Extreme Campus Fabric + Fabric Attach – automatyzacja w sieciach kampusowych.

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Extreme™
Customer-Driven Networking

Extreme Networks

Customer-Driven Networking Solutions from the Enterprise Edge to the Cloud

20+ YEAR
Pioneer in Networking

1996

NASDAQ: $EXTR

$1 BILLION
REVENUE

CUSTOMERS
30,000+
6,000+ PARTNERS

INDUSTRY'S
FIRST
Gig-E / 10 Gig-E
SWITCH
Extensive Patent Portfolio

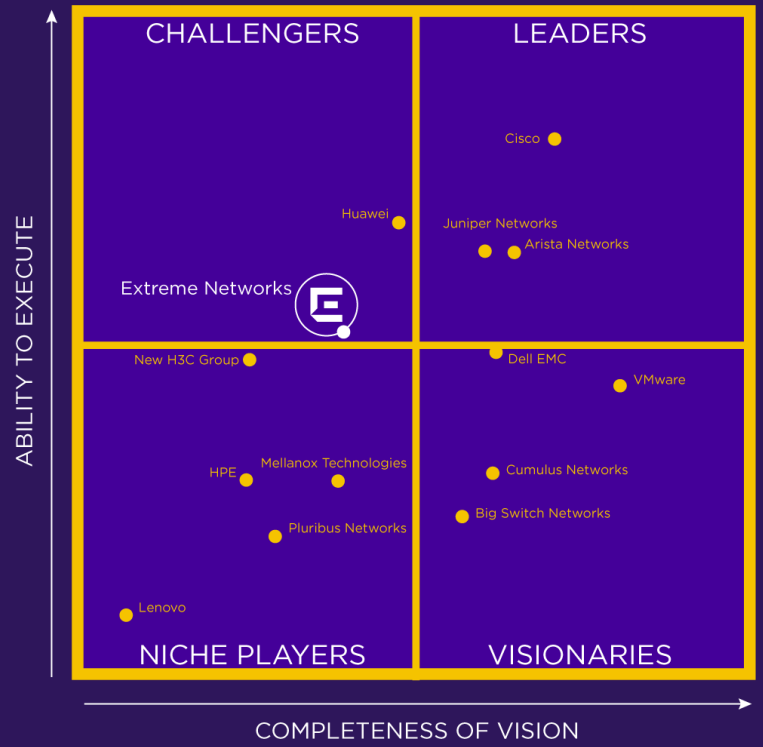
RANKED **#1**
100% *INSOURCED*
SERVICE & SUPPORT

