              The PPP Banyan Vines Control Protocol (BVCP)

Status of this Memo

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 Protocol for establishing
   and configuring the Banyan VINES protocol over PPP.

Table of Contents

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
    BVCP packets to choose and configure the VINES network-layer
    protocol. Once BVCP has reached the Opened state, VINES datagrams
    can be sent over the link.

    The link will remain configured for communications until explicit LCP
    or BVCP 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.

2. A PPP Network Control Protocol for VINES

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

   The Baynan VINES 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 BVCP packet is encapsulated in the Information field
   of a PPP Data Link Layer frame where the Protocol field indicates
   type hex 8035 (Banyan VINES Control Protocol).

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

   BVCP 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

   BVCP has a distinct set of Configuration Options.

2.1. Sending VINES Datagrams

   Before any VINES datagrams may be communicated, PPP must reach the
   Network-Layer Protocol phase, and the Banyan VINES Control Protocol
   must reach the Opened state.

   Exactly one VINES packet is encapsulated in the Information field of
   a PPP Data Link Layer frame where the Protocol field indicates type
   hex 0035 (Banyan VINES datagram). The maximum length of a VINES
   datagram transmitted over a PPP link is the same as the maximum
   length of the Information field of a PPP data link layer frame.

   The format of the Information field itself is the same as that
   defined in [2].

2.2. General Considerations

   VINES supports an Address Resolution Protocol, VINES ARP, primarily
   used for address assignment. Since this protocol is part of VINES
   IP, it is fully supported over BVCP. VINES also supports a data-link
   Echo Protocol (VINES Echo), used to test connectivity to a VINES
   Server in a LAN environment, which is not supported over BVCP.

3. BVCP Configuration Options

   BVCP Configuration Options allow modifications to the standard
   characteristics of the network-layer protocol to be negotiated. If a
   Configuration Option is not included in a Configure-Request packet,
   the default value for that Configuration Option is assumed.

   BVCP uses the same Configuration Option format defined for LCP [1],
   with a separate set of Options.

   Up-to-date values of the BVCP Option Type field are specified in the
   most recent "Assigned Numbers" RFC [3]. Current values are assigned
   as follows:

        Value   Option

          1   BV-NS-RTP-Link-Type
          2   BV-FRP
          3   BV-RTP
          4   BV-Suppress-Broadcast

   Note: A suggestion was made to combine the BV-NS-RTP-Link-Type option
   and the BV-RTP option into a single option that could negotiate one
   of four settings (S-RTP, NS-RTP-LAN, NS-RTP-WAN, NO-RTP). This
   suggestion has been rejected because VINES must already deal with a
   mix of S-RTP and NS-RTP, and that pushing this information down to
   the PPP layer is not desirable.

3.1. BV-NS-RTP-Link-Type
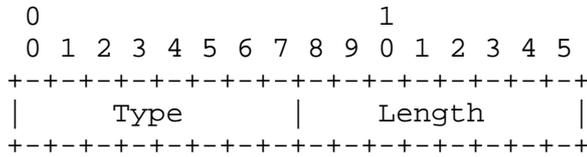
   Description

      This Configuration Option provides a way to negotiate the way the
      Non-Sequenced Routing Update Protocol (NS-RTP) (pre-VINES 5.5,
      i.e., 4.11 and 5.0) will run on the link. NS-RTP handles updates
      differently depending on whether the interface is a LAN type or a
      WAN type. For a LAN type, the full routing table is rebroadcast
      every update interval (90 seconds). For a WAN type, the full
      routing table is only transmitted for the first 3 update intervals
      after the link comes up. After that only changes are transmitted
      (for 5 update intervals). Note that this has no effect if
      Sequenced RTP (VINES 5.5) is being used. More information on this
      can be found in [2].

      This option negotiates what an implementation is willing to
      receive, and is negotiated separately per side of the PPP
      connection. The acceptance of this option (by the peer) indicates
      that the peer will send NS-RTP updates as if the link was a LAN

      type. The rejection (or absence) of this option indicates that
      the peer will send NS-RTP updates as if the link was a WAN type.

      By default, NS-RTP updates are sent as if the link was a WAN type.

