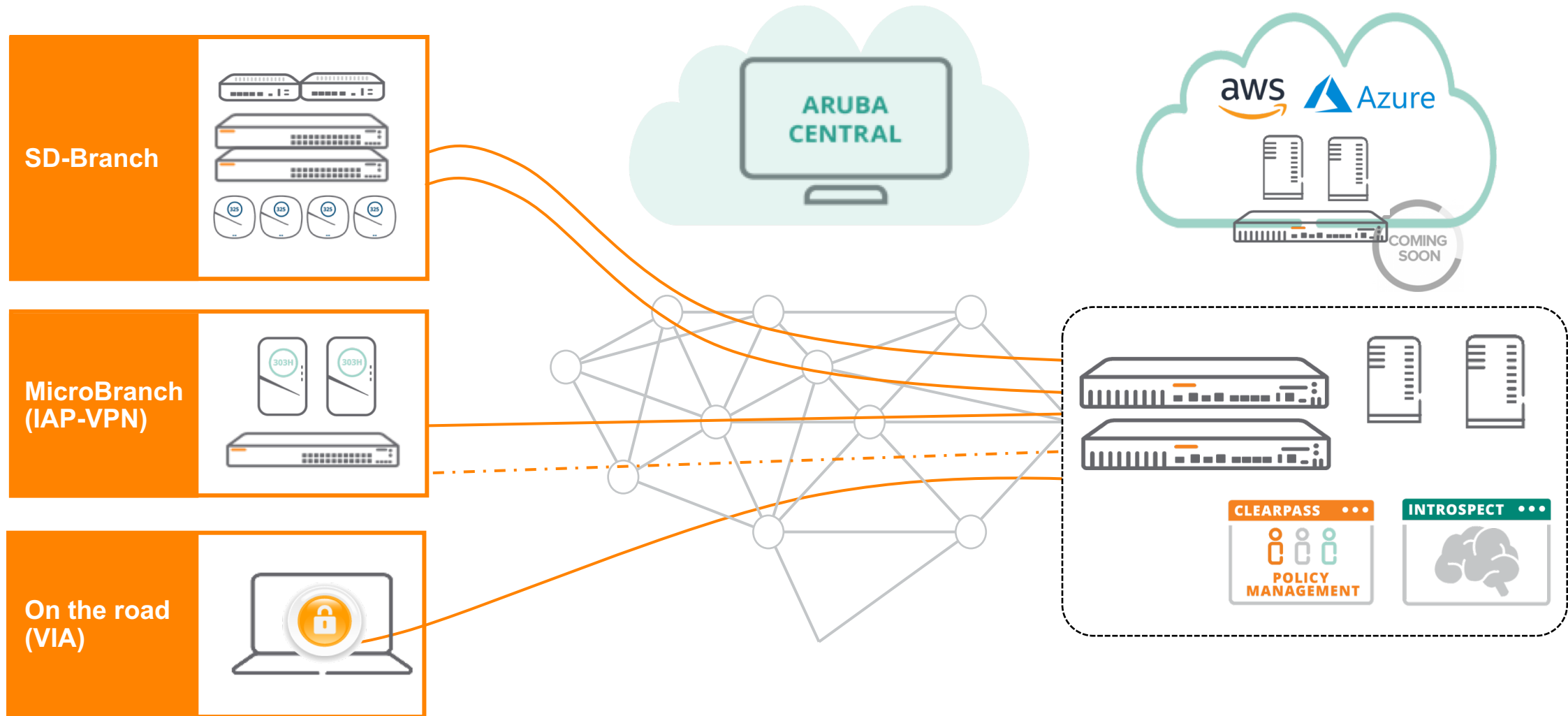


Aruba SD-Branch

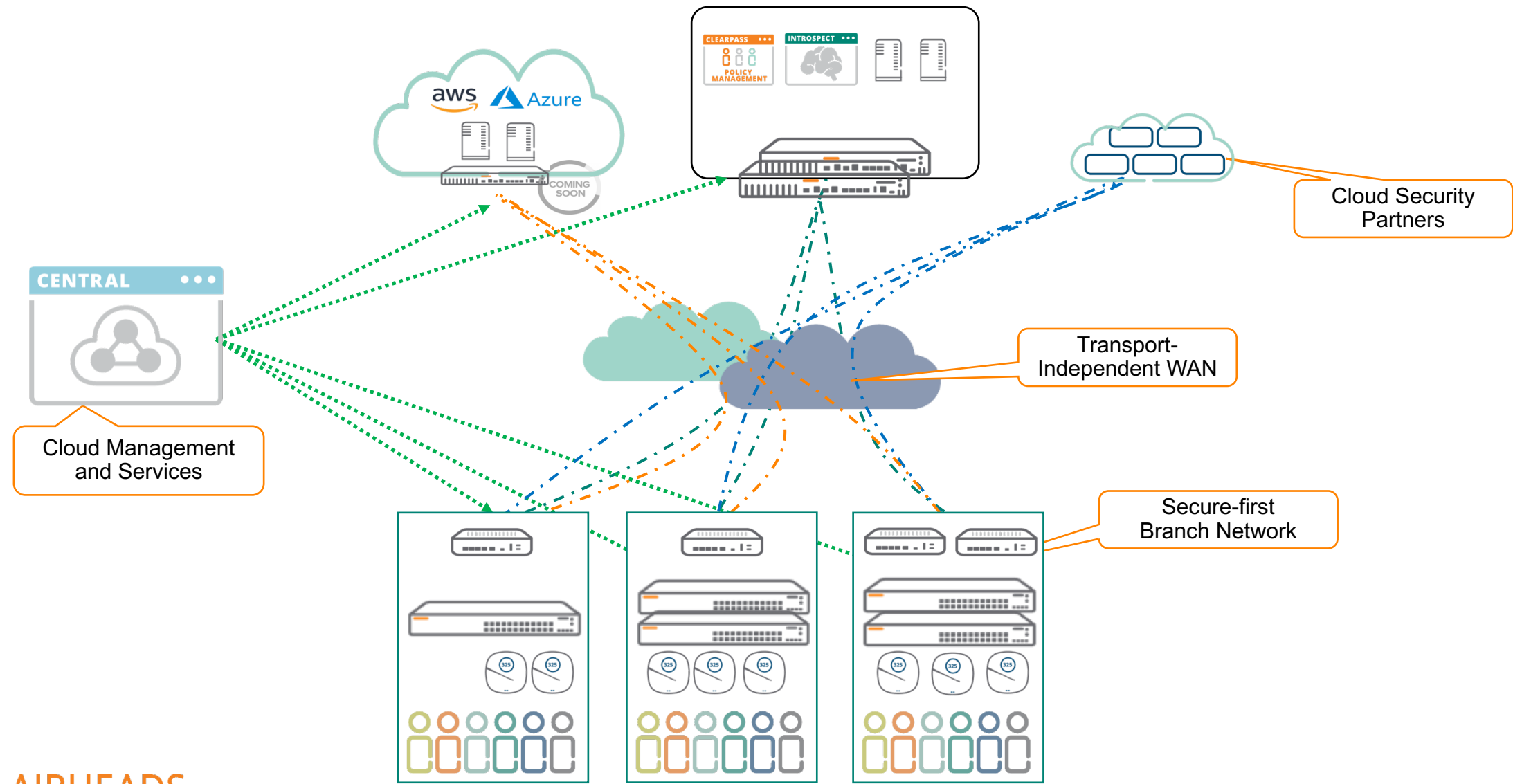
John Schaap
john.schaap@hpe.com

14 November 2018

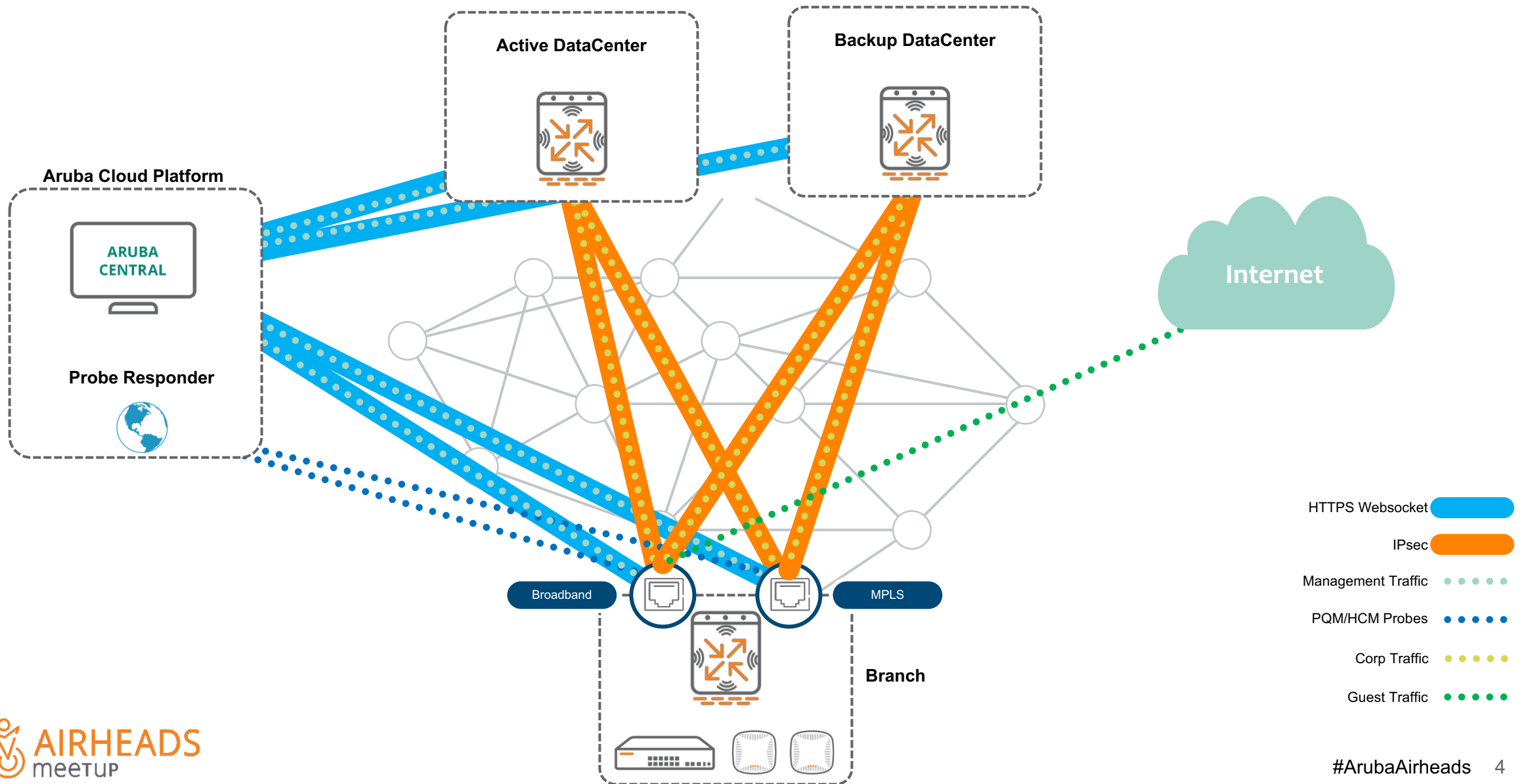
Aruba Distributed Architectures



Aruba SD-Branch solution

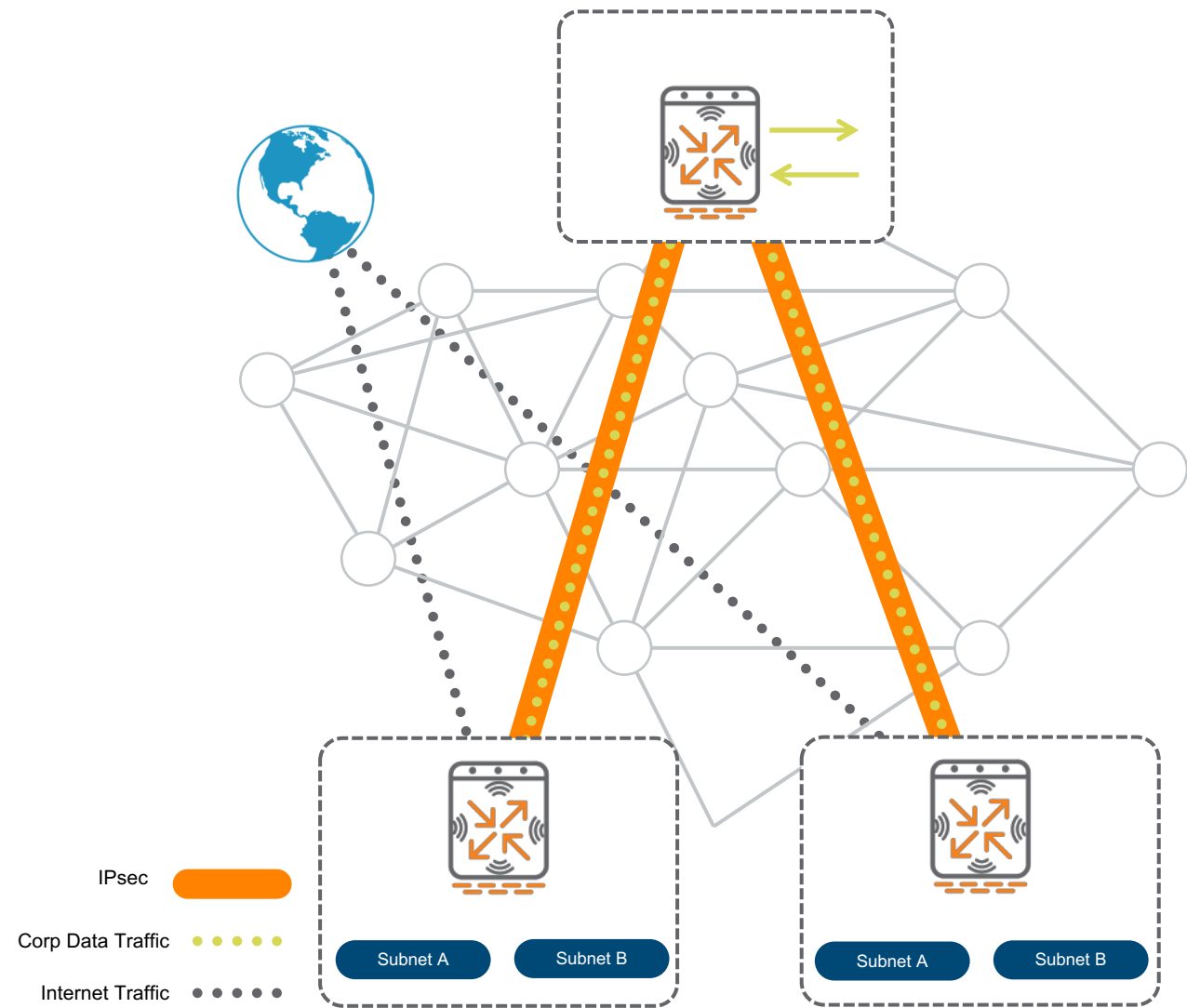


