VPLS Architectures
draft-sajassi-vpls-architectures-00.txt

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Agenda

- **What's New**

- **VPLS Reference Architecture**

- **VPLS Architectures**

- **Next Step**

- # **What's New**

What's New

- **Defining a VPLS Reference Architecture in terms of its Logical Components**

- **Defining Architectures for Distributed-PE with Ethernet Edge Device**

- **Defining an Architecture for Distributed-PE with MPLS/IP Edge Device**

- **Defining an Architecture for VLAN-aware operation and furthermore for customers' overlapping VLANs**

- # **VPLS Reference Architecture**

VPLS Components

- **Logical Components for a VPLS Reference Architecture**

  1. **Attachment VCs**

  2. **Emulated VCs**

  3. **Emulated Tunnels**

  4. **Auto Discovery**

  5. **Auto Configuration**

  6. **Virtual Switch Instances**

  7. **Attachment Tunnels**

  8. **Extension VCs**

- **Components 1-5 are in common with L2VPN**

- **Components 6-8 are added for VPLS**

VPLS System – An Example

PE

VSI

CE-2

PE

VSI

Emulated VC

CE-1

Emulated Tunnel

PE   VSI

Attachment VC

CE-3
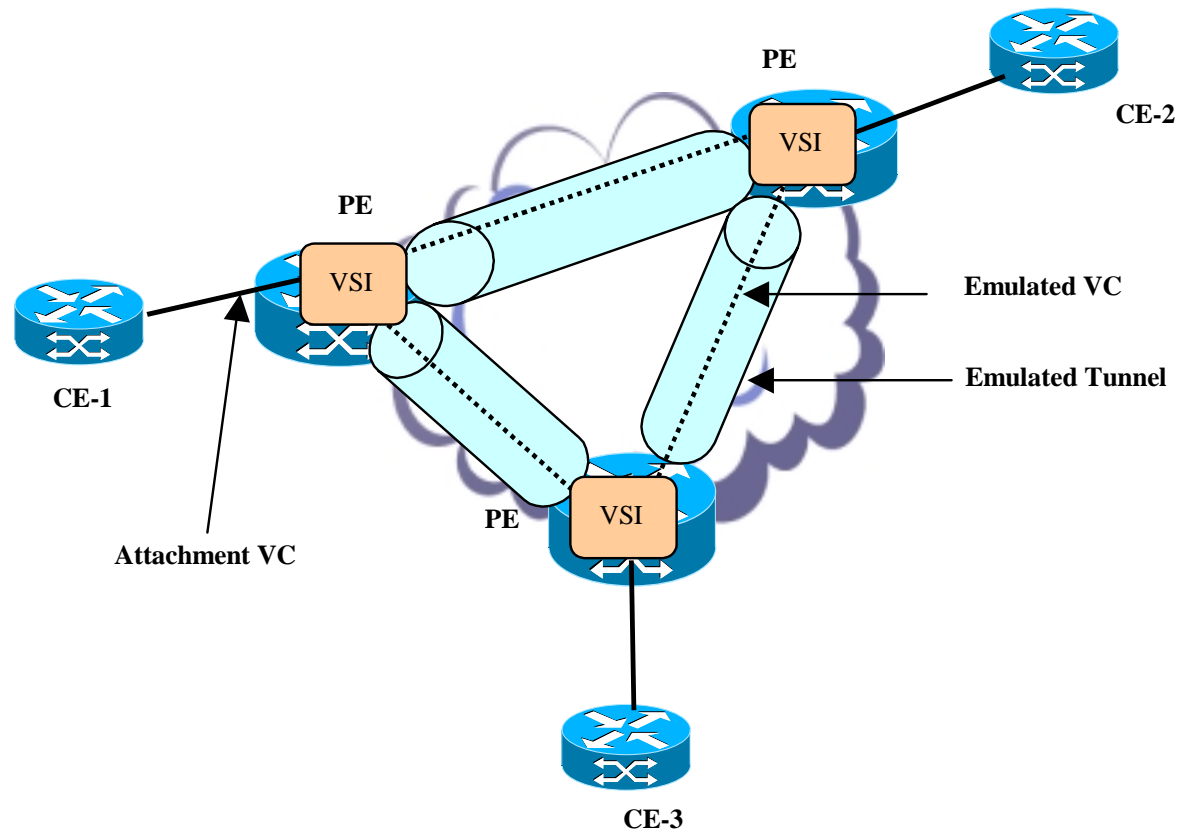
- # **VPLS Architectures**

Single-PE Architecture

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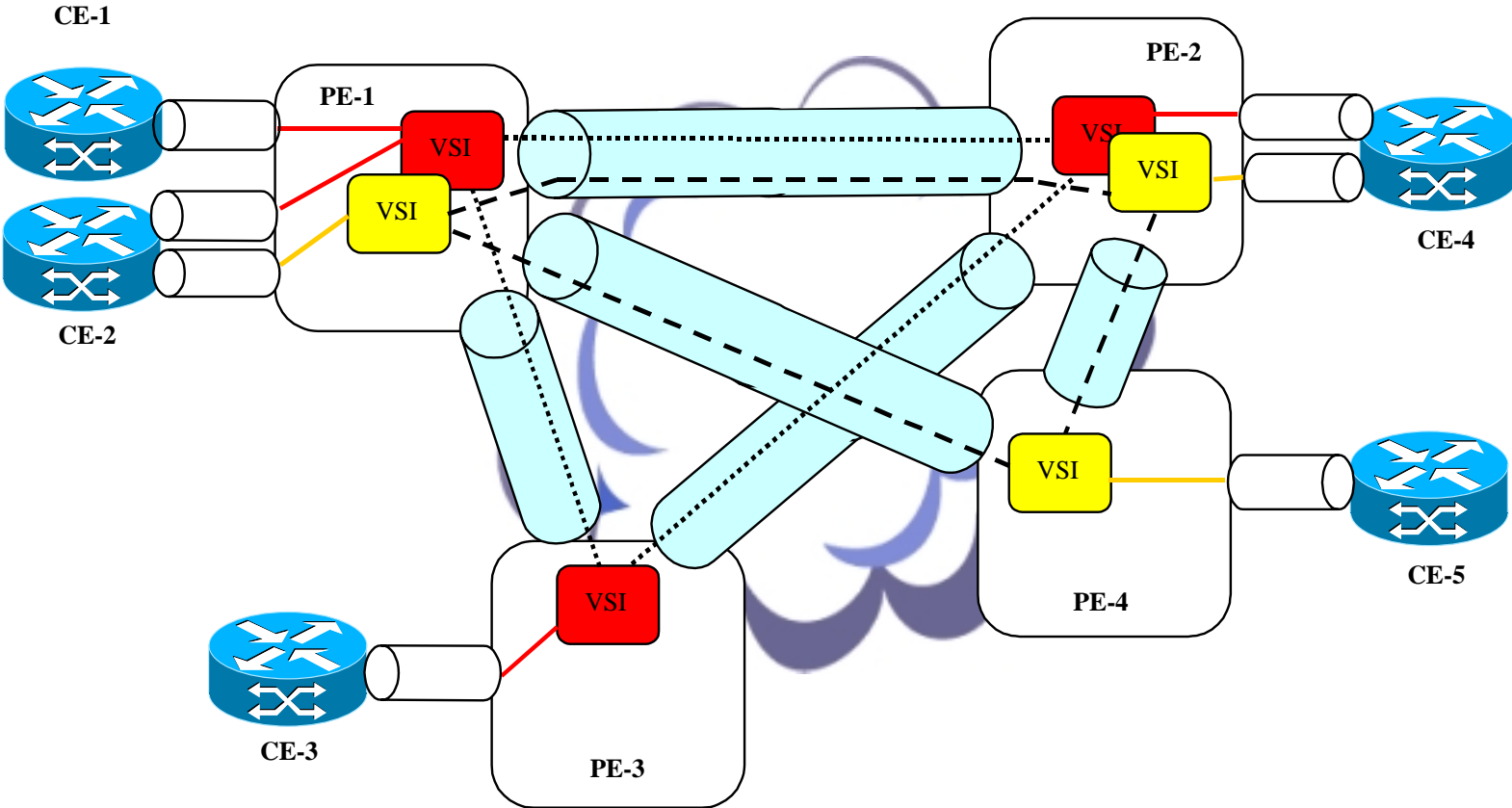
Single-PE Functions

- **Data Plane Functions**

    - Attachment VCs termination

    - Emulated VCs termination

    - Tunneling of Emulated VCs

    - Maintaining a VSI per VPLS instance (for bridging among Attachment and Emulated VCs)

Single-PE Functions – Cont.

- **Control Plane Functions**

    - Signaling of Emulated Tunnels (if needed)

