

10 Years of EVPN

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Before EVPN...

Layer 3 VPN

Multicast VPN

E-LINE
Point-to-Point

E-LAN
Point-to-Multipoint



and Ethernet

meshes and

signalling

fill the gaps –

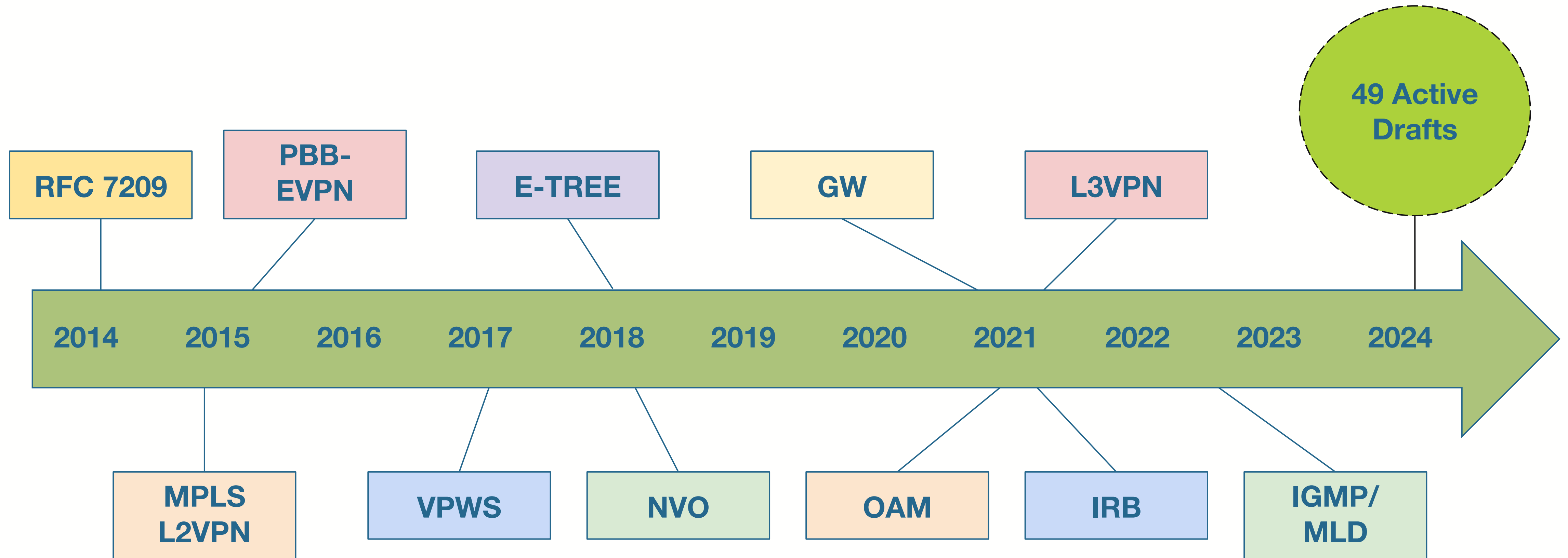


What if we could start again...

- Learning our lessons and now that we understand the requirements, what if we could start again...



10 Years of EVPN Evolution - 19 RFCs

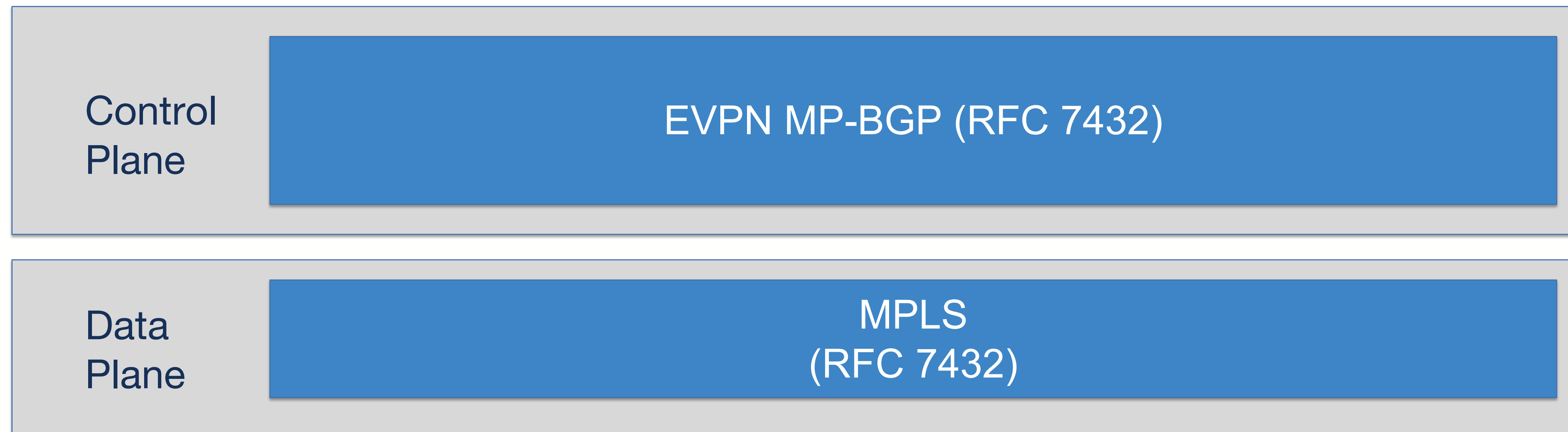


EVPN – MPLS L2VPN

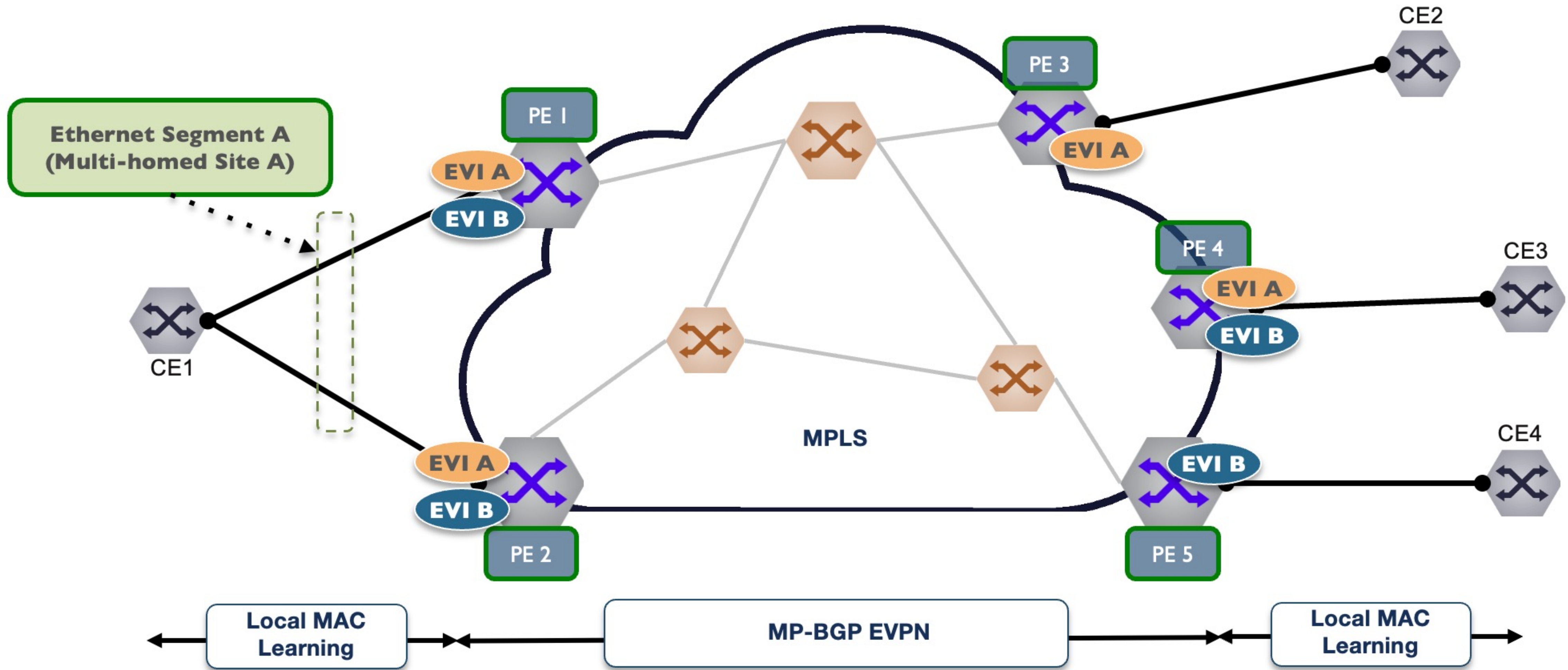


What did we get...

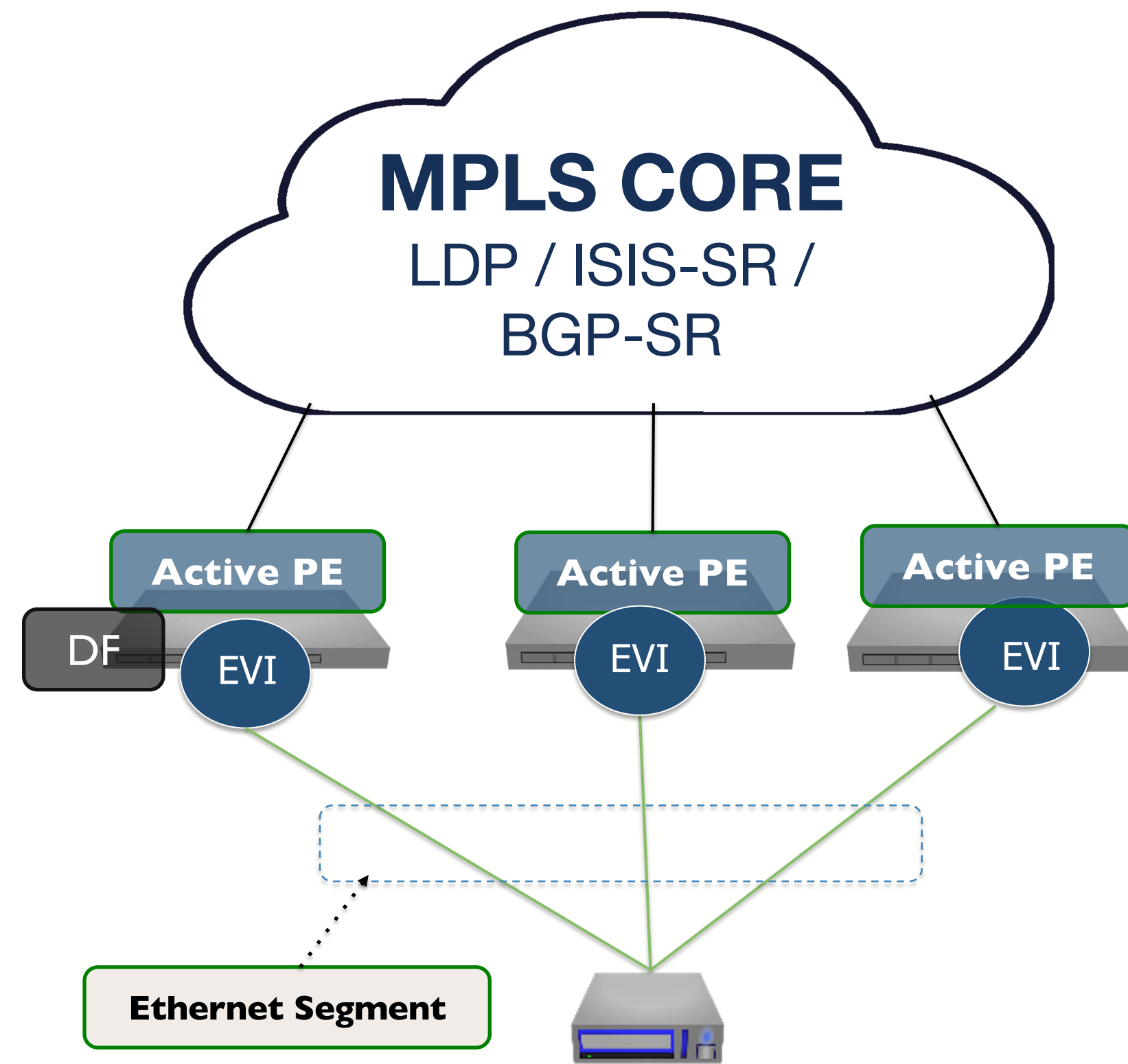
- BGP control plane and new address family to advertise MAC addresses and IP prefixes.
- MPLS forwarding plane