Overview Architecture



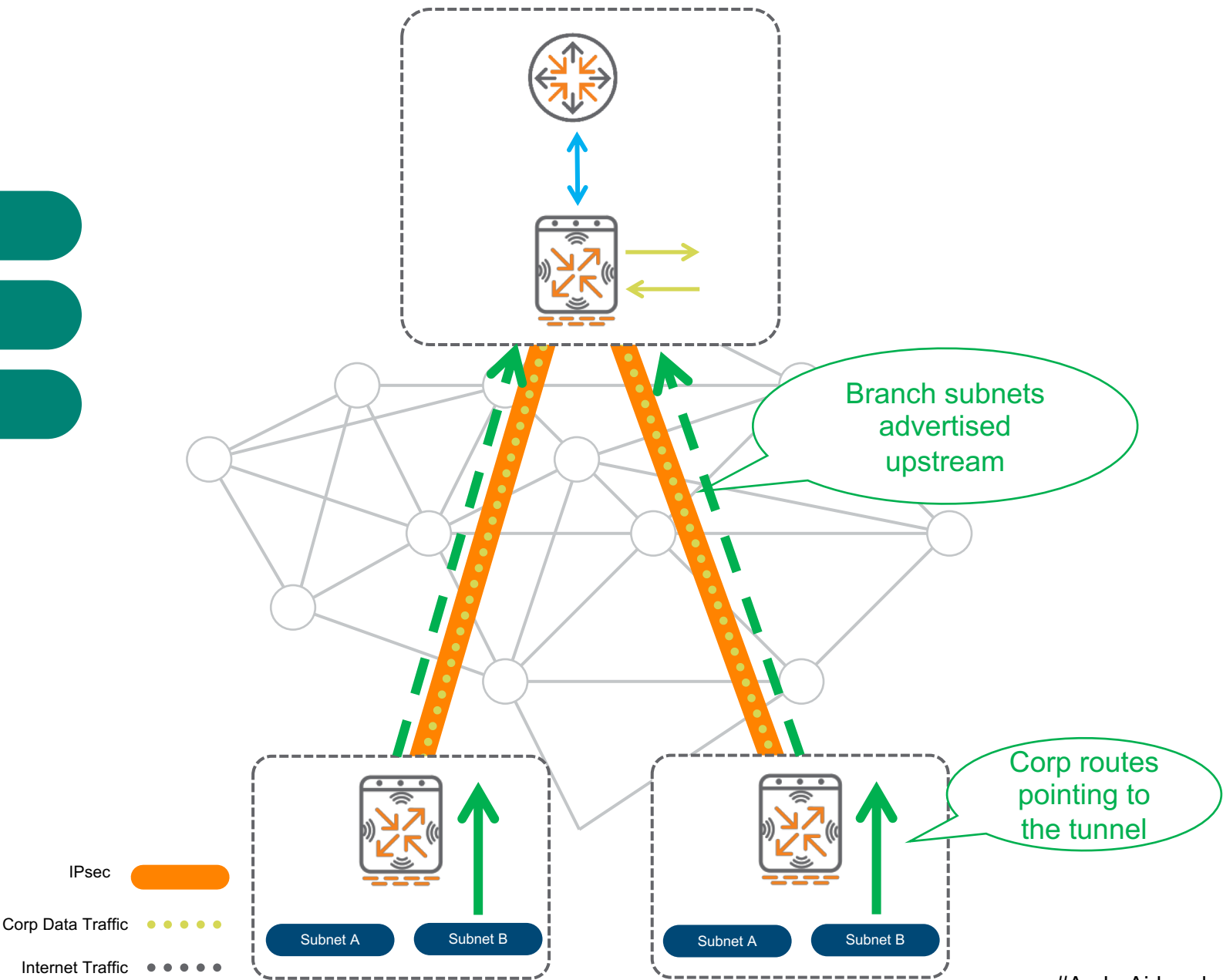
Step 1: Build a secure overlay

Automatic tunnel establishment



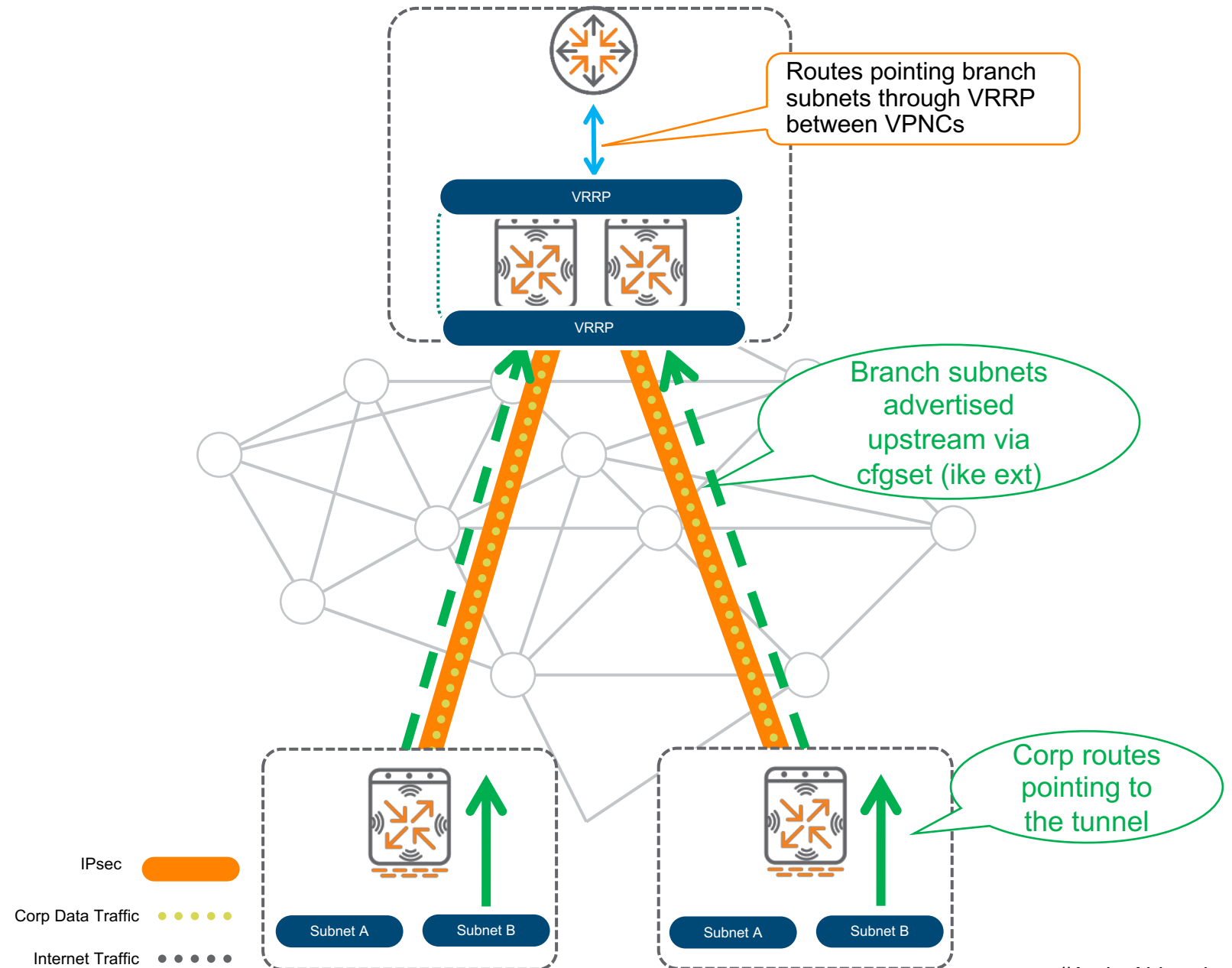
Auto Hub & Spoke

- 1 Bring UP tunnels
- 2 Advertise branch subnets
- 3 Add routes to tunnels



