

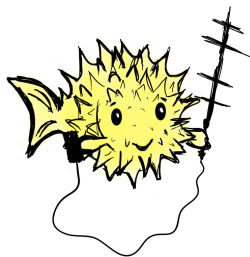
AX.25 over Internet Protocol

draft-learmonth-intarea-rfc1226-bis

Iain R. Learmonth

IETF108 Online // 27th July 2020

HamBSD



Introduction

Amateur Radio

Amateur radio, also known as ham radio, is the use of radio frequency spectrum for purposes of non-commercial exchange of messages, wireless experimentation, self-training, private recreation, radiosport, contesting, and emergency communication.

—Wikipedia. "Amateur Radio".

Introduction

Packet Radio

Packet radio is a digital radio communications mode used to send packets of data.

—Wikipedia. "Packet Radio".

Introduction

AX.25

The AX.25 (Amateur X.25) [1] protocol was derived from the X.25 data link layer protocol and adapted for amateur radio use. Every AX.25 packet includes the sender's amateur radio callsign, which satisfies the US FCC requirements for amateur radio station identification. AX.25 allows other stations to automatically repeat packets to extend the range of transmissions.

—Wikipedia. "Packet Radio".

Introduction

Physical Layers

- Bell 202 Tones over FM (AFSK)
- Bell 103 Tones over SSB (FSK)
- PSK, MFSK
- **Virtual (overlay)**

Introduction

AX.25 Applications

- AX.25 Layer 3 (BBS, Mailbox, Keyboard-to-keyboard)
- IPv4 over AX.25
- Delay Tolerant Networking
- Automatic Packet Reporting System (APRS) [6]

[\[Docs\]](#) [\[txt|pdf\]](#) [\[Tracker\]](#)

EXPERIMENTAL

Network Working Group
Request for Comments: 1226

B. Kantor
Univ. of Calif San Diego
May 1991

Internet Protocol Encapsulation of AX.25 Frames

Status of this Memo

This memo describes a method for the encapsulation of AX.25 (the Amateur Packet-Radio Link-Layer Protocol) frames within IP packets. This technique is an Experimental Protocol for the Internet community. Discussion and suggestions for improvement are requested. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

AX.25 over IP

Quality of Service (DiffServ)

This update adds recommendations for DiffServ Codepoint [5] values for the encapsulating IP headers for both AX.25 and APRS frames.

AX.25:

Frame Type	DSCP
Regular	BE
Priority	AF21

APRS:

Frame Type	DSCP
Regular	AF11
Low Precedence	BE
Operator Present	AF21

AX.25 over IP

Security Considerations

- Integrity check is included in original protocol
- There's a need for authenticity guarantee
- Encryption is forbidden on the amateur radio service
- tl;dr use IPSec with ESP [4] and NULL encryption [2]





AX.25 over IP

Questions, Comments, Feedback and Answers

??????

<https://datatracker.ietf.org/doc/draft-learmonth-intarea-rfc1226-bis/>

References I

-  William A Beech, Douglas E Nielsen, Jack Taylor, and Lee Knoper.
Ax.25 link access protocol for amateur packet radio version 2.2, 1997.
<https://www.tapr.org/pdf/AX25.2.2.pdf>.
-  R. Glenn and S. Kent.
The NULL Encryption Algorithm and Its Use With IPsec.
RFC 2410 (Proposed Standard), November 1998.
-  B. Kantor.
Internet protocol encapsulation of AX.25 frames.
RFC 1226 (Experimental), May 1991.
-  S. Kent.
IP Encapsulating Security Payload (ESP).
RFC 4303 (Proposed Standard), December 2005.



K. Nichols, S. Blake, F. Baker, and D. Black.

Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers.

RFC 2474 (Proposed Standard), December 1998.

Updated by RFCs 3168, 3260, 8436.



APRS working group.

Aprs protocol specification version 1.0.1, 2000.

<http://www.aprs.org/doc/APRS101.PDF>.

Spare Slides

Assorted things that do AX.25

- http://www.linux-ax25.org/wiki/Main_Page
- <https://www.kenwood.com/au/com/amateur/tm-d710a/>
- <https://www.ariss.org/current-status-of-iss-stations.html>
- <https://hamsbd.org/>
- <https://github.com/ke6jjj/ka9q-unix>
- <https://scm.xan.host/patty.git/>
- <https://github.com/wb2osz/direwolf>