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## **Accommodating an MTU of 1500 in PPPoE**

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### Abstract

Point-to-Point Protocol Over Ethernet, (PPPoE), as described in [RFC 2516](#), mandates a maximum negotiated MRU of 1492. This memo proposes relaxing that restriction to allow a maximum negotiated MRU of 1500. This can be achieved by treating the PPPoE Header and Protocol ID as part of the Ethernet Header, taking advantage of the fact that most network devices have buffers for the Ethernet Header and Payload that are at least 1522 octets in size. To aid backward compatibility, the proposal recommends testing the link with MRU-sized Echo-Request packets if an MRU greater than 1492 has been assumed or negotiated.

## 1. Description

As PPPoE [1] is increasingly becoming the protocol of choice for provisioning residential and small business Internet service, this is having the undesirable effect of reducing the effective MTU for large segments of Internet users from 1500 octets to 1492 octets.

The reduced MTU can cause problems for any equipment or software that is configured with a static MTU, in particular if the expected or default value is 1500. In addition, widespread adoption of a lower MTU reduces the overall efficiency of the Internet.

The reduction in MTU was deemed necessary because a PPPoE header requires 8 octets, and the maximum payload size of an Ethernet frame is 1500 octets.

However, many devices support variable length Ethernet headers, without compromising the 1500 octet MTU of the Ethernet Frame's payload. For example, any device that supports double-tagged VLANs, (802.1Q-in-Q), will already allow for at least 8 octets of additional data in the Ethernet header to accommodate the two VLAN tags.

Therefore, it is suggested to replace [Section 7](#), Paragraph 2 of [RFC 2516](#), which reads as follows:

"The Maximum-Receive-Unit (MRU) option MUST NOT be negotiated to a larger size than 1492. Since Ethernet has a maximum payload size of 1500 octets, the PPPoE header is 6 octets and the PPP Protocol ID is 2 octets, the PPP MTU MUST NOT be greater than 1492."

with the following:

"The Maximum-Receive-Unit (MRU) option MUST NOT be negotiated to a larger size than 1500.

Since Ethernet has a maximum payload size of 1500 octets, and the PPPoE Header plus Protocol ID is 8 octets, an MRU greater than 1492 can only be accommodated if the negotiating devices, and any intermediate devices, are capable of treating the PPPoE Header plus Protocol ID as if they were part of the Ethernet Header. In other words, they must have sufficient overhead in their Ethernet Header representations to accommodate the extra 8 octets.

Devices that are not capable of handling the extra 8 octets in their Ethernet Header SHOULD negotiate an MRU no larger than 1492. If no MRU has been specified by the receiving side, the sending side MAY assume that the receiving side is capable of handling the PPP default MRU of 1500. To ensure compatability with older equipment, if the sending side is assigning an MRU greater than 1492 to the receiving side, (either by default, or through negotiation), it is RECOMMENDED that the sending side send one or more MRU-sized Echo-Request packets

once the session is opened, to test that the receiving side and any intermediate equipment can handle the MRU. If no Echo-Replies are received, the sending side MAY choose to repeat the test with Echo-Request packets of size 1492. If these packets receive replies, the sending side MAY choose to treat the receiver as if it had explicitly specified an MRU of 1492.

If the LCP includes any 802.1Q VLAN tags, a device SHOULD negotiate an MRU no larger than 1492."

## **2. Security Considerations**

Older devices which assume that the maximum size for an Ethernet header plus its payload is less than 1522 octets might suffer buffer overflow conditions if they encounter larger frames. These devices should be retired, as most modern network devices are capable of generating larger Ethernet frames, which leaves the older devices vulnerable to attack regardless of whether PPPoE is used as the attack vector.

## **3. References**

[1] Mamakos L., Lidl K., Evarts J., Carrel D., Simone D., Wheeler R., "A Method for Transmitting PPP Over Ethernet (PPPoE)", [RFC 2516](#), February 1999

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