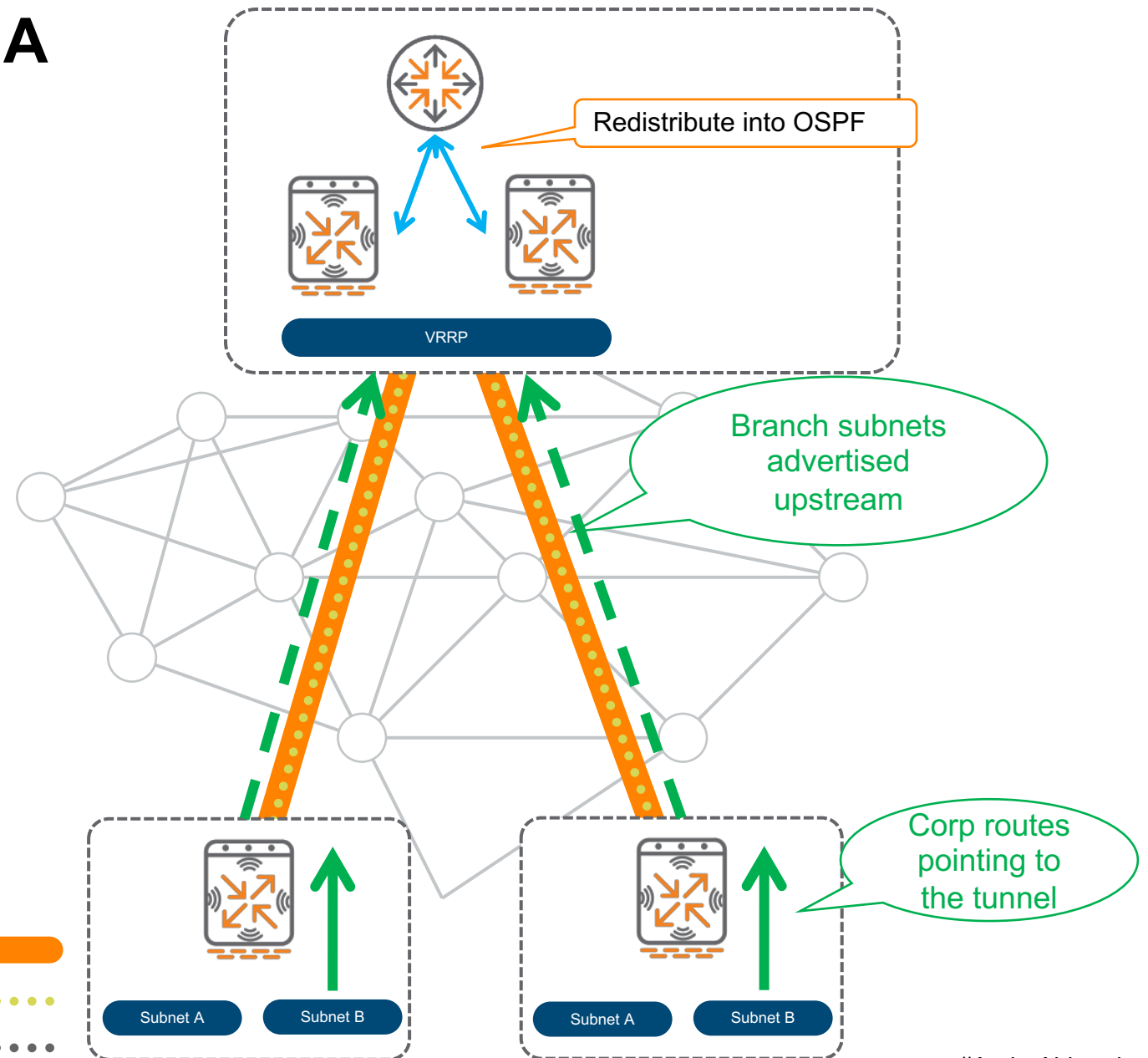
Single DC L2 HA

Using static routes

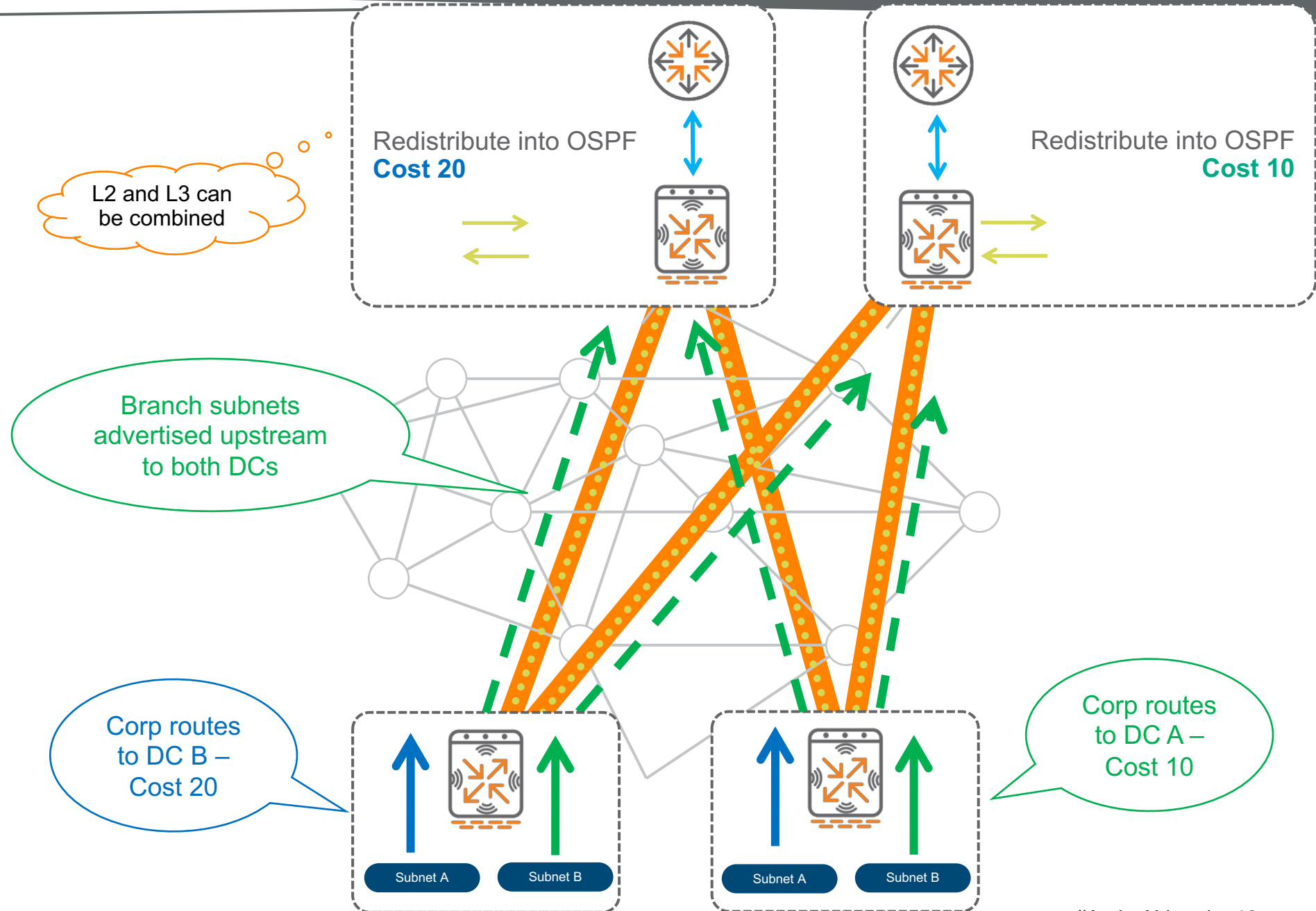


Auto Hub & Spoke – L2 HA

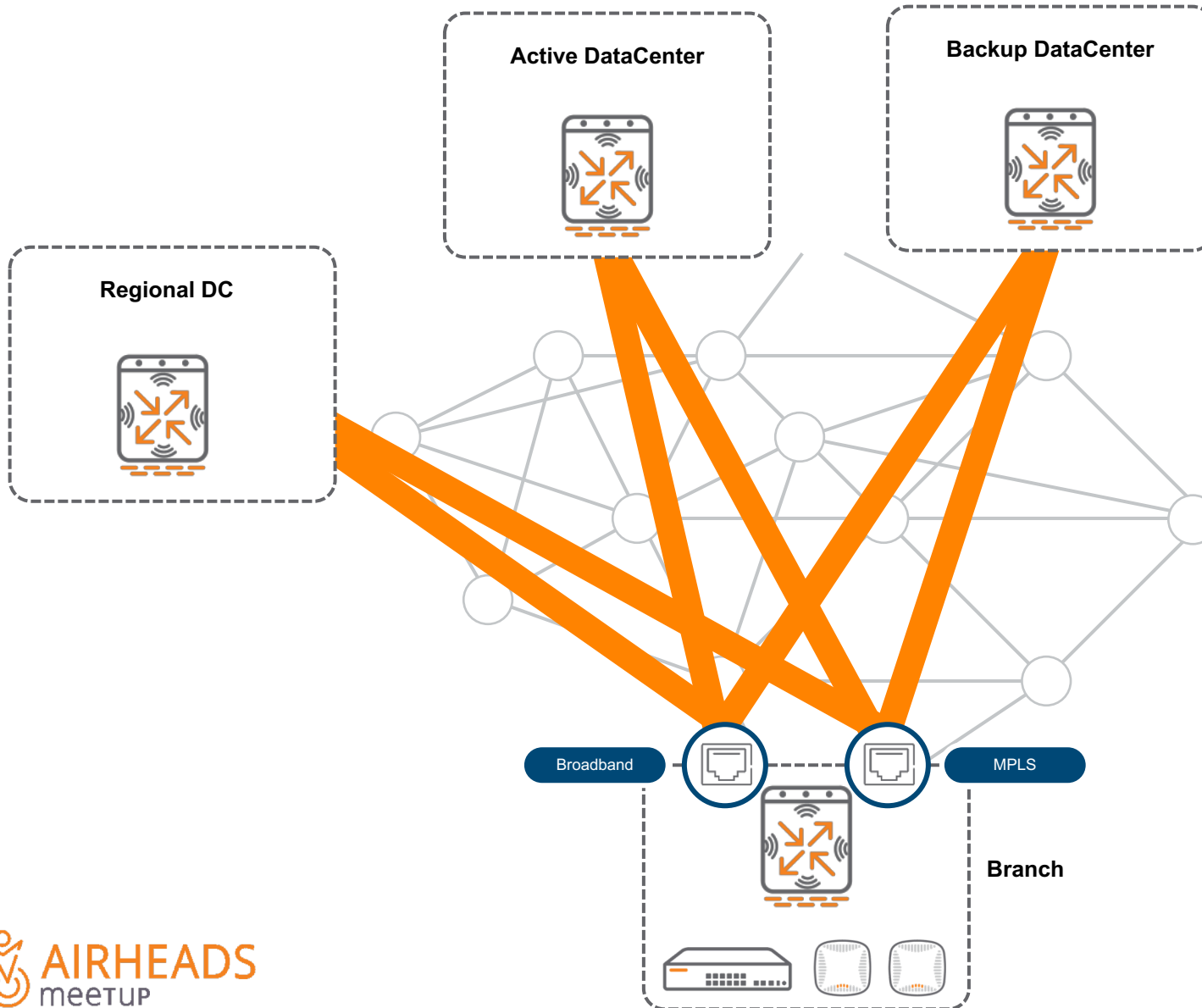
- 1 VRRP between 2 VPNCs
- 2 Track uplink interface/VLAN
- 3 Preempt? – use with caution (and delay)