    - Signaling of Emulated VCs

    - Auto-discovery of peer PEs per VPLS instance

    - Auto-configuration of a VPLS instance

# Single-PE Architecture: VLAN-aware VPLS System
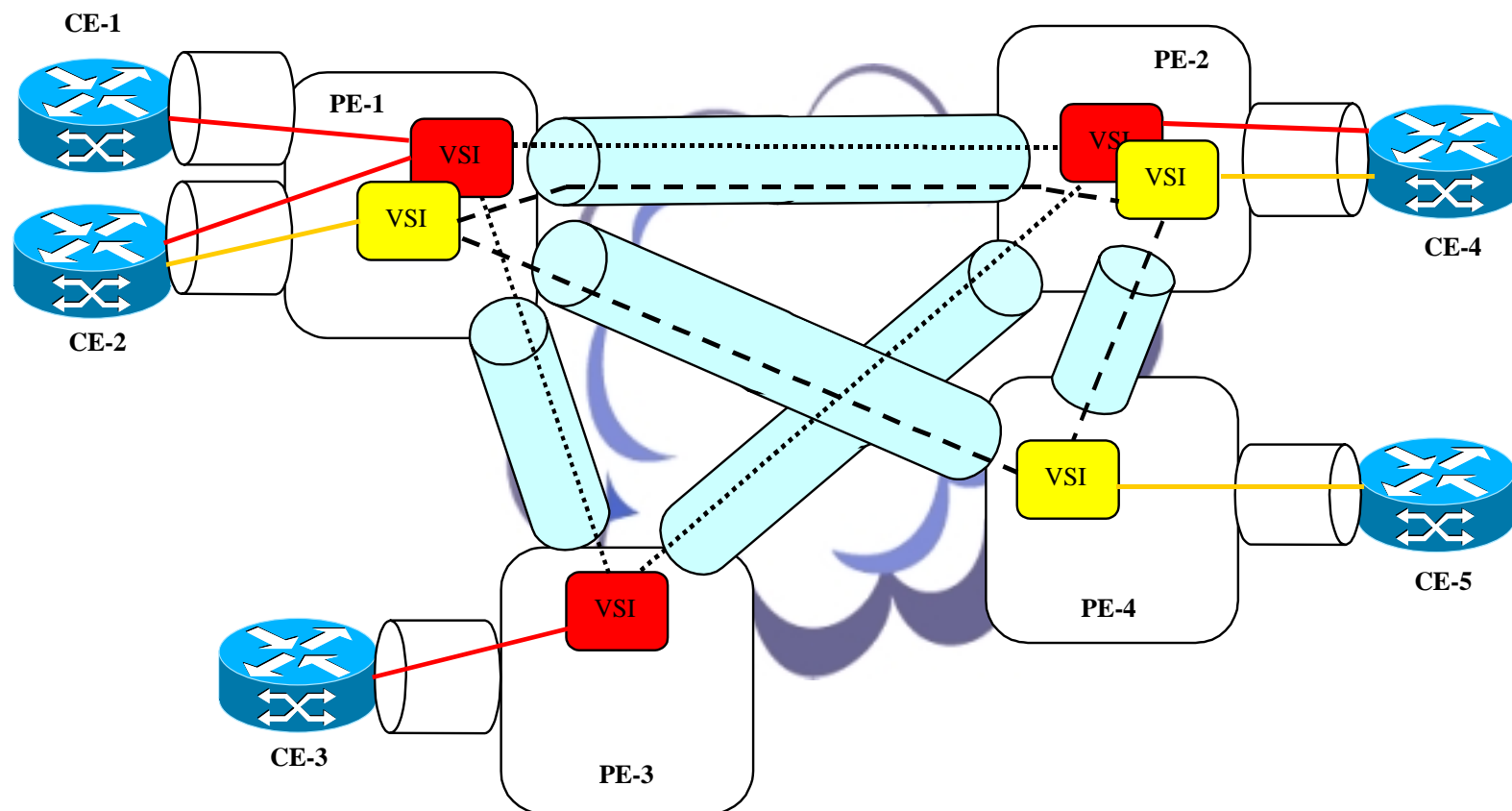
Qualified Learning

Qualified learning uses a single VPLS instance for a customer w/ several VLANs – need a protocol such as GVRP to limit the broadcast/flooding over the Emulated VCs
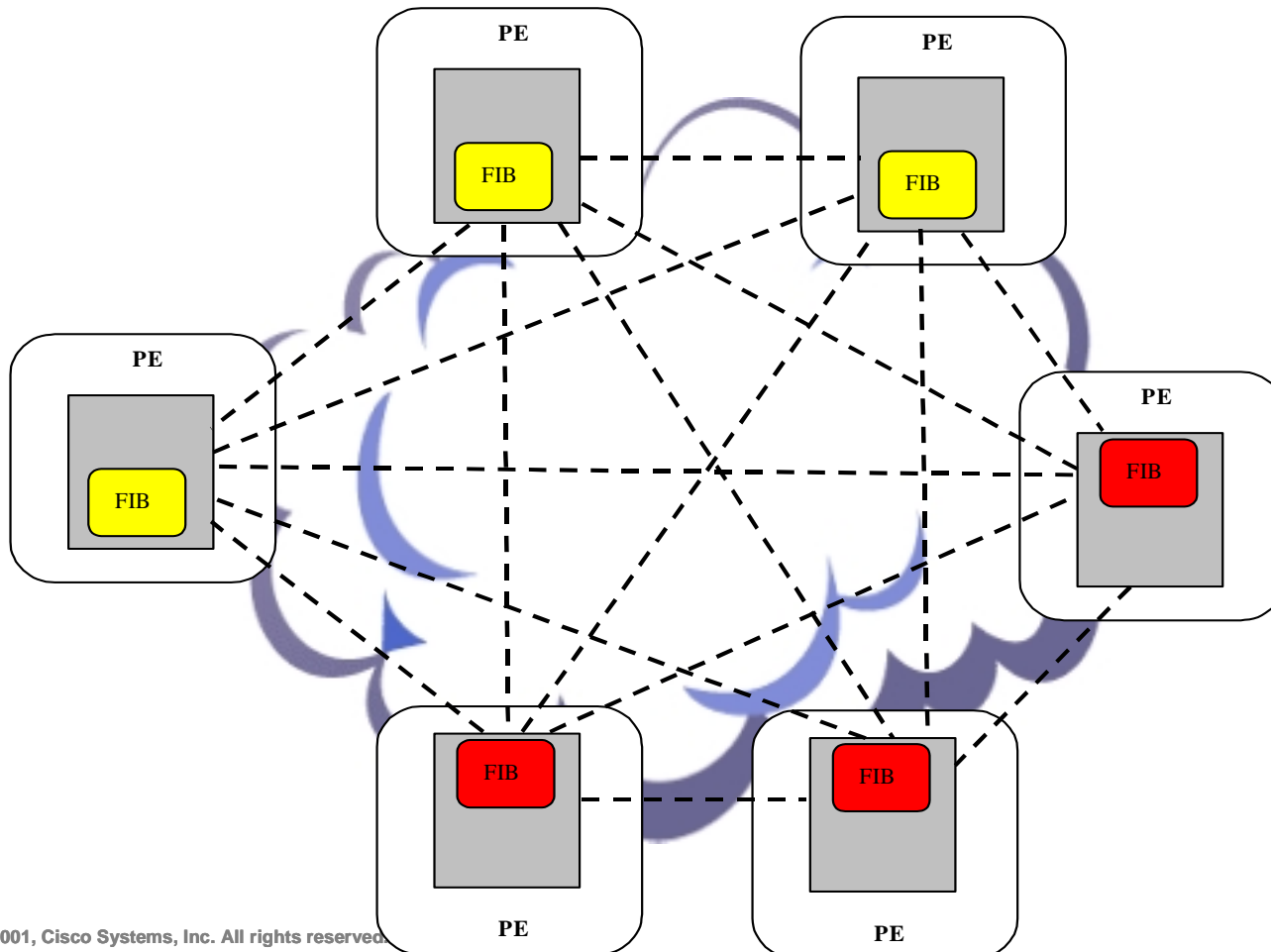
draft-sajassi – one VPLS per VLAN for VLAN-aware operation

