VLAN-Aware Bundling for VPLS

draft-cai-l2vpn-vpls-vlan-aware-bundling-00

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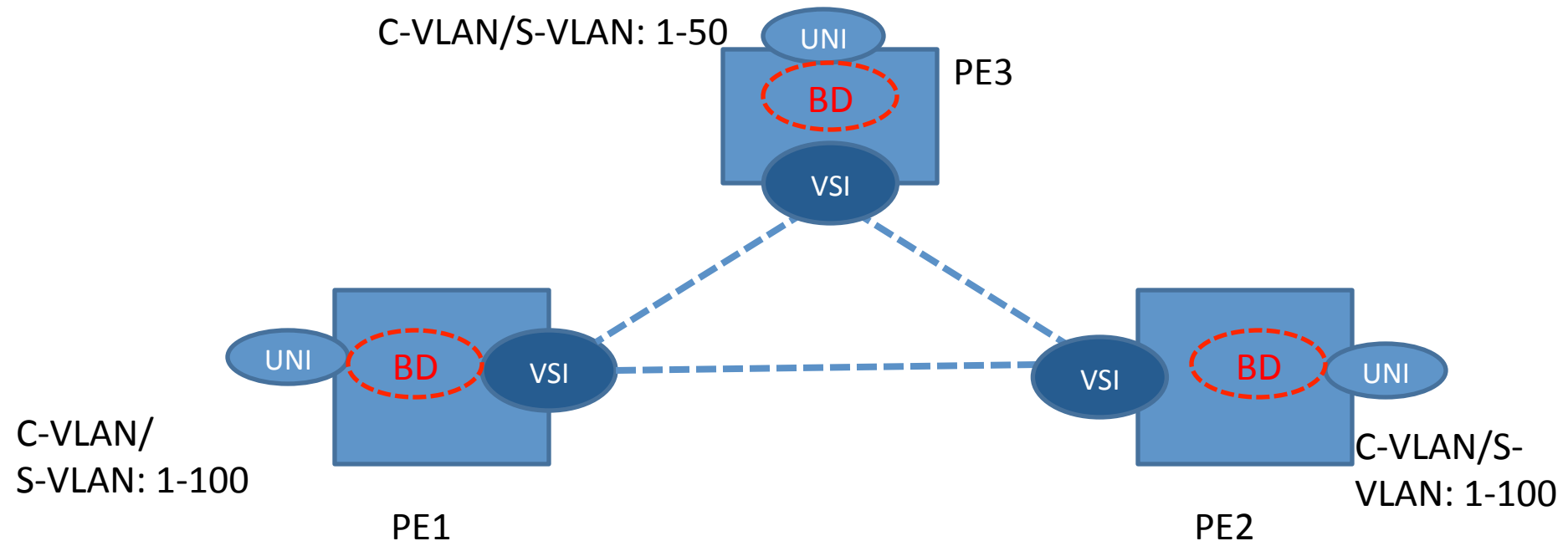Reshad Rahman (rrahman)
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A simple scenario: DC LAN Extension

- **Solution 1: VSI per each VLAN**
  → Provisioning/configuration/scale overhead

- **Solution 2: QinQ, VLANs are bundled into same VSI**
  → No VLAN separation, for example, duplicated MAC across VLANs could cause issue
  → Unnecessary packet flooding to PE3 for VLAN 51-100 (in this example)
  → Unnecessary MAC withdrawal (in the multi-homing scenario)

C-VLAN/S-VLAN: 1-50

UNI

BD PE3

VSI

C-VLAN/
S-VLAN: 1-100

UNI BD VSI

VSI BD UNI

C-VLAN/S-
VLAN: 1-100

PE1

PE2

What's the "VLAN-aware bundling"?