Multiple hubs



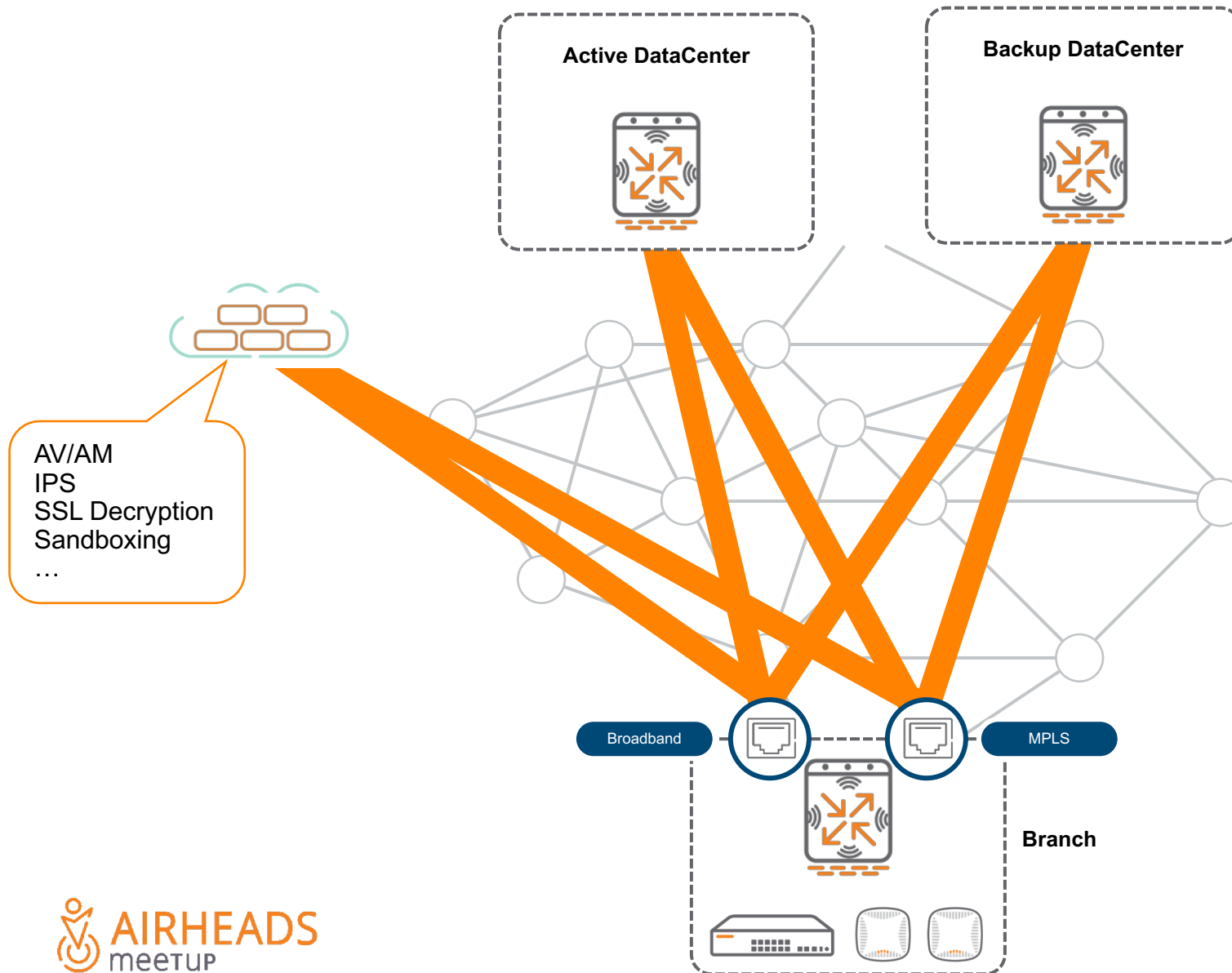
Regional Hubs



1 More specific route to regional DC

2 Routes only redistributed locally or exported with high cost

Cloud Services integration



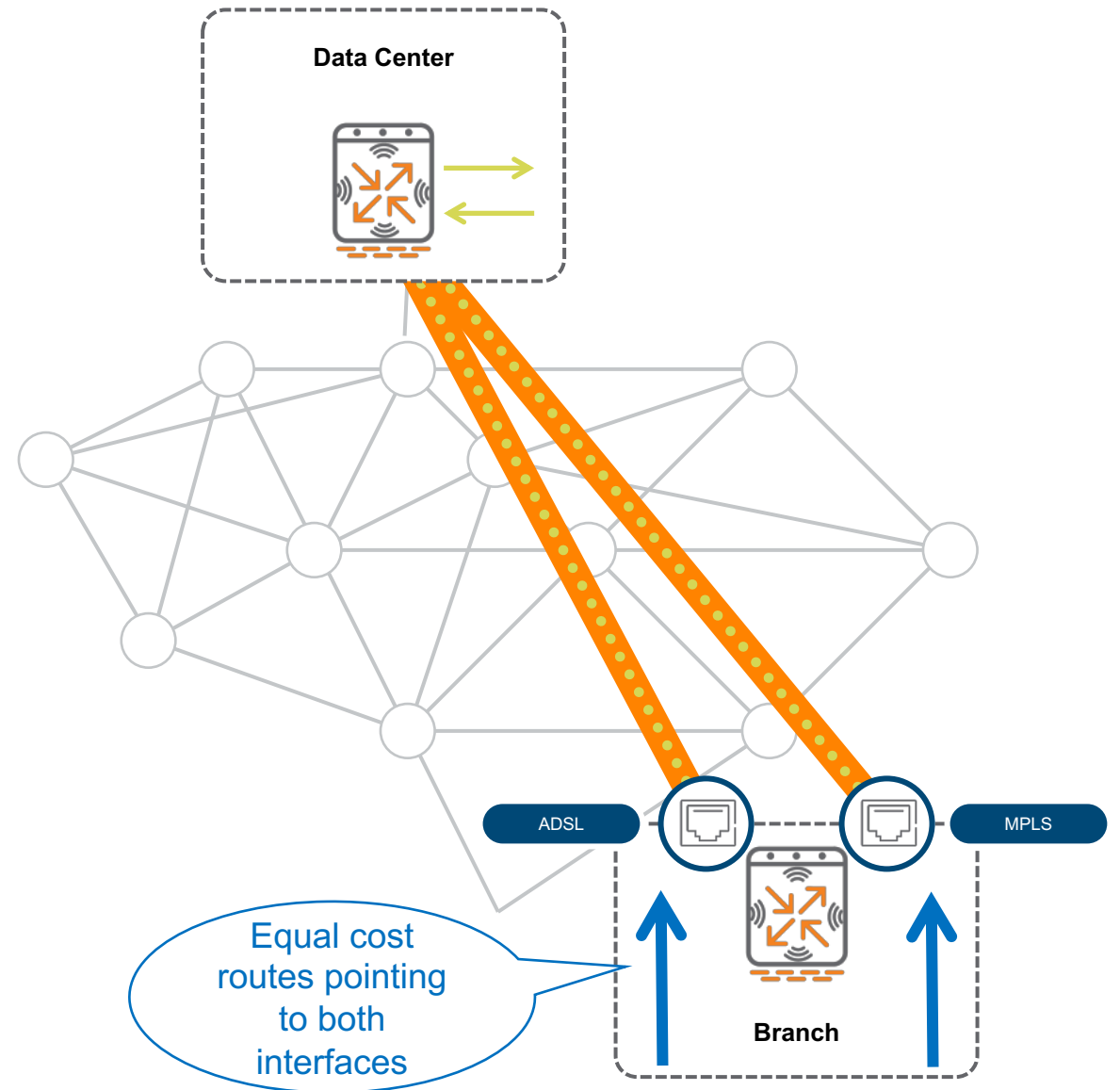
- 1 Set tunnel to Zscaler (site-to-site)
- 2 Create PBR policy to force traffic through ZScaler
- 3 Route advertisement not needed. Zscaler pins the session to the link it came from.

Step 2: Uplink load-balancing

Split-Tunnel – Local peel off

Only for reference – Config is GUI-based

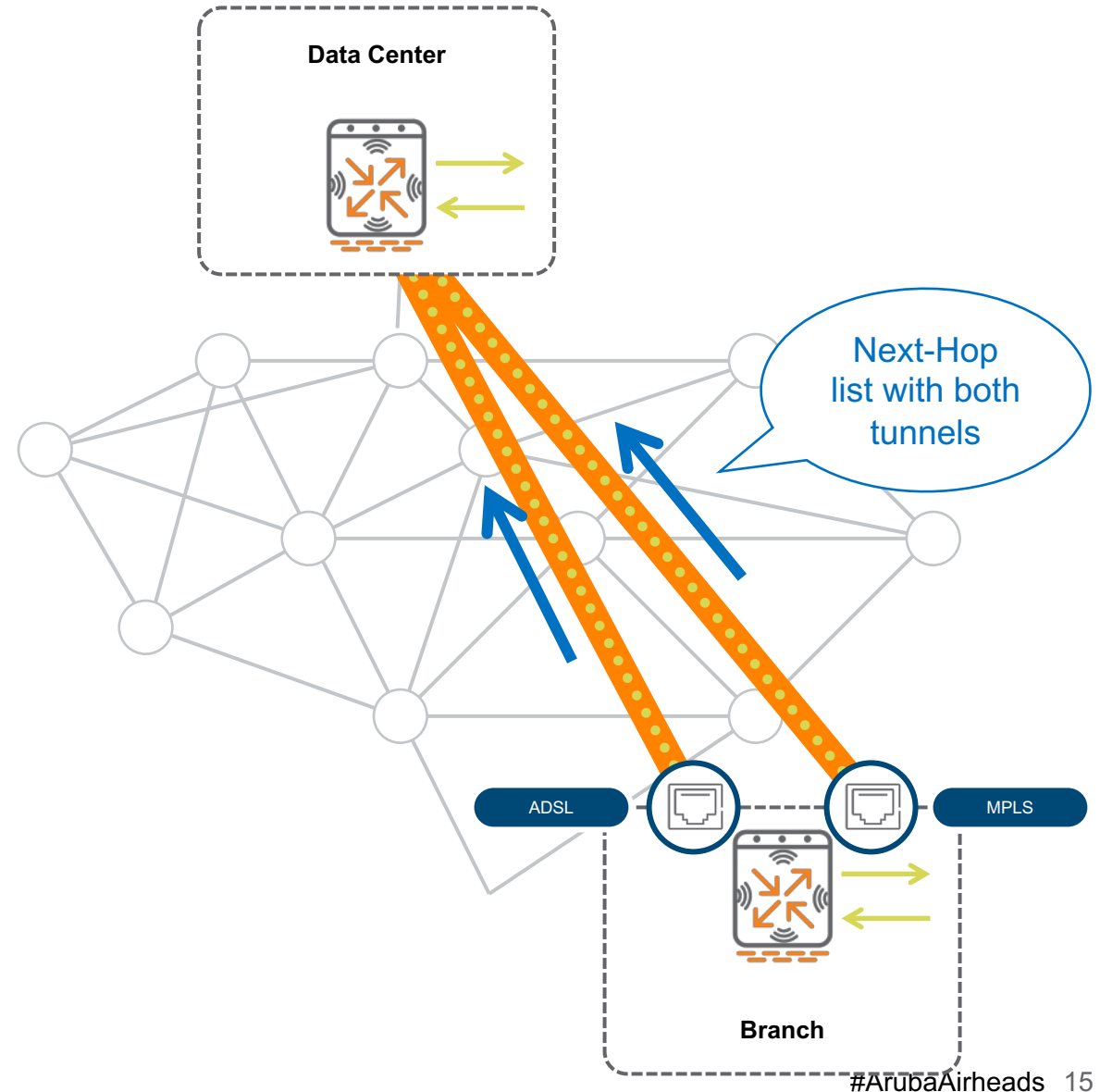
```
!  
ip route 10.0.0.0 255.0.0.0 route tun-vpnc1-mpls 10  
ip route 10.0.0.0 255.0.0.0 route tun-vpnc1-adsl 10  
!  
ip default-gateway mpls-gw  
ip default-gateway adsl-gw  
!
```



Full-Tunnel

Only for reference – Config is GUI-based

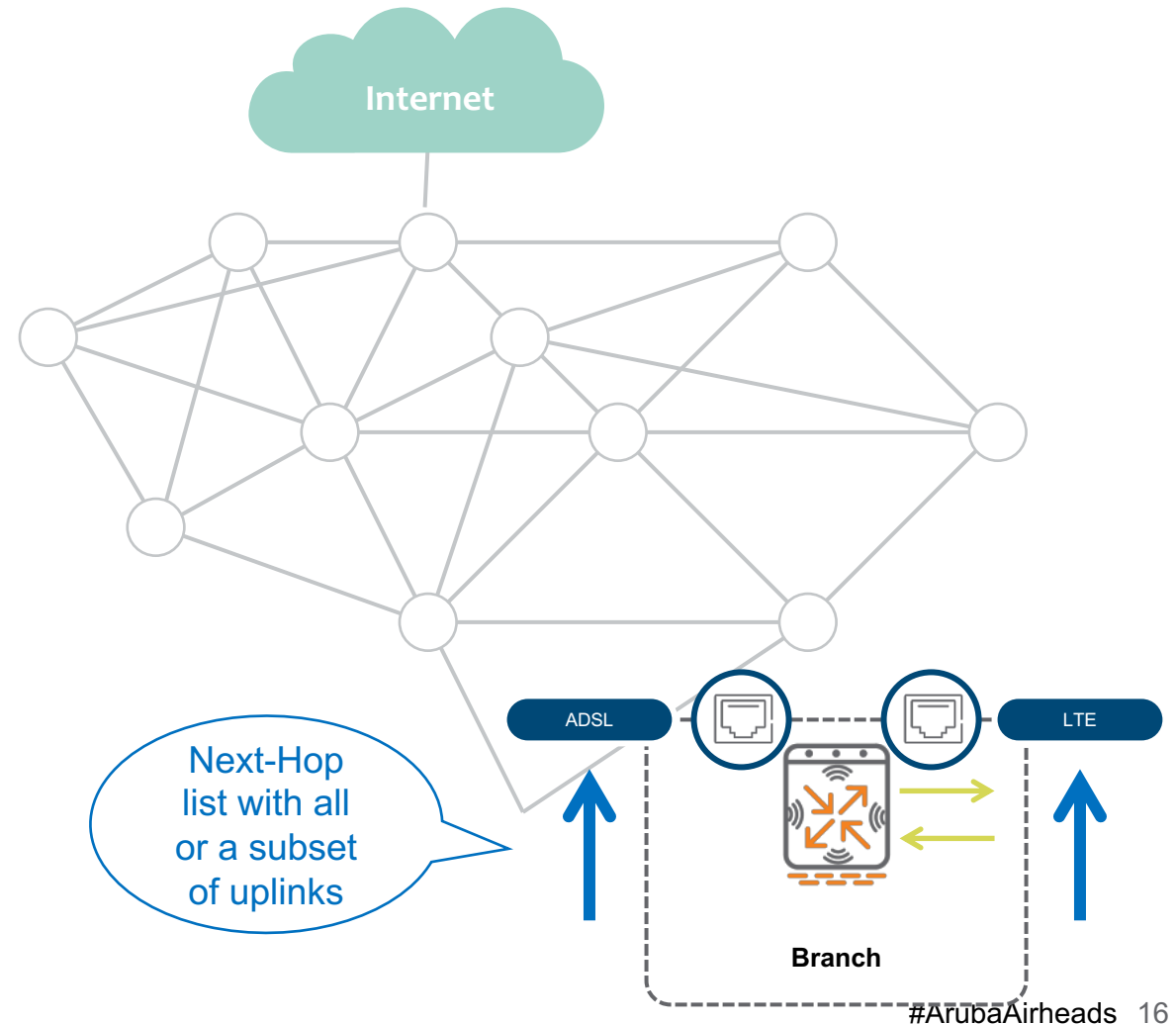
```
ip nexthop-list full-tunnel
 ipsec-map vpnc1-adsl priority 100
 ipsec-map vpnc1-mpls priority 100
 ipsec-map vpnc2-adsl priority 50
 ipsec-map vpnc2-mpls priority 50
!
ip access-list route full-tunnel
 alias local-net alias local-net any forward
 any any any route next-hop-list full-tunnel
!
user-role POS
 access-list session POS
 access-list route full-tunnel
```



Local-breakout

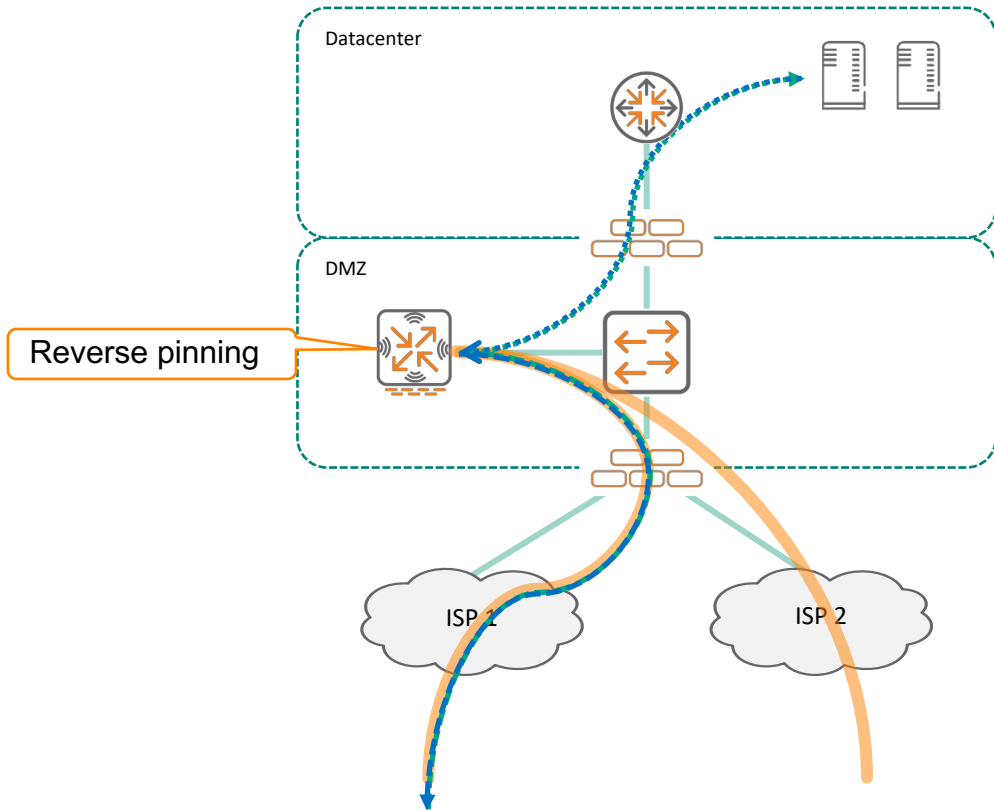
Only for reference – Config is GUI-based

```
ip nexthop-list local-breakout
  ip dhcp vlan 4093 priority 100
  ip dhcp vlan 4094 priority 100
!
!
ip access-list route local-breakout
  alias local-net alias local-net any forward
  any any any route next-hop-list local-breakout
!
user-role guest
  access-list session guest
  access-list route local-breakout
```



Not so fast: DC Architectures...