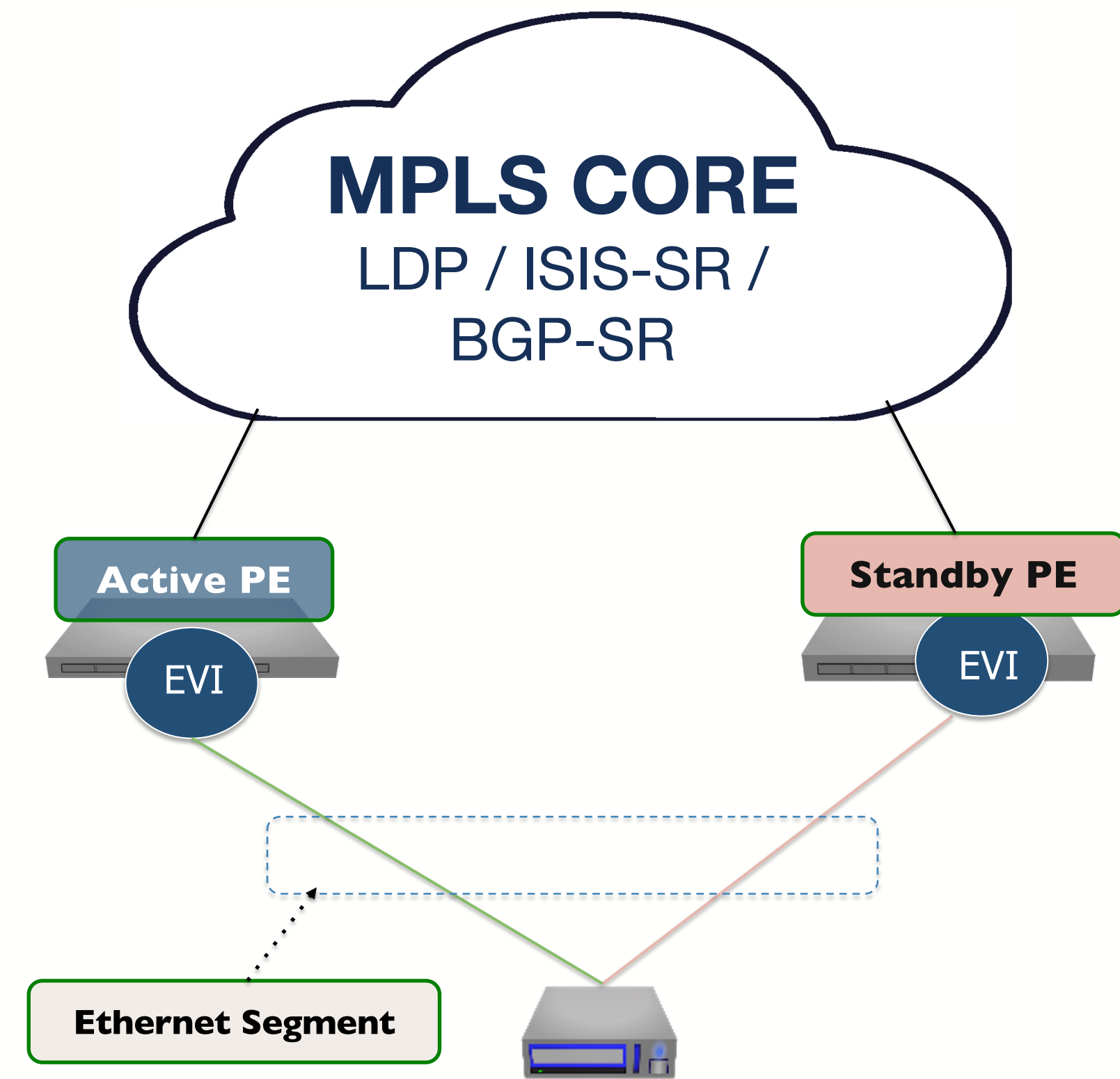
EVPN L2VPN – MAC VRFs



EVPN Multihoming

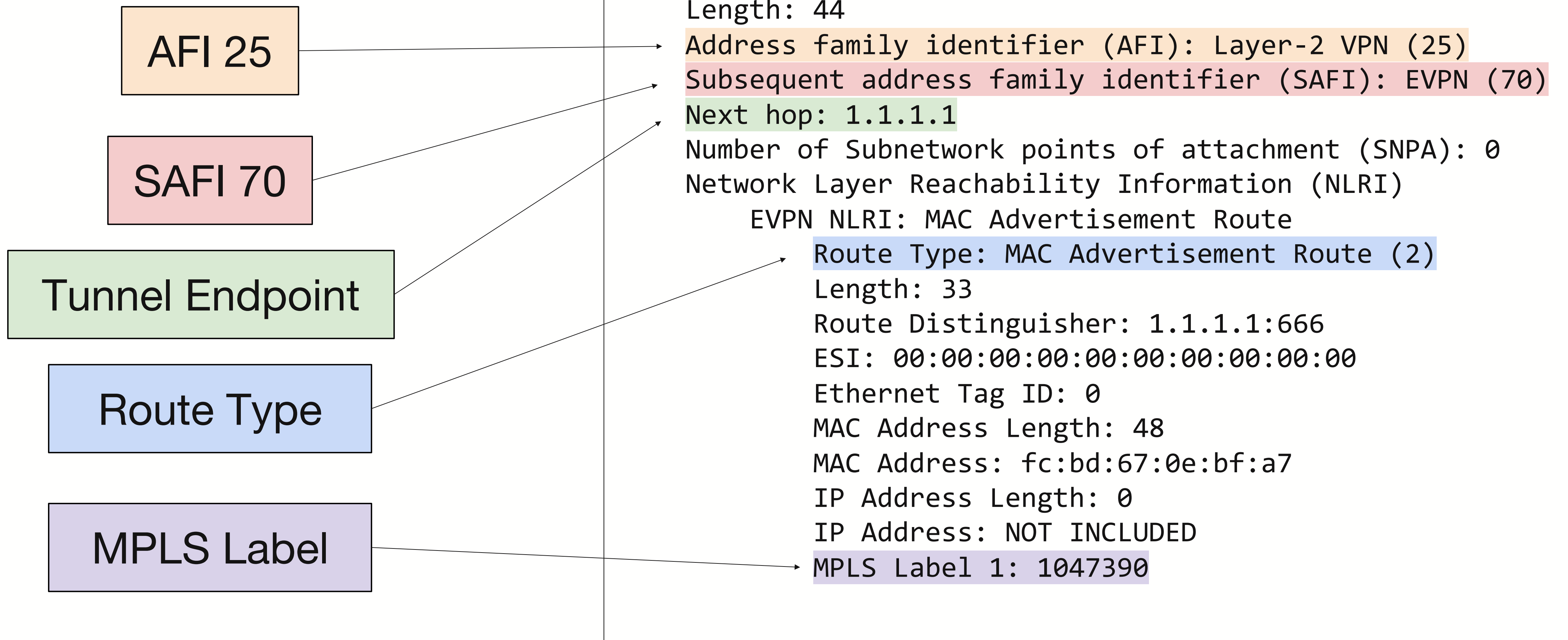


Multi-node Active-Active Site



Multi-node Single-Active Site

EVPN Protocol



EVPN Route Types - L2VPN

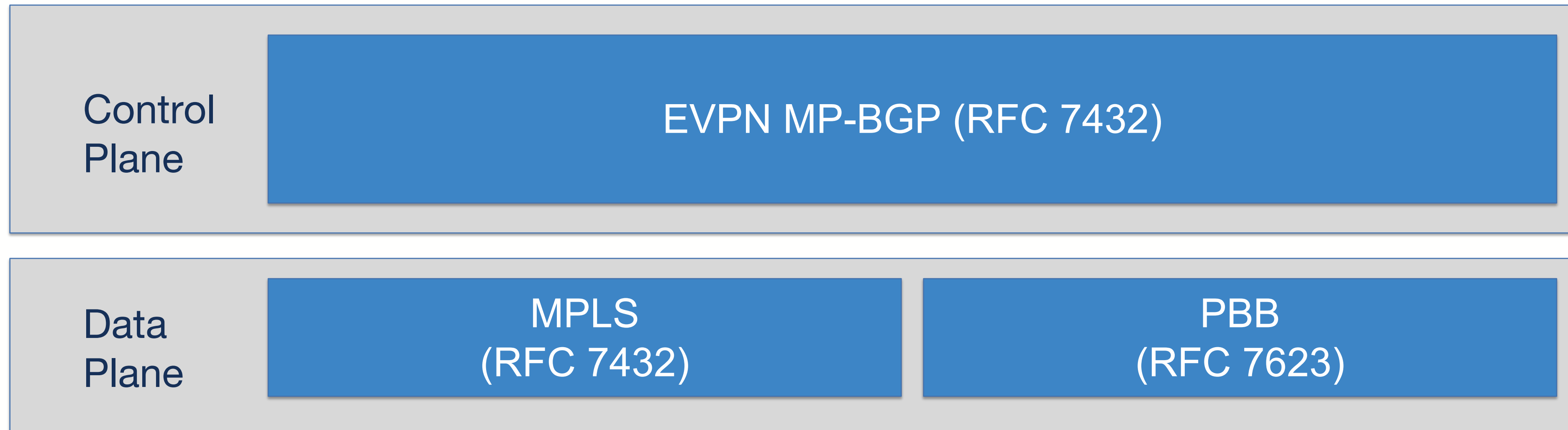
| Route Type | Description |
|------------|---|
| Type-1 | Auto-Discovery Segment Route – For A/A multi-homing forwarding, and to allow remote discovery of dual-homed Segments. |
| Type-2 | MAC address Route - Advertisement of locally learnt/provisioned MAC address and optionally IP addresses. |
| Type-3 | Inclusive Multicast Ethernet Route - For advertisement EVI membership for the creation of ingress replication lists |
| Type-4 | Ethernet Segment Route – For multi-homing deployments to allow Peer discovery on same segment and DF election |