3,000+ EMPLOYEES
HQ: SAN JOSE, CA
Business in 80+ Countries

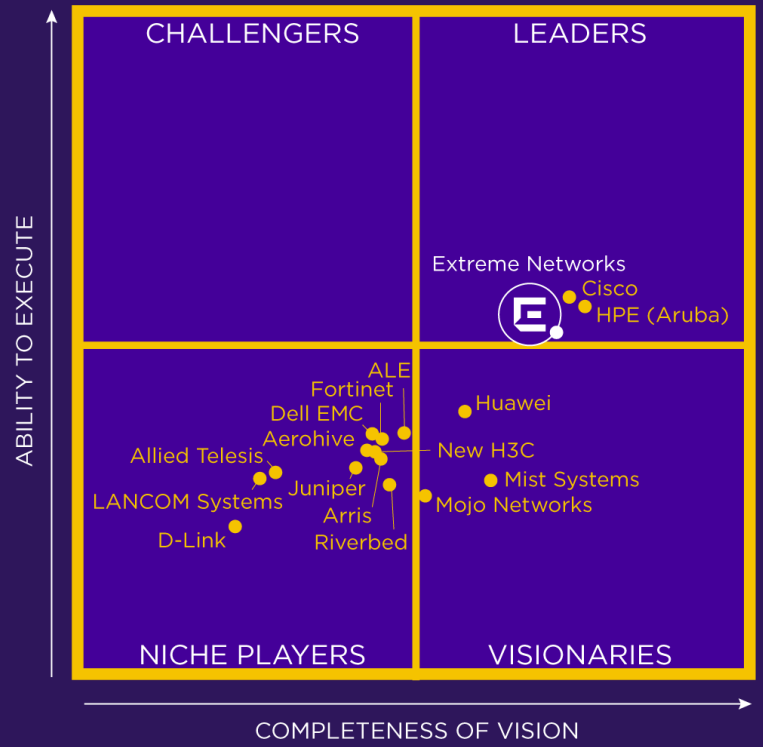
EXTREME NOW

Results

2018 Data Center Magic Quadrant



2018 LAN/WLAN Magic Quadrant



Customer-Driven Networking

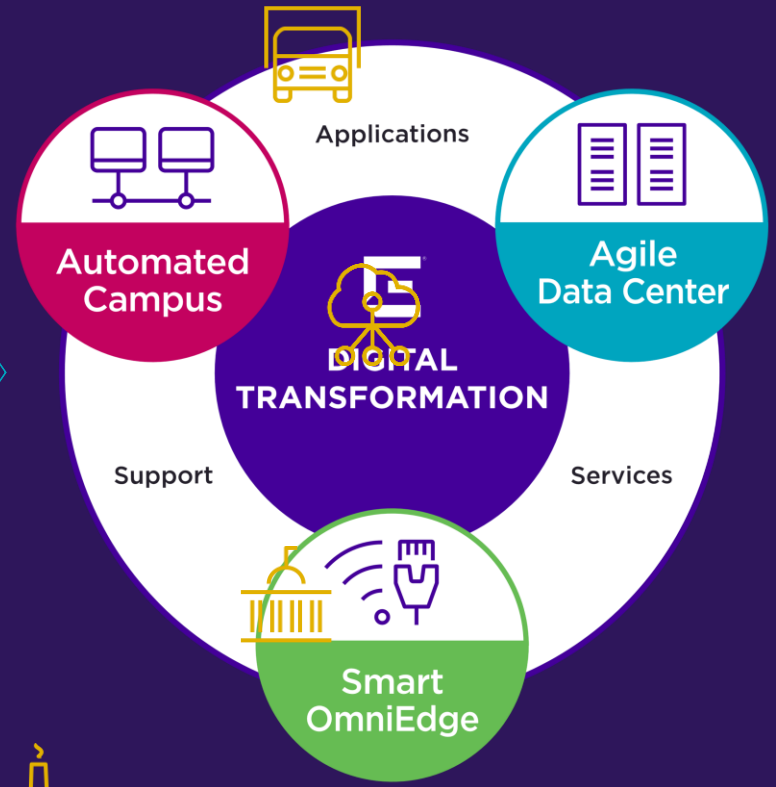