Datacenter Topologies – Single Armed VPNC



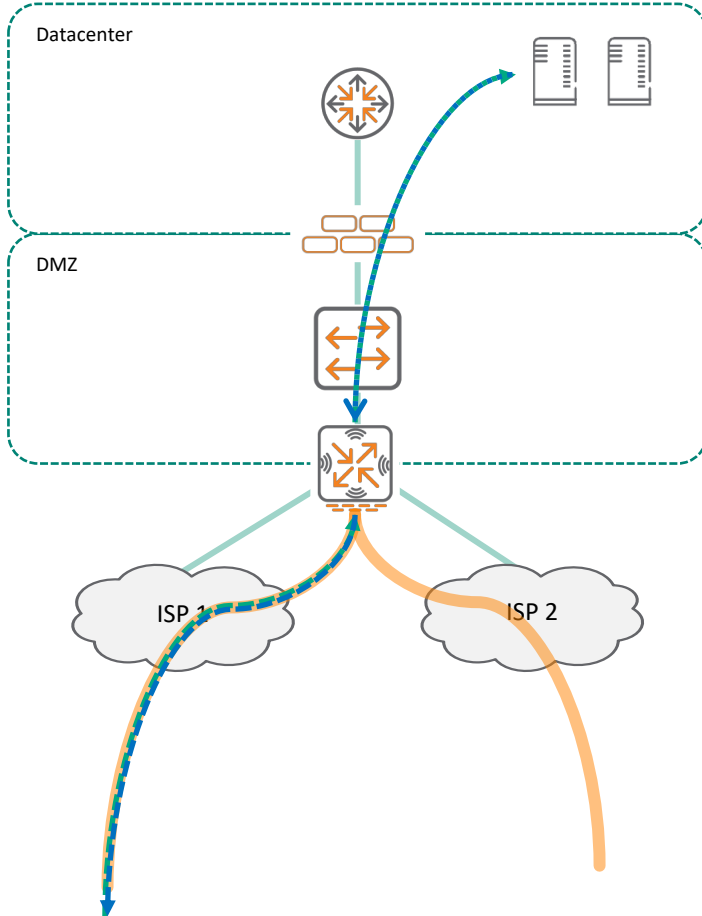
1

Traffic comes into VPNC from tunnel A

2

Reverse pinning - Traffic goes back through the original tunnel

Detail about Reverse-pinning (applies to all topologies)



Branch-initiated traffic

- 1 Traffic comes into VPNC from tunnel A
- 2 Reverse pinning - Traffic goes back through the original tunnel

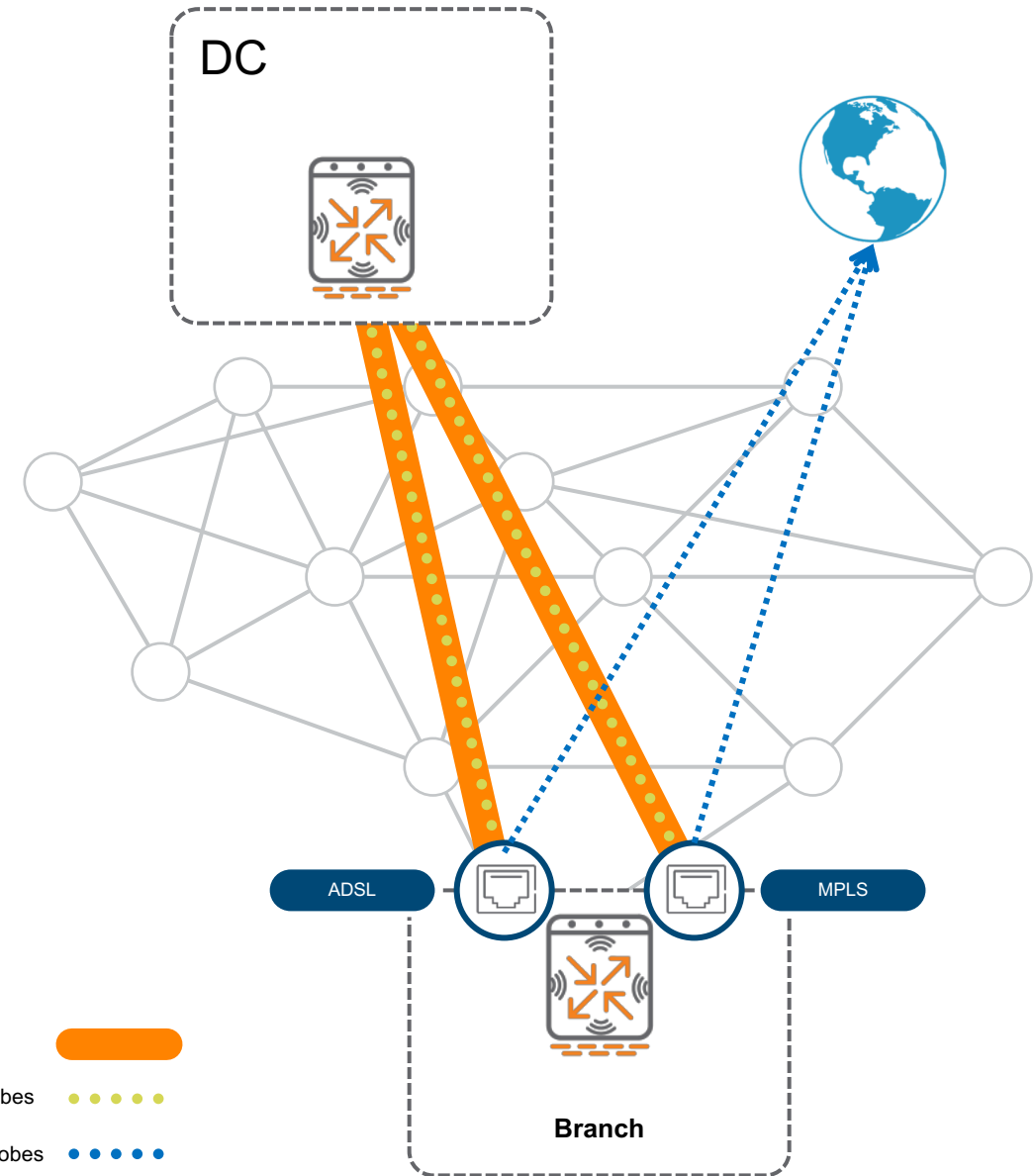
DC-initiated traffic

- 1 Traffic sourced from DC goes to the Branch
- 2 VPNC has equal cost multipath towards the branch
- 3 Branch sends return traffic based on configured policy
- 4 VPNC "pins" the session to the path chosen by the BGW

Step 3: Dynamic Path Selection

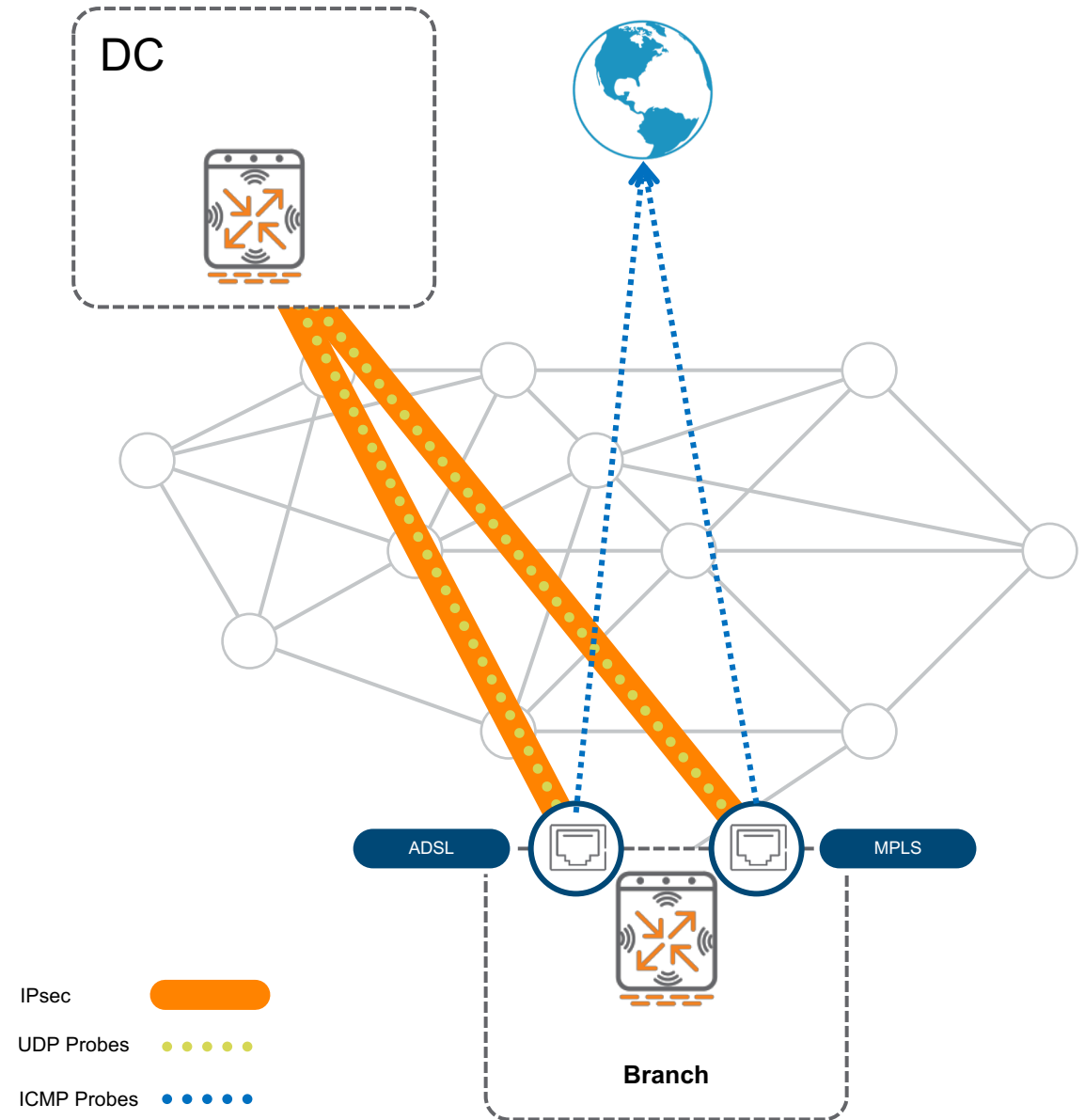
WAN Health Check Monitor

- ICMP Probes measure Internet reachability.
Recommended: **pqm.arubanetworks.com**
- DPD probes monitor tunnel status
- If HCM reports uplink down
 - No src-natted traffic
 - No communication with Aruba Central
- If DPD reports tunnel down
 - Tunnels are torn down



Path Quality Monitoring



- ICMP Probes measure latency and packet loss > Global probe responder service: **pqm.arubanetworks.com**
- UDP Probes (UDP 4500) measure latency, packet loss and jitter – MOS is derived from these values
- Probes can be sent through the underlay or through the overlay



WAN Policies

1 Specify 'Interesting' Traffic

Traffic Specification Rules for Employee Mission Critical Policy

SOURCE	DESTINATION	APPLICATION	
Employee	Any	Workday	 
Employee	20.20.20.0/24	Exchange	
Employee	30.30.30.0/24	TCP Port 22	



2 Choose SLA parameters to measure WAN performance

Select SLA for Employee Mission Critical Policy

NAME	LATENCY (MS)	JITTER (MS)	LOSS (%)	UTILIZATION (%)
Highly Available	150	150	1	20
Best for Internet	100	100	5	80
Best for Voice	50	25	5	80



Probe Options for Highly Available SLA

Destination IP:

Protocol: ☒ ICMP ☐ UDP

Probe interval: sec.

