

The PPP SNA Control Protocol (SNACP)

Status of this Memo

This document specifies an Internet standards track protocol for the Internet community, and requests discussion and suggestions for improvements. Please refer to the current edition of the "Internet Official Protocol Standards" (STD 1) for the standardization state and status of this protocol. Distribution of this memo is unlimited.

Abstract

The Point-to-Point Protocol (PPP) [1] provides a standard method for transporting multi-protocol datagrams over point-to-point links. PPP defines an extensible Link Control Protocol, and proposes a family of Network Control Protocols for establishing and configuring different network-layer protocols.

This document defines the Network Control Protocols for establishing and configuring Systems Network Architecture (SNA) over PPP and SNA over LLC 802.2 over PPP.

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1. Introduction

PPP has three main components:

1. A method for encapsulating multi-protocol datagrams.
2. A Link Control Protocol (LCP) for establishing, configuring, and testing the data-link connection.
3. A family of Network Control Protocols for establishing and configuring different network-layer protocols.

In order to establish communications over a point-to-point link, each end of the PPP link must first send LCP packets to configure and test the data link. After the link has been established and optional facilities have been negotiated as needed by the LCP, PPP must send SNACP packets to choose and configure the SNA network-layer protocol. Once SNACP has reached the Opened state, SNA datagrams can be sent over the link.

The link will remain configured for communications until explicit LCP or SNACP packets close the link down, or until some external event occurs (an inactivity timer expires or network administrator intervention).

1.1. Specification of Requirements

In this document, several words are used to signify the requirements of the specification. These words are often capitalized.

- MUST** This word, or the adjective "required", means that the definition is an absolute requirement of the specification.
- MUST NOT** This phrase means that the definition is an absolute prohibition of the specification.
- SHOULD** This word, or the adjective "recommended", means that there may exist valid reasons in particular circumstances to ignore this item, but the full implications must be understood and carefully weighed before choosing a different course.
- MAY** This word, or the adjective "optional", means that this item is one of an allowed set of alternatives. An implementation which does not include this option **MUST** be prepared to interoperate with another implementation which does include the option.

1.2. Terminology

This document frequently uses the following terms:

- datagram** The unit of transmission in the network layer (such as IP). A datagram may be encapsulated in one or more packets passed to the data link layer.
- frame** The unit of transmission at the data link layer. A frame may include a header and/or a trailer, along with some number of units of data.
- packet** The basic unit of encapsulation, which is passed across the interface between the network layer and the data link layer. A packet is usually mapped to a frame; the exceptions are when data link layer fragmentation is being performed, or when multiple packets are incorporated into a single frame.
- peer** The other end of the point-to-point link.
- silently discard**
This means the implementation discards the packet without further processing. The implementation SHOULD provide the capability of logging the error, including the contents of the silently discarded packet, and SHOULD record the event in a statistics counter.
- PIU** Path information unit. A message unit consisting of a transmission header (TH) alone, or a TH followed by a basic information unit (BIU) or a BIU segment. PIU is analogous to datagram.
- TH** Transmission header. Control information, optionally followed by a basic information unit (BIU) or a BIU segment, that is created and used by path control to route message units and to control their flow within the network.
- BIU** Basic information unit. In SNA, the unit of data and control information passed between half-sessions. It consists of a request/response header (RH) followed by a request/response unit (RU).
- message unit**
In SNA, the unit of data processed by any layer; for example, a basic information unit (BIU), a path information unit (PIU), or a request/response unit (RU).

NLP Network Layer Packet. In High Performance Routing (HPR), the message unit used to carry data over the route. Network Layer Packet is analogous to datagram.

2. A PPP Network Control Protocol for SNA

The SNA Control Protocol (SNACP) is responsible for configuring, enabling, and disabling SNA on both ends of the point-to-point link. SNACP uses the same packet exchange mechanism as the Link Control Protocol (LCP). SNACP packets may not be exchanged until PPP has reached the Network-Layer Protocol phase. SNACP packets received before this phase is reached should be silently discarded.

Note that there are actually two SNA Network Control Protocols; one for SNA over LLC 802.2 and another for SNA without LLC 802.2. These SNA NCPs are negotiated separately and independently of each other.

The SNA Control Protocol is exactly the same as the Link Control Protocol [1] with the following exceptions:

Frame Modifications

The packet may utilize any modifications to the basic frame format which have been negotiated during the Link Establishment phase.

Data Link Layer Protocol Field

Exactly one SNACP packet is encapsulated in the PPP Information field, where the PPP Protocol field indicates type hex 804B (SNA over LLC 802.2) or hex 804D (SNA).

