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TCP Fails To Respect IPV6\_USE\_MINMTU  
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## Abstract

The IPV6\_USE\_MINMTU socket option is used to set the maximum IPv6 packet size to be used on a socket. Many implementations of TCP running over IPv6 neglect to check the IPV6\_USE\_MINMTU value when performing MSS negotiation and when constructing a TCP segment. This lead to oversized IPv6 packets being sent resulting in unintended Path Maximum Transport Unit Discovery (PMTUD) being performed and to fragmented IPv6 packets being sent.

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## [1.](#) Introduction

The IPV6\_USE\_MINMTU [[RFC3542](#)] socket option is used to set the maximum IPv6 packet size to be used on a socket. Many implementations of TCP running over IPv6 neglect to check this value when performing MSS negotiation and when constructing a TCP segment. This lead to oversized IPv6 packets being sent resulting unintended PMTUD [[RFC1191](#)] being performed and to fragmented IPv6 packets being sent.

TCP when running over IPv6 SHOULD check the state of the IPV6\_USE\_MINMTU when performing MSS negotiation. TCP implementations already use learnt PMTU and interface MTU when performing MSS negotiation.

TCP, when running over IPv6, SHOULD check the state of the IPV6\_USE\_MINMTU when calculating the segment size to send. TCP implementations already use learnt PMTU and interface MTU when performing calculating the segment size to send.

### [1.1.](#) Reserved Words

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 [[RFC2119](#)].

## [2.](#) MSS Negotiation

TCP when running over IPv6 SHOULD check the state of the IPV6\_USE\_MINMTU when performing MSS negotiation. If the value of

IPV6\_USE\_MINMTU is one (1) then the application has requested that PMTUD not be performed on the is socket and that IPv6 packets be sent at a size no greater than the network minimum MTU of 1280 bytes. This means that the TCP MSS negotiation size SHOULD be no bigger than

1220 (1280 - 40 - 20) to account for the IPv6 header and the TCP header and MAY be smaller.

If this negotiation is properly performed then PMTUD of reply traffic should not normally occur.

### 3. Segment Size Calculation

TCP when running over IPv6 SHOULD check the state of the IPV6\_USE\_MINMTU when calculating the next segment to send. If the value of IPV6\_USE\_MINMTU is one (1) then the maximum segment size SHOULD be 1220.

If the TCP layer neglects to check the value of IPV6\_USE\_MINMTU and it is one (1), the packet, when passed to the IPv6 layer, will be fragmented if the resulting packet is bigger than 1280 octets. This can result in communications failures due to intermediate nodes not passing fragmented packets.

### 4. Current Usage

The IPV6\_USE\_MINMTU and TCP are used together in DNS nameservers as TCP message streams are normally no more than a couple of IPv6 packets, there are lots of servers / clients and there are external time constraints where recovery from lost ICMPv6 PTB will fall outside of the time constraint window.

### 5. Normative References

- [RFC1191] Mogul, J. and S. Deering, "Path MTU discovery", [RFC 1191](#), DOI 10.17487/RFC1191, November 1990, <<http://www.rfc-editor.org/info/rfc1191>>.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997,

<<http://www.rfc-editor.org/info/rfc2119>>.

[RFC3542] Stevens, W., Thomas, M., Nordmark, E., and T. Jinmei,  
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