Bursts per probe:


3 Configure path preference parameters

WAN Path Selection for Employee Mission Critical Policy

☐ Direct to Internet

Primary path: 

Secondary path: 

Last resort path: 

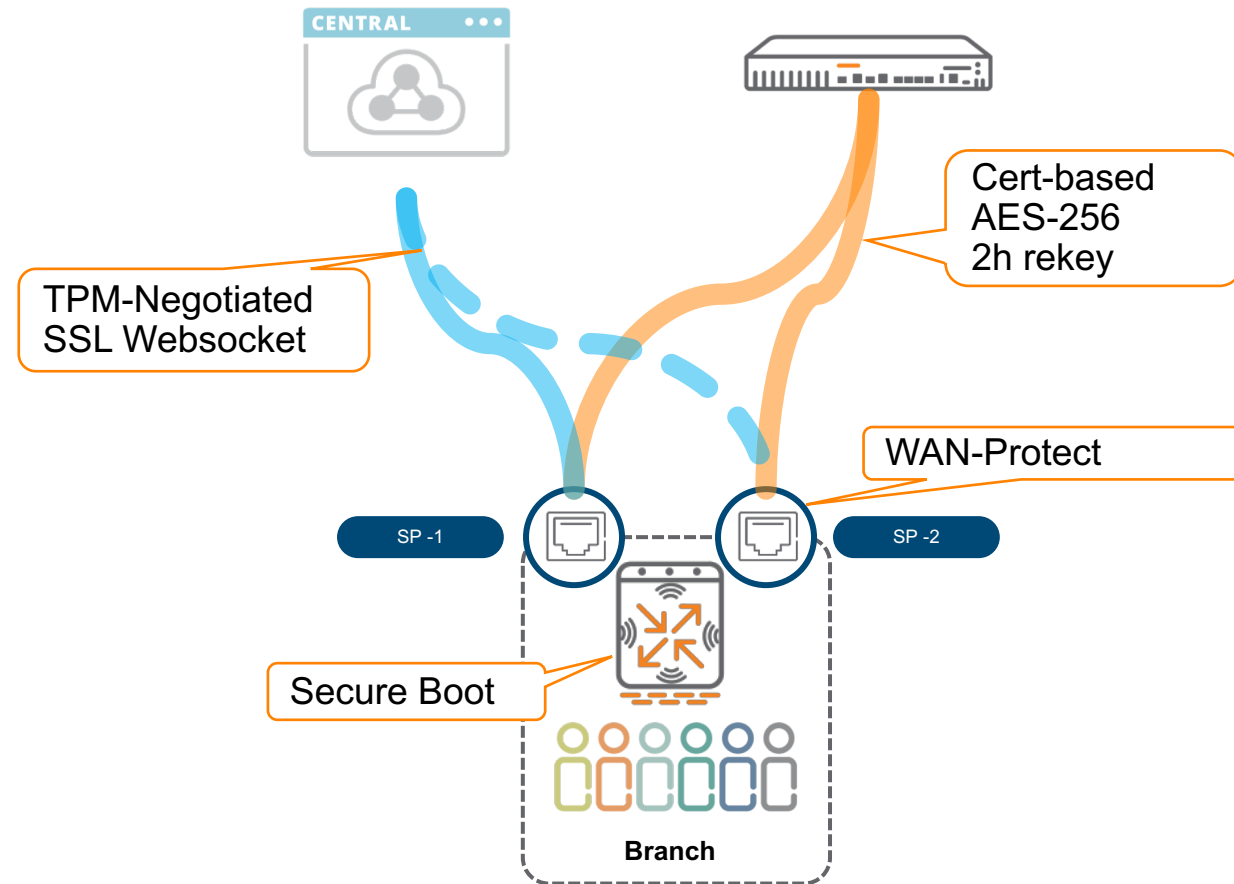
Step 4: Solve the Branch problem, not just the WAN

Security and hardening

- 1 Secure Boot
- 2 WAN-Protect ACL
- 3 TPM-Negotiated mgmt websocket
- 4 Cert-based AES256 encryption



Security Core

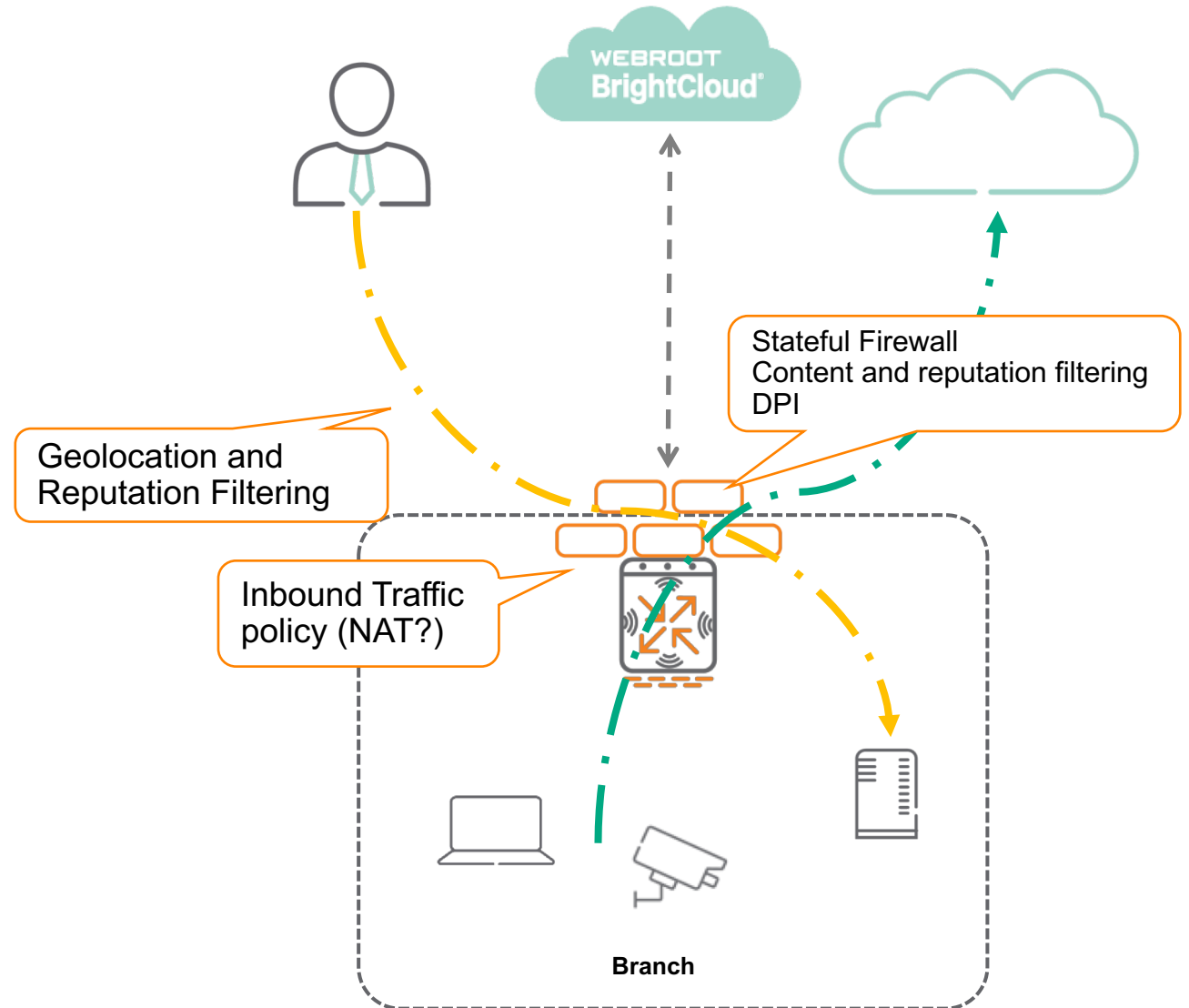


Branch Firewall

- 1 Inbound firewall policies
- Apply on WAN interfaces
- 2 Geolocation and reputation filtering
- Inbound and outbound
- 3 Stateful firewall with ALGs and DPI
- 4 Web Content and Reputation Filtering