AVAYA — Campus Networking

BROCADE — Data Center Networking

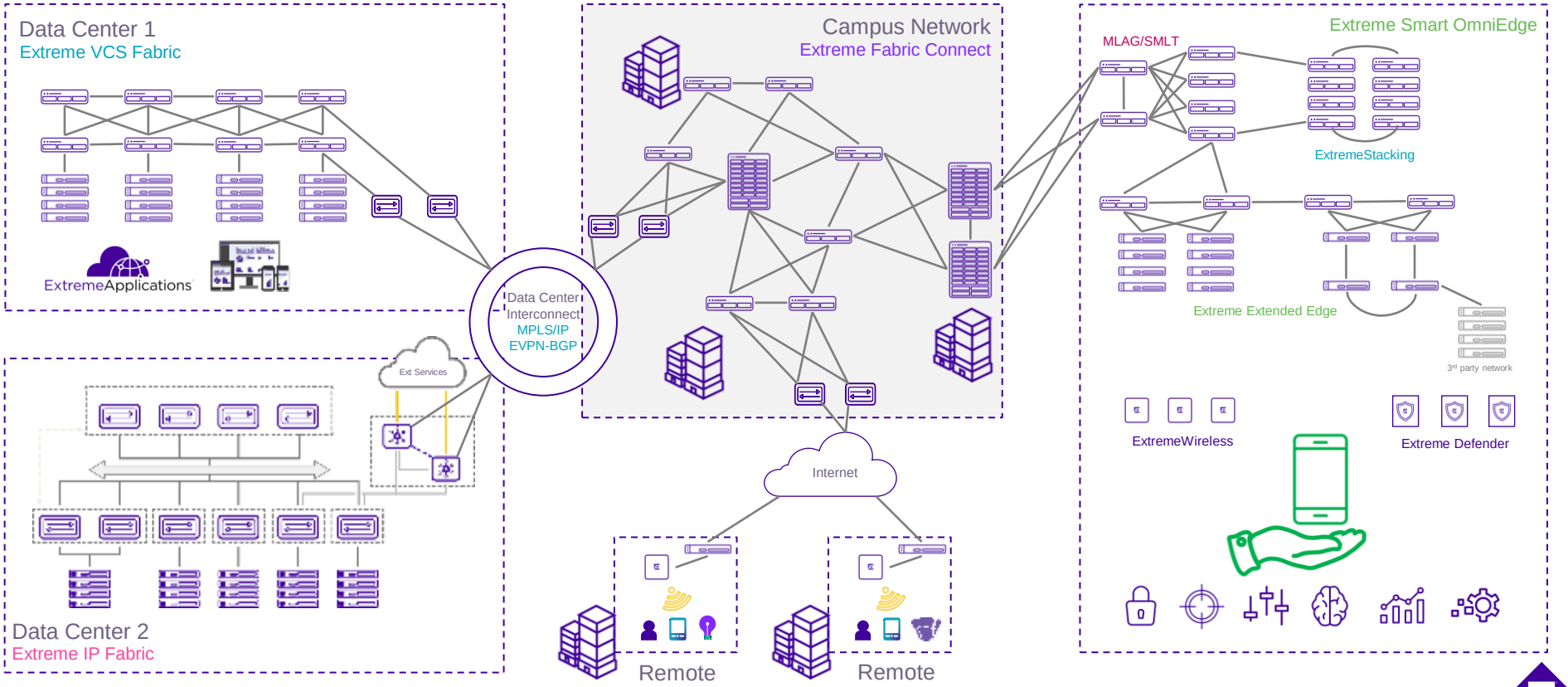
enterasys® Secure Networks™ — Edge/Campus/ Software Management

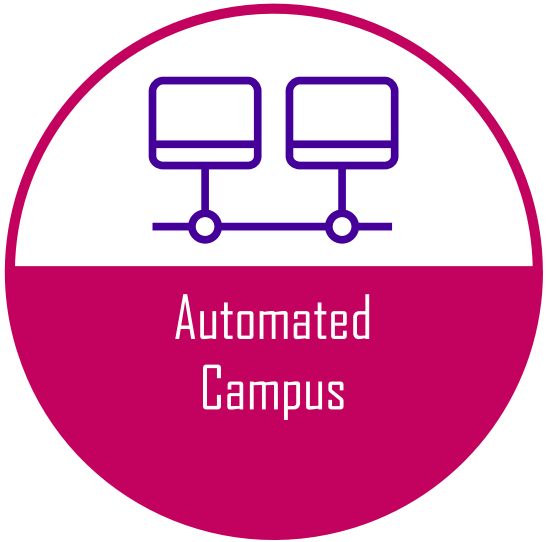
extreme networks — Edge/Campus Networking

