



EVPN Concepts

EVPN ↔ **L3VPN**
EVI ↔ **VRF**

Multihomed devices can be...

- > **Single-Active:** with one active PE
- > **All-Active:** with multiple active PEs (will need split horizon and designated forwarding)

Data Plane learning can be static or dynamic

MPLS or VXLAN control plane

LDP still used as hop-by-hop for tunnel labels

PE advertises MAC addresses and next hops from CEs using MBGP

Full mesh reflection

LAG (with All Active mode)

This update will be one of the route types shown below

A VLAN WILL MAP TO AN EVI MUCH LIKE A VLAN (S-TAG or C-TAG) MAPPED TO AN I-SID

One EVI per VLAN (possibly indicating each customer is represented by one VLAN. OR each customers VLAN gets an EVI). When carried across an EVI the "Ethernet Tag ID" isn't needed to differentiate.

Device (PC, Switch, Router etc)

Overview

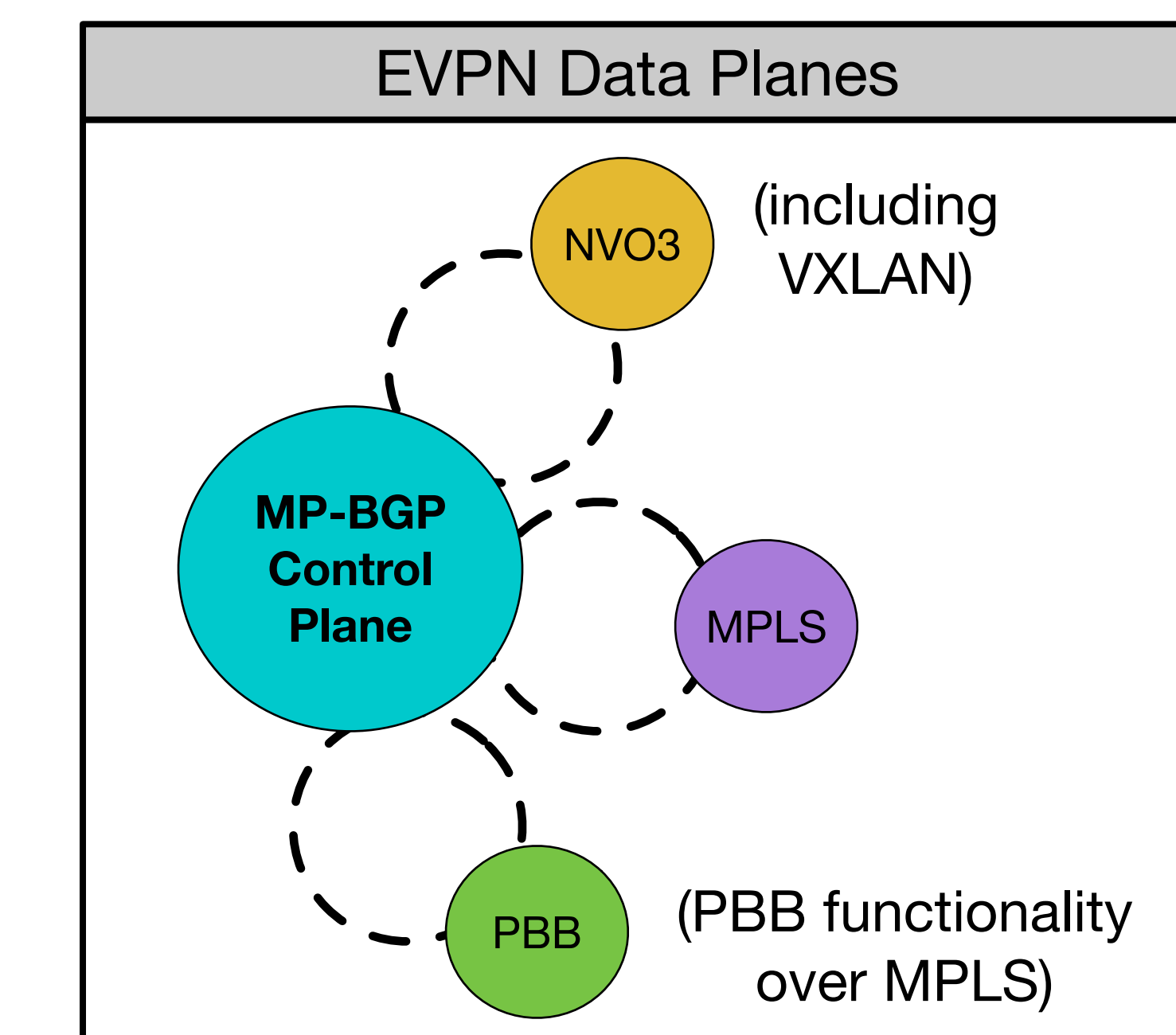
AFI = 25 (L2VPN), SAFI = 70 (EVPN).
ECMP from multihomed CEs is possible.
EVI is a VPN instance (like a VRF for L3VPN).
ESI is a link that connects the CE to the PEs.