Use a single VPLS instance per customer VLAN – flooding/broadcasting works the same way as VLAN-unaware operatoin
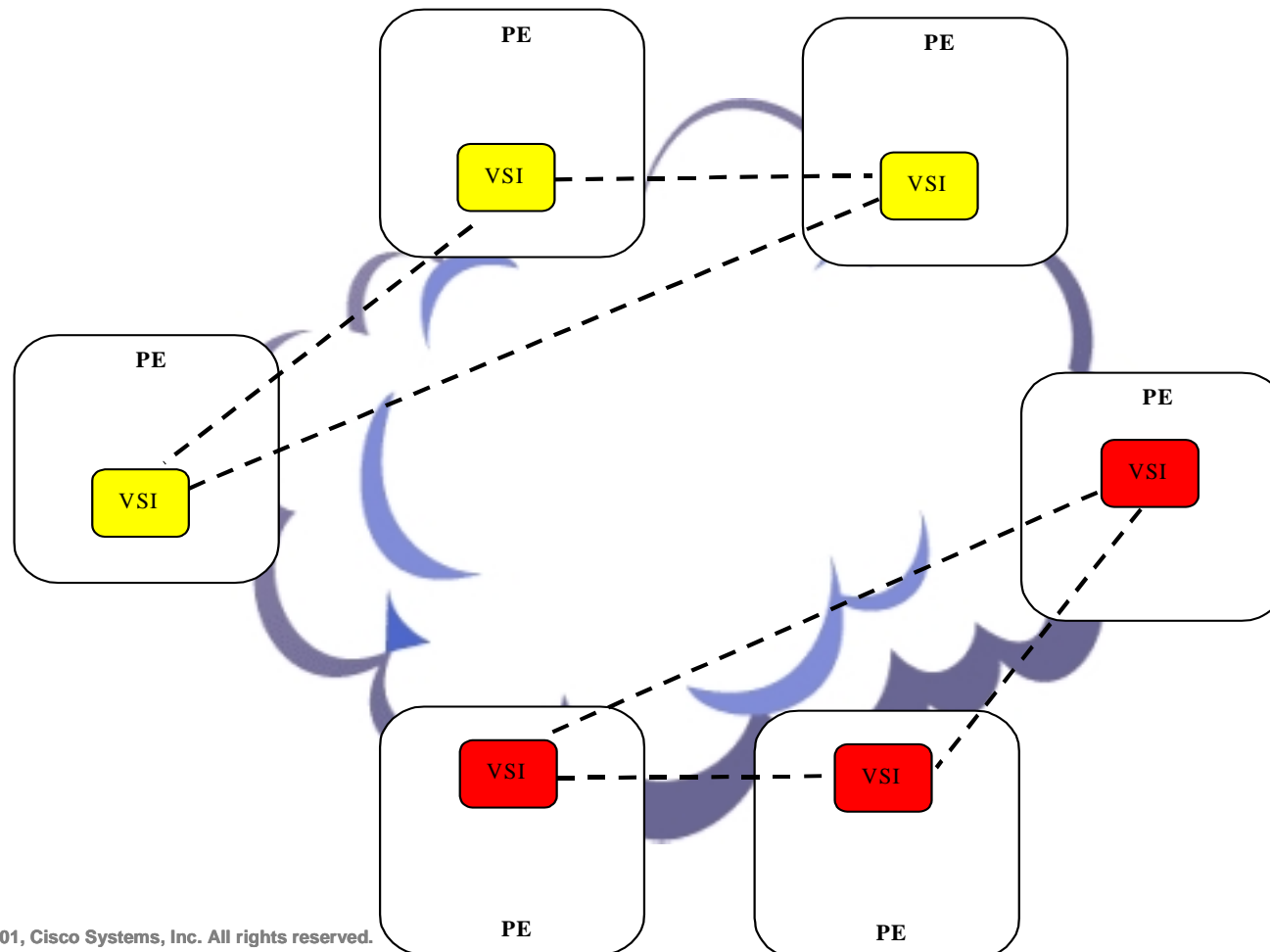
One VLAN per VPLS

- **Advantages**

  - **Simplified operation (no need for L2 protocol such as GVRP)**

  - **Better traffic separation and QoS provisioning (e.g., TE tunnel for one VLAN and LSP tunnel for another VLAN)**

  - **Fewer Emulated VCs for some topologies**

Distributed-PE

- **Two Options from from Data-Plane Perspective**

    1. VSI functionality is done at PE-CLE

    2. VSI functionality is done at PE-POP

- **Four Options from Control-Plane Perspective**

    1. Emulated signaling and auto-discovery are both performed at the PE-POP

    2. Emulated signaling at PE-CLE and auto-discovery at PE-POP

    3. Emulated signaling at PE-POP and auto-discovery at PE-CLE

    4. Emulated signaling and auto-discovery are both performed at the PE-CLE

# Distributed-PE Architecture w/ Ethernet-based PE-CLE:

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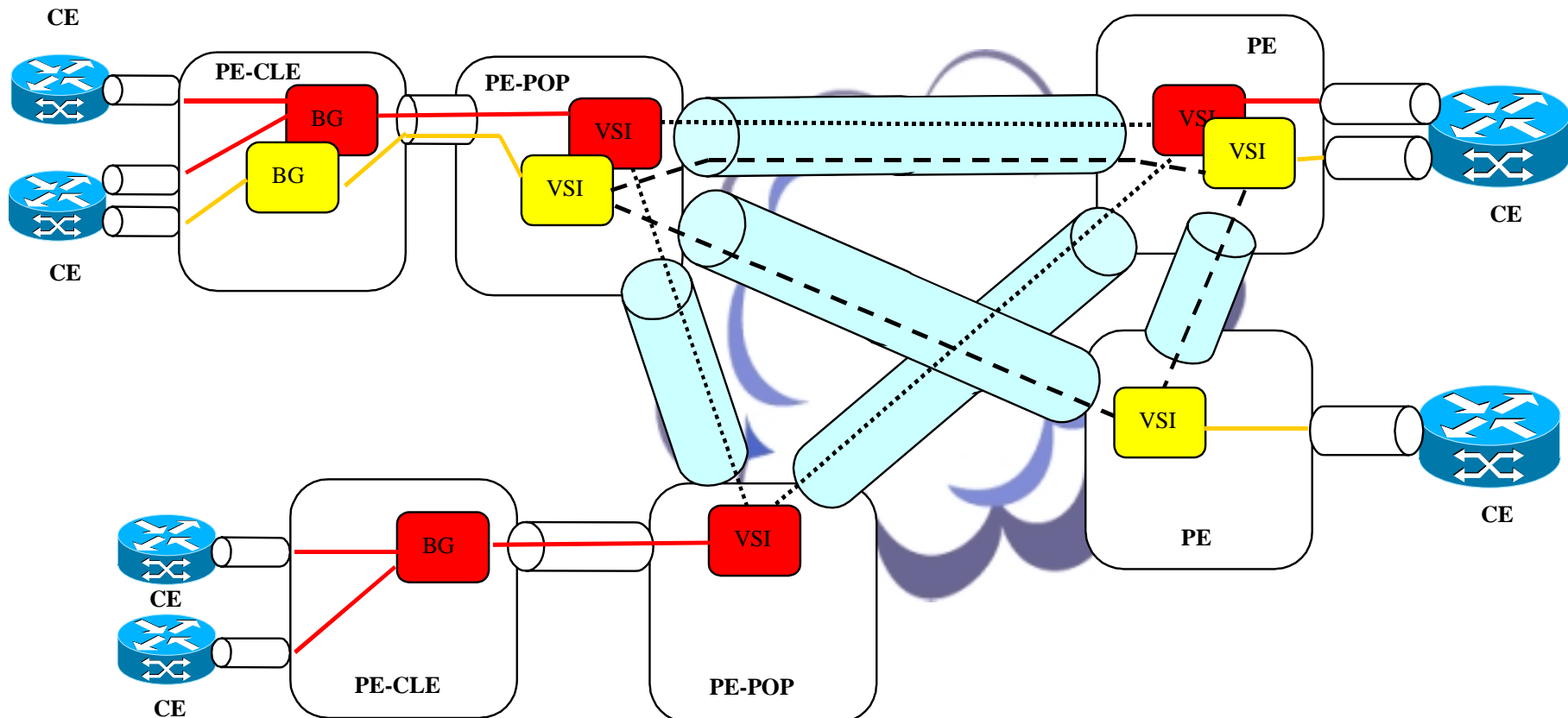
Functions