ZEBRA — Wireless Networking



Extreme End-to-end Networking

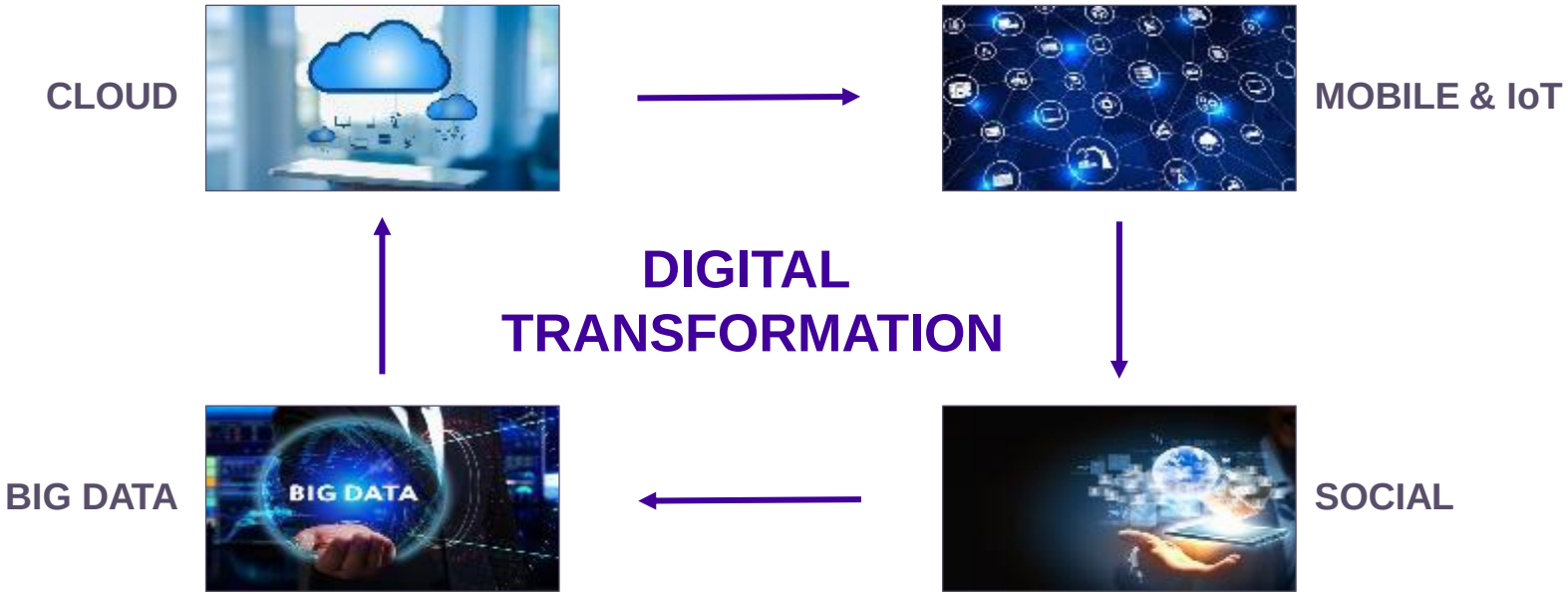




Extreme™
Customer-Driven Networking

Are Decades Old Networking Technologies the Best Foundation for Your Existing and Emerging Technologies?

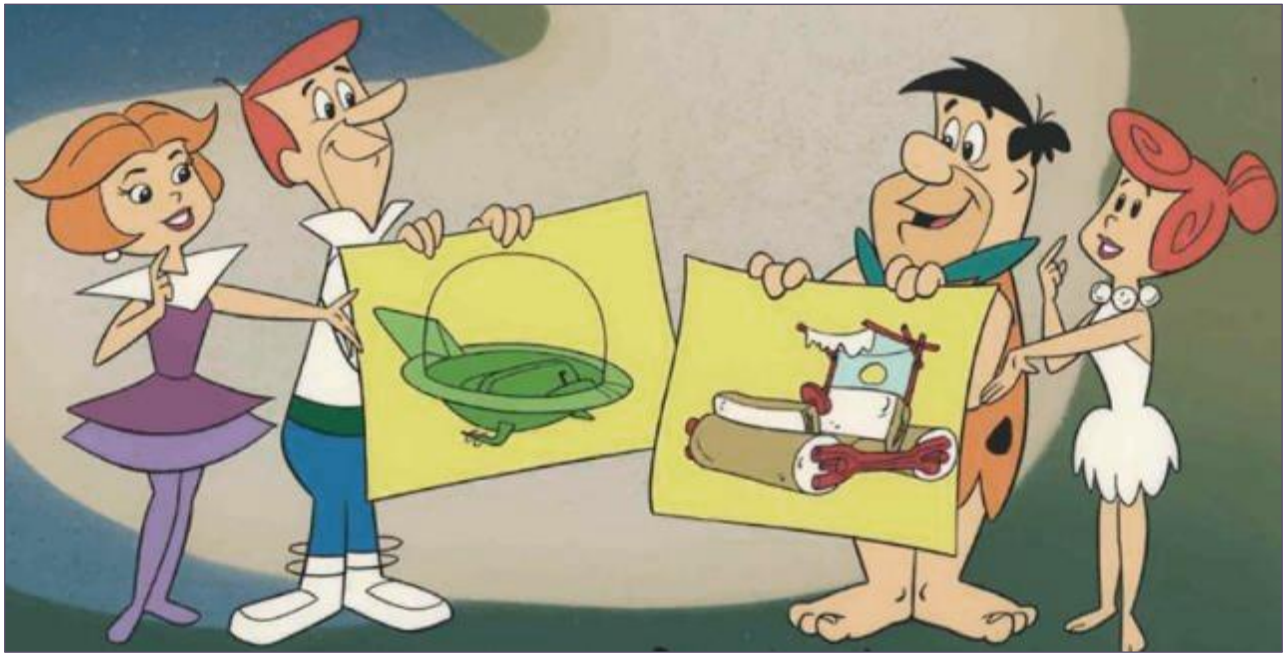
The Network: Underpins Digital Transformation



