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Change Status of RFC 2675 to Historic
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Abstract

This document changes the status of RFC2675, IPv6 Jumbograms, from Proposed Standard to Historic.

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Table of Contents

1. Introduction	2
2. Conventions and Definitions	2
3. Rationale	2
4. RFCs Referencing Jumbograms	3
5. Security Considerations	4
6. IANA Considerations	4
7. References	4
7.1. Normative References	4
7.2. Informative References	4
Acknowledgments	7
Appendix B. Appendix A	7
Appendix C. Appendix B	9
Authors' Addresses	12

1. Introduction

[RFC2675] defines the IPv6 Jumbo Payload Option, which enables Jumbograms, IPv6 datagrams that carry a payload greater than 65,535 octets. Jumbograms have seen little deployment in the open Internet and there are currently no known active Internet deployments.

Note: "Jumboframe" is a commonly term that is used to describe frames that exceed 1500 bytes in length, and is different to an IPv6 Jumbo Payload Option, or Jumbogram.

When published, this document changes the status of RFC2675 to historic.

2. Conventions and Definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

3. Rationale

Jumbograms have seen little deployment, A Roadmap for Transmission Control Protocol (TCP) Specification Documents ([RFC7414]) explains some of the protocol reasons behind this:

"This document states that jumbograms are to only be used when it can be guaranteed that all receiving nodes, including each router in the end-to-end path, will support jumbograms. If even a single node that does not support jumbograms is attached to a local network, then no host on that network may use jumbograms. This explains why jumbogram use has been rare, and why this document is considered a performance optimization and not part of TCP over IPv6's basic functionality."

Over time, the IPv6 Node Requirements document series has reported on the deployment of Jumbograms, as follows:

- * RFC4294: "IPv6 Jumbograms "[RFC-2675]" MAY be supported."
- * RFC6434: "To date, few implementations exist, and there is essentially no reported experience from usage."
- * RFC8504: "Removed Jumbograms (RFC 2675) as they aren't deployed."

This document removes support for Jumbograms, and therefore paves the way for the removal of their support from operating system stacks. This also removes the need for testing Jumbogram support, which otherwise require links with a MTU greater than 65,535 bytes, making testing of implementations impractical without significant effort.

4. RFCs Referencing Jumbograms

This section summarises document in the RFC series that mention support for IPv6 Jumbograms.

The Jumbo option is mentioned in a set of documents:

- * Protocols that consider the larger possible sized enabled by Jumbograms, for encryption ciphers (AES [RFC3686] and [RFC4309]).
- * Protocols that are unable to support Jumbograms, due to their increased length (SRTP [RFC3711] and ROHC [RFC5225]).
- * Protocols that consider the jumbogram option field as a possible length format (IPFIX [RFC5102], IPv6 transition [RFC8468]).

TCP specifications have also referred to Jumbograms. Adding support for TCP jumbograms required modification to the Maximum Segment Size and Urgent Pointer fields to interpret a value of 65,535 as infinite. These modifications resulted in references to [RFC2675] in several TCP Documents ([RFC4614], [RFC6691], [RFC7323], [RFC7414]) and the TCP Roadmap [RFC7414], which describes the fundamental changes to TCP required to support Jumbograms.

UDP Usage Guidelines [RFC8085] refers to Jumbogram support for large unfragmentable datagrams:

"IPv6 allows the option of transmitting large packets ("jumbograms") without fragmentation when all link layers along the path support this [RFC2675]."

References also appear in documents that acknowledge the existence of the jumbo option, but do not define new mechanisms. Jumbograms are mentioned in IPv6 node requirements [RFC4294], UDP Guidelines [RFC5405] (historic), IPv6 Avian Carriers [RFC6214], IPv6 node requirements [RFC6434], DTN convergence [RFC7122].

If published, this document changes the status of RFC2675 to historic. Use of Jumbograms will no longer be specified as an IETF mechanism for use with these IETF-specified protocols.

5. Security Considerations

XXX security considerations XXX

The security considerations for in RFC2675 state: "The Jumbo Payload option and TCP/UDP jumbograms do not introduce any known new security concerns".

6. IANA Considerations

This document has no IANA actions.

7. References

7.1. Normative References

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Acknowledgments

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Appendix B. Appendix A

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This appendix provides an annotated list of text where support is mentioned within the RFC series.

Document	Status	Title	Summary
RFC3686	PS	Using Advanced Encryption Standard (AES) Counter Mode With IPsec Encapsulating Security Payload (ESP)	Considerations to cover large packets
RFC3711	PS (Updated by [RFC5506], [RFC6904])	The Secure Real-time Transport Protocol (SRTP)	(except for ipv6 "jumbograms" [RFC2675], which are not likely to be used for RTP-based multimedia traffic).
RFC3790	Informational	Survey of IPv4 Addresses in Currently Deployed IETF Internet Area Standards Track and Experimental Documents	"This document defines a IPv6 packet format and is therefore not discussed in this document."
RFC4294	Informational (Obsoleted by	IPv6 Node Requirements	"ipv6 jumbograms" [RFC-2675] MAY