- **PE-CLE**

  - **Tunneling of Attachment VCs to the PE-POP OR;**

  - **Attachment VC termination and origination of Extension VCs toward the PE-POP**

- **PE-POP**

  - **Attachment Tunnels termination (if used)**

  - **Attachment VC termination OR Extension VC termination**

  - **Emulated VCs - signaling and termination**

  - **Emulated Tunnels – signaling and termination**

  - **Maintaining a VSI per VPLS instance**

  - **Auto-discovery & Auto-configuration**

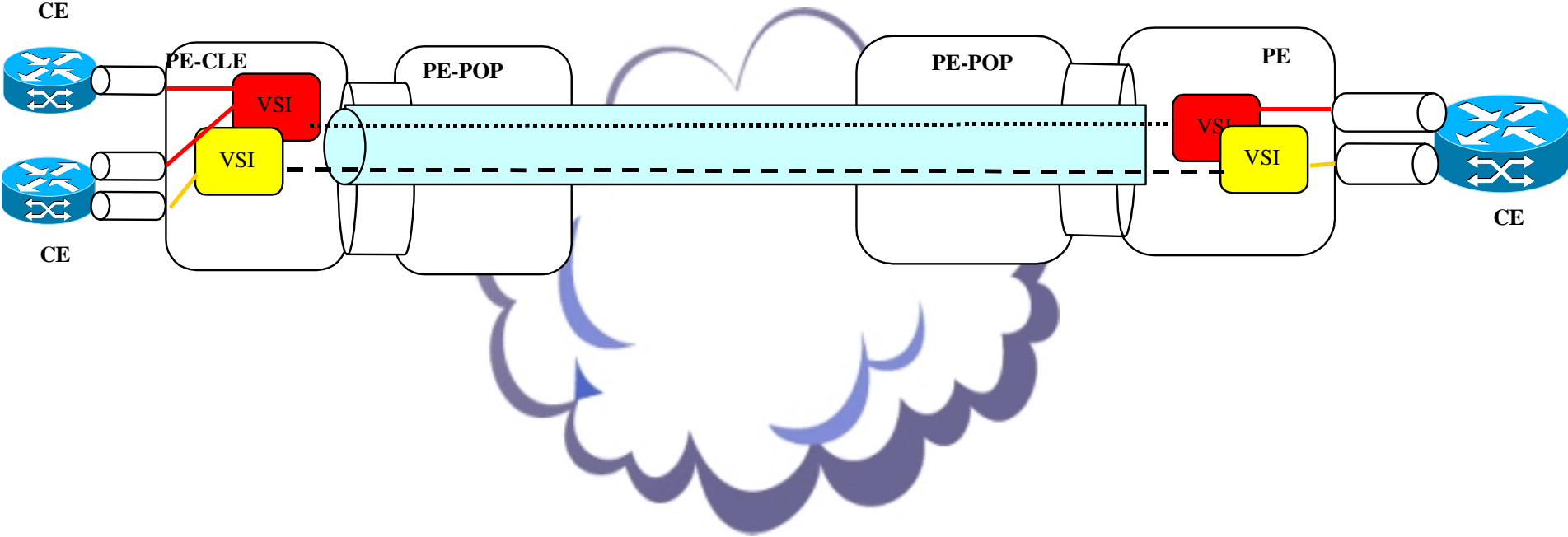# Distributed-PE Architecture w/ MPLS/IP-based PE-CLE:

