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Network Working Group  
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## TCP Options and MSS

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### Abstract

This memo discusses what value to use with the TCP MSS option.

## **1. INTRODUCTION**

There has been some confusion as to what value should be filled in the TCP MSS option when using TCP options. [RFC-879](#) [[Postel83](#)] stated:

The MSS counts only data octets in the segment, it does not count the TCP header or the IP header.

which is unclear about what to do about TCP options. [RFC-1122](#) [[Braden89](#)] attempted to clarify this in [section 4.2.2.6](#), but there still seems to be confusion.

## 2. TCP Options and MSS

The MSS value to be sent in an MSS option should be equal to the effective MTU minus the fixed IP and TCP headers. By ignoring both IP and TCP options when calculating the value for the MSS option, if there are any IP or TCP options to be sent in a packet, then the sender must decrease the size of the TCP data accordingly. The reason for this can be seen in the following table:

|                | +-----+<br>  MSS is adjusted<br>  to include options | +-----+<br>  MSS isn't adjusted<br>  to include options |         |
|----------------|--|---|---------|
| +-----+        |  |   | +-----+ |
| Sender adjusts | Packets are too                                      | Packets are the   |         |
| length for     | short  | correct length  |         |
| options        |  |   |         |
| +-----+        |  |   | +-----+ |
| Sender doesn't | Packets are the                                      | Packets are too   |         |
| adjust length  | correct length                                       | long.   |         |
| for options    |  |   |         |
| +-----+        |  |   | +-----+ |

Since the goal is to not send IP datagrams that have to be fragmented, and packets sent with the constraints in the lower right of this grid will cause IP fragmentation, the only way to guarantee that this doesn't happen is for the data sender to decrease the TCP data length by the size of the IP and TCP options. It follows then, that since the sender will be adjusting the TCP data length when sending IP and TCP options, there is no need to include the IP and TCP option lengths in the MSS value.

## 3. Security Considerations

Packets that are too long will either be fragmented or dropped. If packets are fragmented, intermediary firewalls or middle boxes may drop the fragmented packets. In either case, when packets are dropped the connection can fail; hence it is best to avoid generating fragments.

## 4. IANA Considerations

This document has no actions for IANA.



## 5. References

### Informative References

[Braden89] Braden, R., editor, "Requirements for Internet Hosts -- Communication Layers", [RFC-1122](#), October, 1989

[Postel83] Postel, J., "The TCP Maximum Segment Size and Related Topics", [RFC-879](#), ISI, November 1983.

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