ARP-Mediation draft

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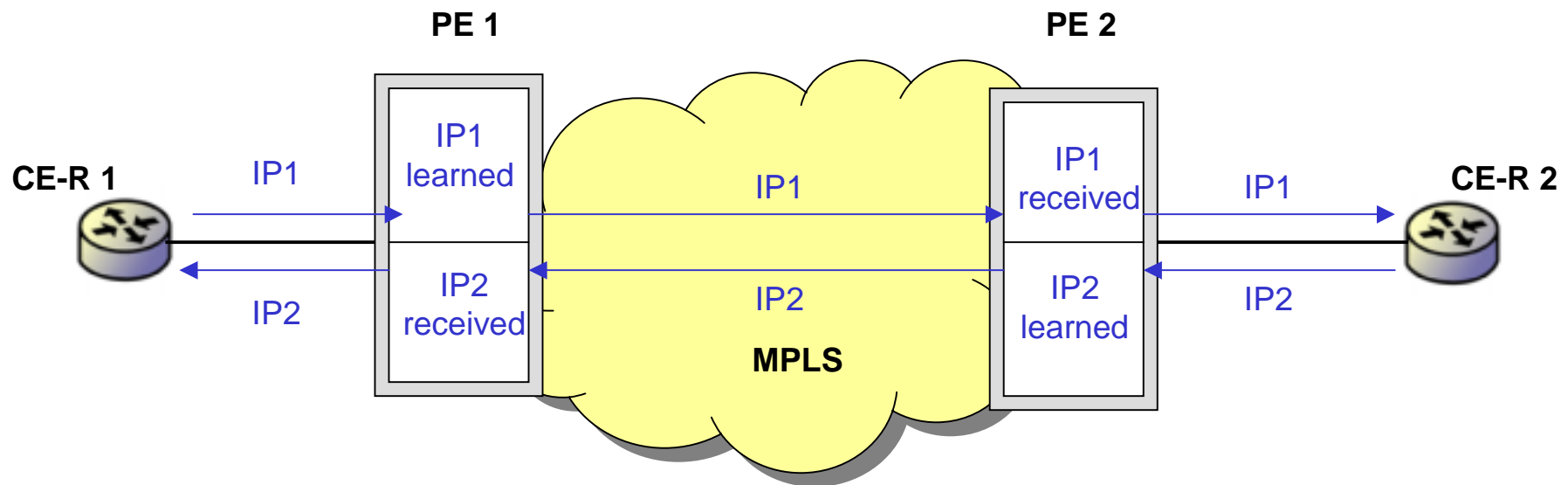|	
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Problem Scope

- VPWS for IP L2 Interworking on heterogeneous access circuits disrupts ARP mechanisms used by CE-Rs

- Requires SP operators to meddle with customer's IP address and its configuration on PE routers for VPN which is inherently Layer 2 based

Ethernet

MPLS

PE 2   Frame Relay   **CE-R 2**

CE-R 1

ARP-Request
Here is IP_1
and MAC_1.
What is the
MAC_2 for IP_2?

PE 1

In-ARP-Request
Here is IP_2 and
$DLCI_2$. What is
IP_1?
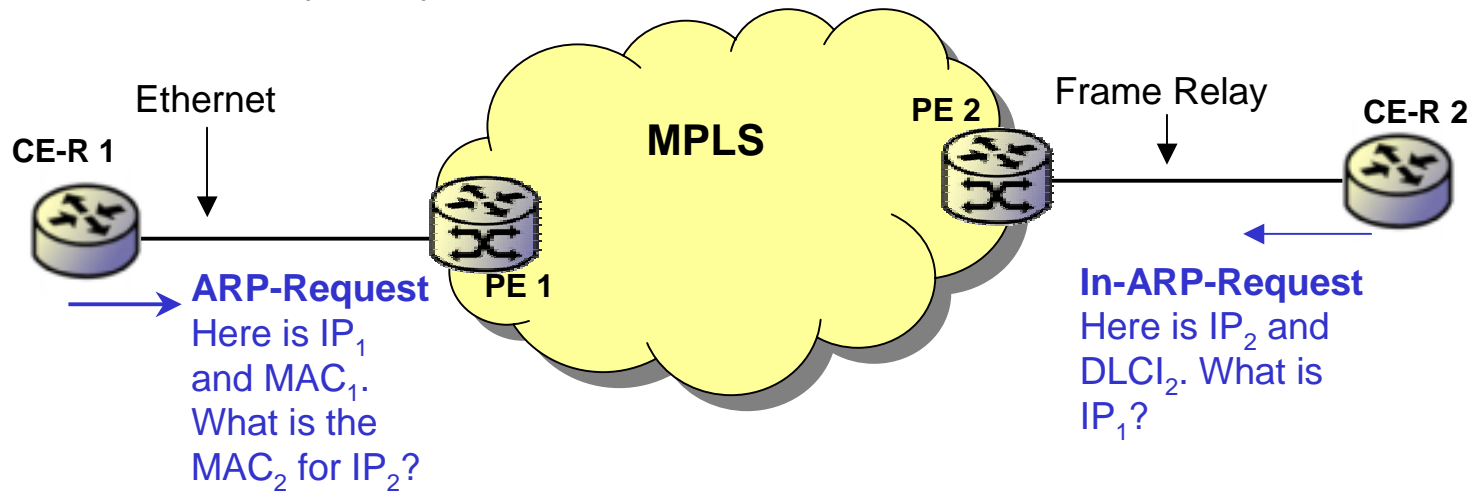
Solution