L2 and L3 services in one VPN.
Multiple Data Plane encapsulation models (MPLS or VXLAN).
ARP or ND proxy (PE responds on behalf of client)
No more flood-and-learn. Pre-Signalled FDB used instead.
You can control who learns what MAC (using policies).

Route Type	Route Description	Route Usage
1	Ethernet Auto-Discovery (A-D) Route	Endpoint Discovery, Aliasing, Mass-Withdrawal
2	MAC Advertisement Route	MAC/IP Advertisement
3	Inclusive Multicast Route	BUM Flooding Tree
4	Ethernet Segment Route	Ethernet Segment Discovery, DF Election
5	IP Prefix Route	IP Route Advertisement

BGP Update (octets)

RD (8)	Each EVI (just like a VRF) has an RD (?)
ESI (10)	Ethernet Segment Identifier
Ethernet Tag ID (4)	Broadcast domain (VLAN) for the EVPN
MAC Length (1)	
MAC Address (6)	48-bit MAC address
IP Length (1)	
IP Address (0, 4 or 16)	0 for no IP, 4 for IPv4 and 16 for IPv6
MPLS Label 1 (3)	MPLS Label for EVI (?)
MPLS Label 2 (0 or 3)	Label for split horizon BUUM traffic (?)
Ext comms...	



Extended Community Type	Extended Community Description	Extended Community Usage
0x06/0x01	ESI Label Extended Community	Split Horizon Label
0x06/0x02	ES-Import Route Target	Redundancy Group Discovery
0x06/0x00	MAC Mobility Extended Community	MAC Mobility
0x03/0x030d	Default Gateway Extended Community	Default Gateway

