Updates to Destination Options Processing
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Abstract

This document updates the requirements for processing Destination Options in IPv6 in two ways. First, the requirement that all intermediate destinations in a Routing header must process options in a Destination header appearing before the Routing header is relaxed. Secondly, the processing of a Destination Option marked as changeable is clarified.

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1 Introduction

[RFC8200] specifies the Destination Options header and processing requirements. Two requirements for processing Destination Options are described based on their association with a Routing header. A Destination Options header that is in a packet with no Routing header, or follows a Routing header, is processed only by the final destination node (if no routing header is present that is simply the destination of the packet). A Destination Options header that comes before a Routing header must be processed by each intermediate destination listed in a Routing header. In the first case, Destination Options are only processed by one node, but in the latter they may need to be processed by many intermediate nodes. This distinction motivates a couple of clarifications to the requirements.

In that case of Destination Options that come before a Routing header, this document proposes that intermediate destination nodes may ignore the options. This change has a similar justification for relaxing the requirement that all intermediate nodes process Hop-by-Hop options in [RFC8200]. Intermediate destination nodes may be closer in taxonomy to switches and routers than end hosts, so it follows that they may have similar processing constraints in efficiently processing extension headers and TLVs. Those constraints could lead to similar ad hoc implementation behaviors for processing packets with options. Some implementations have dropped packets with options, others have relegated them to slow path processing; in either case, these behaviors at even a few nodes can essentially render options unusable. Allowing intermediate nodes to ignore options retains the primary value and usability of Destination Options. Intermediate nodes that are not interested in them can ignore them, nodes that fully support them can process them.

Destination Options may be marked as changeable (the third-highest-order bit of the Option Type for the Destination Option is set). Per [RFC8200], for such a marked option its Option Data may be changed en route. [RFC8200] also states that with the exception of Hop-by-Hop options, extension headers are not processed except by a destination. It follows that the only possible case that a Destination Option may be modified en route is when an intermediate destination in a Routing header modifies it. This document clarifies that.

2 Processing Requirements of Destination Options

Options in a Destination Options header that is after a Routing header, or are in a packet with no Routing header present, MUST be examined and processed by the destination node.

The options in a Destination Options header that appears before a
Routing header MAY be examined or processed by intermediate nodes listed in the routing header, including the original destination as well as the ultimate destination provided in the routing header. If an intermediate node does not process the options in a Destination Option header appearing before a Routing header, then it MUST skip over the Destination Options header and continue to process the next header which should be a Routing header.

3 Changeable Destination Options

If a Destination Option in a Destination Options header that appears before a Routing header is marked as changeable (the third-highest order bit of the option type is set), then the Option Data may be changed by an intermediate destination node en route to the final destination. Specifically, the node for the initial destination address as well as any intermediate node listed in the Routing header may change the Option Data.

If a Destination Option is marked to be changeable (the third-highest order bit of the option type is set) and is in a Destination Options header that follows a Routing header, or there is no Routing header present, then the Option Data cannot be changed en route. There are no nodes in the path that are permitted to change the Option Data.

Note that the requirement when an Authentication header is present that the entire Option Data field must be treated as zero-valued octets when computing or verifying the packet’s authenticating value is still applicable.

4 Security Considerations

Relaxing the requirement that Destination Options can be ignored by intermediate nodes should not pose any new security risk. It should be noted that any security mechanism specified in a Destination Option should take into account that not all intermediate destinations would necessarily process the security option.

5 IANA Considerations

There are no IANA considerations in this specification.

6 References

6.1 Normative References

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