- Allow PE to 'learn' locally-attached CE-R's IP address
- Let PEs exchange the learned IP addresses for a given IP based VPW
- Have PE proxy in address resolution protocol for the remote CE

Solution

- Learn locally attached CE's IP address
  - Snoop SA from Multicast or broadcast IP router protocol packets
  - Use ICMP based router discovery - RDP
  - Glean from ARP or Inverse ARP request packet

- PEs exchange learned IP addresses
  - Martini – IP address as one of the interface parameters
  - Kompella – IP address list as TLV in L2VPN NLRI that corresponds one to one with range of labels advertised

- Proxy functions of PE – Learn IP to Physical Addr binding
  - For FR/ATM attached CE-R, PE either generate unsolicited inverse ARP request or respond to inverse ARP request with remote CE's IP address
  - For Ethernet attached CE-R, PE use remote CE's IP address and his own MAC address to either generate unsolicited ARP request or proxy ARP response to the request.

IGP issues

- Broadcast link attached CE-R cross-connected to p-to-p link attached CE-R poses problems for IGP

- OSPF – uses DR/BDR, network type in router LSA and networks LSA for broadcast links. Must configure ospfIfType as point-to-point to make it work

- ISIS uses MAC addresses in ISH. No Configuration available. Still an issue.

- RIP – works fine. No special configuration required

Summary & Recommendations

- Draft reduces configuration complexity
  - Eliminates requirement of knowing and configuring IP addresses of CE-Rs in PE when offering IP interworking for PVWS
  - Requires no changes to CE-Rs