Services Overview

VLAN Based - one to one

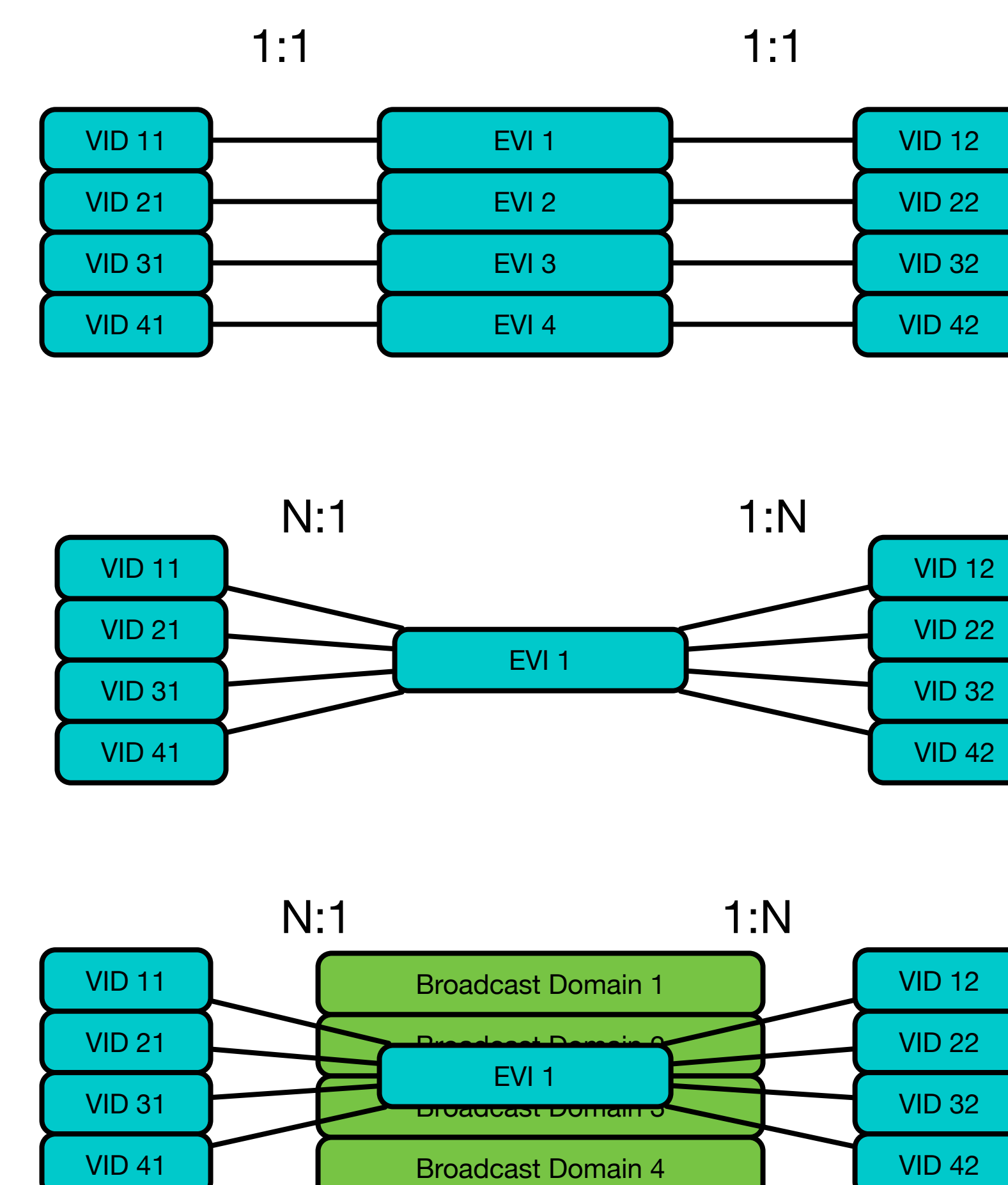
1:1 mapping of VLAN to EVI.
VLAN translation allowed.
Single bridge domain per EVI.
Ethernet tag in route is set to 0.

VLAN Bundle - EVI doesn't care about the VLAN and multiple VLANs map to it

Multiple to one mapping of VLAN to EVI.
Still single bridge domain for each EVI.
MACs need to be unique across VLANs.
No VLAN translation.
Ethernet tag in route is set to 0.

VLAN Aware - EVI cares about what the VLAN is

Multiple to one Mapping of VLAN to EVI.
Multiple broadcast domains.
One bridge domain per VLAN.
VLAN translation allowed (look at left then right VIDs).
Ethernet tag is set to configured tag (VLAN).



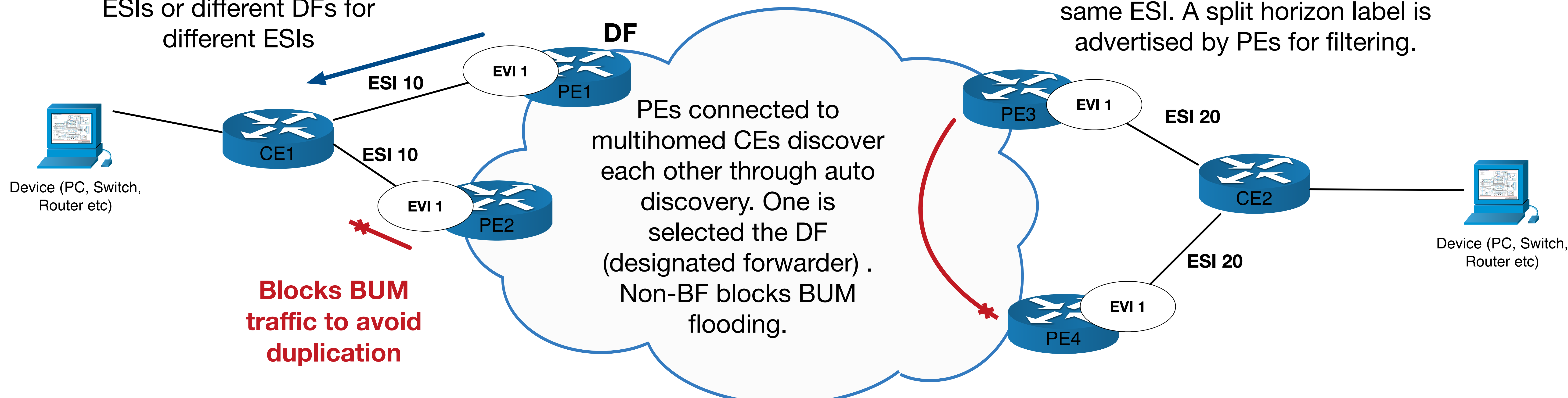
Mapping multiple VLANs to one EVI... the only catch is that duplicate MACs could cause issues. VLANs are *not* carried across.