	[RFC6434])		be supported."
RFC4309	PS	Using Advanced Encryption Standard (AES) CCM Mode with IPsec Encapsulating Security Payload (ESP)	Size parameters are set so they will cover Jumbograms
RFC4614	Informational (Obsoleted by [RFC7414])	A Roadmap for Transmission Control Protocol (TCP) Specification Documents	Mentions that jumbograms exist
RFC5102	PS (Obsoleted by [RFC7012])	Informational Model for IP Flow Information Experimental	Adds Jumbogram size considerations to length fields
RFC5225	PS	RObust Header Compression Version 2 (ROHCv2): Profiles for RTP, UDP, IP, ESP and UDP-Lite	Does not support Jumbograms
RFC5405	BCP (Obsoleted by [RFC8085])	Unicast UDP Usage Guidelines for Application Designers	Jumbograms exist
RFC6214	Informational	Adaptation of RFC 1149 for IPv6	
RFC6434	Informational (Obsoleted by [RFC8504])	IPv6 Node Requirements	"to date, few implementations exist, and there is essentially no reported experience from usage."
RFC6691	Informational	TCP Options and Maximum Segment Size (MSS)	Treat 65,353 value in MSS and Urgent Pointer fields as infinite
RFC7122	Experimental	Datagram Convergence Layers for the Delay- and Disruption-Tolerant	Jumbograms exist though rarely used

		Networking (DTN) Bundle Protocol and Licklider Transmission Protocol (LTP)	
RFC7323	PS	TCP Extensions for High performance	Jumbograms weaken the TCP checksum
RFC7414	Informational	A Roadmap for Transmission Control Protocol (TCP) Specification Documents	Jumbograms exist
RFC8085	BCP	UDP Usage Guidelines	Jumbograms exist
RFC8468	Informational	IPv4, IPv6, and IPv4-IPv6 Coexistence: (Updated by) dates for the IP Performance Metrics (IPPM) Framework	Length considerations
RFC8504	BCP	IPv6 Node Requirements	"removed Jumbograms (RFC 2675) as they aren't deployed."

Table 1

Appendix C. Appendix B

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Relevant quotes from PS and BCP documents that reference [RFC2675].

Using Advanced Encryption Standard (AES) Counter Mode With IPsec Encapsulating Security Payload (ESP) ([RFC3686]):

"This construction can produce enough key stream for each packet sufficient to handle any IPv6 jumbogram [JUMBO]."

"Note that ESP with 32- bit Sequence Numbers will not exceed 2^{64} blocks even if all of the packets are maximum-length IPv6 jumbograms [JUMBO]."

"A 28-bit block counter value is sufficient for the generation of a key stream to encrypt the largest possible IPv6 jumbogram [JUMBO]; however, a 32-bit field is used. This size is convenient for both hardware and software implementations."

The Secure Real-time Transport Protocol (SRTP) ([RFC3711]):

"The AES has a block size of 128 bits, so 2^{16} output blocks are sufficient to generate the 2^{23} bits of keystream needed to encrypt the largest possible RTP packet (except for IPv6 "jumbograms" '[RFC2675]', which are not likely to be used for RTP-based multimedia traffic)."

Using Advanced Encryption Standard (AES) CCM Mode with IPsec Encapsulating Security Payload (ESP) ([RFC4309]):

"L L indicates the size of the length field in octets. CCM defines values of L between 2 octets and 8 octets. This specification only supports L = 4. Implementations MUST support an L value of 4 octets, which accommodates a full Jumbogram [JUMBO]; however, the length includes all of the encrypted data, which also includes the ESP Padding, Pad Length, and Next Header fields."

"payload

The payload of the ESP packet. The payload MUST NOT be longer than 4,294,967,295 octets, which is the maximum size of a Jumbogram [JUMBO]; however, the ESP Padding, Pad Length, and Next Header fields are also part of the payload."

"This construction provides more key stream for each packet than is needed to handle any IPv6 Jumbogram [JUMBO]."

Information Model for IP Flow Information Export ([RFC5102], Obsolete):

"5.4.30. payloadLengthIPv6

Description:

This Information Element reports the value of the Payload Length field in the IPv6 header. Note that IPv6 extension headers belong to the payload. Also note that in case of a jumbo payload option the value of the Payload Length field in the IPv6 header is zero and so will be the value reported by this Information Element."

"5.7.1. ipPayloadLength

Description:

The effective length of the IP payload. For IPv4 packets, the value of this Information Element is the difference between the total length of the IPv4 packet (as reported by Information Element totalLengthIPv4) and the length of the IPv4 header (as reported by Information Element headerLengthIPv4). For IPv6, the value of the Payload Length field in the IPv6 header is reported except in the case that the value of this field is zero and that there is a valid jumbo payload option. In this case, the value of the Jumbo Payload Length field in the jumbo payload option is reported."

RObust Header Compression Version 2 (ROHCv2): Profiles for RTP, UDP, IP, ESP and UDP-Lite ([RFC5225]):

"IPv6 headers using the jumbo payload option of RFC 2675 '[RFC2675]' will not be compressible with this encoding method since the value of the payload length field does not match the length of the packet.

UDP Usage Guidelines ([RFC5405], Obsolete):

"IPv6 allows the option of transmitting large packets ("jumbograms") without fragmentation when all link layers along the path support this '[RFC2675]'."

TCP Extensions for High Performance ([RFC7323]):

"Expanding the TCP window beyond 64 KiB for IPv6 allows Jumbograms '[RFC2675]' to be used when the local network supports packets larger than 64 KiB. When larger TCP segments are used, the TCP checksum becomes weaker."

"The same technique applies to IP version 6, except in the case of IPv6 Jumbograms. When IPv6 Jumbograms are supported, [RFC2675] requires additional steps for dealing with the Urgent Pointer; these steps are described in Section 5.2 of '[RFC2675]'."

UDP Usage Guidelines [RFC8085]:

"IPv6 allows the option of transmitting large packets ("jumbograms") without fragmentation when all link layers along the path support this '[RFC2675]'."

IPv6 Node Requirements ([RFC8504]):

"Removed Jumbograms (RFC 2675) as they aren't deployed."

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