- C-**VLAN or S-VLAN separation**
- **"VLAN-aware" means "VLAN separation**", which means:
  - C-VLANs or S-VLANs are in different broadcast domain.
  - MAC learning/flushing is per VLAN.
- "VLAN-aware" includes both UNI and WAN side
  - UNI: "vlan-aware" bundling (or "vlan-aware" qinq).
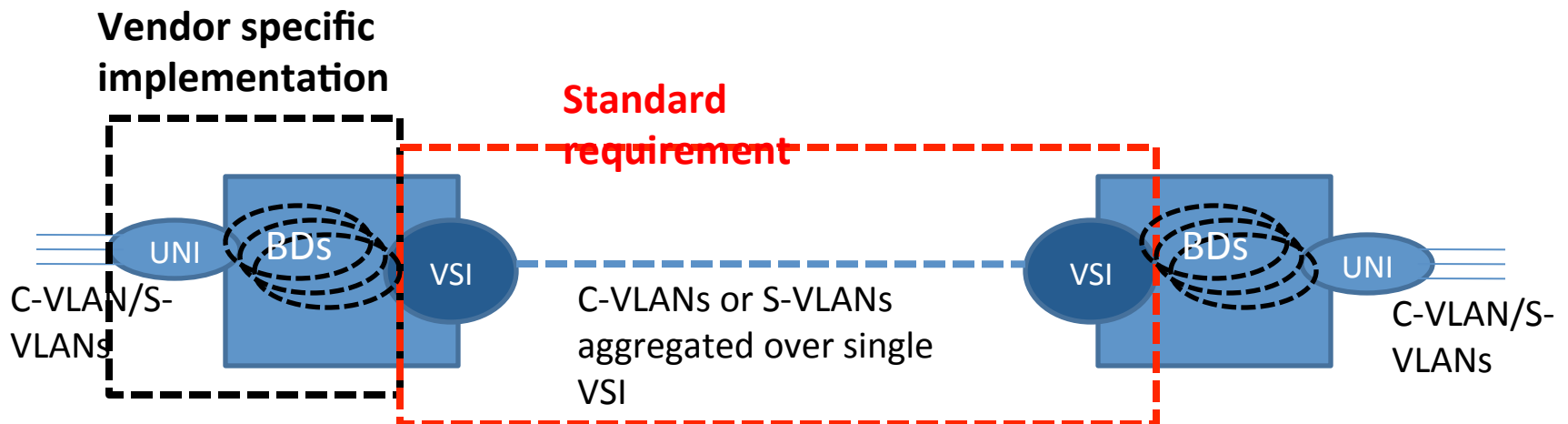 - WAN side: "vlan-aware" vpls.
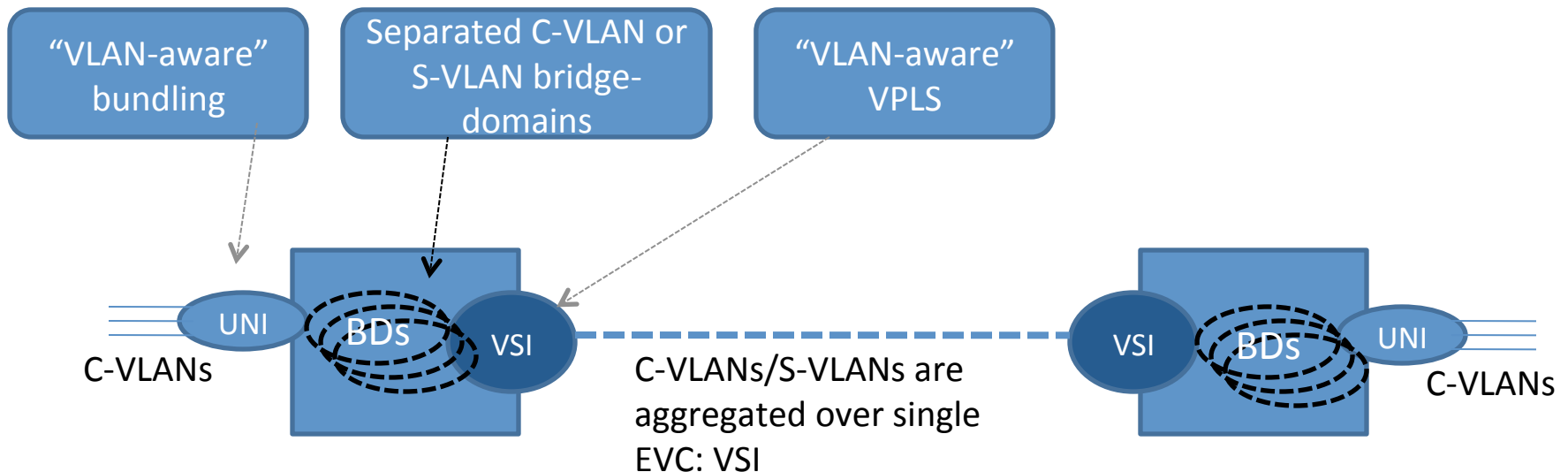
What do we gain?