Code field

Only Codes 1 through 7 (Configure-Request, Configure-Ack, Configure-Nak, Configure-Reject, Terminate-Request, Terminate-Ack and Code-Reject) are used. Other Codes should be treated as unrecognized and should result in Code-Rejects.

Timeouts

SNACP packets may not be exchanged until PPP has reached the Network-Layer Protocol phase. An implementation should be prepared to wait for Authentication and Link Quality Determination to finish before timing out waiting for a Configure-Ack or other response. It is suggested that an implementation give up only after user intervention or a configurable amount of time.

Configuration Option Types

There are no Configuration Options for SNA or for SNA over LLC 802.2.

3. Sending SNA PIUs and NLPs.

Before any SNA packets may be communicated, PPP must reach the Network-Layer Protocol phase, and the appropriate SNA Control Protocol must reach the Opened state.

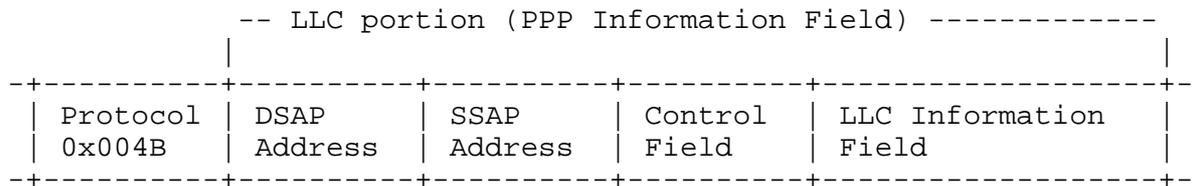
The maximum length of a SNA packet transmitted over a PPP link is the same as the maximum length of the Information field of a PPP encapsulated packet.

The format of the PPP Information field itself is the same as that defined in [1]. Detailed information on SNA and APPN can be found in [3], [4], [5], [6], and [7].

3.1. Sending SNA XID or FID2 PIUs over LLC

Exactly one SNA XID or FID2 PIU over LLC 802.2 is encapsulated in the PPP Information field, where the PPP Protocol field indicates type hex 004B (SNA over LLC 802.2).

A summary of this frame structure, beginning with the PPP Protocol field, is shown below. The fields are transmitted from left to right.

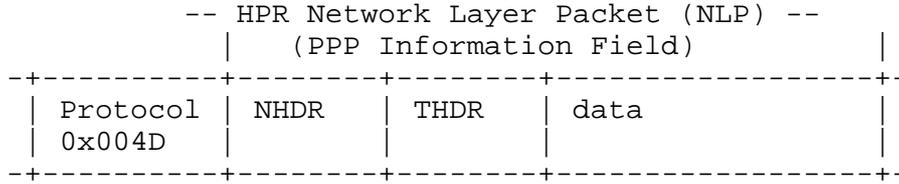


The LLC information field contains the XID or FID2 PIU. LLC(2) is included in this format for link-level error recovery. Error recovery is done by the routers at each end of the PPP link.

3.2. Sending HPR Network Layer Packets (NLPs)

Exactly one HPR Network Layer Packet (NLP) is encapsulated in the PPP Information field, where the PPP Protocol field indicates type hex 004D (SNA).

A summary of this frame structure, beginning with the PPP Protocol field, is shown below. The fields are transmitted from left to right.



3.3. Other Considerations

It is architecturally possible to transport HPR NLPs over LLC over PPP using PPP Protocol field type hex 004B (SNA over LLC 802.2) if the optional HPR link-level error recover tower is included in the implementation.

Security Considerations

Security issues are not discussed in this memo.

References

- [1] Simpson, W., "The Point-to-Point Protocol (PPP)", STD 51, RFC 1661, Daydreamer, July 1994.
- [2] Reynolds, J., and J. Postel, "Assigned Numbers", STD 2, RFC 1700, USC/Information Sciences Institute, October 1994.
- [3] "SNA Formats", GA27-3136, IBM.
- [4] "SNA APPN Architecture Reference", SC30-3422, IBM.
- [5] "APPN Architecture and Product Implementations Tutorial", GG24-3669-02, IBM.
- [6] APPN Implementers Workshop homepage, <http://www.raleigh.ibm.com/app/aiwhome.htm>
- [7] "APPN High Performance Routing (HPR) Architecture", <ftp://networking.raleigh.ibm.com/pub/standards/aiw/appn/hpr>

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Chair's Address

The working group can be contacted via the current chair:

Karl F. Fox
Ascend Communications
3518 Riverside Dr., Suite 101
Columbus, Ohio 4322

EMail: karl@ascend.com

Author's Address

Questions about this memo can also be directed to:

Andrew M. Fuqua
International Business Machines Corporation
P. O. Box 12195
Research Triangle Park, NC 27709

EMail: fuqua@vnet.ibm.com

