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W. Eddy
MTI Systems
A. Oppermann

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Transmission Control Protocol Specification
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Abstract

This document specifies the Internet's Transmission Control Protocol (TCP). TCP is an important transport layer protocol in the Internet stack, and has continuously evolved over decades of use and growth of the Internet. In this time, a number of changes have been made to TCP as it was specified in [RFC 793](#), though these are only documented in a piecemeal fashion. This document collects and brings those changes together with the protocol specification from [RFC 793](#). This document obsoletes [RFC 793](#) and several other RFCs (TODO: list actual RFCs).

Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[1](#)].

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Table of Contents

- [1.](#) Purpose and Scope [2](#)
- [2.](#) Introduction [3](#)
- [3.](#) Functional Specification [3](#)
 - [3.1.](#) Segment Format [3](#)
 - [3.2.](#) State Machine [4](#)
 - [3.3.](#) Event Processing [4](#)
- [4.](#) Changes from [RFC 793](#) [4](#)
- [5.](#) IANA Considerations [4](#)
- [6.](#) Security Considerations [5](#)
- [7.](#) References [5](#)
 - [7.1.](#) Normative References [5](#)
 - [7.2.](#) Informative References [5](#)
- Authors' Addresses [5](#)

1. Purpose and Scope

In 1983, [RFC 793](#) [2] was released, documenting the Transmission Control Protocol (TCP), and replacing earlier specifications for TCP that had been published in the past.

Since that time, TCP has been implemented many times, and has been used as a transport protocol for numerous applications on the Internet.

For several decades, [RFC 793](#) plus a number of other documents have combined to serve as the specification for TCP [3]. Over time, errata have been identified on [RFC 793](#), as well as deficiencies in security, performance, and other aspects. A number of enhancements has grown and been documented separately.

The purpose of this document is to bring together all of the IETF Standards Track changes that have been made to the TCP specification and adopt them into an update of the [RFC 793](#) protocol specification.

In addition to the protocol specification that describes the TCP segment format, generation, and processing rules that are to be implemented in code, [RFC 793](#) and other updates also contain informative and descriptive text for human readers to understand aspects of the protocol design and operation. This document does not attempt to alter or update those parts of [RFC 793](#), and is focused only on updating the normative protocol specification.

2. Introduction

[RFC 793](#) contains a discussion of the TCP design goals and provides examples of its operation, including examples of connection establishment, closing connections, and retransmitting packets to repair losses.

This document describes the functionality expected in modern implementations of TCP, and replaces the protocol specification in [RFC 793](#). It does not replicate or attempt to update the examples and other discussion in [RFC 793](#). Other documents are referenced to provide explanation of the theory of operation, rationale, and detailed discussion of design decisions. This document only focuses on the normative behavior of the protocol.

TODO: describe the subsequent structure of the document to-be (e.g. will it follow the newtcp BSD implementation?), and mention that a list of changes from [RFC 793](#) will be kept in the final section

3. Functional Specification

TODO

3.1. Segment Format

TODO

3.2. State Machine

TODO

3.3. Event Processing

TODO

4. Changes from [RFC 793](#)

TODO: Incomplete list of changes - these need to be added to and made more specific, as the document proceeds:

1. incorporate the accepted errata
2. incorporate 1122 additions
3. point to major additional docs like 1323bis and 5681
4. incorporate relevant parts of 3168 (ECN)
5. incorporate 6093 (urgent pointer)
6. incorporate 6528 (sequence number)
7. incorporate Fernando's new number-checking fixes (if past the IESG in time)
8. point to PMTUD?
9. point to 5461 (soft errors)
10. mention 5961 state machine option
11. mention 6161 (reducing TIME-WAIT)
12. incorporate 6429 (ZWP/persist)
13. incorporate 6691 (MSS)

5. IANA Considerations

This memo includes no request to IANA. Existing IANA registries for TCP parameters are sufficient.

TODO: check whether entries pointing to 793 and other documents obsoleted by this one should be updated to point to this one instead.

6. Security Considerations

TODO

7. References

7.1. Normative References

- [1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

7.2. Informative References

- [2] Postel, J., "Transmission Control Protocol", STD 7, [RFC 793](#), September 1981.
- [3] Duke, M., Braden, R., Eddy, W., Blanton, E., and A. Zimmermann, "A Roadmap for Transmission Control Protocol (TCP) Specification Documents", [draft-ietf-tcpm-tcp-rfc4614bis-00](#) (work in progress), August 2013.

Authors' Addresses

Wesley M. Eddy
MTI Systems
US

Email: wes@mti-systems.com

Andre Oppermann

Email: andre@freebsd.org