19
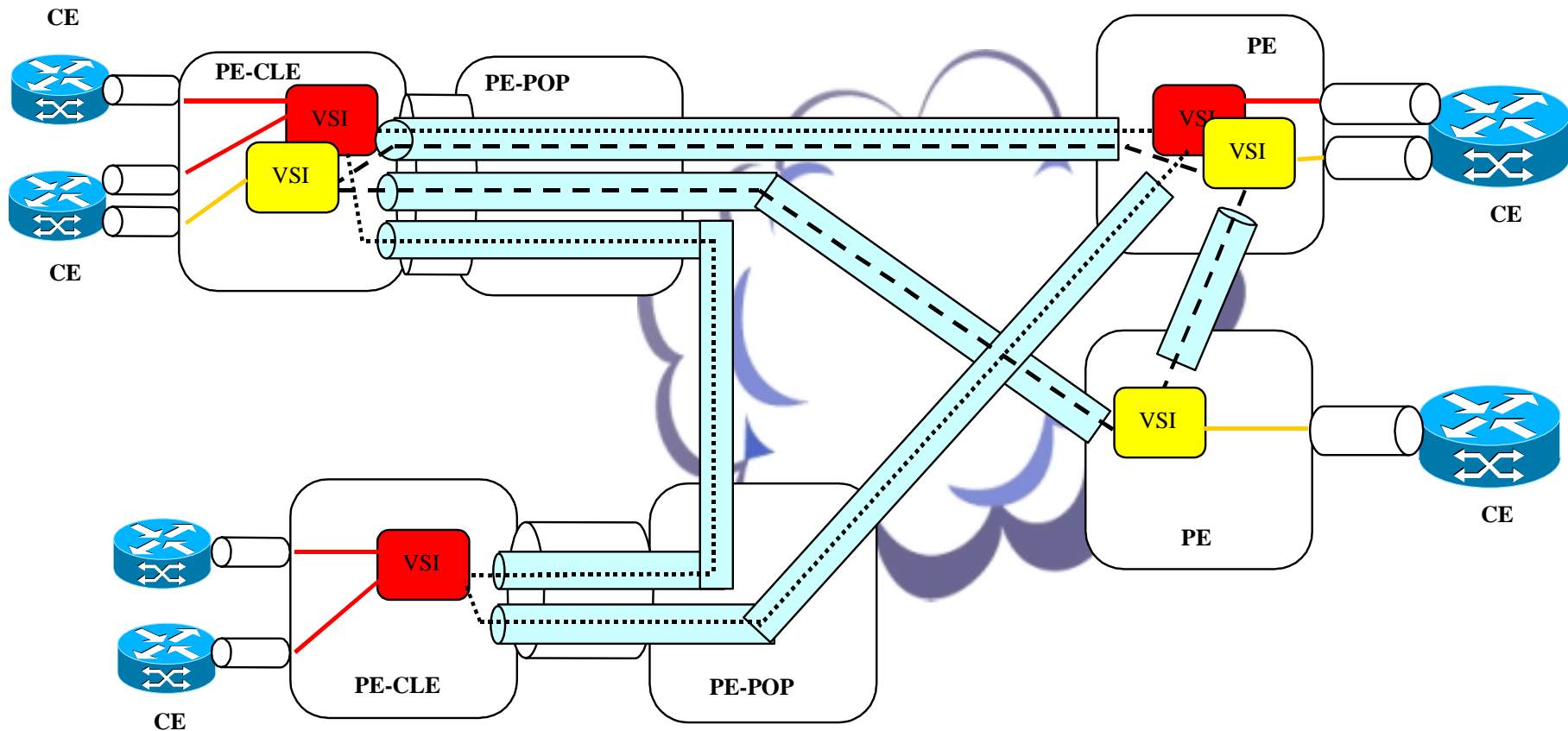
Functions

- ## PE-CLE

  - Attachment VCs termination

  - Emulated VCs – termination and signaling

  - Emulated Tunnels – signaling and termination

  - Maintaining a VSI per VPLS instance
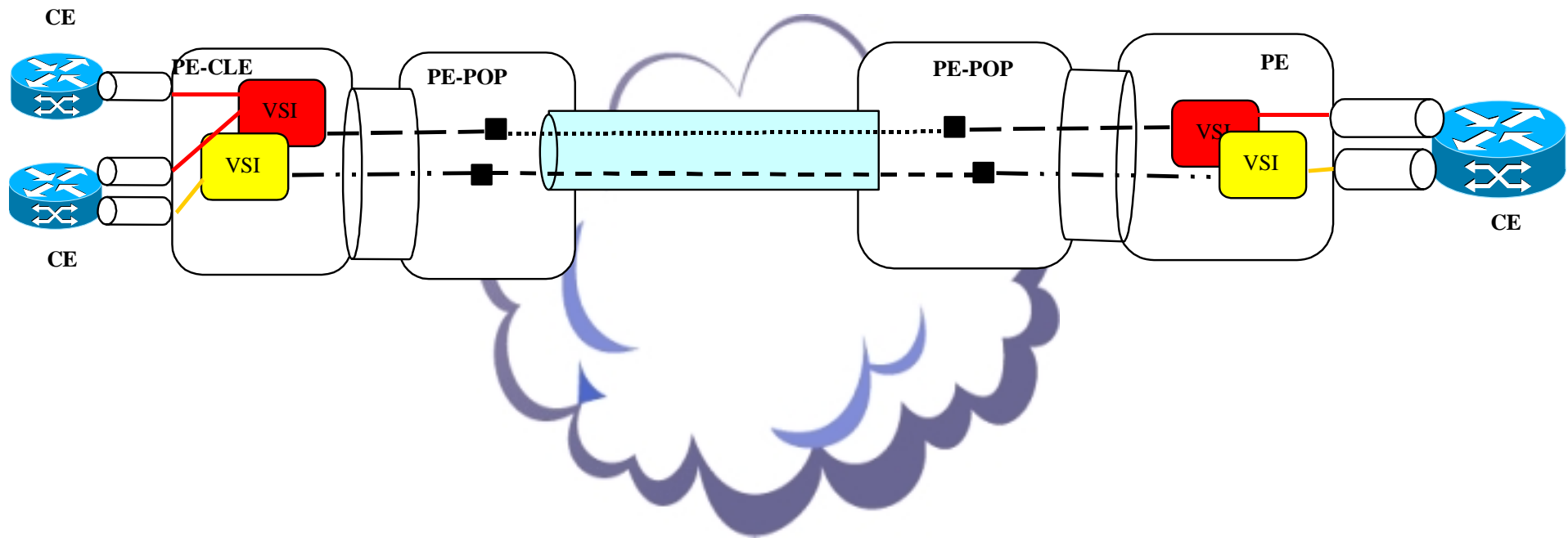
- ## PE-POP