EVPN – PBB Data Plane

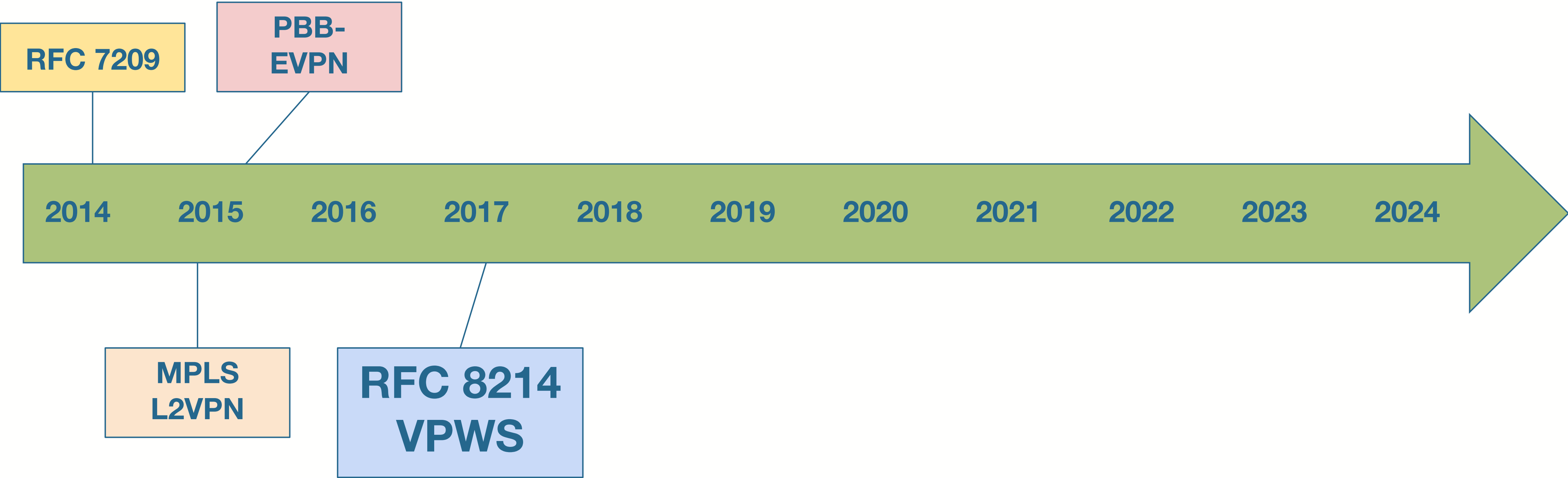


EVPN - PBB Data Plane

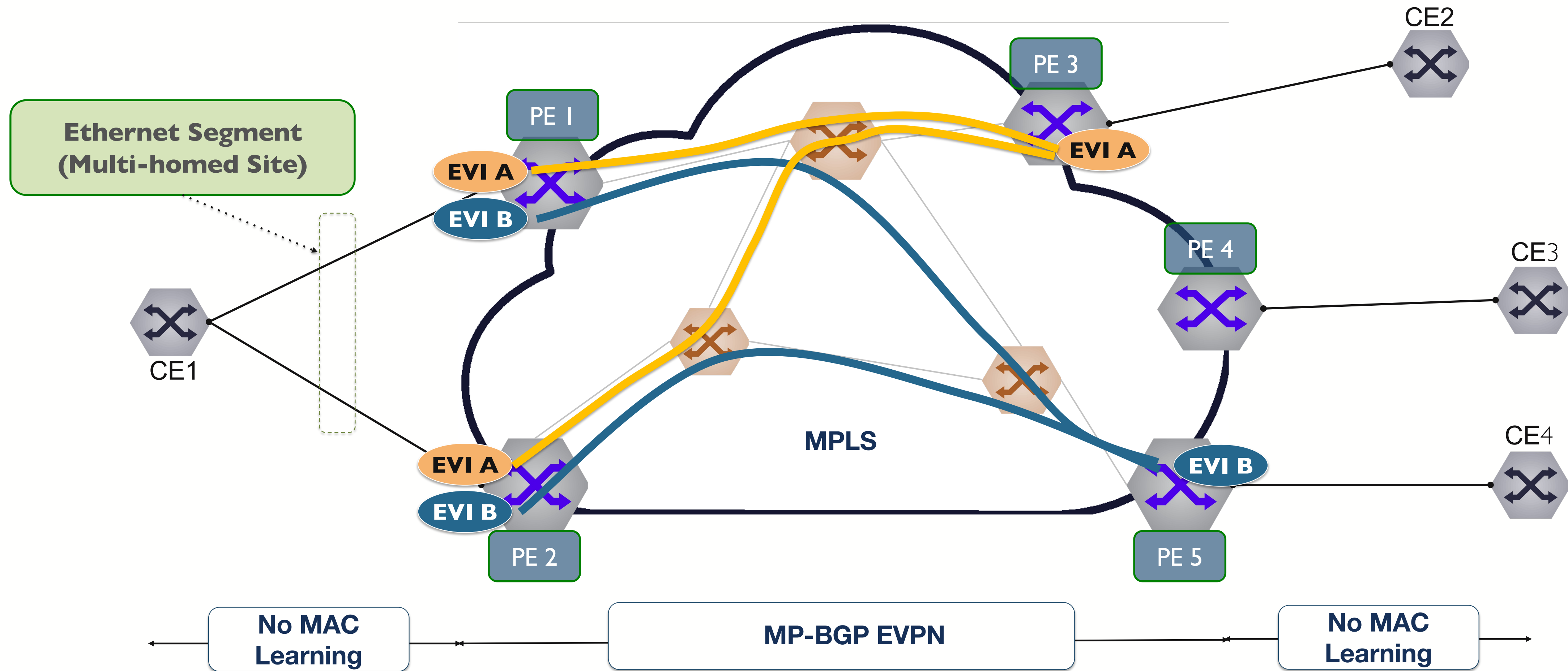
- BGP control plane and new address family to advertise MAC/IP and IP prefixes.
- Multiple forwarding plane options, with an equivalent BGP EVPN control plane
 - RFC 7432 – MPLS forwarding plane
 - RFC 7623 – PBB forwarding plane



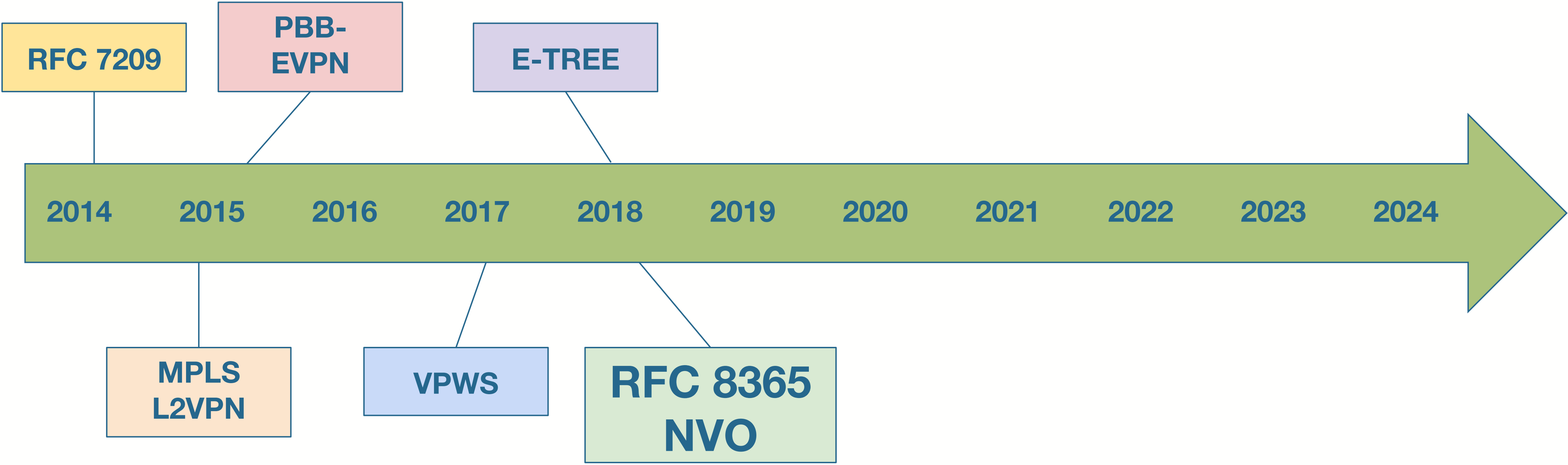
EVPN VPWS - Ethernet (Virtual) Private Line



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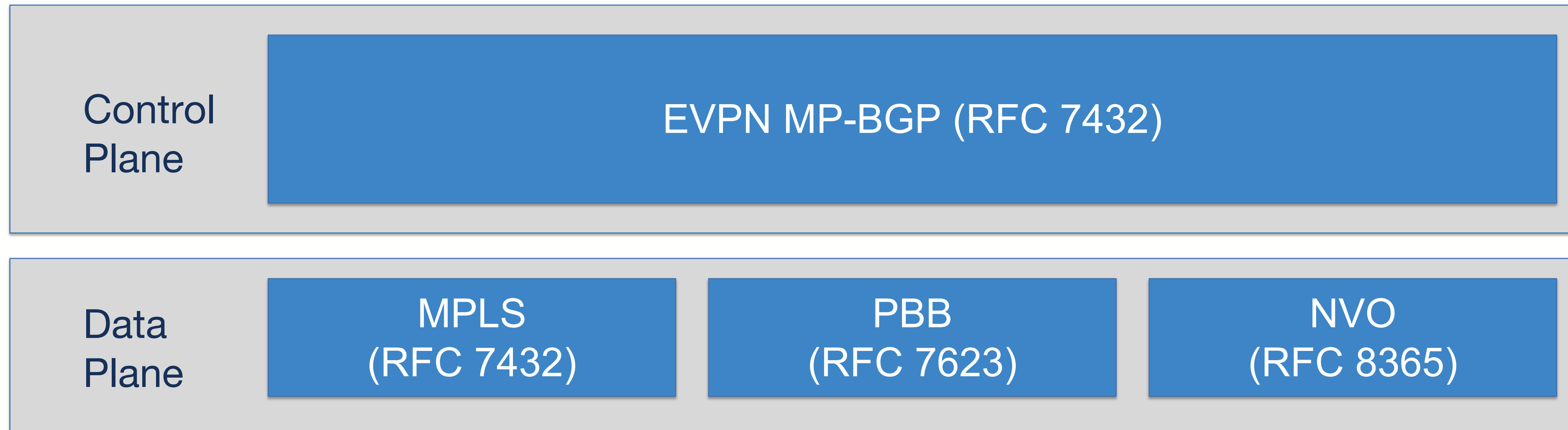


EVPN - Network Virtualization Overlay

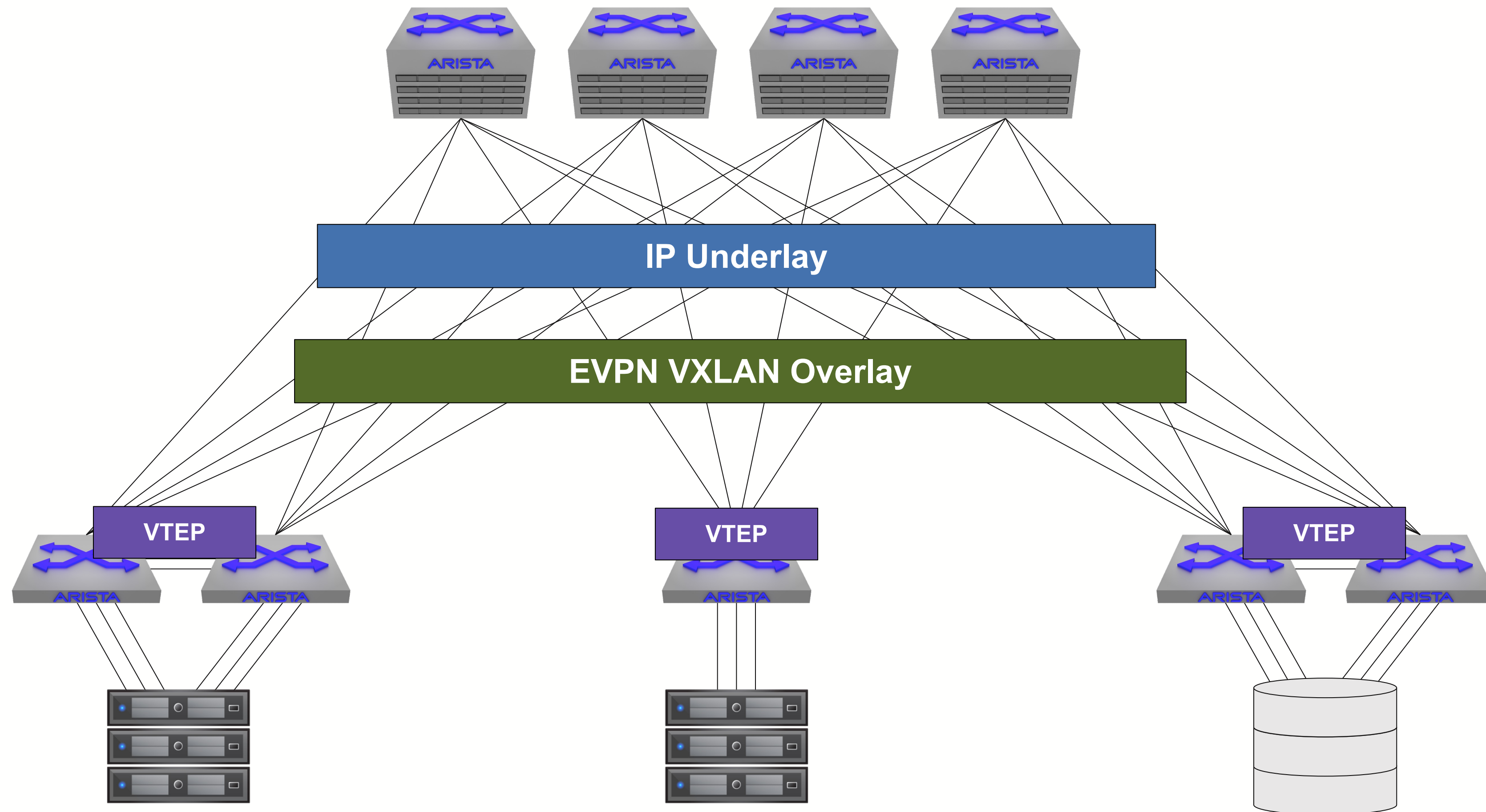


EVPN - Network Virtualization Overlay

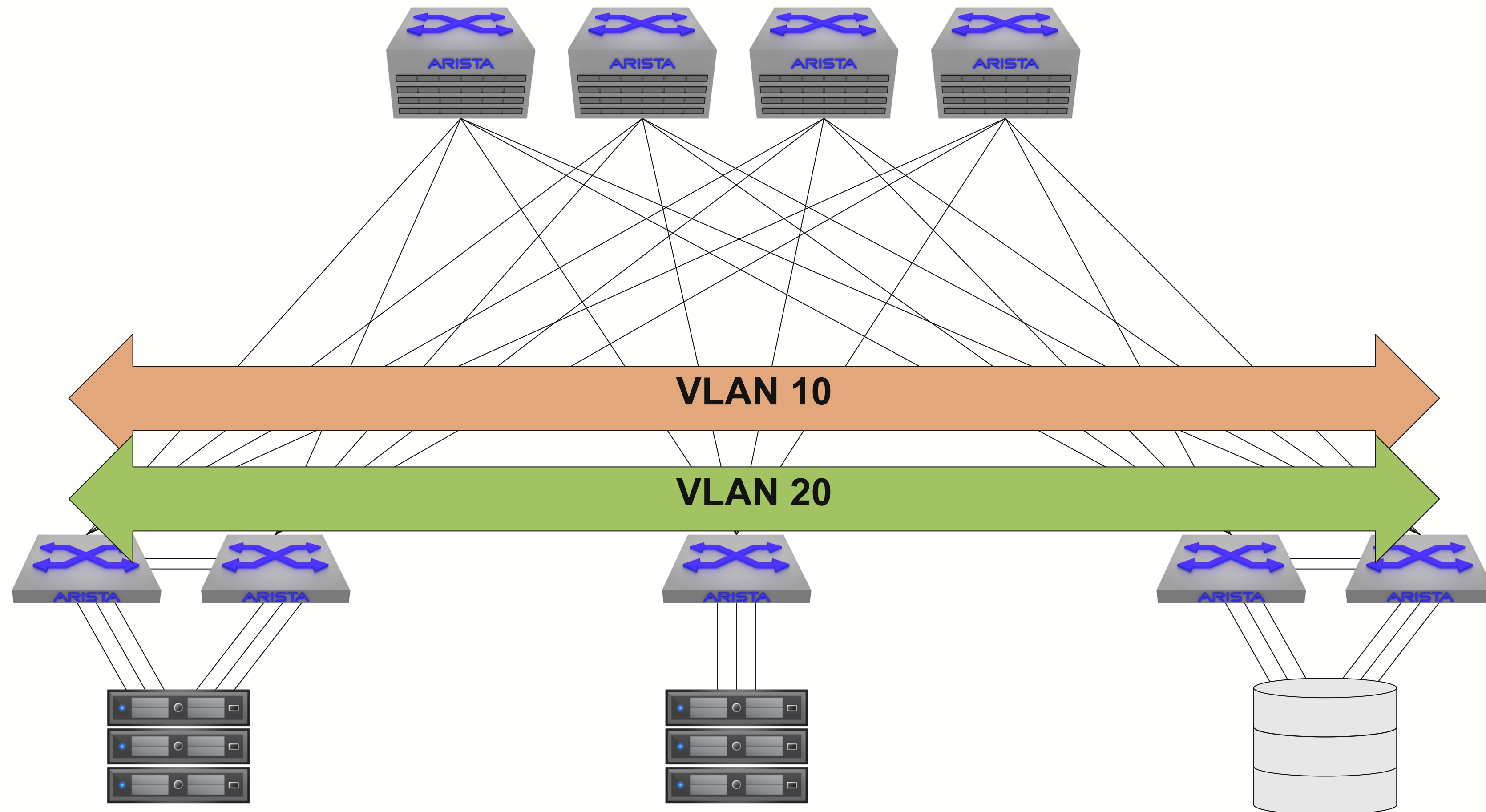
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 - RFC 8365 – VXLAN, NVGRE, MPLSoGRE



