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Negotiating the Maximum Number of MPTCP Subflows draft-boucadair-mptcp-extensions-00

Abstract

This document specifies an experimental MPTCP option that is meant to negotiate the maximum number of subflows that can be established and maintained for a given MPTCP connection. The purpose is to minimize any possible performance degradation that can be induced by a possibly large number of establishment requests for additional subflows if the remote endpoint is not appropriateley dimensioned to handle such requests.

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 <u>RFC 2119</u> [<u>RFC2119</u>].

Status of This Memo

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1. Introduction

This document specifies a MPTCP option that is meant to indicate to a remote peer the maximum number of subflows that can be established within a single MPTCP connection. If the remote peer honors the indication provided in this option, any performance degradation induced by a possibly abusive setup of additional subflows that exceed the said maximum becomes unlikely.

This document adheres to [I-D.bonaventure-mptcp-exp-option].

This option targets mainly MPTCP deployments within a single administrative domain such as those MPTCP designs meant to achieve load-balancing, for example. The use of this option contributes to the harmonization of node configuration within an administrative domain, so that an optimal number of subflows is maintained by involved nodes independently of their actual performance capabilities. This option can be used for other deployment scenarios. It is out of scope of this document to identify an exhaustive list of such scenarios. Internet-Draft

<u>1.1</u>. Experiment Goals

Experiments based upon the MPTCP option described in this document are meant to help operators refine their MPTCP design and operational procedures, by tweaking some MPTCP parameters such as the number of subflows to be associated with a given MPTCP connection. Experimenting with this MPTCP option should also help assess whether this option can be used to propagate MPTCP-related optimization parameters (derived from the number of concurrent subflows associated to each MPTCP connection) that can be configured in a node that is responsible for aggregating MPTCP connections established with upstream nodes.

2. Maximum Subflows MPTCP Option

This option follows the shared experimental format defined in [<u>I-D.bonaventure-mptcp-exp-option</u>] (see Figure 1).

0 1 2 2 4 5 6 7 0 0			0
0123450789	012345	5 6 7 8 9 0 1 2 3 4 5 6	78901
++		-++	+
Kind	Length	Subtype Flags Exp	eriment
Id. (16 bits)	ľ	Maximum Sub-Flows	

Figure 1: Option Format

The meaning of "Kind", "Length", "Subtype", and "Flags" (especially 'S' and 'U' flags) are exactly the same as defined in [I-D.bonaventure-mptcp-exp-option].

Experiment ID (to be assigned, see <u>Section 5</u>).

The "Maximum Sub-Flows" field indicates the number of maximum concurrent subflows that can be maintained by a given MPTCP endpoint for each MPTCP connection established by or with this endpoint. The value of this field MUST be strictly greater than zero.

3. Behavior

The option defined in Section 2 is used by a TCP endpoint to indicate to its corresponding peer the maximum number of subflows that it can maintain per MPTCP connection.

If two peers (T1 and T2) indicate the maximum number of concurrent subflows per connection they can maintain, then they MUST NOT

maintain more than "MIN(MAX_SUBFLOW(T1), MAX_SUBFLOW(T2))" concurrent subflows.

The absence of this option in an MPTCP control message issued by a MPTCP endpoint is an indication that this endpoint can instantiate any number of subflows per MPTCP connection.

If no maximum number of subflows is configured locally to an MPTCP endpoint, it may rely on the results of procedures such as [<u>I-D.boucadair-mptcp-connectivity-checks</u>] as a hint to determine the value to include in the "Maximum Sub-Flows" MPTCP option.

<u>4</u>. Security Considerations

MPTCP-related security considerations are documented in [<u>RFC6824</u>] and [<u>I-D.ietf-mptcp-attacks</u>].

<u>5</u>. IANA Considerations

This document requests IANA to assign an experiment ID as per [<u>I-D.bonaventure-mptcp-exp-option</u>].

<u>6</u>. Acknowledgements

твс

7. References

7.1. Normative References

- [I-D.bonaventure-mptcp-exp-option] Bonaventure, 0., Hesmans, B., and M. Boucadair, "Experimental Multipath TCP option", 1992.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", <u>BCP 14</u>, <u>RFC 2119</u>, March 1997.
- [RFC6824] Ford, A., Raiciu, C., Handley, M., and O. Bonaventure, "TCP Extensions for Multipath Operation with Multiple Addresses", <u>RFC 6824</u>, January 2013.

<u>7.2</u>. Informative References

[I-D.boucadair-mptcp-connectivity-checks] Boucadair, M. and C. Jacquenet, "MPTCP Connectivity Checks", draft-boucadair-mptcp-connectivity-checks-00 (work in progress), March 2015. [I-D.ietf-mptcp-attacks] Bagnulo, M., Paasch, C., Gont, F., Bonaventure, O., and C. Raiciu, "Analysis of MPTCP residual threats and possible fixes", <u>draft-ietf-mptcp-attacks-04</u> (work in progress), March 2015.

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