Network Working Group W A Simpson [DayDreamer]
Internet Draft
expires in six months August 1998

PPP with Framing Conversion
draft-ietf-pppext-conversion-01.txt

Status of this Memo

This document is an Internet-Draft. Internet Drafts are working documents of the Internet Engineering Task Force (IETF), its Areas, and its Working Groups. Note that other groups may also distribute working documents as Internet Drafts.

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 not appropriate to use Internet Drafts as reference material, or to cite them other than as a ``working draft'' or ``work in progress.''

To learn the current status of any Internet-Draft, please check the ``1id-abstracts.txt'' listing contained in the internet-drafts Shadow Directories on:

ftp.is.co.za (Africa)
nic.nordu.net (Northern Europe)
ftp.nis.garr.it (Southern Europe)
ftp.ietf.org (Eastern USA)
ftp.isi.edu (Western USA)
munnari.oz.au (Pacific Rim)

Distribution of this memo is unlimited.

Copyright Notice

Abstract

The Point-to-Point Protocol (PPP) [RFC-1661] provides a standard method for transporting multi-protocol datagrams over point-to-point links. This document describes the use of converters for bridging PPP encapsulated packets between links with different framing techniques.

1. Introduction

Some forms of bridging convert PPP encapsulated packets between different framing formats. It is the responsibility of the bridge to do all stuffing and framing conversions.

At one time, it was expected that such conversions would be relatively rare, and would only occur between asynchronous and synchronous links [RFC-1662]. Unfortunately, external converters have since appeared that bridge PPP from bit-synchronous HDLC to bit-synchronous X.25, bit-synchronous X.25 to bit-synchronous Frame Relay, bit-synchronous to octet-synchronous HDLC and Frame Relay, and that are daisy-chained together in sundry combinations.

Also, the interpretation of "high speed" has changed over time. When the PPP specifications were originally written, high speed generally began at 57.6 Kbps, and was assumed for most synchronous links. Since then, implementors have applied the [RFC-1662] low speed recommendations to link speeds of up to 622 Mbps, squeezing out the last small percentage of performance. This ambiguity has resulted in unanticipated proliferation of options.

Moreover, some implementors have interpreted the term "recognizable" to mean that the implementation merely supports negotiation of an option, although that option has no effect on the interface. This misunderstanding has resulted in undesirable interaction of options.

Furthermore, the (committee designed) multi-link specification [RFC-1990] introduced many LCP options, and the bandwidth allocation protocol(s) [RFC-2125] introduced link management complexity, that are not compatible with the conversion requirements of [RFC-1662].

This specification describes the current practices necessary for avoiding the failure modes of this ensuing cacaphony of options, and numerous interoperability problems that have been identified with bridging converters.

1.1. Terminology

In this document, the key words "MAY", "MUST, "MUST NOT", "optional", "recommended", "SHOULD", and "SHOULD NOT", are to be interpreted as described in [RFC-2119].

2. Passive Converters

A "passive" converter relies on outside PPP peers to conduct all LCP negotiation. The converter inspects any LCP Configure-Acks passing through it, and dynamically updates its configuration accordingly. For "Asynchronous to Synchronous Conversion" [RFC-1662], this technique works with only a minimum of implementation effort.

However, when more than one conversion is attempted, or when options might be legitimately negotiated by the PPP peers that are not recognized by intermediate converters, passive conversion can inexplicably fail. The link will successfully pass Link Establishment phase, but appear to be disfunctional to the user. This does not meet PPP requirements [RFC-1547].

For example, two converters might be placed back-to-back:

```
async --- converter --- sync --- converter --- async
```

The async implementations could negotiate LCP framing-related options (such as Address-and-Control-Field-Compression, FCS-Alternatives, or another vendor specific option), without any guarantee that the intervening converters can successfully receive the resulting modified frames. Because LCP is extensible, there can be no requirement that any converter recognize and interpret all current and future options.

This problem also applies to a single converter, where the "high speed" sync implementation requests "low speed" options that mimic an async implementation. But, there is no guarantee that the intervening converter will recognize the option and can successfully receive the resulting modified frames.

Therefore, the use of passive converters is deprecated. For backward compatibility, bit-synchronous and octet-synchronous implementations SHOULD respond to the LCP Async-Control-Character-Map (ACCM) Configuration Option with a Configure-Ack, but MUST NOT include the ACCM in a Configure-Request.

3. Active Converters

An "active" converter intercepts LCP configuration negotiation, while allowing other PPP traffic to pass unimpeded. The converter becomes the PPP LCP peer on each interface, examining all LCP Link Configuration packets (Configure-Request, Configure-Ack, Configure-Nak, and Configure-Reject).

Inappropriate or ineffectual options that arrive in LCP Configure-Requests (such as ACCM from synchronous links or ACFC from variable-framed links) indicate that another (passive) converter is present in the path. Separate LCP negotiation on each interface prevents these options from propagating incorrect configuration information.

However, when explicitly configured on a per option basis, an implementation MAY negotiate ineffectual options seen in a Configure-Nak, and MAY respond to such requested options with a Configure-Ack.

4. Multi-Link Conversion

Framing conversion requires that each link be paired with another single link. Multi-link negotiation is not compatible with active or passive converters.

Instead, all PPP multi-link capable devices MUST terminate all PPP traffic on each interface. That is, multi-link devices are considered routers, and MUST conform to the requirements for routers.

Security Considerations

This specification introduces no known security vulnerabilities.

Acknowledgements

Dirk Van Aken provided useful critiques of earlier versions of this document.

References

[RFC-1547] Perkins, D., "Requirements for an Internet Standard Point-to-Point Protocol", Carnegie-Mellon University, (June 1989) December 1993.

[RFC-1661] Simpson, W., Editor, "The Point-to-Point Protocol (PPP)", STD-51, DayDreamer, July 1994.

[RFC-1662] Simpson, W., Editor, "PPP in HDLC-like Framing", STD-51, DayDreamer, July 1994.

[RFC-2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP-14, Harvard University, March 1997.

Contacts

Comments about this document should be discussed on the ietf-ppp@merit.edu mailing list.

This document was reviewed by the Point-to-Point Protocol Working Group of the Internet Engineering Task Force (IETF). The working group can be contacted via the current chair:

Karl Fox
Ascend Communications
655 Metro Place South, Suite 370
Dublin, Ohio 43017

karl@Ascend.com

Questions about this document can also be directed to:

William Allen Simpson
DayDreamer
Computer Systems Consulting Services
1384 Fontaine
Madison Heights, Michigan 48071

wsimpson@UMich.edu
wsimpson@GreenDragon.com (preferred)

Full Copyright Statement