

Network Working Group
Internet-Draft
Obsoletes: [1226](#) (if approved)
Intended status: Experimental
Expires: November 19, 2020

I. Learmonth
HamBSD
May 18, 2020

Internet Protocol Encapsulation of AX.25 Frames
draft-learmonth-rfc1226-bis-00

Abstract

This document describes a method for the encapsulation of AX.25 Link Access Protocol for Amateur Packet Radio frames within IP version 4 and version 6 packets. Obsoletes [RFC1226](#).

Note

Comments are solicited and should be addressed to the author(s).

The sources for this draft are at:

<https://github.com/irl/draft-rfc1226-bis>

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of [BCP 78](#) and [BCP 79](#).

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at <https://datatracker.ietf.org/drafts/current/>.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on November 19, 2020.

Copyright Notice

Copyright (c) 2020 IETF Trust and the persons identified as the document authors. All rights reserved.

This document is subject to [BCP 78](#) and the IETF Trust's Legal Provisions Relating to IETF Documents

(<https://trustee.ietf.org/license-info>) in effect on the date of publication of this document. Please review these documents carefully, as they describe your rights and restrictions with respect to this document.

1. Introduction

This document describes a method for the encapsulation of AX.25 (the AX.25 Link Access Protocol for Amateur Packet Radio [[AX.25](#)]) frames within IP version 4 and version 6 packets. It obsoletes [[RFC1226](#)].

This document explicitly states that it applies both to Internet Protocol version 4 and version 6 and now mentions negotiation of larger frame sizes possible in AX.25 version 2.2. Additionally, it gives recommendations for DiffServ codepoint marking of the encapsulating headers based on the AX.25 frame content and provides security considerations for the use of this encapsulation method.

2. Terminology

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](#)].

3. Internet Protocol Encapsulation

Each AX.25 frame is encapsulated in one IP version 4 or version 6 datagram. For AX.25 version 2.0, the maximum frame size expected is 330 bytes and implementations MUST be prepared to handle frames of this size. Higher frame sizes can be negotiated by AX.25 version 2.2 and so this is a minimum requirement and not a limit.

HDLC framing elements (flags and zero-stuffing) are omitted, as the IP datagram adequately delimits the beginning and end of each AX.25 frame. The CRC-16-CCITT frame check sequence (normally generated by the HDLC transmission hardware) is included trailing the information field. In all other respects, AX.25 frames are encapsulated unaltered.

3.1. Priority Frames

In normal operation, the DiffServ codepoint field [[RFC2474](#)] in the encapsulating IP header SHOULD be set to best effort (BE). The exception to this is "priority frames" as specified for AX.25 version 2.2, including acknowledgement and digipeat frames, which SHOULD have the DiffServ codepoint set to AF21 [[RFC2597](#)]. A slot is reserved on the radio channel for the transmission of these frames and the use of

Learmonth

Expires November 19, 2020

[Page 2]

this codepoint will permit the frames to arrive promptly at the station for transmission.

For the avoidance of doubt: on decapsulation the AX.25 frame MUST NOT be modified regardless of the DiffServ codepoint on the received encapsulating IP header.

3.2. Automatic Packet Reporting System

As a special case, when used with the Automatic Packet Reporting System [[APRS](#)], priority frames will not occur. If a tunnel is configured as carrying APRS data, the DiffServ codepoint SHOULD by default be set to AF11 [[RFC2597](#)]. Where the "Precedence Bit" [[RR-bits](#)] is set (i.e. it is zero) in an APRS packet, the DiffServ codepoint should be set to BE. Where the "Operator Present Bit" [[RR-bits](#)] is set (i.e. it is zero), the DiffServ codepoint MAY be set to AF21 [[RFC2597](#)].

Again, for the avoidance of doubt: on decapsulation the AX.25 frame MUST NOT be modified regardless of the DiffServ codepoint on the received encapsulating IP header.

4. IANA Considerations

Protocol number 93 is assigned in [[protocol-numbers](#)] and should be updated to point to this document.

5. Security Considerations

XXX Left the hard part for last, but the basics of it:

You should use something to guarantee integrity

My advice is to use IPsec

Use ESP on the Internet, use AH on amateur radio links

Use AH if possibility that packet will go via amateur radio

Tunnels will be configured statically (can't think of other use cases) so certificates are good

Routing via IPsec is not required, transport mode suffices, tunnel mode for cases where there is NAT

6. Acknowledgements

The author would like to acknowledge the work of Brian Kantor who authored the original specification [RFC1226] that this document updates.

7. References

7.1. Normative References

- [AX.25] Tucson Amateur Packet Radio Corporation, "AX.25 Link Access Protocol for Amateur Packet Radio Version 2.2", July 1998, <<https://www.tapr.org/pdf/AX25.2.2.pdf>>.
- [protocol-numbers] IANA, "Assigned Internet Protocol Numbers", <<http://www.iana.org/assignments/protocol-numbers/protocol-numbers.xhtml>>.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.
- [RFC2474] Nichols, K., Blake, S., Baker, F., and D. Black, "Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers", [RFC 2474](#), DOI 10.17487/RFC2474, December 1998, <<https://www.rfc-editor.org/info/rfc2474>>.
- [RFC2597] Heinanen, J., Baker, F., Weiss, W., and J. Wroclawski, "Assured Forwarding PHB Group", [RFC 2597](#), DOI 10.17487/RFC2597, June 1999, <<https://www.rfc-editor.org/info/rfc2597>>.
- [RR-bits] Bruninga, B., "APRS Future Use of AX.25 SSID RR Bits", December 2012, <<http://aprs.org/aprs12/RR-bits.txt>>.

7.2. Informative References

- [APRS] Wade, I., Ed., "APRS Protocol Reference", August 2000, <<http://www.aprs.org/doc/APRS101.PDF>>.
- [RFC1226] Kantor, B., "Internet protocol encapsulation of AX.25 frames", [RFC 1226](#), DOI 10.17487/RFC1226, May 1991, <<https://www.rfc-editor.org/info/rfc1226>>.

Author's Address

Iain R. Learmonth
HamBSD

Email: irl@hambsd.org