

# Pseudowires and Control Words

## Fixing it once and for all

**Use of Ethernet Control Word RECOMMENDED**

**draft-ietf-pals-ethernet-cw-00**

# History of the PW design

- A pseudowire is a tunnelling mechanism.
- When PWs were first deployed, some equipment of commercial significance was unable to process the Ethernet Control Word.
- At that time no Ethernet MAC address had been issued by the IEEE Registration Authority Committee (RAC) that started with 0x4 or 0x6,
- Considered safe to deploy Ethernet PWs without the CW.
- Thus the CW for an Ethernet PW is OPTIONAL in RFC4385.

# What has happened since?

- The IEEE RAC has since issued Ethernet MAC addresses starting with 0x4 or 0x6.
- Locally assigned Ethernet MAC addresses are in wide use.
- Some network elements implement more complex methods that rely on heuristics to discriminate between Ethernet PW packets and IP packets. Such mechanisms are unreliable.
- Misordering and drops of PW encapsulated packets happen too frequently in real deployments.

# Why does misordering happen?

- Payload immediately follows the label stack when control word is not in use.
- Lookup beyond the MPLS label stack based on the first nibble will result in identifying the flow based on the regular five tuple distribution scheme.
- This will break when the packet is not IP and first nibble is 0x4 or 0x6. The packet may experience traffic conditioning on whatever fields are in the same place as the five tuple elements would have been.

# How does the PW CW prevent this?

- The first nibble of the PW CW is zero.
- MPLS encapsulated payload starting with a PW CW can never be confused with an IP packet. This disambiguation was exactly what the PW CW was designed to do.
- It is a simple architectural change. However the backwards compatibility may be a more complex problem.
- FAT PWs or Entropy labels are not outlawed or deprecated by this recommendation.

# Side effects of this recommendation

- CW increases packet size by 4 octets. There are deployments where MTU size is tightly controlled and has unmovable upper bounds.
- Middleboxes that analyse transit PW traffic and are not aware of PW setup signalling will make decisions on packet format and structure based on the assumption that there is no CW at all.

# Why does it matter?

- A number of operators have raised the concern.
- The IEEE liaison raised it with the IESG.
- The fix is simple and solves the real problem.
- PWs are widely deployed.
- Platforms have evolved since initial design of PWs.

# What's next?

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- Comments and feedback welcome.
- Document is expected to progress after IETF100.
- Check your configurations for control word.