PPP Internet Protocol Control Protocol Extensions
for Route Table Entries

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Abstract

The Point-to-Point Protocol (PPP) [1] provides a standard method for transporting multi-protocol datagrams over point-to-point links. PPP defines a family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols. The PPP Internet Protocol Control Protocol (IPCP) [2] defines the NCP for establishing and configuring the Internet Protocol (IP) [3].

This document extends IPCP by defining the negotiation of IP route table entries. This extension provides added functionality but is optional and preserves compatibility.

1. Introduction
PPP is widely used by broadband service providers as the protocol of choice for connecting hosts to the Internet. PPP is popular because it is a well-known protocol that has been utilized by dial-up service providers for many years. PPP also provides per-user access control, billing, etc. These later features of PPP are the most appealing to providers. In recent years, PPP has seen two transport extensions emerge to support broadband access. These transports are PPP over Ethernet (PPPoE) [5] and PPP over AAL5 (PPPoA) [6]. With the emergence of broadband, the PPP client is migrating from the subscribers PC to the broadband customer premise equipment (CPE).

Broadband provides more bandwidth to the subscriber. Broadband service providers are wanting to utilize this additional bandwidth to provide additional services to subscribers. Service Providers, for obvious reasons, desire to isolate these additional services from standard Internet service. As stated earlier, PPP provides the per-user access control, billing, etc. This makes PPP a logical choice for providing these additional services. PPP also allows the service provider to utilize its investment in networking hardware used to provide standard Internet access.

If PPP is to be used for both Internet access and additional service access, PPP hosts (whether residing in the PC or CPE) must be able to establish multiple PPP links. The presence of multiple PPP links can complicate packet routing decisions in the host. This document proposes an extension to IPCP to address the packet routing issues induced in the presence of multiple PPP links. The extension provides the ability to add route table entries for specific PPP interfaces.

2. Conventions

The keywords MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL, when they appear in this document, are to be interpreted as described in [4].

3. Additional IPCP Configuration Option

3.1 Route-Add

Description

This configuration option defines a method for negotiating zero or more route table entries for the PPP interface on the local (client) end of the link. If the local peer supports the Route-Add option, it MUST include the Route-Add option with a length of 2 to its IPCP Configure Request. The remote (server) peer, if it supports the Route-Add option, SHOULD return the appropriate
number of Route-Add option entries in its IPCP response. If the remote peer does not wish to add any route entries to the local peer, the remote peer MUST NOT include the Route-Add option in its response. The local peer MUST accept this response as an indication that the remote peer does not wish to add any routes to the interface.

If the remote peer does not support the Route-Add option (e.g. current implementations), the remote peer MAY reject the Route-Add option. This is an indication to the local peer that the remote peer does not support the Route-Add option and IPCP negotiation MUST continue without it.

A Route-Add option entry with a Route-Address and Route-Mask of zero indicates a default route.

Any routes added via the Route-Add option MUST be deleted when the IPCP layer terminates.

A summary of the Route-Add option format is shown below. The fields are transmitted from left to right and are in network-byte order.

```
0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |        Route-Address
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Route-Address (cont)      |        Route-Mask
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Route-Mask (cont)         |        Route-Next-Hop
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Route-Next-Hop (cont)     |        Route-Metric
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Route-Metric (cont)       |        
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Type

(To be assigned by IANA)

Length

18

Route-Address

The four octet field defining the destination network or host address.
Route-Mask

The four octet field defining the subnet mask for the route. For host route entries, this field MUST be set to all one's.

Route-Next-Hop

The four octet field defining the route’s next hop. This field MAY be zero if the next hop for the route is the remote peer.

Route-Metric

The four octet field defining the metric value for the route.

Normative References


Informative References


Security Considerations

Security issues are not discussed in this memo.

IANA Considerations

Requires IPCP option number assignment for the Route-Add option.

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