  - Auto-discovery

  - Auto-configuration

Single-Segment MPLS/IP-based PE-CLE

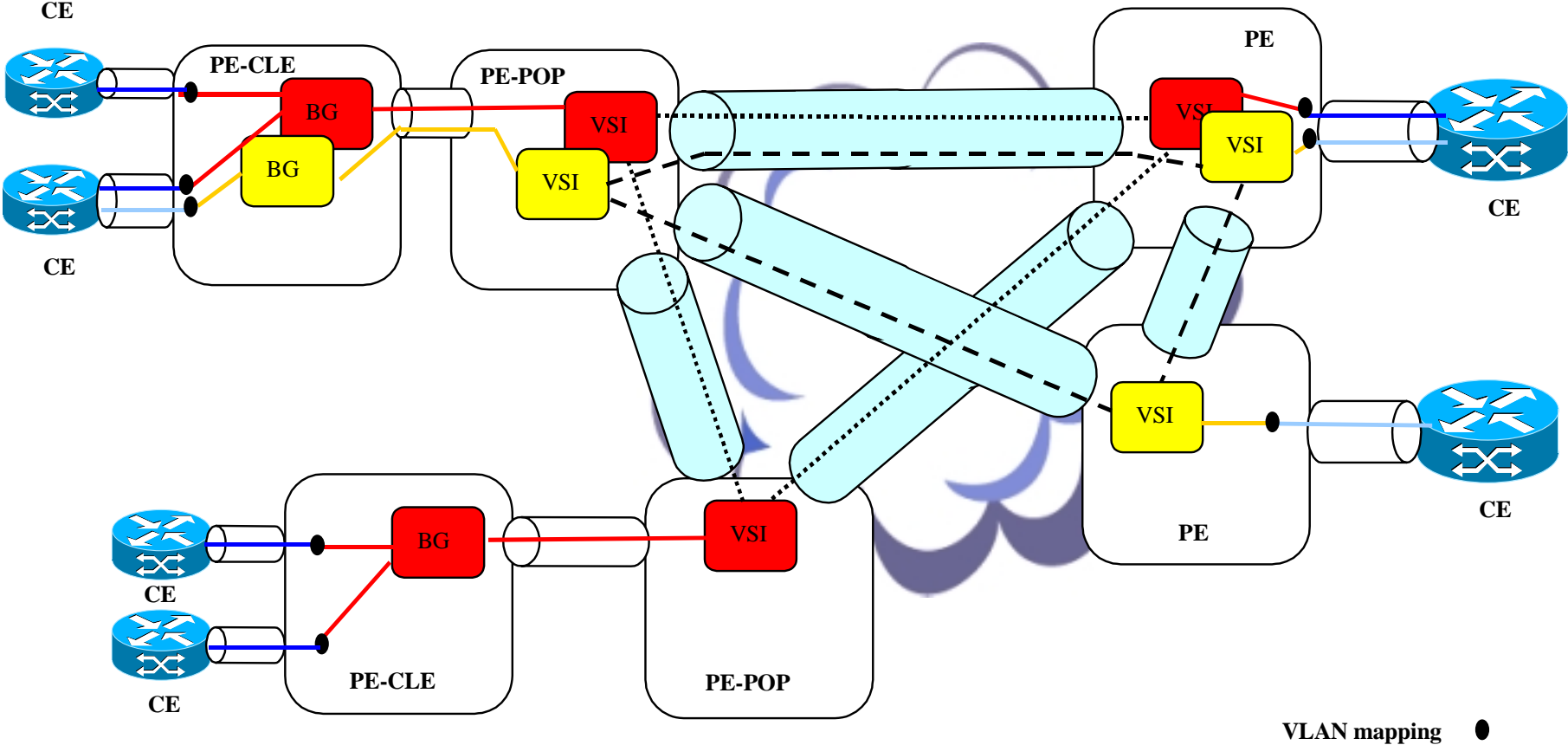## Single-Segment Emulated VC
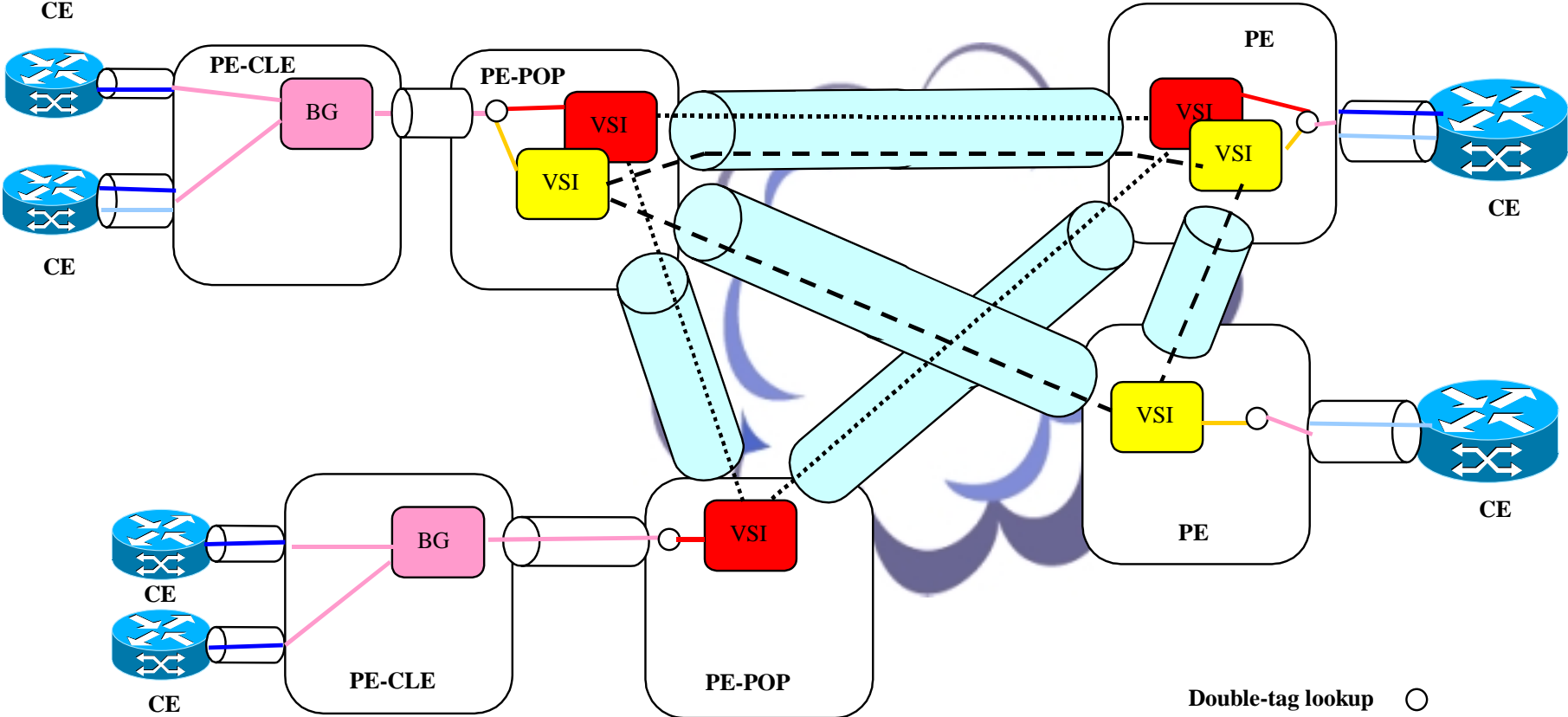
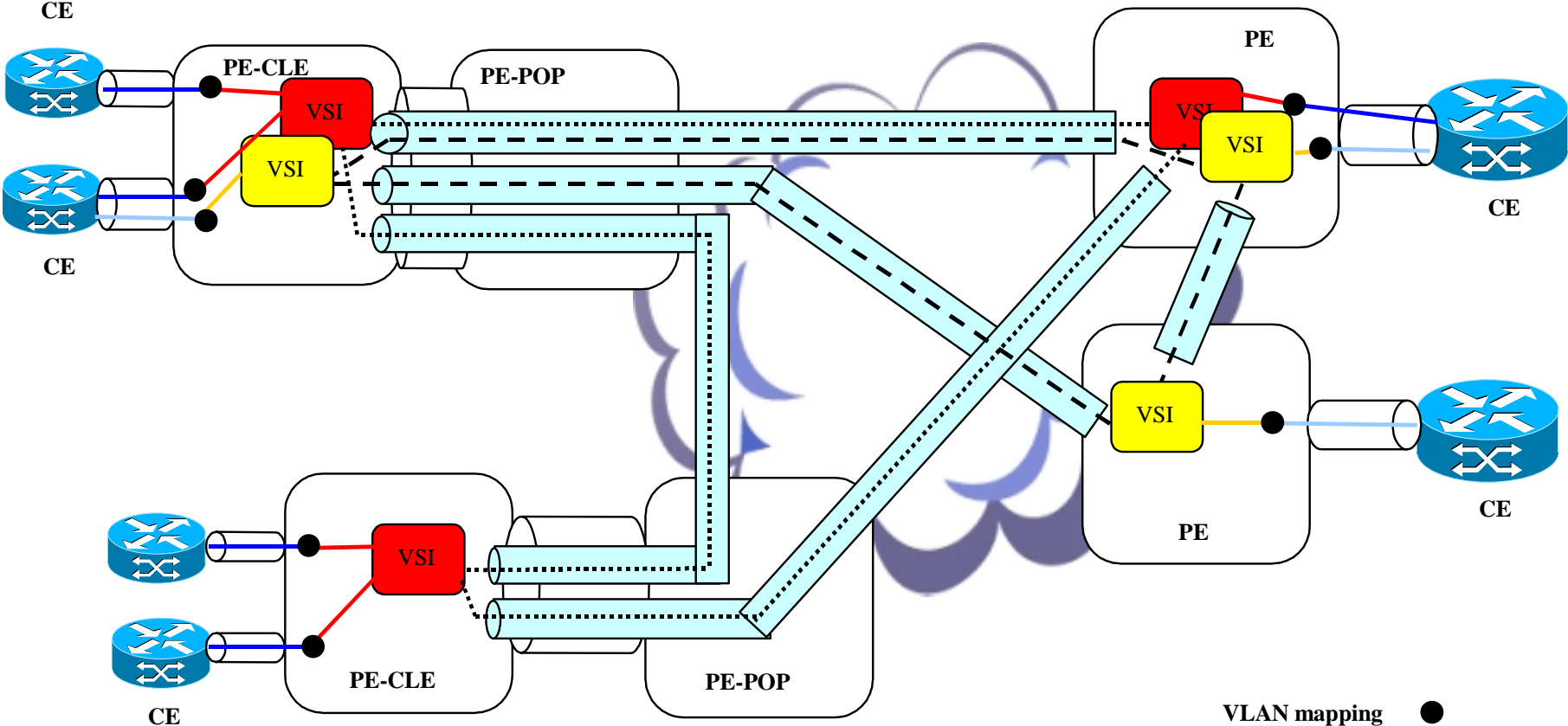# Draft-kompella Multi-Segment MPLS/IP-based PE-CLE

Multi-Segment Emulated VC

VLAN-aware Operation: Ethernet-based PE-CLE w/ Extension VCs

VLAN mapping ●

VLAN-aware Operation: Ethernet-based PE-CLE w/ Attachment Tunnel

CE

PE-CLE

PE-POP

PE

BG

VSI

VSI

VSI

VSI

CE

CE

CE

BG

VSI

VSI

CE

CE

PE-CLE

PE-POP

PE

CE

Double-tag lookup

VLAN-aware Operation: MPLS/IP-based PE-CLE

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- **Next Step**

Next Step

- **To assist the design team in consolidating the current designs and architectures**

- **To adopt the current proposal as a working group item**