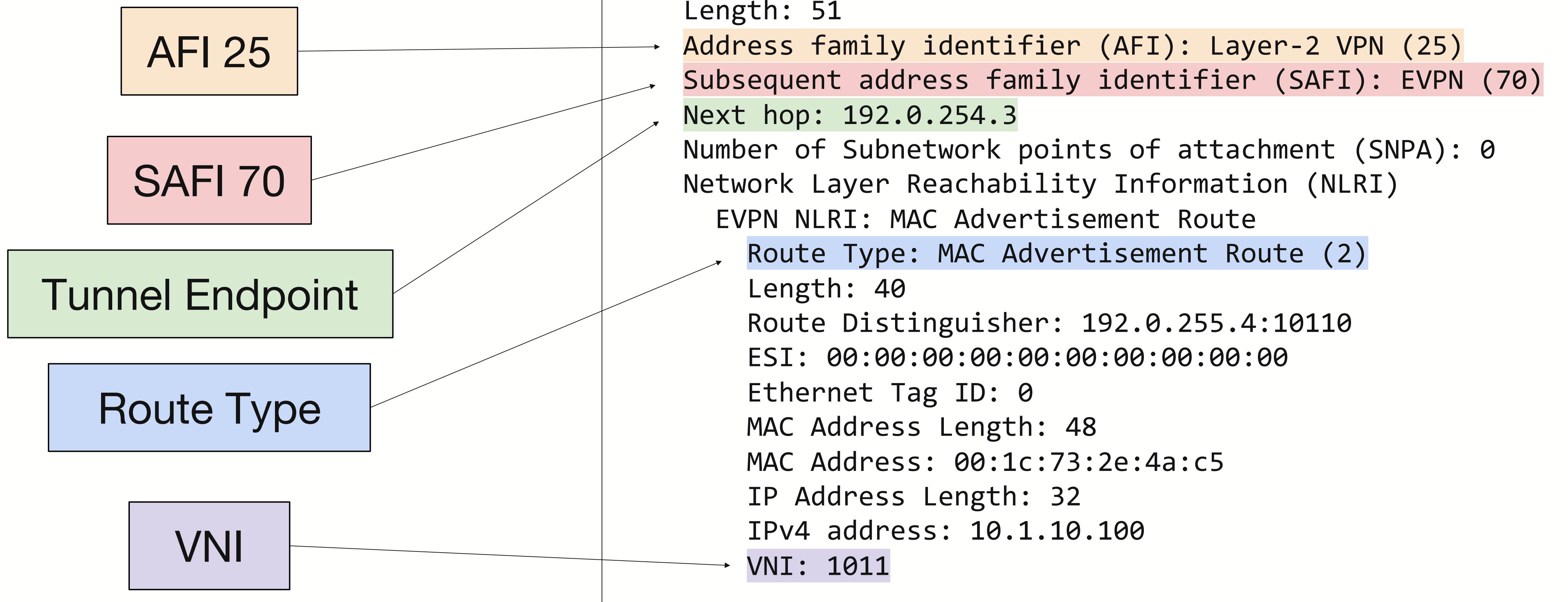
Network Virtualization Overlay



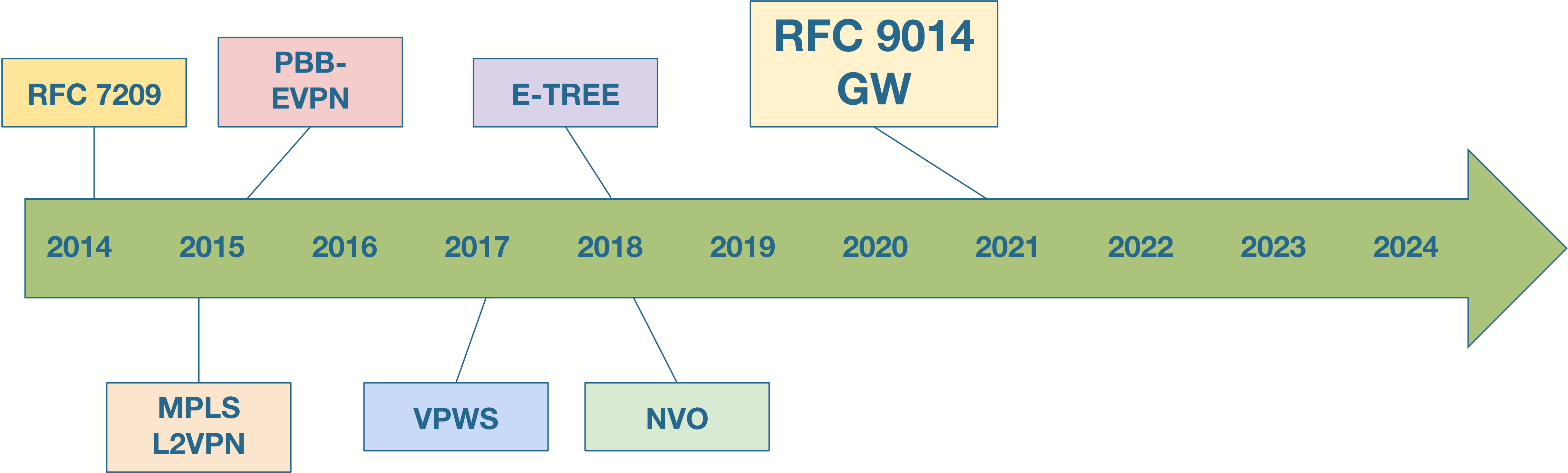
Network Virtualization Overlay



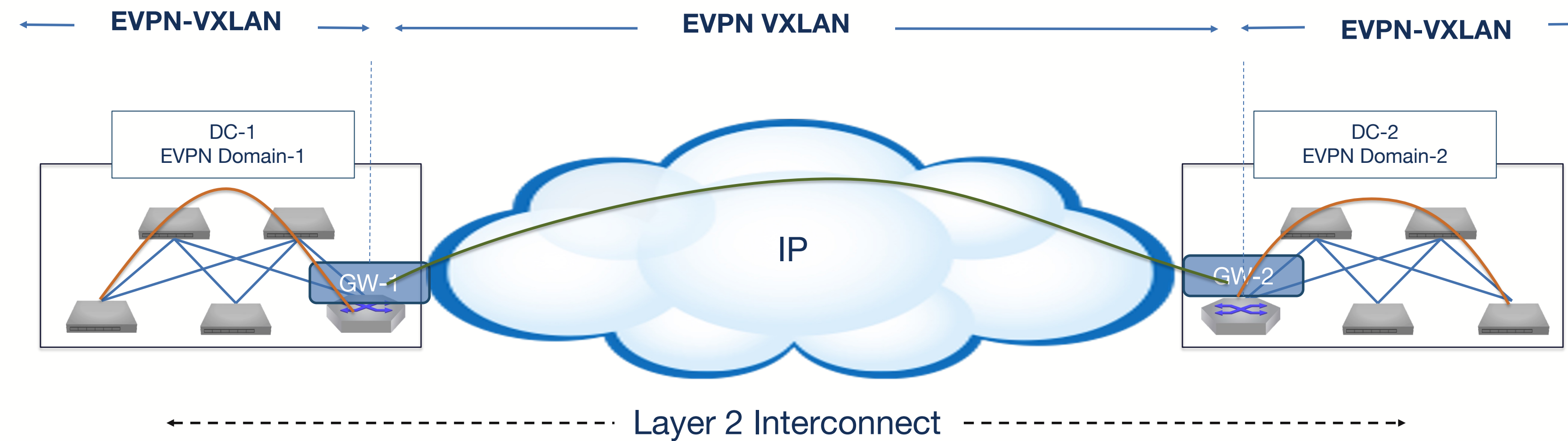
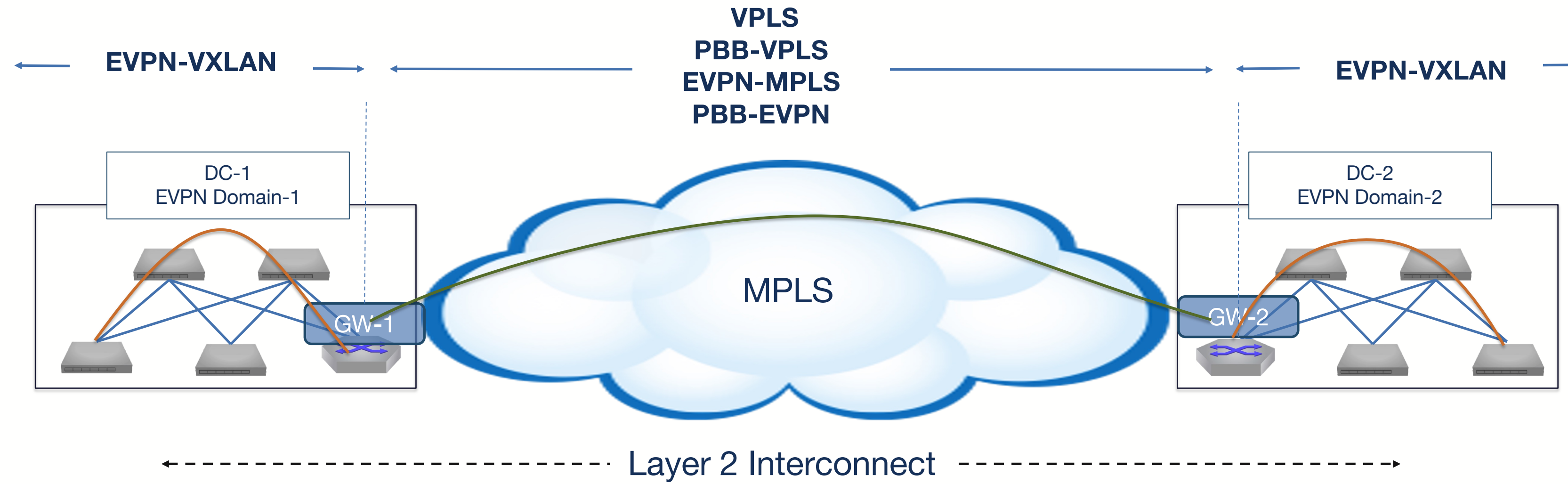
EVPN Protocol