Mapping multiple VLANs to one EVI... but the VLAN is cared about, so you have one broadcast domain per EVI (e.g. the Ethernet tag is *not* zero) - possibly one customer with multiple VLANs.

All-Active MULTIHOMING and SPLIT HORIZON

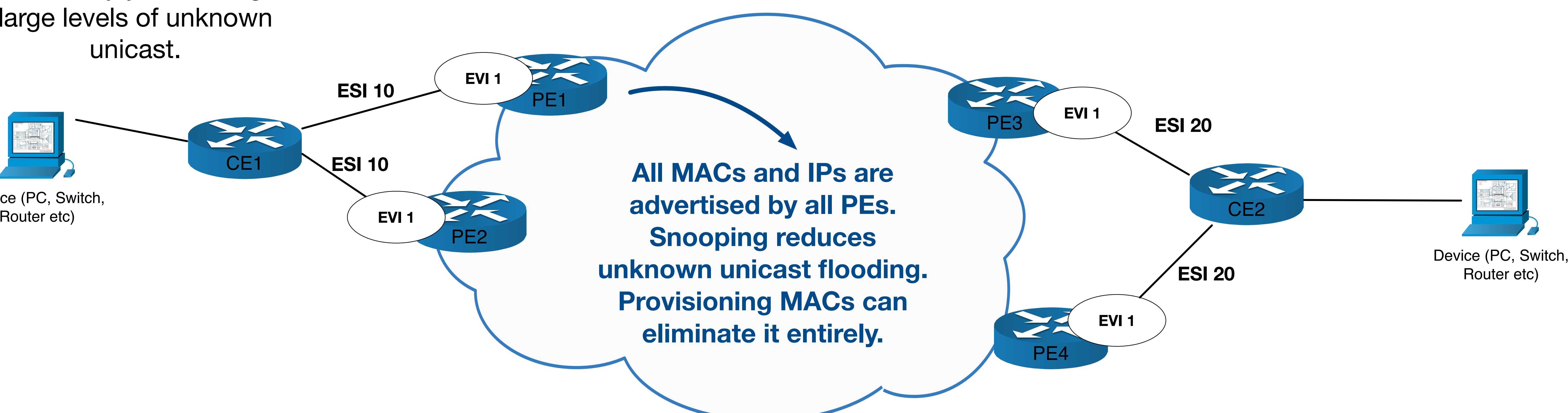
Can have same DFs for all
ESIs or different DFs for
different ESIs

Split horizon = BUM traffic from one ESI is not forwarded back onto the same ESI. A split horizon label is advertised by PEs for filtering.



You could have spoofed or untrusted sources... additionally you could get large levels of unknown unicast.

