info/rfc9114>>.
- [RFC2119] Bradner, S., "[Key words for use in RFCs to Indicate Requirement Levels](#)", [BCP 14](#), RFC 2119, [DOI 10.17487/RFC2119](#), March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC6455] Fette, I. and A. Melnikov, "[The WebSocket Protocol](#)", RFC 6455, [DOI 10.17487/RFC6455](#), December 2011, <<https://www.rfc-editor.org/info/rfc6455>>.
- [RFC7807] Nottingham, M. and E. Wilde, "[Problem Details for HTTP APIs](#)", RFC 7807, [DOI 10.17487/RFC7807](#), March 2016, <<https://www.rfc-editor.org/info/rfc7807>>.
- [RFC8174] Leiba, B., "[Ambiguity of Uppercase vs Lowercase in RFC 2119 Key Words](#)", [BCP 14](#), RFC 8174, [DOI 10.17487/RFC8174](#), May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.
- [RFC8441] McManus, P., "[Bootstrapping WebSockets with HTTP/2](#)", RFC 8441, [DOI 10.17487/RFC8441](#), September 2018, <<https://www.rfc-editor.org/info/rfc8441>>.

Acknowledgments

This document had reviews and input from many contributors in the IETF HTTP and QUIC Working Groups, with substantive input from David Schinazi, Martin Thomson, Lucas Pardue, Mike Bishop, Dragana Damjanovic, Mark Nottingham, and Julian Reschke.

Author's Address

Ryan Hamilton

Google

E-Mail: rch@google.com