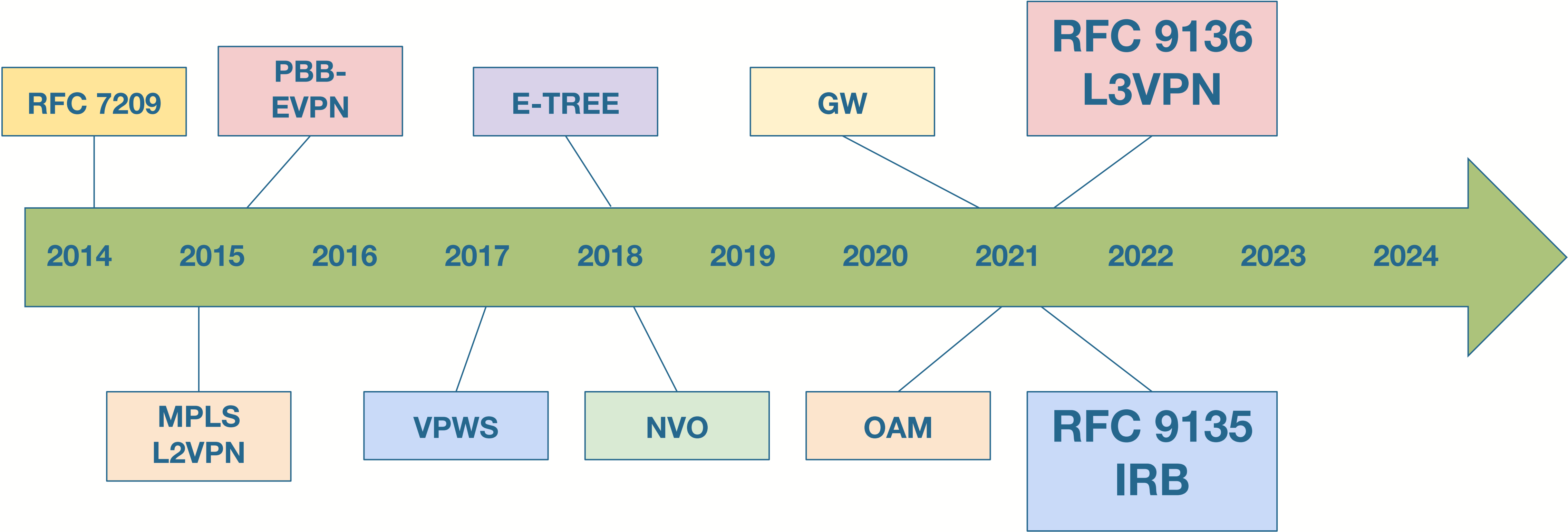
EVPN - Interconnect Solutions



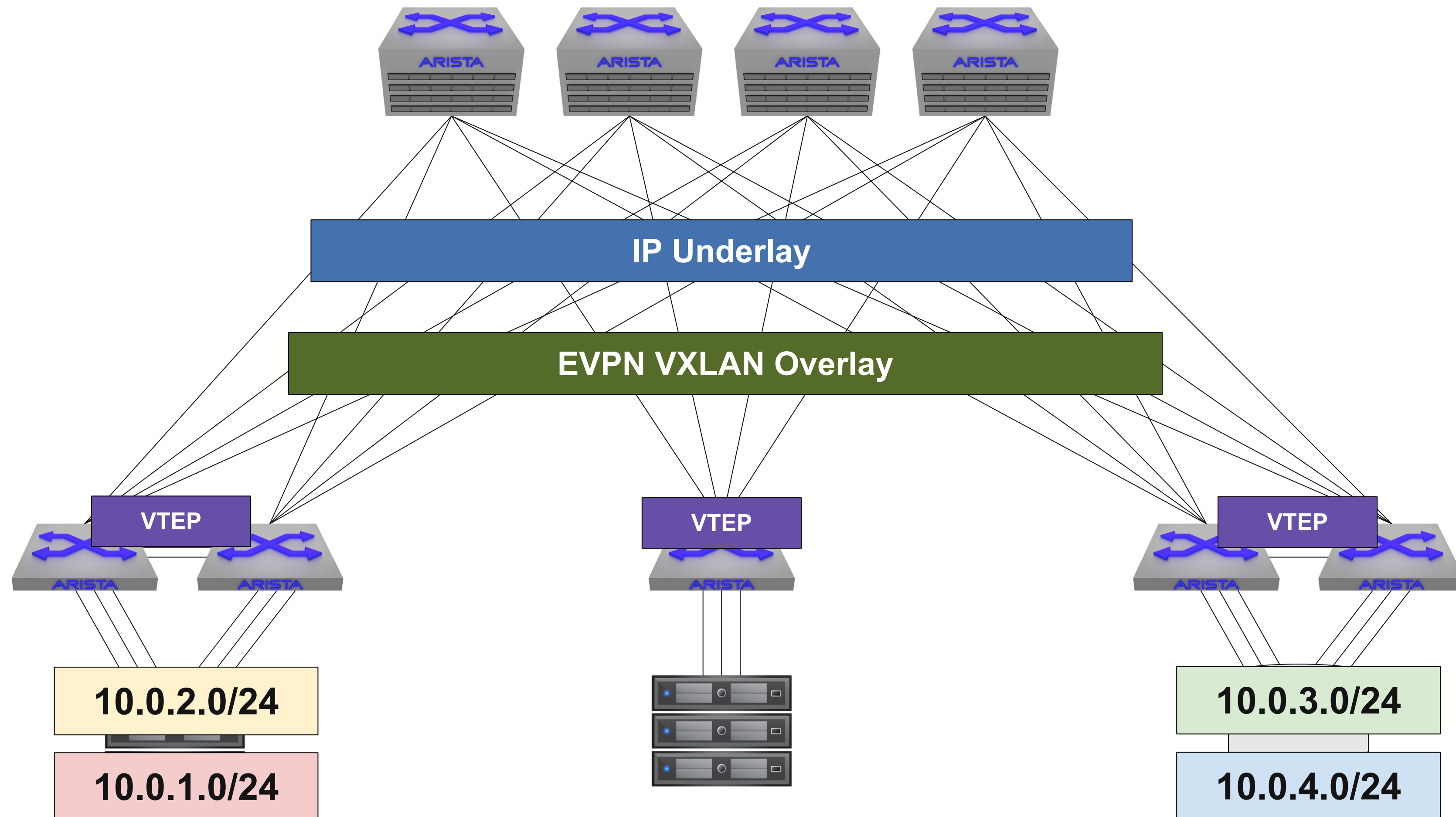
EVPN - Interconnect Solutions



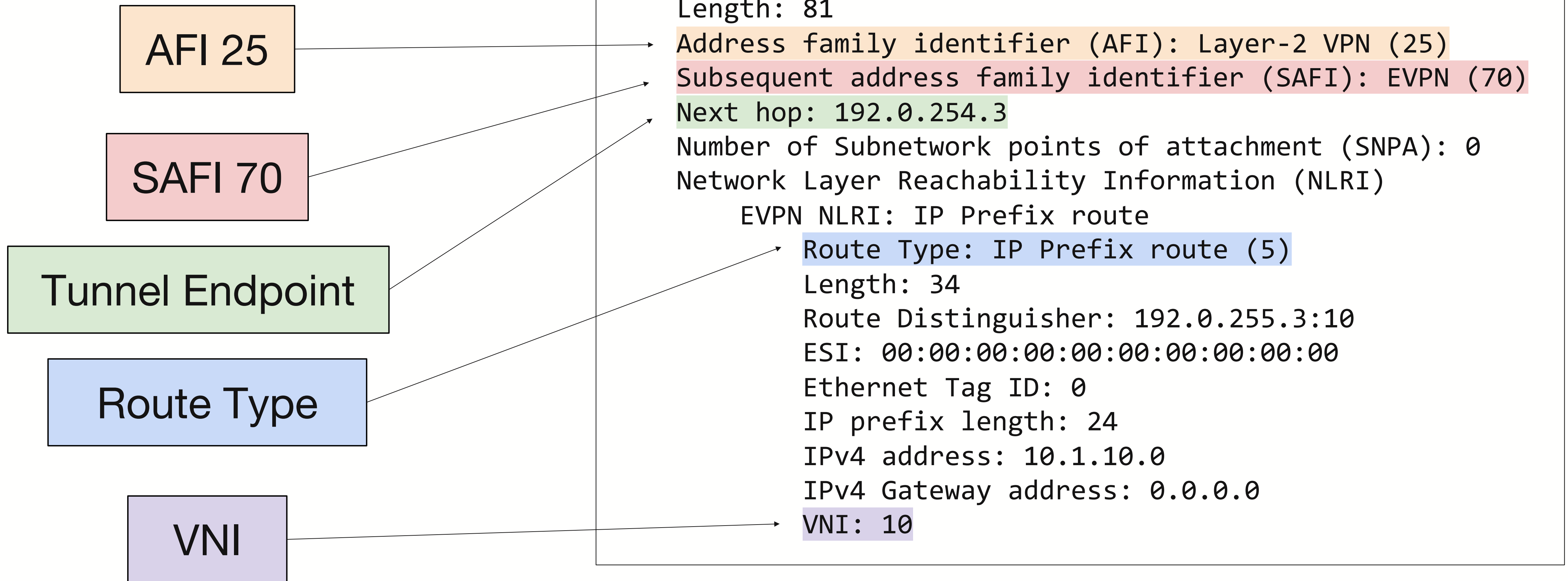
EVPN - L3VPN and IRB



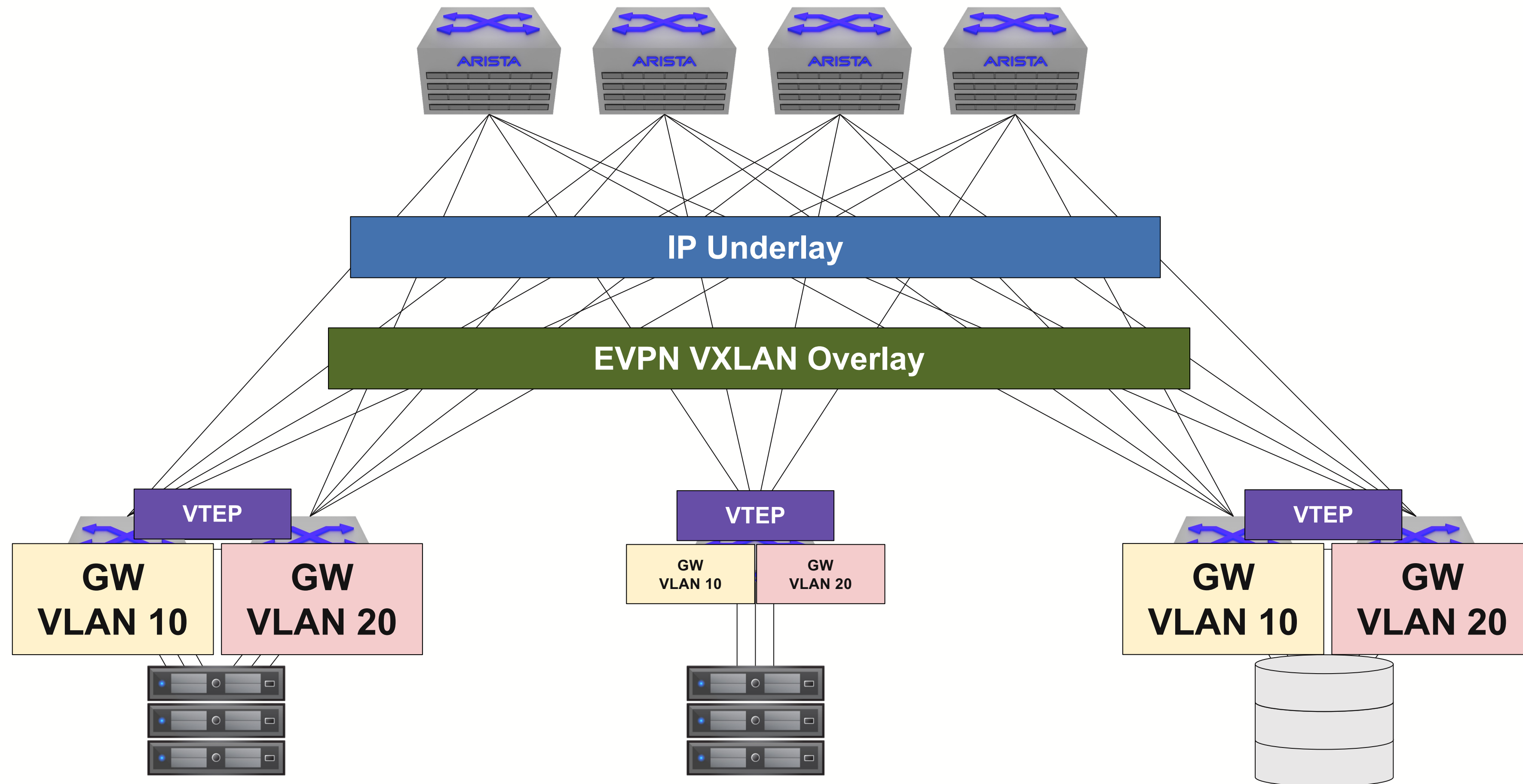