- Draft should be adopted as work item

PE-MTU signaling

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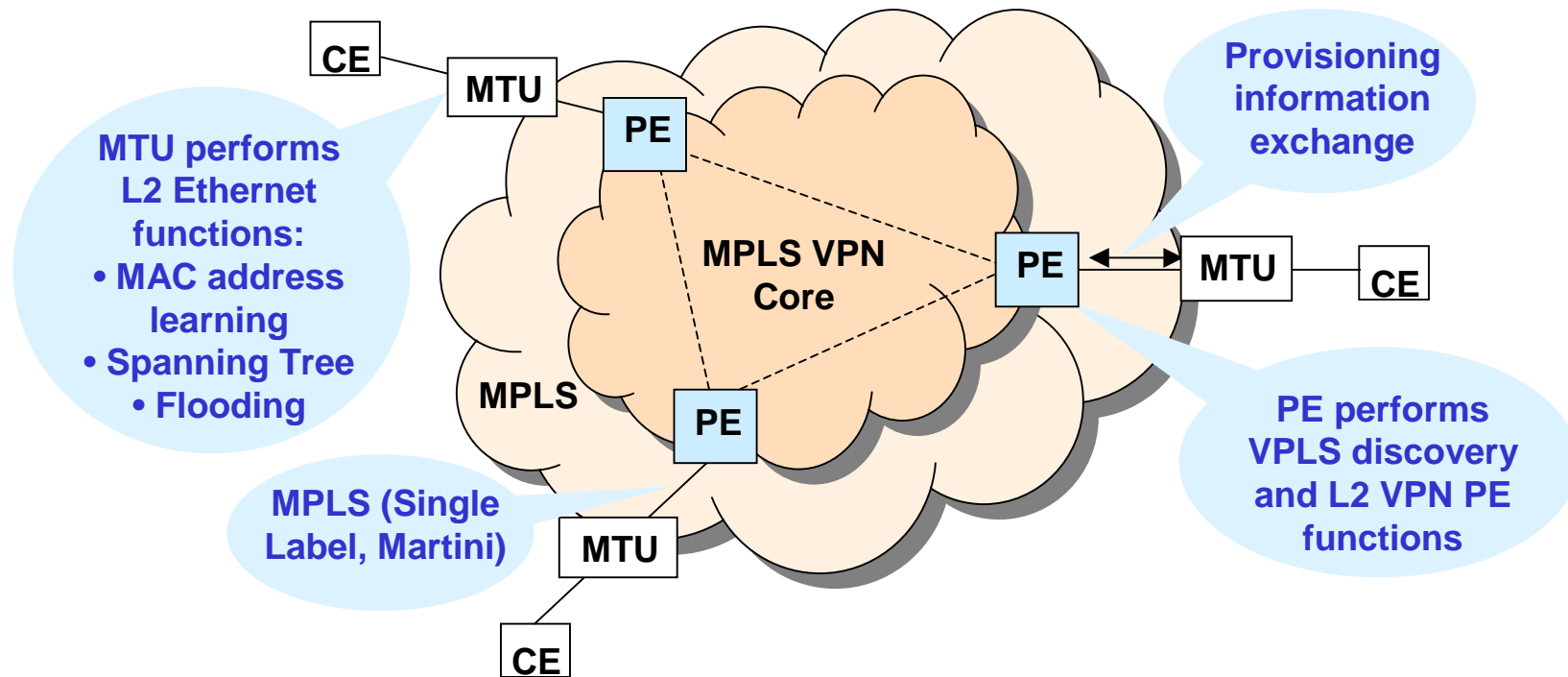
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Problem Scope & Solution

- D VPLS & H VPLS require PE <-> MTU to exchange label and configuration information
- Draft specifies details for LDP as signaling protocol

CE

MTU

PE

MTU performs L2 Ethernet functions:
- **MAC address learning**
- **Spanning Tree**
- **Flooding**

MPLS VPN Core

PE

MTU

CE

Provisioning information exchange

MPLS

PE

MPLS (Single Label, Martini)

MTU

CE

PE performs VPLS discovery and L2 VPN PE functions

Information Elements

- ## MTU FEC element to carry VPLS Id

MTU Type (8)	H(1)	Reserved(7)	Site Identifier(16)
VPLS Identifier (Most significant 4-bytes)			
VPLS Identifier (Least significant 4-bytes)			