   A summary of the BV-NS-RTP-Link-Type Configuration Option format is
   shown below. The fields are transmitted from left to right.

```
       0                   1
       0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
      |     Type      |    Length     |
      +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

      Type

          1

      Length

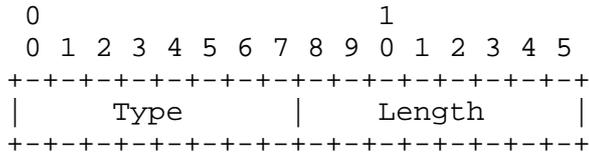   2

3.2. BV-FRP

   Description

      This Configuration Option provides a way to negotiate the use of
      VINES Fragmentation Protocol (FRP). This protocol is used to
      allow fragmentation and reassembly of a VINES packet over the
      link. FRP prepends a two octet field to every packet going over
      the link that contains a begin and end fragment information and a
      sequence number. With PPP's default MRU of 1500, FRP is not
      normally needed, and no FRP header would be sent with the VINES
      packet. If a MRU of less than 1484 is negotiated, FRP will be
      needed to send a full size VINES packet over the link. More
      information on this can be found in [2].

      This option negotiates what an implementation is willing to
      receive, and is negotiated separately per side of the PPP
      connection. The acceptance of this option (by the peer) indicates
      that the peer will send VINES packets with a FRP header. The
      rejection (or absence) of this option indicates that the peer will
      send VINES packets without a FRP header.

      By default, VINES packets are sent without a FRP header.

A summary of the BV-FRP Configuration Option format is shown below.
The fields are transmitted from left to right.

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Type

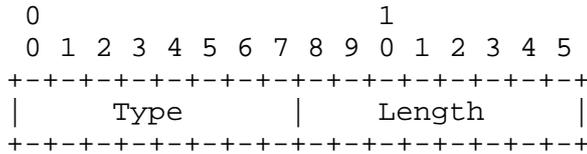   2

Length

   2

3.3. BV-RTP

Description

   This Configuration Option provides a way to negotiate whether RTP
   is used over the link. If dial-up lines with static routes are
   being used, the use of RTP may be totally suppressed to conserve
   bandwidth on the link.

   This option negotiates what an implementation is willing to
   receive, and is negotiated separately per side of the PPP
   connection. The acceptance of this option (by the peer) indicates
   that the peer will not send RTP packets. The rejection (or
   absence) of this option indicates that the peer will send any RTP
   packets.

   By default, RTP packets are sent over the link.

A summary of the BV-RTP Configuration Option format is shown below.
The fields are transmitted from left to right.

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|      Type     |     Length    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Type

    3

Length

    2

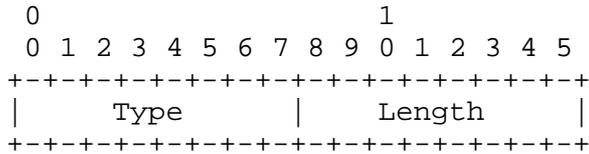## 3.4. BV-Suppress-Broadcast

Description

    This Configuration Option provides a way to negotiate the sending
    of VINES broadcast packets, i.e., packets with a destination VINES
    network address of all ones. This option only affects VINES
    packets that are not of type VINES ARP or VINES RTP. This option
    can be used by a VINES Client to request that most of the
    broadcast packets that would normally be sent to it by a VINES
    Server be discarded, in order to conserve link bandwidth. Most of
    the broadcast packets sent by a VINES Server are not useful to a
    VINES Client.

    This option negotiates what an implementation is willing to
    receive, and is negotiated separately per side of the PPP
    connection. The acceptance of this option (by the peer) indicates
    that the peer MUST NOT send any VINES broadcast packets, other
    than packets of type VINES ARP or VINES RTP. The rejection (or
    absence) of this option indicates that the peer will send all
    VINES broadcast packets.

    By default, all VINES broadcast packets are sent.

A summary of the BV-Suppress-Broadcast Configuration Option format is
shown below. The fields are transmitted from left to right.

```
 0                   1
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Type

   4

Length

   2

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] Banyan, "VINES Protocol Definition", June 1993, Order No.
       003673.

   [3] Reynolds, J., and J. Postel, "Assigned Numbers", STD 2, RFC 1700,
       USC/Information Sciences Institute, October 1994.

Acknowledgements

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