EVPN - L3VPN



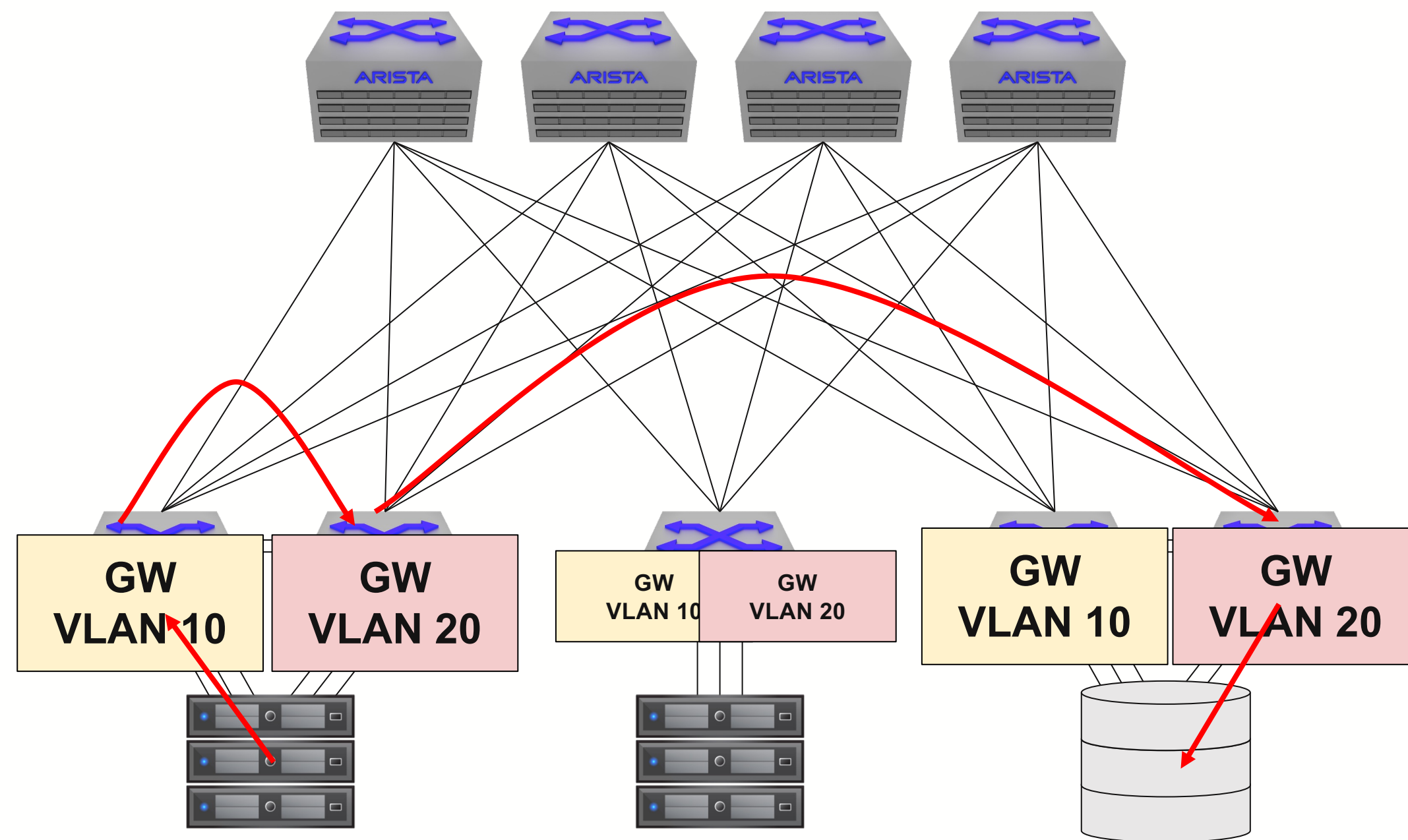
EVPN Route Type 5



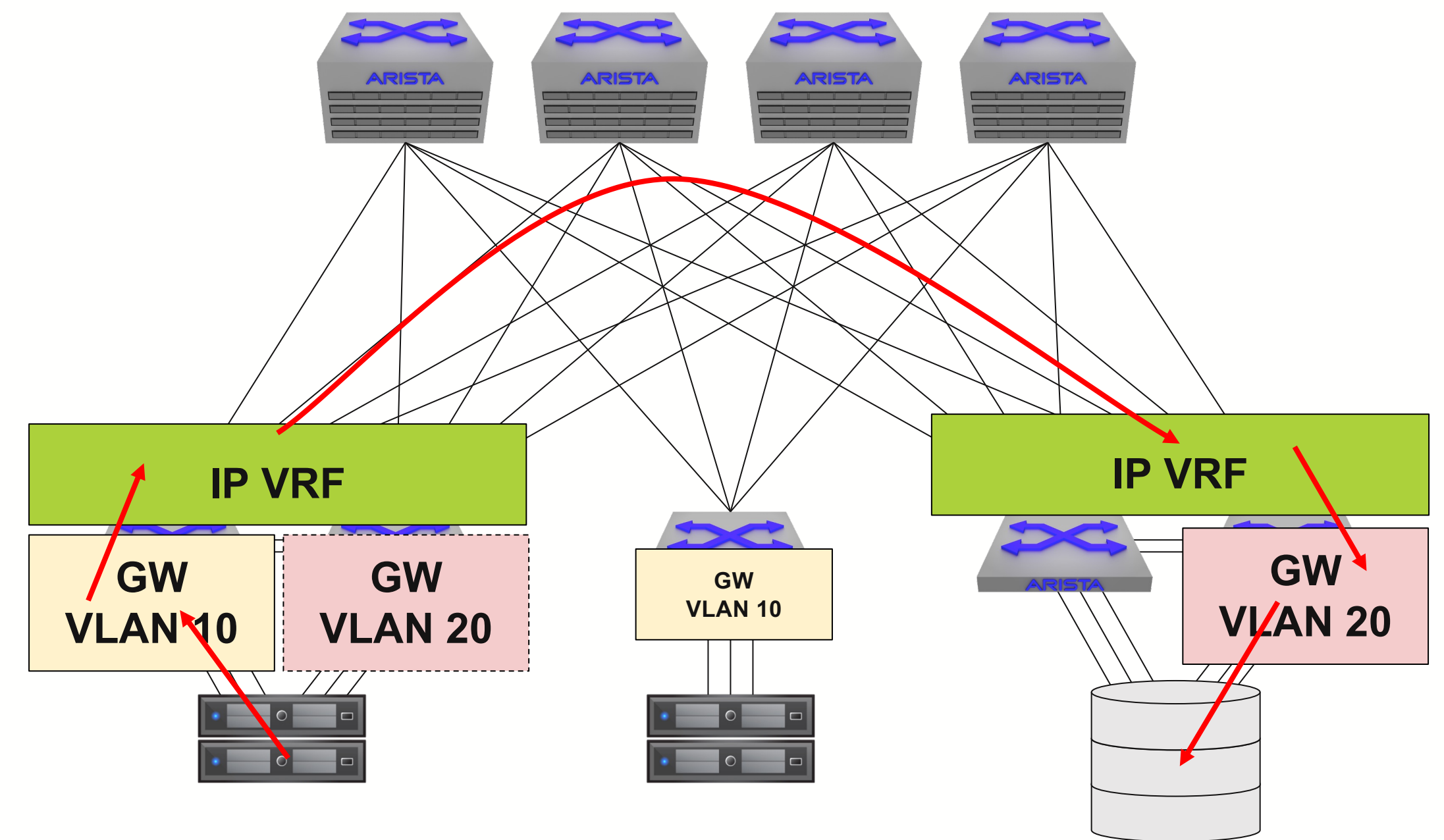
EVPN – Integrated Routing and Bridging



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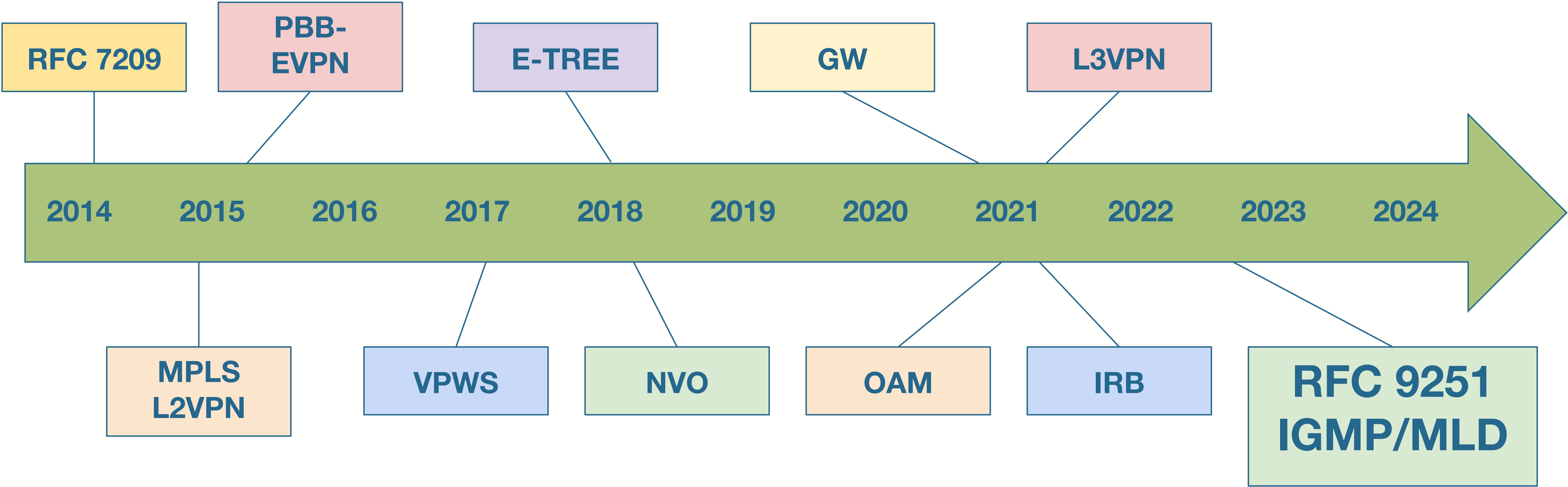