Security Core

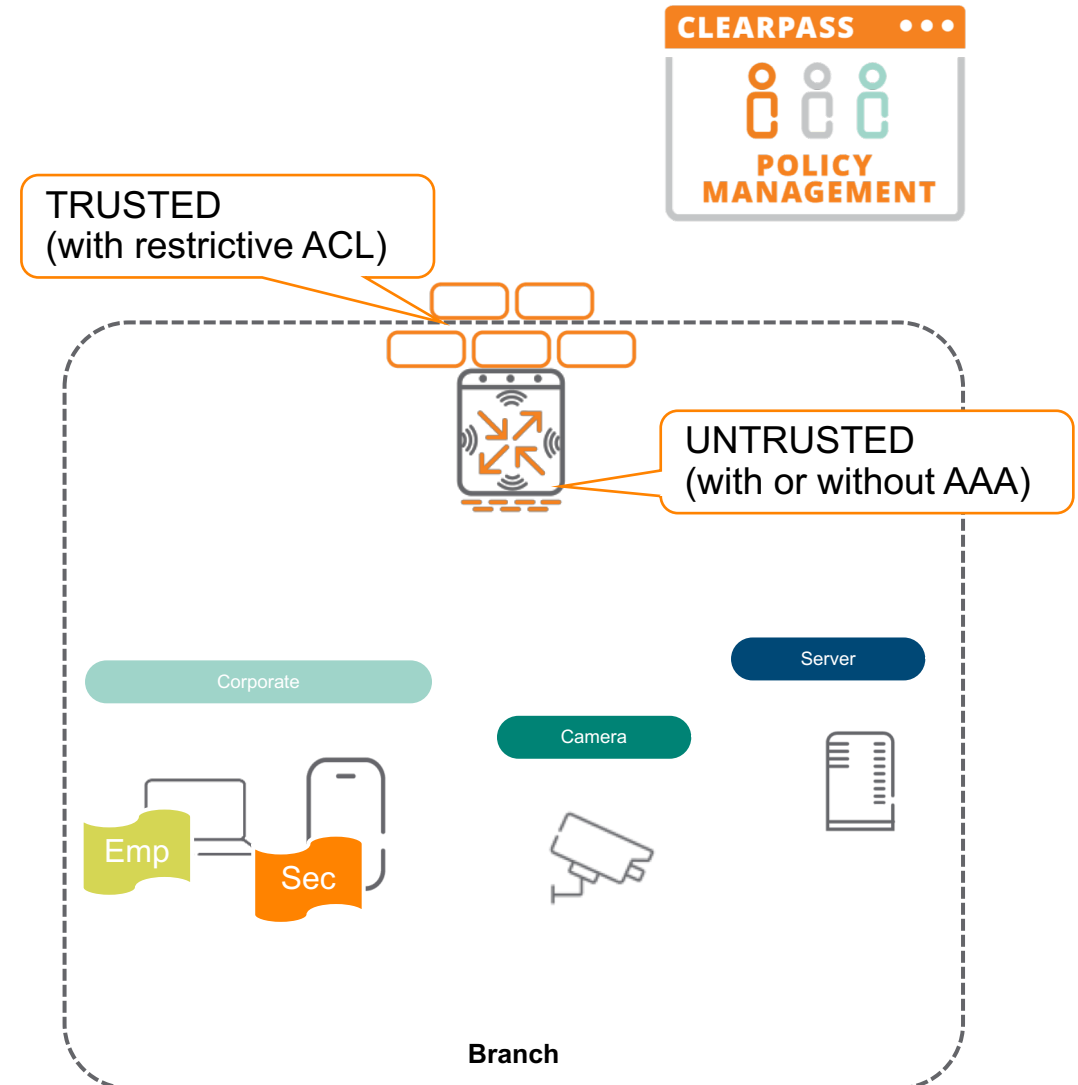


Role-based Security

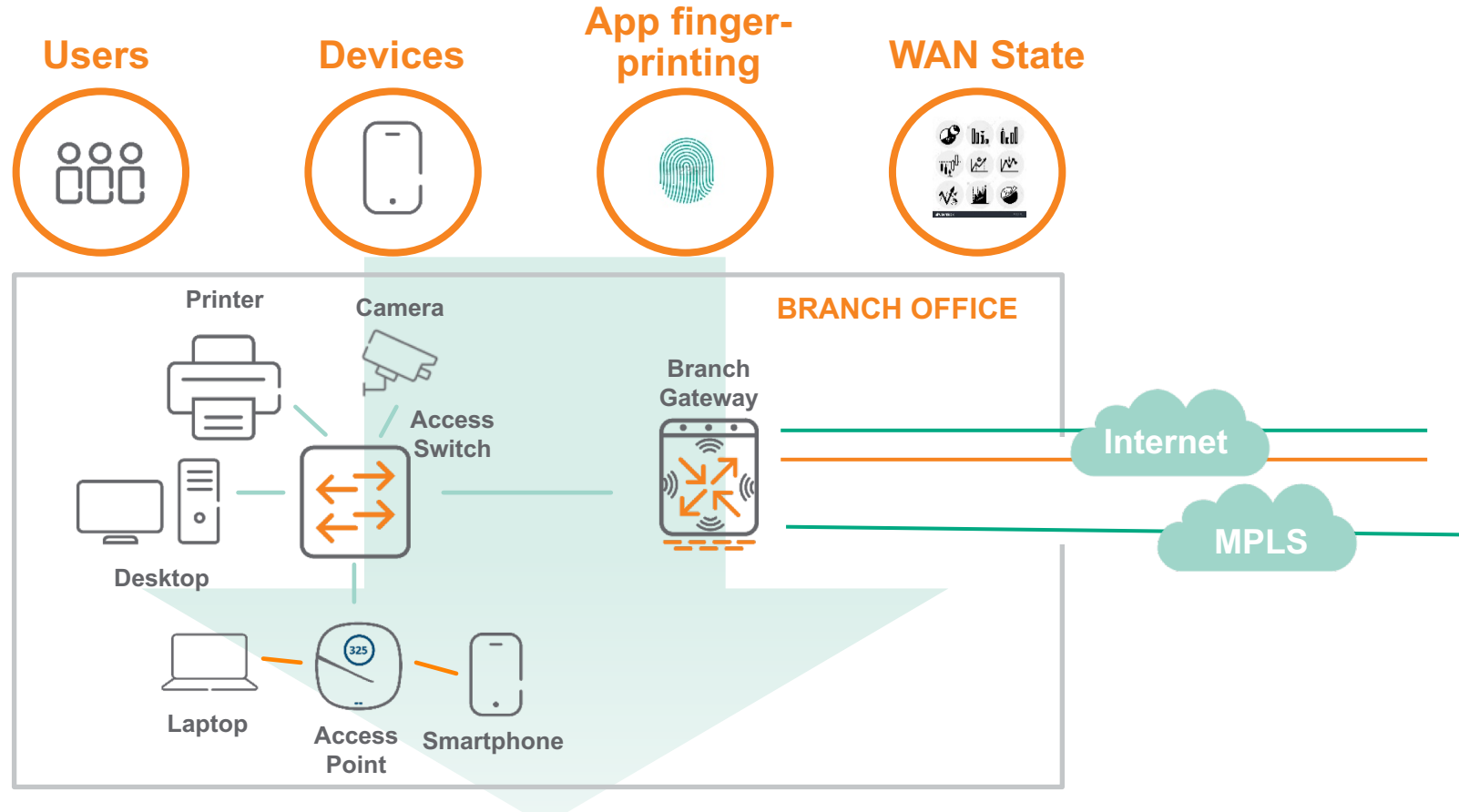
- 1 ALWAYS set WAN ports to TRUSTED
- 2 LAN ports should be set to UNTRUSTED
- 3 Apply AAA profiles to branch VLANs
- 4 (optional) Set AAA-based enforcement



Security Core



Role Based Polices for LAN, Security, WAN



LAN Policies

WLAN and wired switching policies applied per role.
E.g.: Guest SSID, QoS for PCI traffic

Security Policies

Firewall and WebCC policies applied per role.
E.g.: WebCC for Guest, PCI traffic isolation

WAN Policies

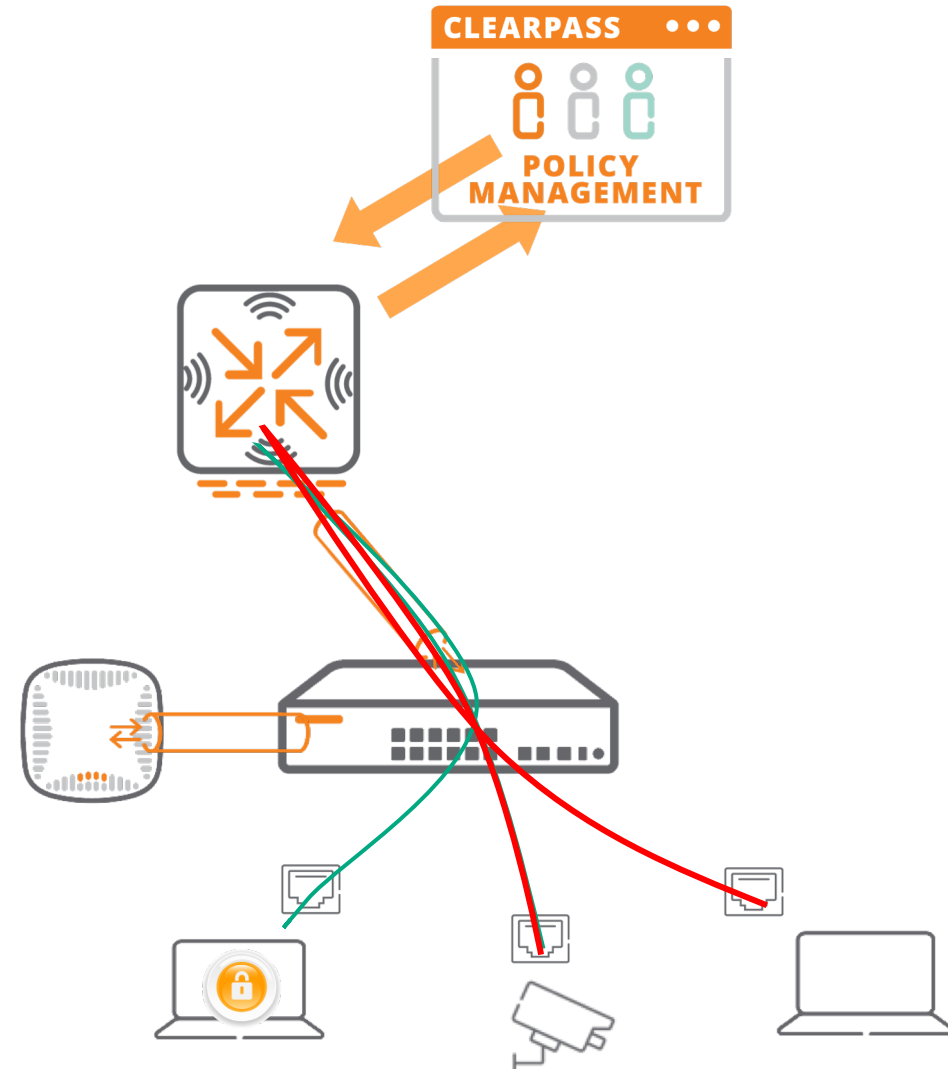
Path steering policies applied per role.
E.g.: Guest to Internet, PCI traffic to MPLS

User Centric Policy

- 1 Switch establishes Tunnel
- 2 APs detected via device-profile. Port override
- 3 Devices profiled and classified by ClearPass
- 4 Roles snooped by GW
- 5 All traffic goes through the firewall > Micro-Segmentation



Security Core



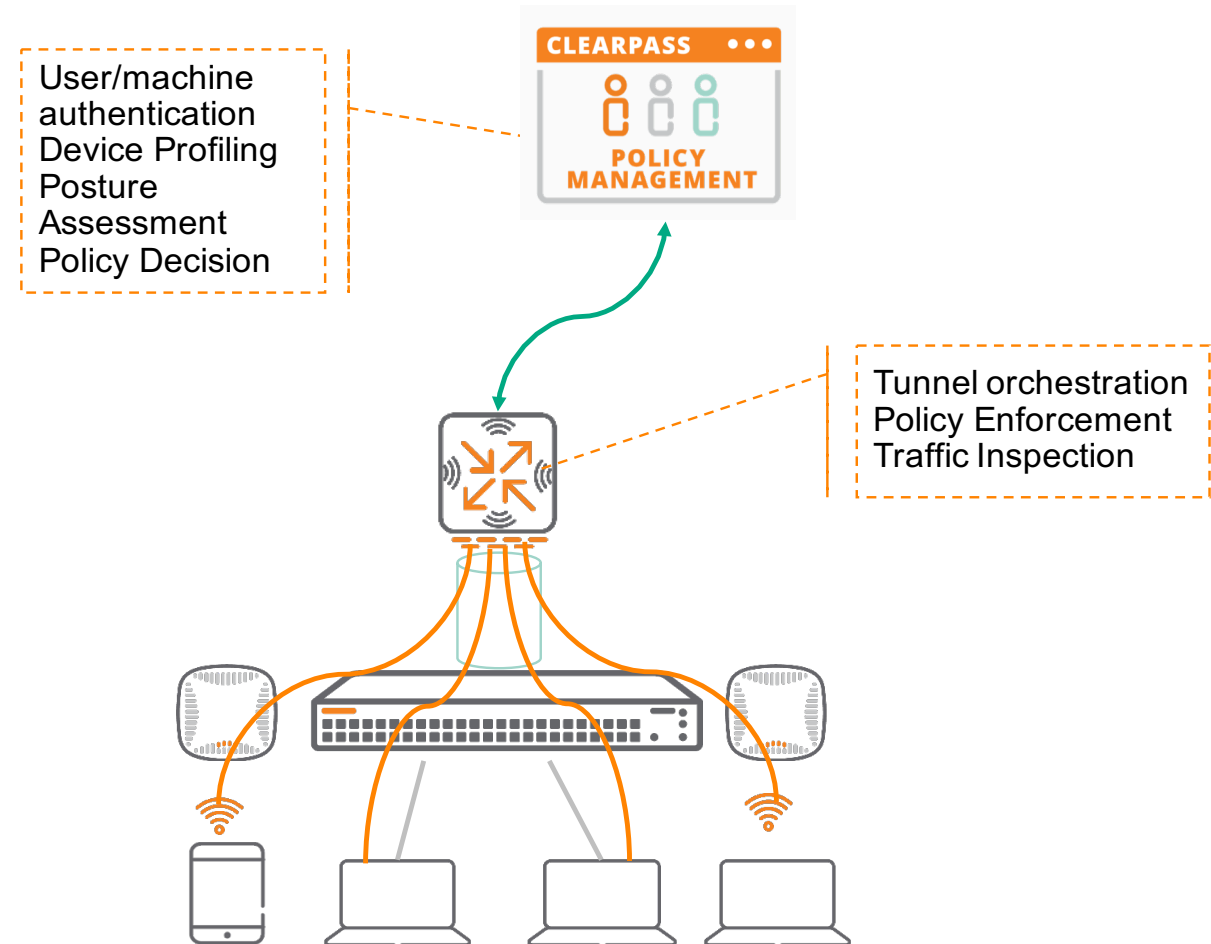
Consolidated Policy Enforcement Point

Dynamic Segmentation applied to the branch

- 1 All ports tunneled to GW
- 2 APs detected via device-profile. Set trunk
- 3 Tunneled traffic always UNTRUSTED
- 4 GW becomes branch security enforcement point
- 5 Intra-VLAN traffic now goes through firewall > Dynamic Segmentation!



Security Core



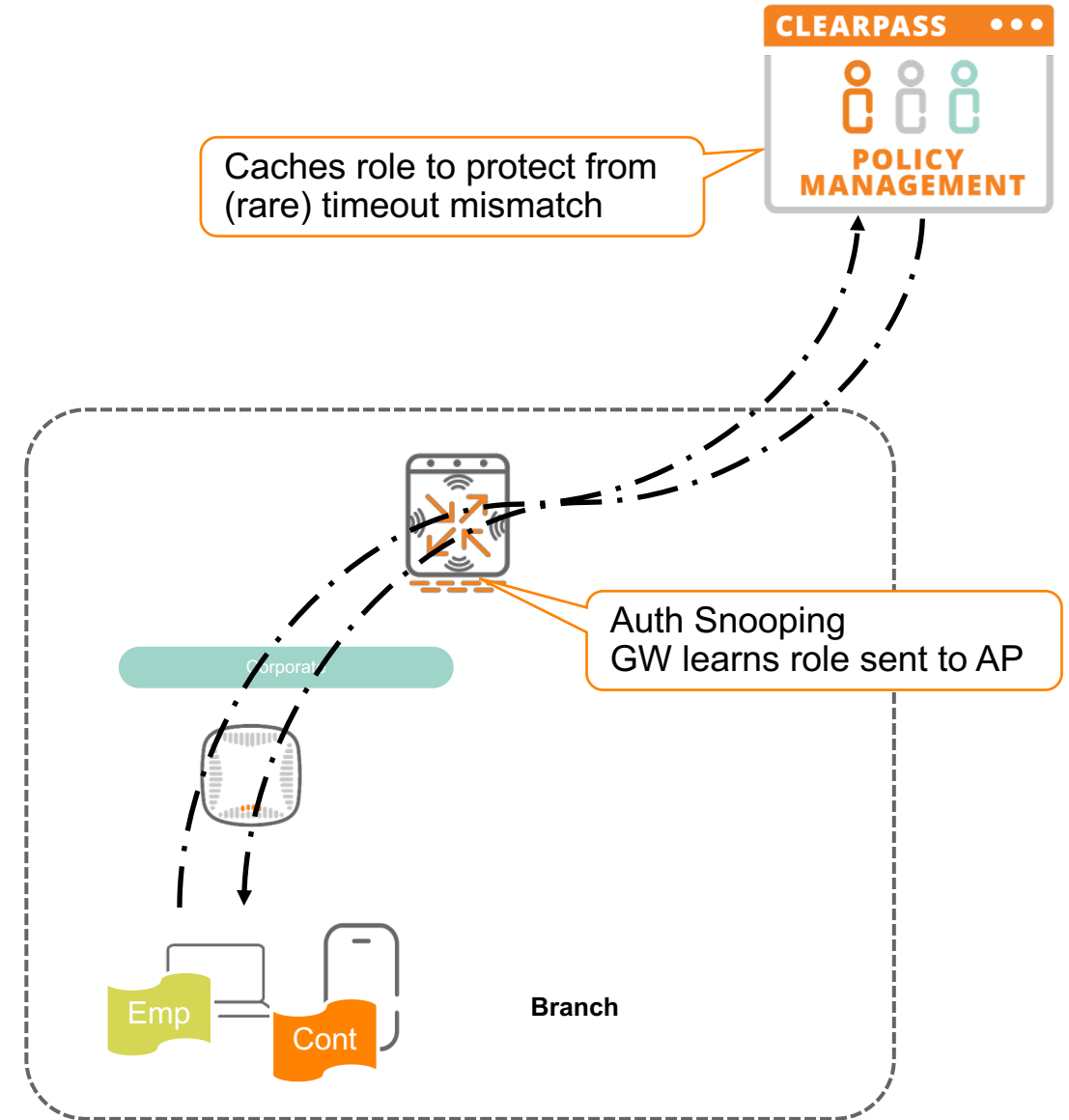
Authentication Snooping (stateful-dot1X)