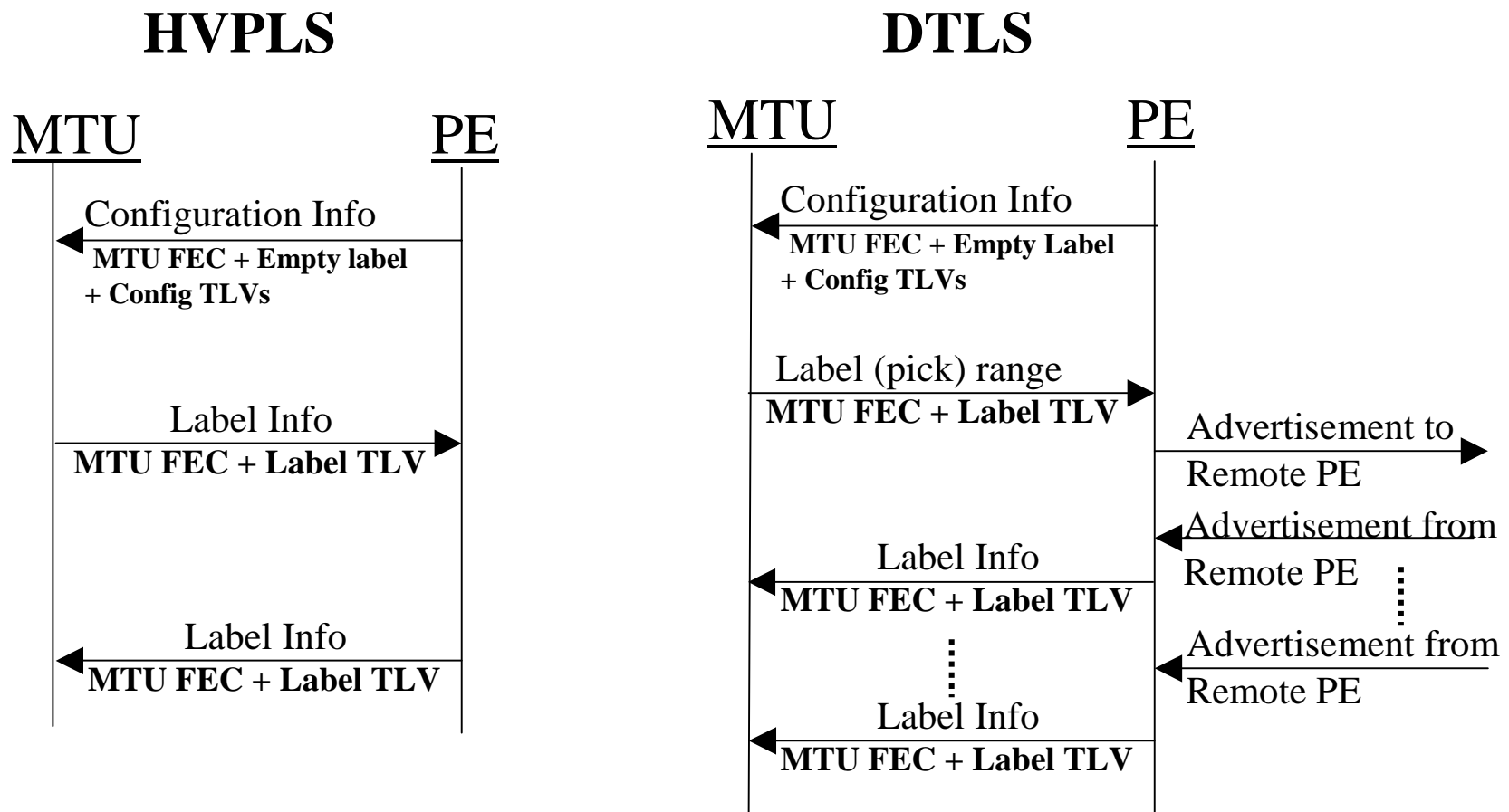- ## Label TLV to optionally contain Label range where each label denote remote site

U	F	Label Type	Length
Label Base			
Remote Site Type	Length=2		Remote Site ID Base
Label Size Type	Length=2		Label Size

Optional

Information Elements

- Configuration TLV - Hierarchical

U	F	Config Type		Length = Total		
U		Port Config Type		Length		
Reserved		MTU Unit#		MTU Slot#		MTU Card#
MTU Port#				MTU Channel#		
U	Logical Port Config Type			Length		
T	Customer Delimiting Tag (Ex. VLAN Tag)					
U	Logical Port Bandwidth Type			Length		
Bandwidth Value						
Additional Port Configuration TLVs						

Optional (Logical Port Config Type / Customer Delimiting Tag)

Optional (Logical Port Bandwidth Type / Bandwidth Value)

Information Exchange

HVPLS

MTU ———————— PE

Configuration Info
MTU FEC + Empty label + Config TLVs

Label Info
MTU FEC + Label TLV

Label Info
MTU FEC + Label TLV

DTLS

MTU ———————— PE

Configuration Info
MTU FEC + Empty Label + Config TLVs

Label (pick) range
MTU FEC + Label TLV

Advertisement to Remote PE

Advertisement from Remote PE

Label Info
MTU FEC + Label TLV

Advertisement from Remote PE

Label Info
MTU FEC + Label TLV

Operations

- MTU receive MTU FEC + Config info
  - Create a Logical Bridge instance and add interfaces into this logical bridge
  - Provide Label range to PE

- PE send/receive VPLS info from Remote PE
  - Send corresponding Labels to MTU

- MTU receive Label information from PE
  - Create logical interface for each label and add it to the logical bridge instance identified by MTU FEC
  - Start modified learning/forwarding on logical interface

Pending Issues

- DTLS uses Labels in 'bidirectional' fashion while LDP traditionally distributes two unidirectional labels. Can bidirectionality requirement be dropped from DTLS?

Conclusion

- Draft addresses important requirement for Decoupled VPLS and Hierarchical VPLS models

- Draft should be adopted as work item