Asymmetric IRB

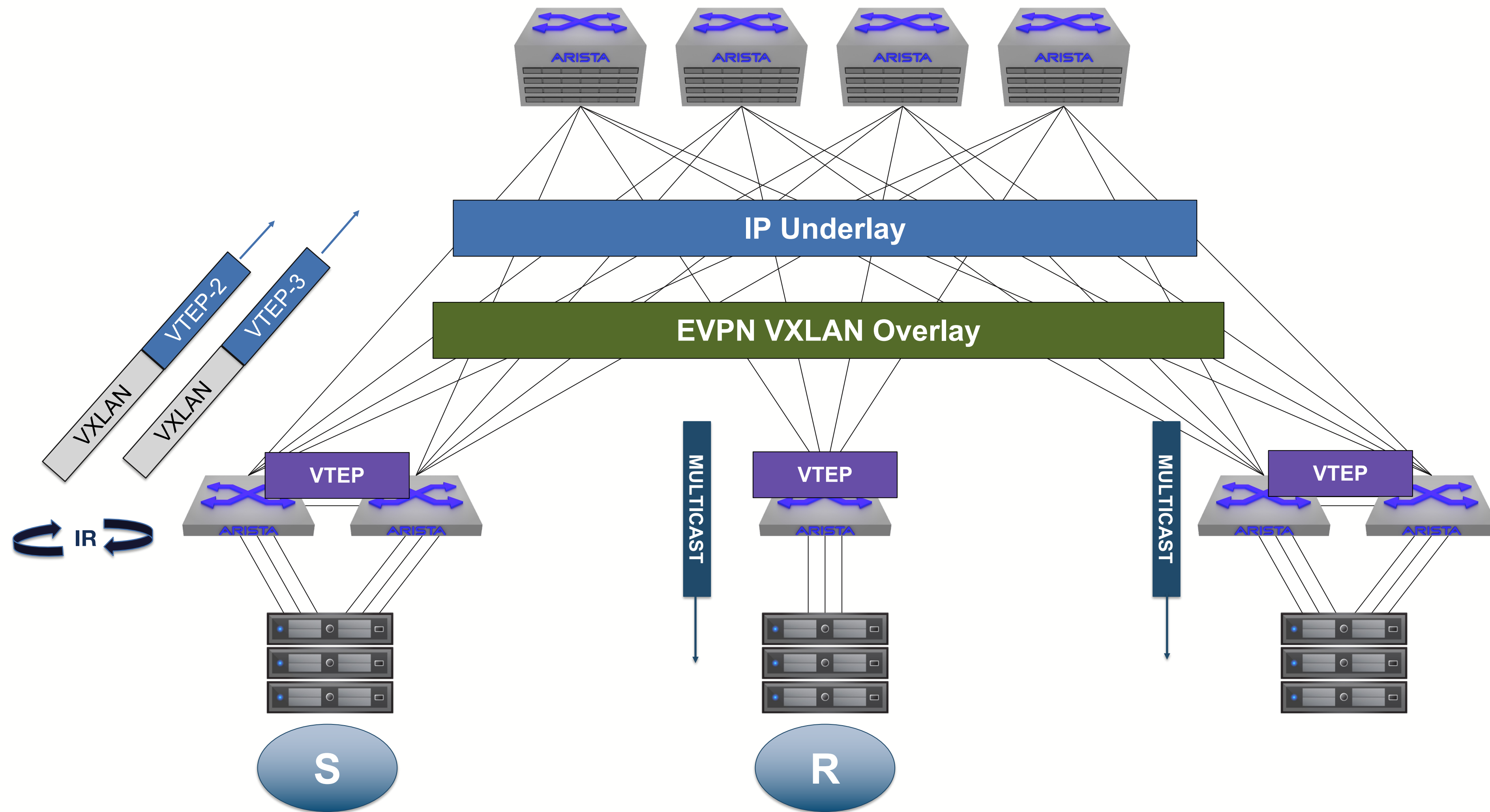


Symmetric IRB

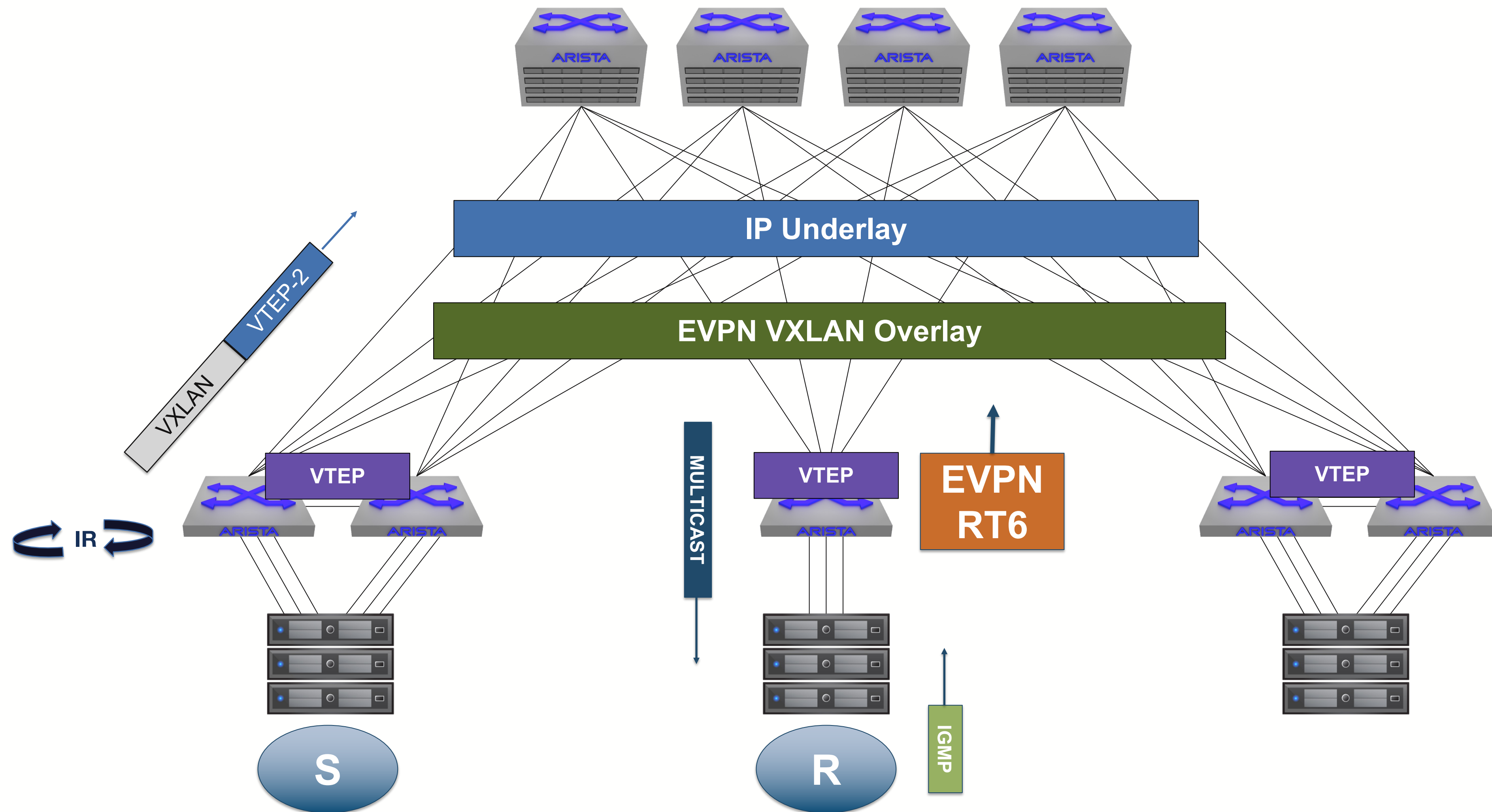
EVPN - Multicast



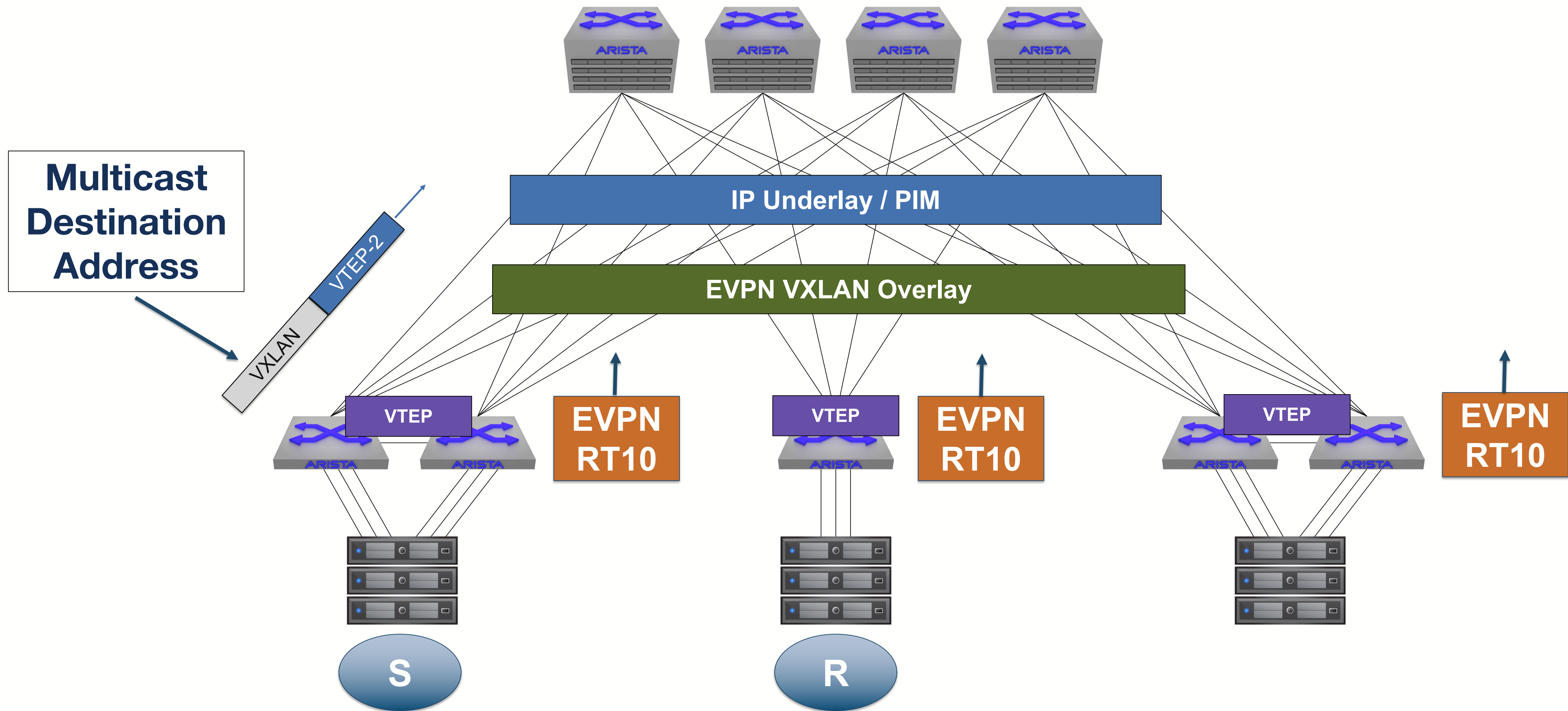
Multicast forwarding without EVPN multicast



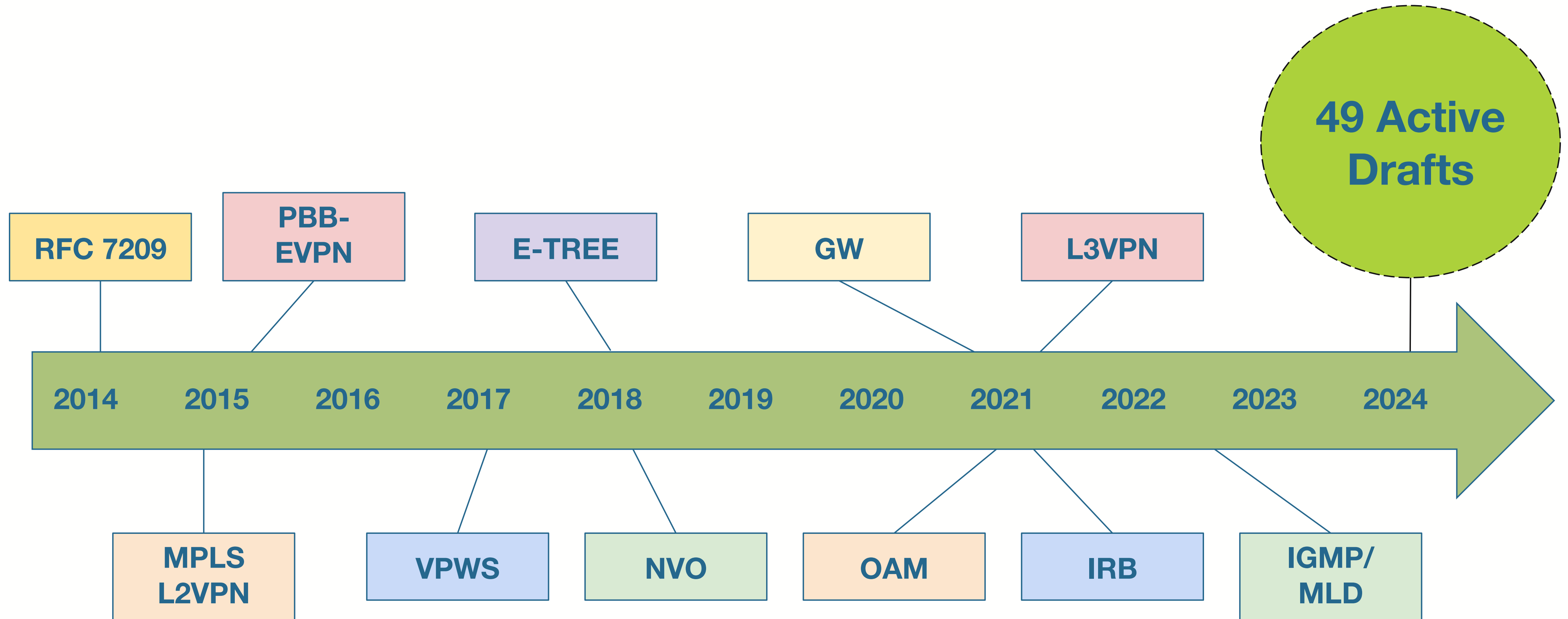
EVPN - IGMP Proxy – Route type 6



EVPN – PIM in the Underlay – Route Type 10



The Future of EVPN



EVPN Interop Testing at EANTC

EUROPEAN ADVANCED NETWORKING TEST CENTER

ARISTA

Calnex

ciena®


CISCO™

ERICSSON 



 highstreet
technologies
Network solutions


HUAWEI

JUNIPER
NETWORKS

 KEYSIGHT

 MICROCHIP

NOKIA

 ribbon®

ZTE

EVPN GW – EANTC EVPN GW interop testing

- Extensive RFC 9014 multi-vendor interop testing
 - Early testing focused on WAN/MPLS GW solution
 - Now multi-vendor support for multiple encapsulations (MPLS and VLANs)
 - Verified EVPN GW for both MPLS and VXLAN encapsulations
 - Industry direction for EVPN scaling and DCI