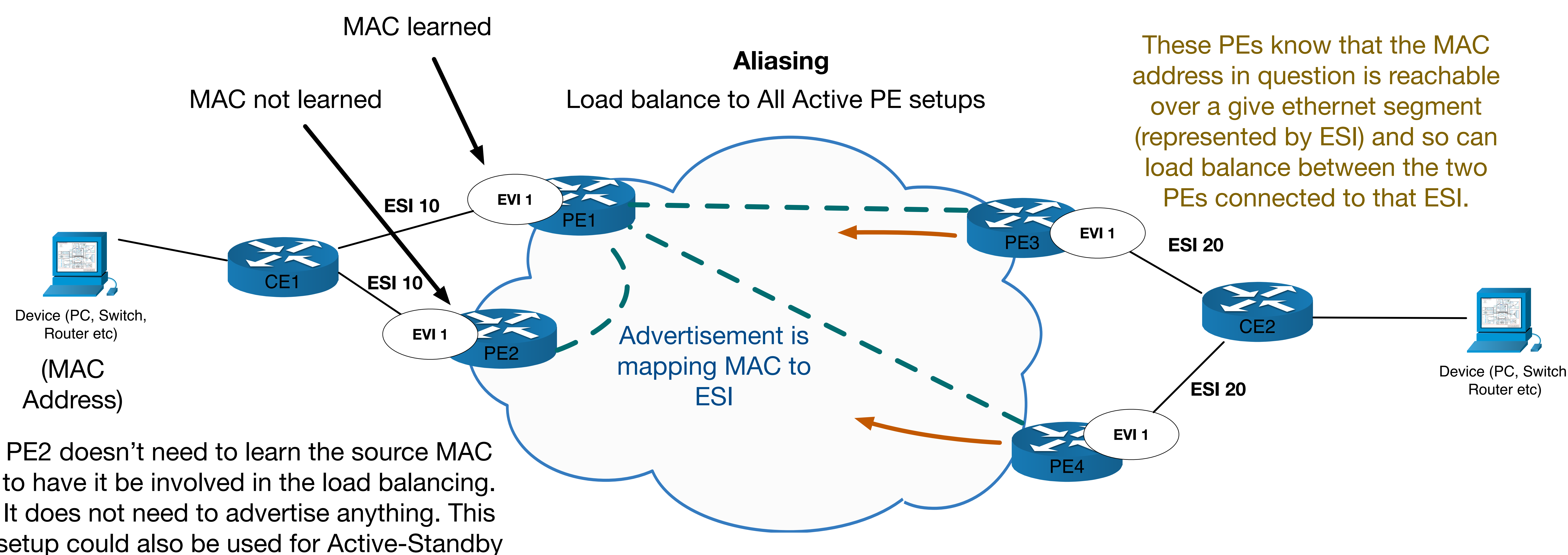
ARP/ND Proxy



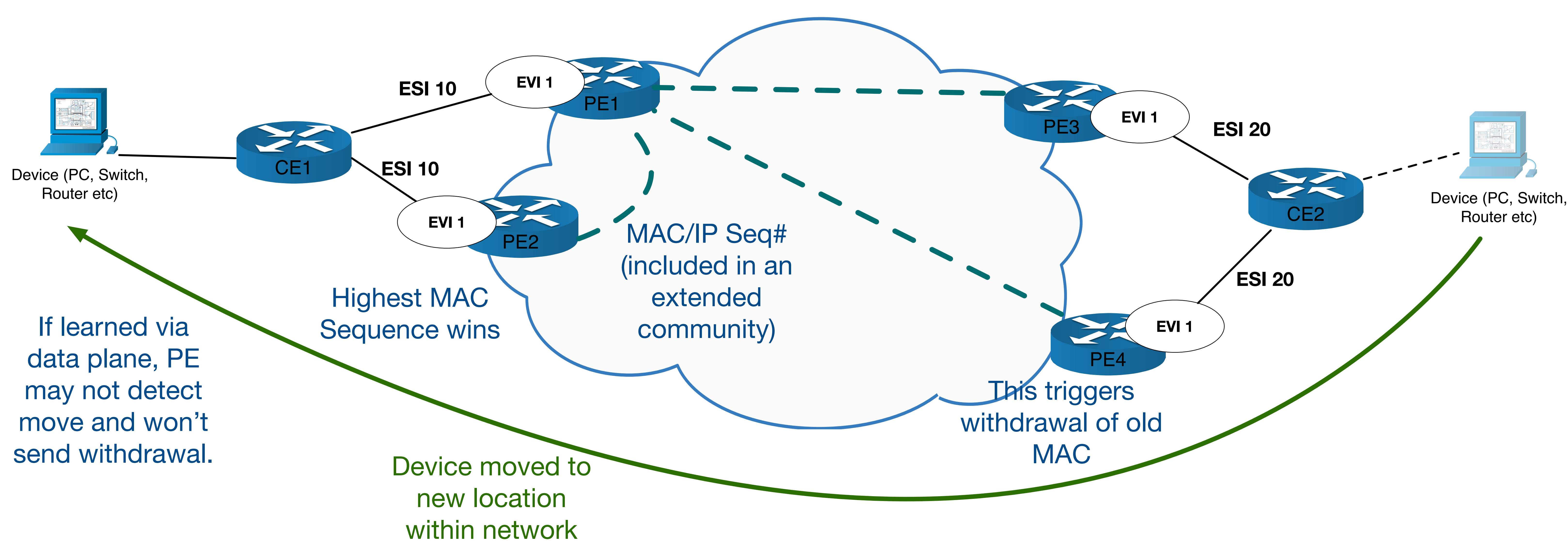
Aliasing

Load balance to All Active PE setups

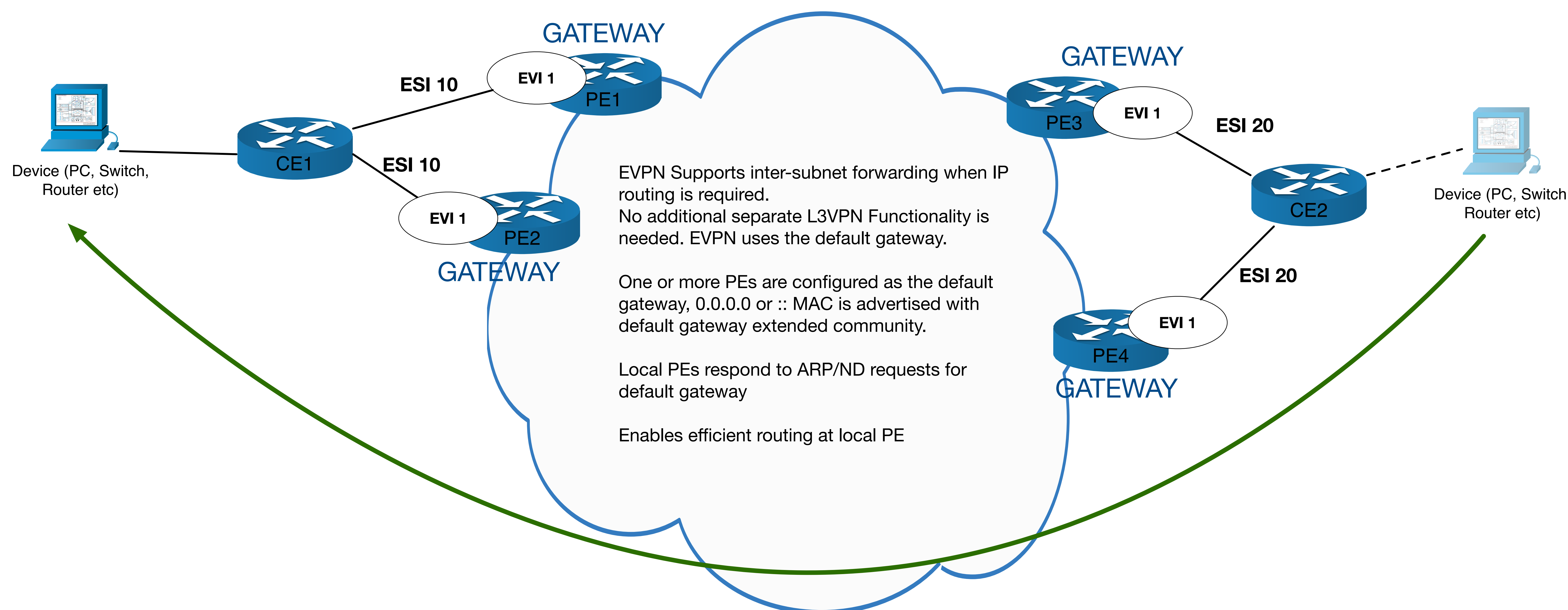
These PEs know that the MAC address in question is reachable over a give ethernet segment (represented by ESI) and so can load balance between the two PEs connected to that ESI.



MAC Mobility



Default Gateway Inter-subnet Forwarding



MAC Mass-Withdrawal