- Use a simple example
  - 5 DC sites, each site has two PEs
  - 1000 VLANs

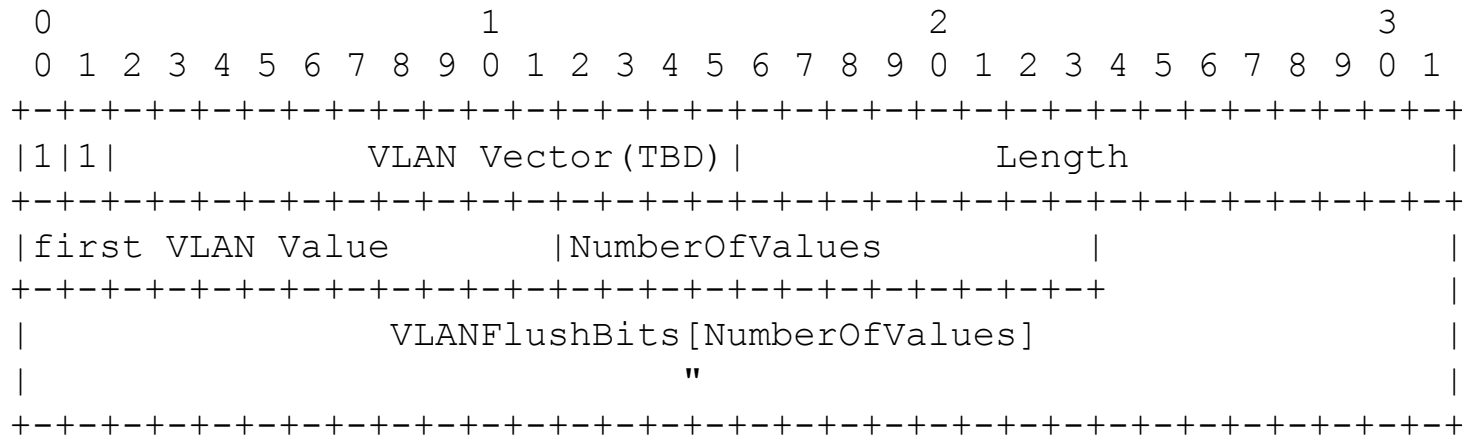| Scale per PE	Classic VPLS	VLAN-aware VPLS
VSIs	1000	1
PWs	9,000	9
ACs	1000	1
Bridge-domains	1000	1000
Lines of configuration	~ nx1000 lines, depend on the platform	~10 lines

Standard requirement

- UNI and C-VLAN/S-VLAN separation(bridge-domain)
  - Vendor specific implementation
- NNI (WAN): VPLS
  - Need inter-operation between vendors
  - The focus of this presentation

Vendor specific implementation

Standard requirement

UNI | BDs | VSI

C-VLAN/S-VLANs

C-VLANs or S-VLANs aggregated over single VSI

VSI | BDs | UNI

C-VLAN/S-VLANs

"VLAN-aware bundling" for VPLS

The PW VLAN Vector TLV is described as below

```
 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 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|1|1|         VLAN Vector(TBD)|              Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|first VLAN Value      |NumberOfValues           |           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+           |
|              VLANFlushBits[NumberOfValues]                 |
|                            "                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

A new PW VLAN vector TLV is defined.
The new PW VLAN Vector TLV will be included in:-
-LDP PW label mapping messages
-MAC flush message

Pruning Multi-destination traffic

- Flooding packet pruning
  - PE only flood the packet based on the VLAN list which it receive from peer PEs
  - IGMP/PIM snooping still works as before
- Mac withdrawal
  - MAC learning, pruning is per each customer VLAN or bridge-domain basis, not per VSI.
  - VPLS Mac withdrawal message should include the list of VLANs that need to have mac flushing on remote PEs.
  - VLAN 0 is for the wildcard.

"VLAN-aware" VPLS Operation

- VLAN translation
  - VLAN translation is a local operation.
  - After VLAN translation, the VLAN ID must have global significance among all PEs when used over the VSI PWs.

- OAM
  - Customer domain OAM will work transparently over VLAN-aware VPLS.
  - Current MPLS OAM mechanisms need to be extended to verify connectivity in the VPLS instance shared by the customer bridge-domains.

Next steps

- Comments are appreciated

Thank you