Learning roles from other authentications

- 1 AP in "logon" role and Stateful dot1X enabled
- 2 Dot1X auth from AP to AAA Server
- 3 AAA Srv responds with user-role/filter-ID (if ClearPass) also binds role to MAC
- 4 GW Snoops Authentication to learn role
- 5 If GW session expires but dot1X doesn't – MAC auth
- 6 ClearPass responds with cached role



Security Core



Guest Access + WebCC

-
- The diagram illustrates the Cloud Guest architecture. A **Branch** (indicated by a dashed box) contains a mobile device and a laptop. The mobile device connects via a dashed blue arrow to a **Cloud Guest** (orange speech bubble) and via a dashed grey arrow to **WEBROOT BrightCloud®** (green cloud). The laptop connects via a solid blue arrow to the **Cloud Guest**. A solid green arrow points from the **Cloud Guest** to a cloud icon. The **CENTRAL** console (top right) shows a cloud icon with three nodes.



Enforcing L7+ security policies

Advanced threat detection (Checkpoint / Palo Alto GPCS / Zscaler)

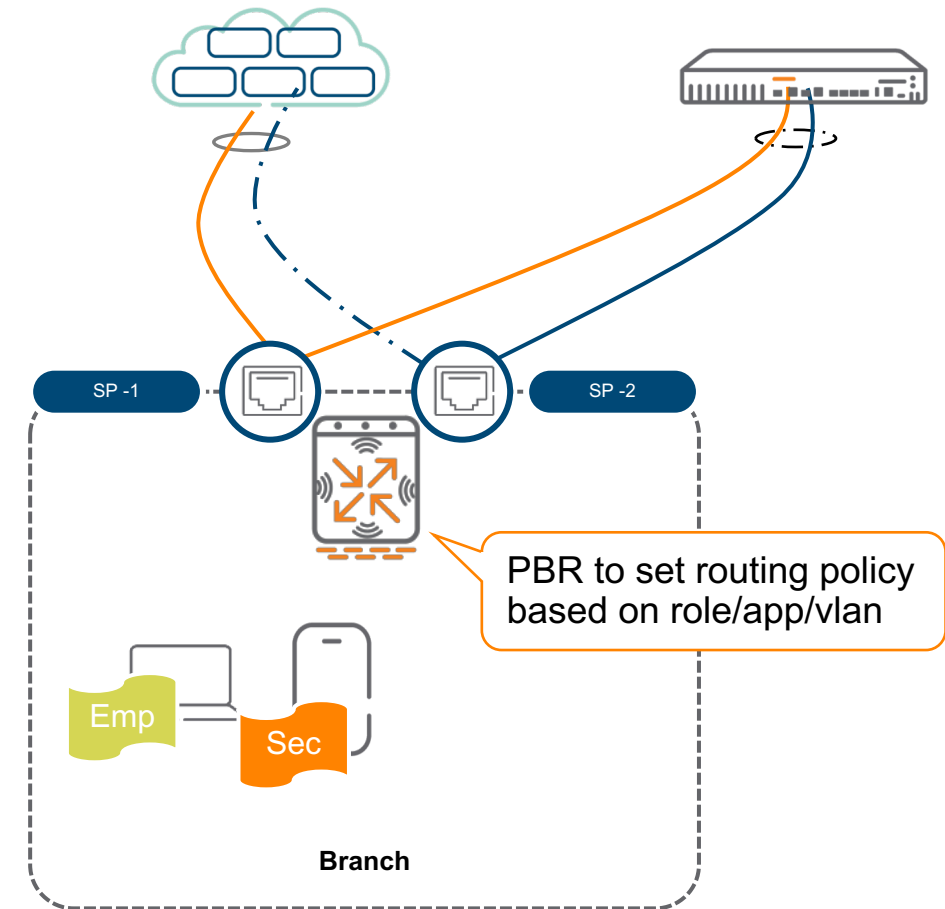
- 1 ClearPass assigns user role
- 2 ClearPass shares role with firewall
- 3 Role includes routing policy to force Internet traffic through Cloud Security



Security Core



360 Security
Exchange Program



Beyond Security Enforcement

UEBA - Introspect integration

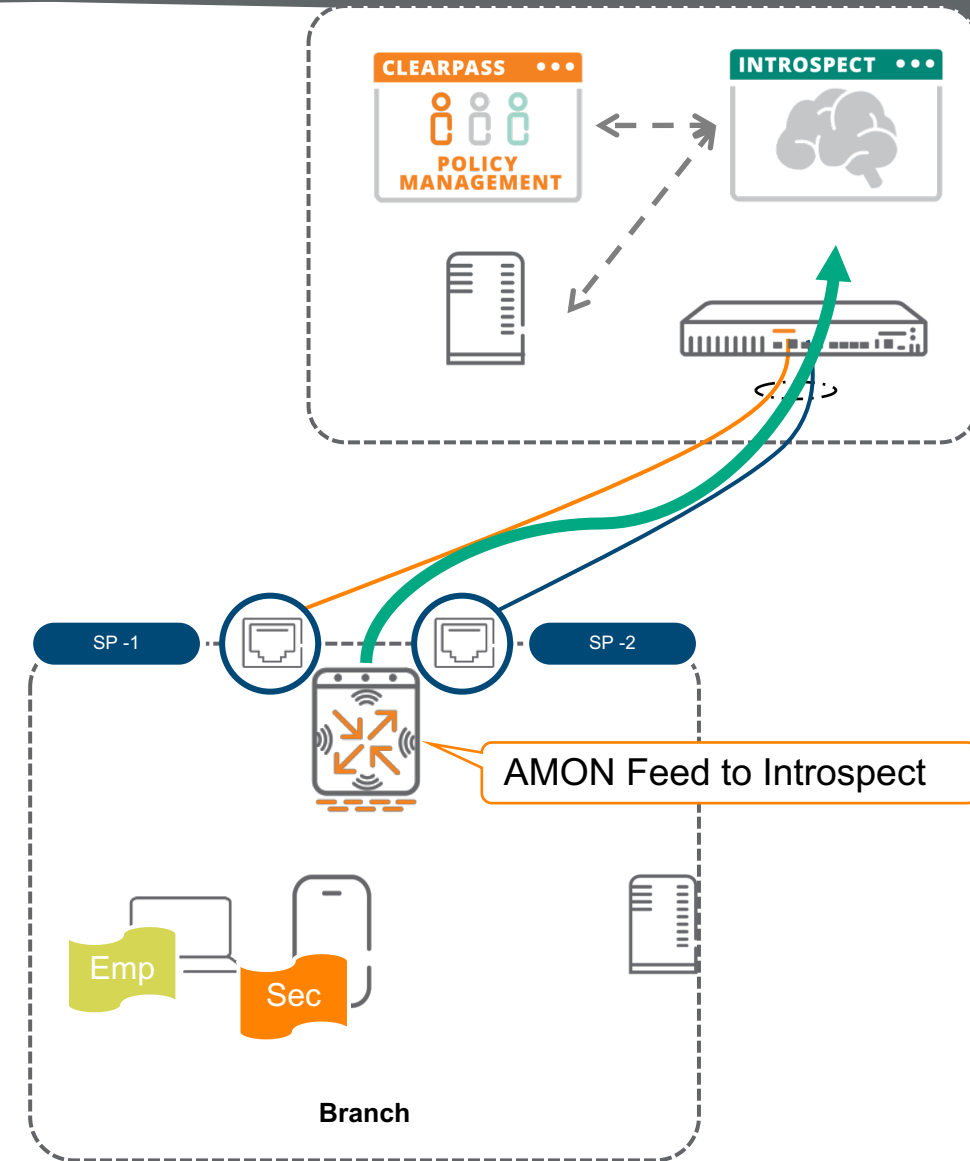
- 1 ClearPass assigns user role
- 2 Introspect integrated with ClearPass and other user services
- 3 GW Sends FW metadata (AMON feed) to Introspect



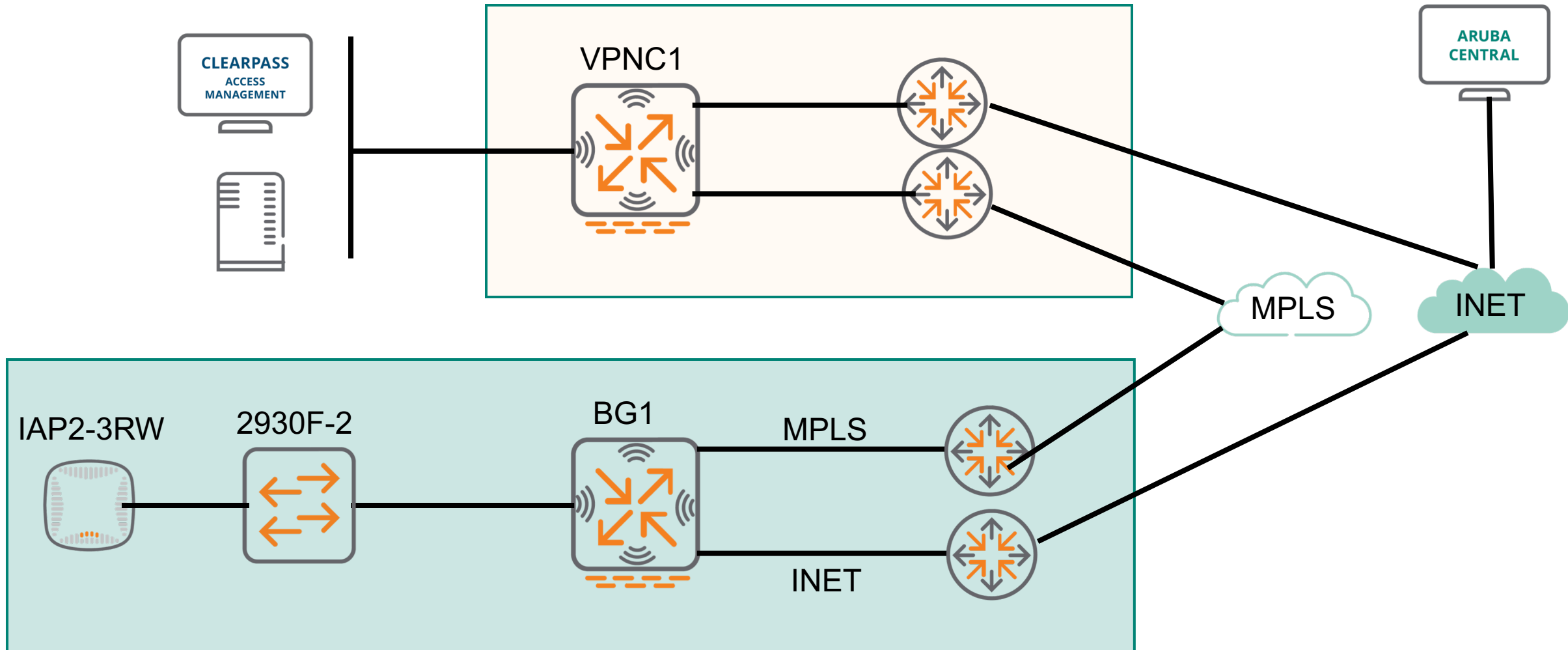
Security Core



360 Security
Exchange Program



Demo





AIRHEADS

meetup

Thank You