2017 Interop testing
EVPN-VXLAN to EVPN-MPLS GW Interconnect

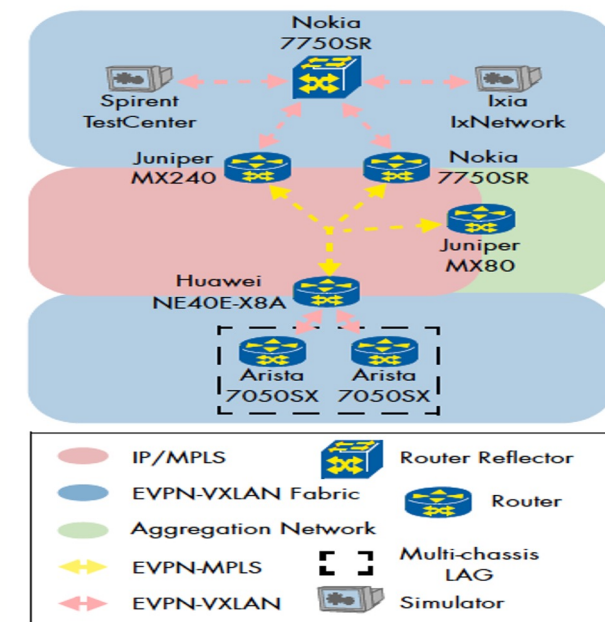


Figure 8: EVPN-VXLAN and EVPN-MPLS Interworking

2018 Interop testing
EVPN-VXLAN to EVPN-MPLS GW Interconnect

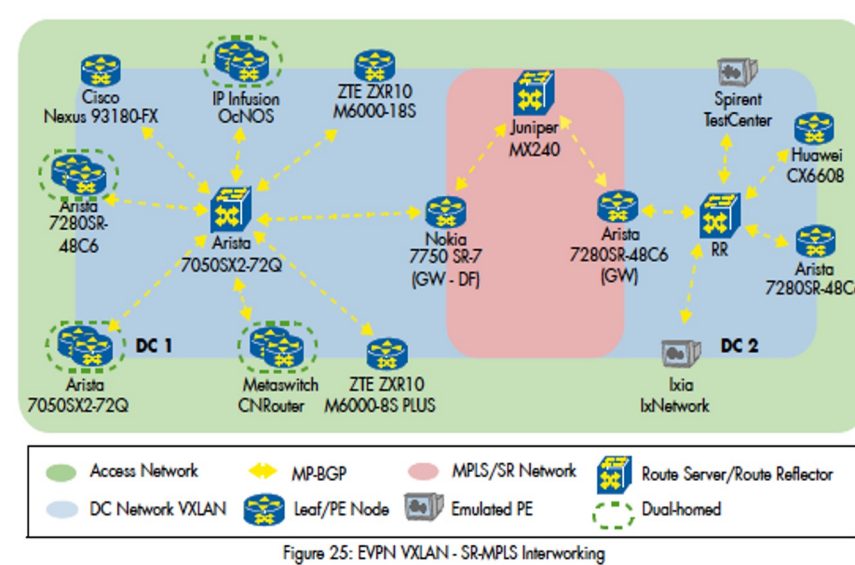


Figure 25: EVPN VXLAN - SR-MPLS Interworking

2019 Interop testing
EVPN-VXLAN to EVPN-MPLS GW Interconnect

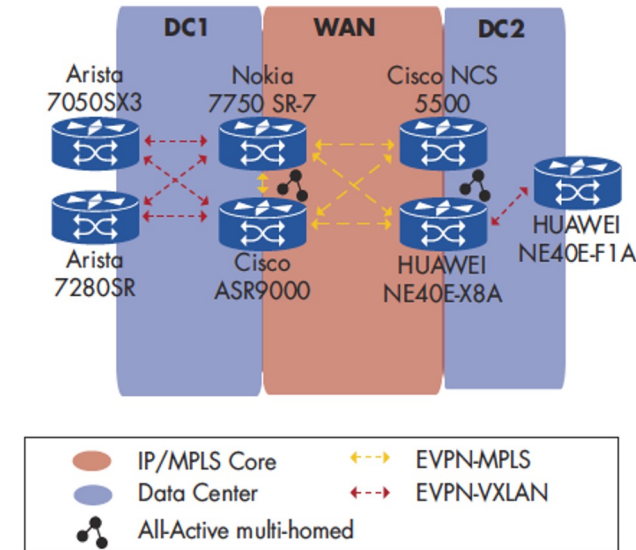
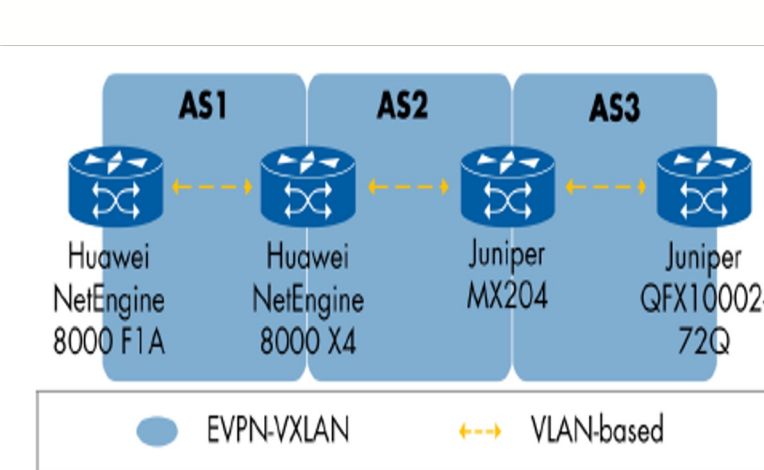


Figure 15: EVPN-VXLAN and EVPN-MPLS Interworking

2020 Interop testing
EVPN-VXLAN to EVPN-VXLAN GW Interconnect



2021 Interop testing
EVPN-VXLAN to EVPN-VXLAN GW Interconnect

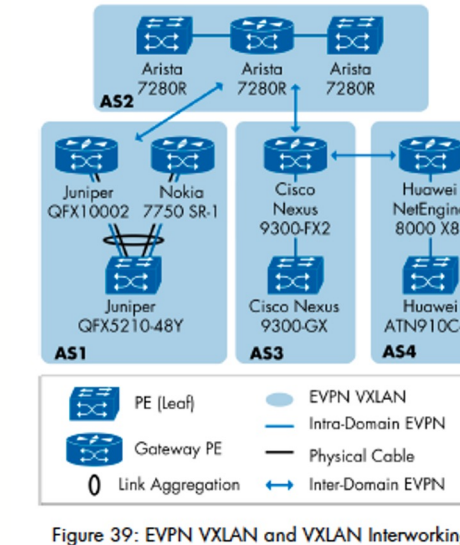
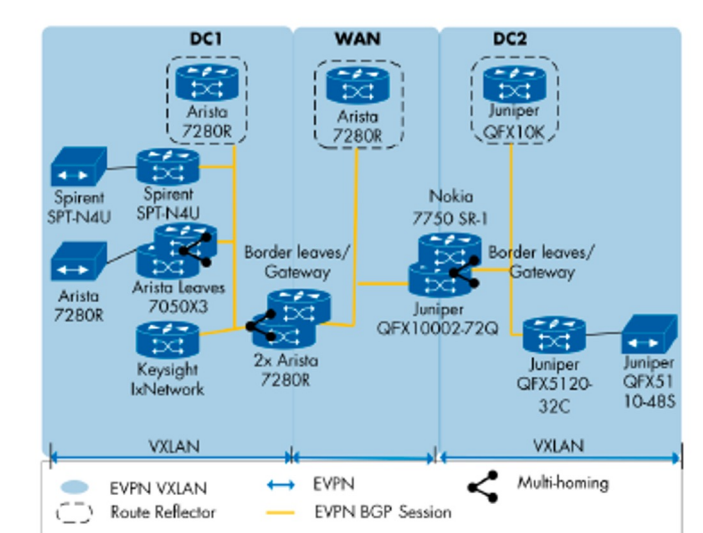


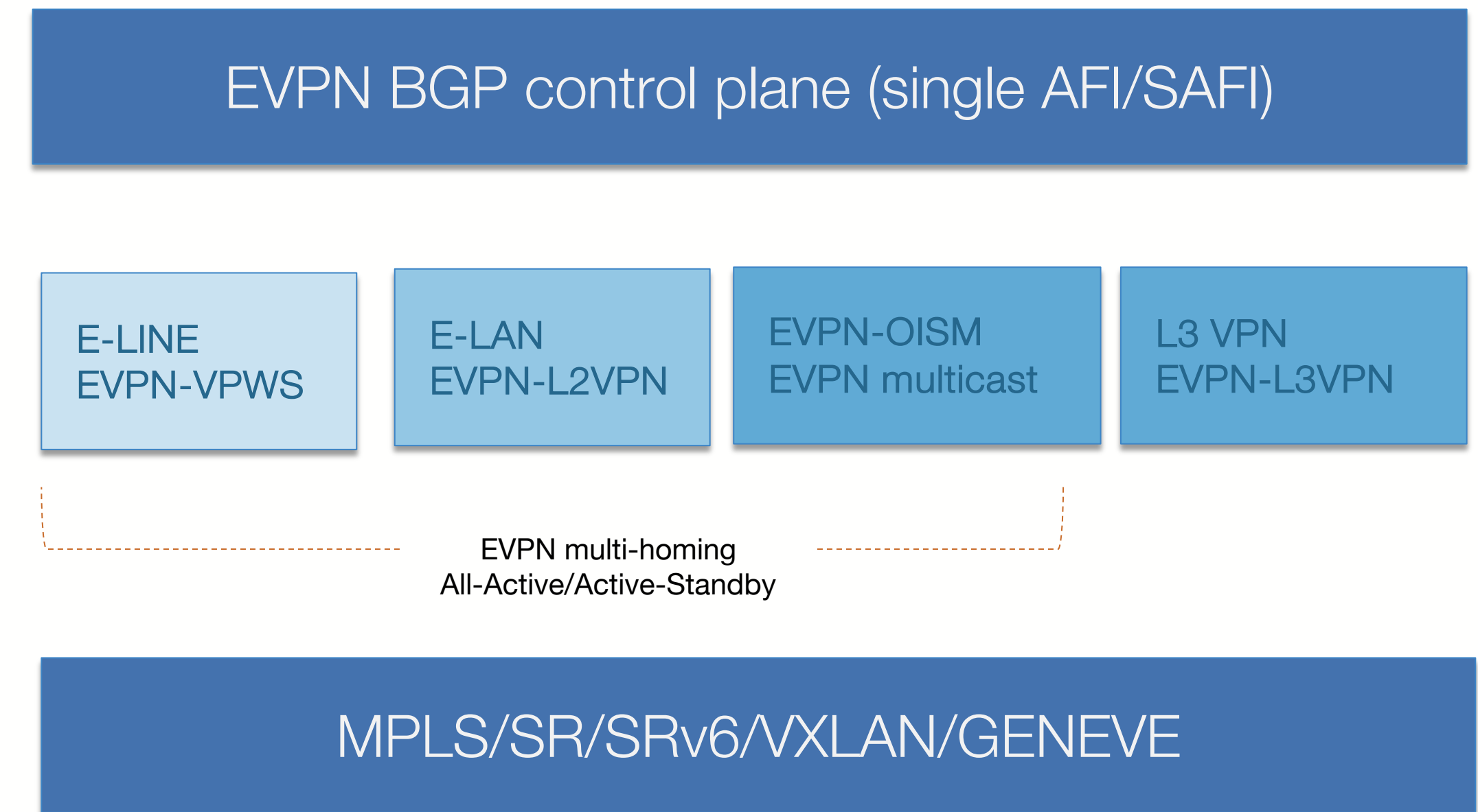
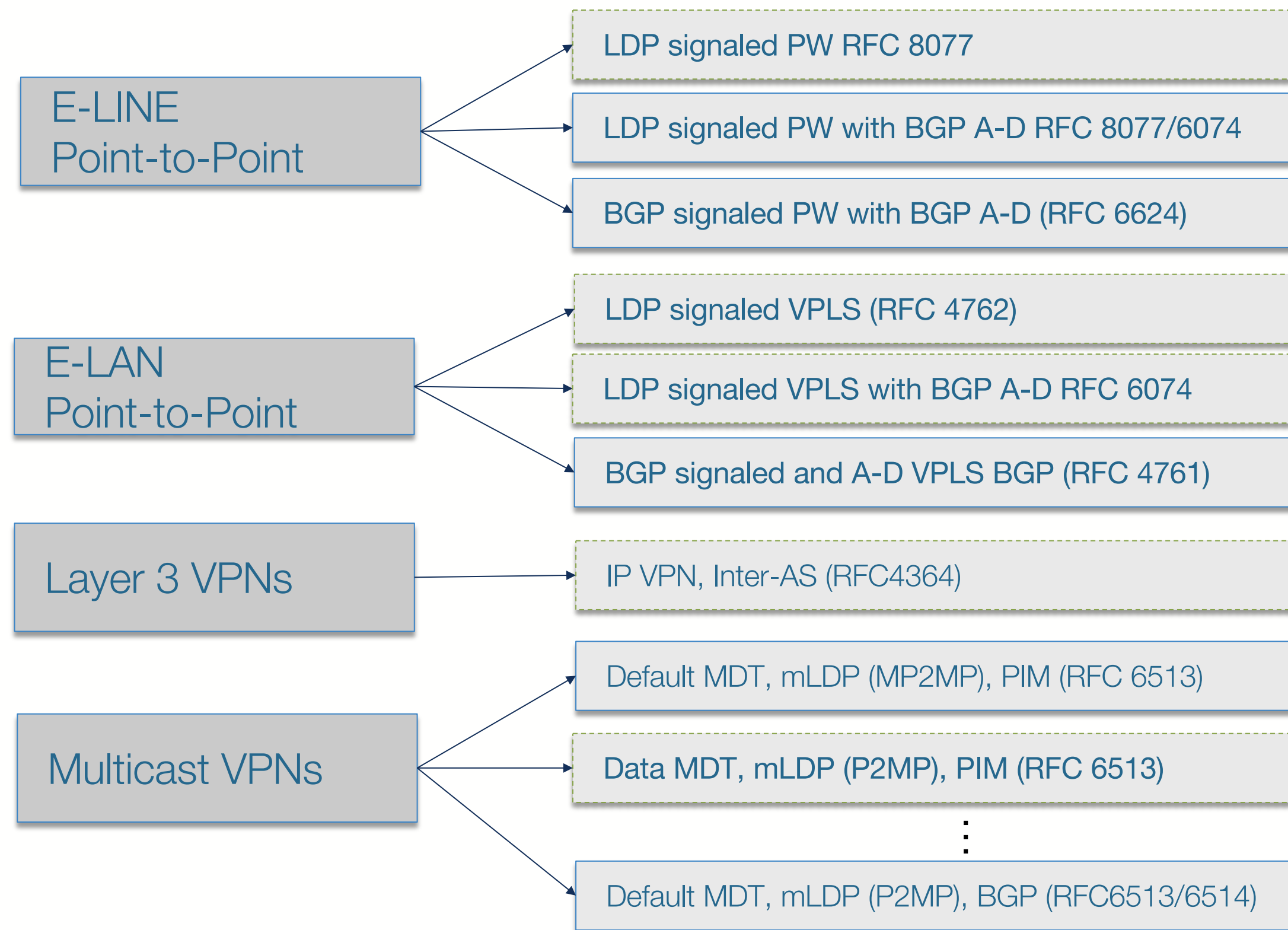
Figure 39: EVPN VXLAN and VXLAN Interworking

2022 Interop testing
EVPN-VXLAN to EVPN-VXLAN GW Interconnect



Multi-vendor support, industry direction is RFC 9014

What did we get... Simplification



Overly complex, multiple signaling protocols, BGP AFs each with vendor specific implementations

Simplify, single BGP AF and EVPN control plane for all layer 2 and 3 services types

Thank You

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