With the emergence of digital business, ***agile, resilient networking is becoming essential*** for participating in a faster, more dynamic and highly networked digital ecosystem. Conversely, a poor network can inhibit digital business efforts.

Gartner Research: Make Networking a Critical Strategic Infrastructure Resource for Enabling Digital Business. 2017

Should Jetson Technology Really Be Running On Flintstone Networking?



DYNAMIC MOBILE REAL-TIME ← **TODAY'S REALITY** → **STATIC ENVIRONMENTS**

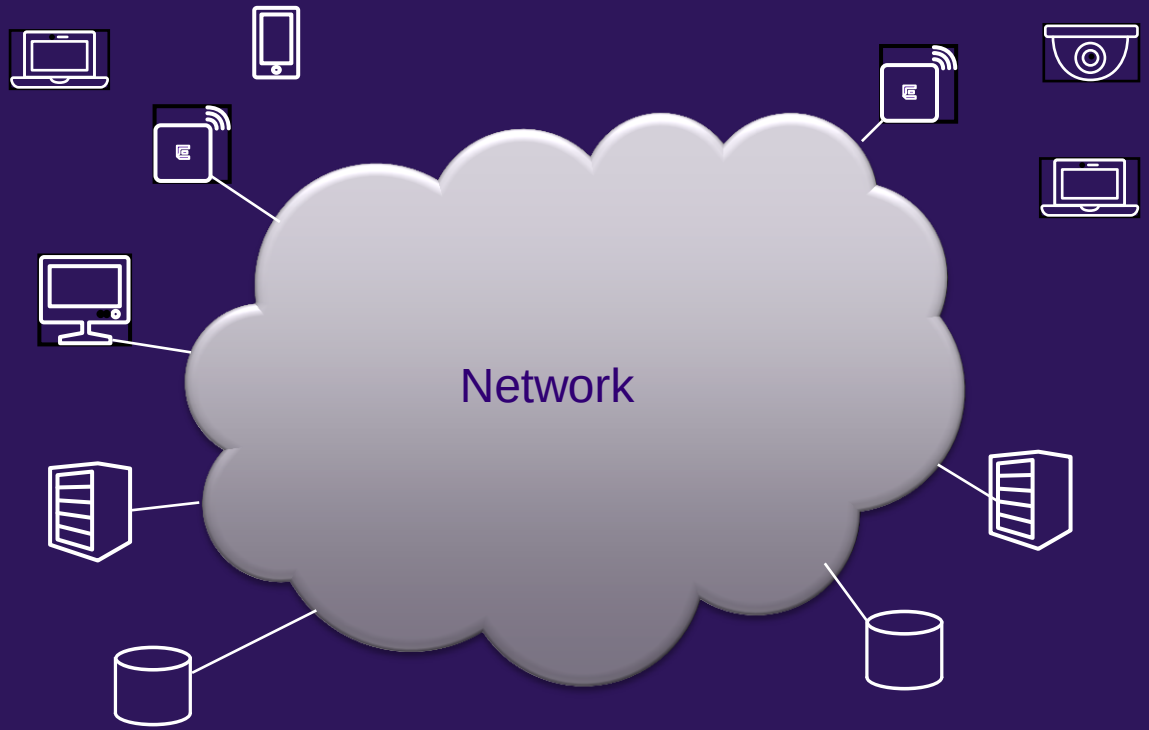
Automated Campus – Value Pillars

Automated Campus

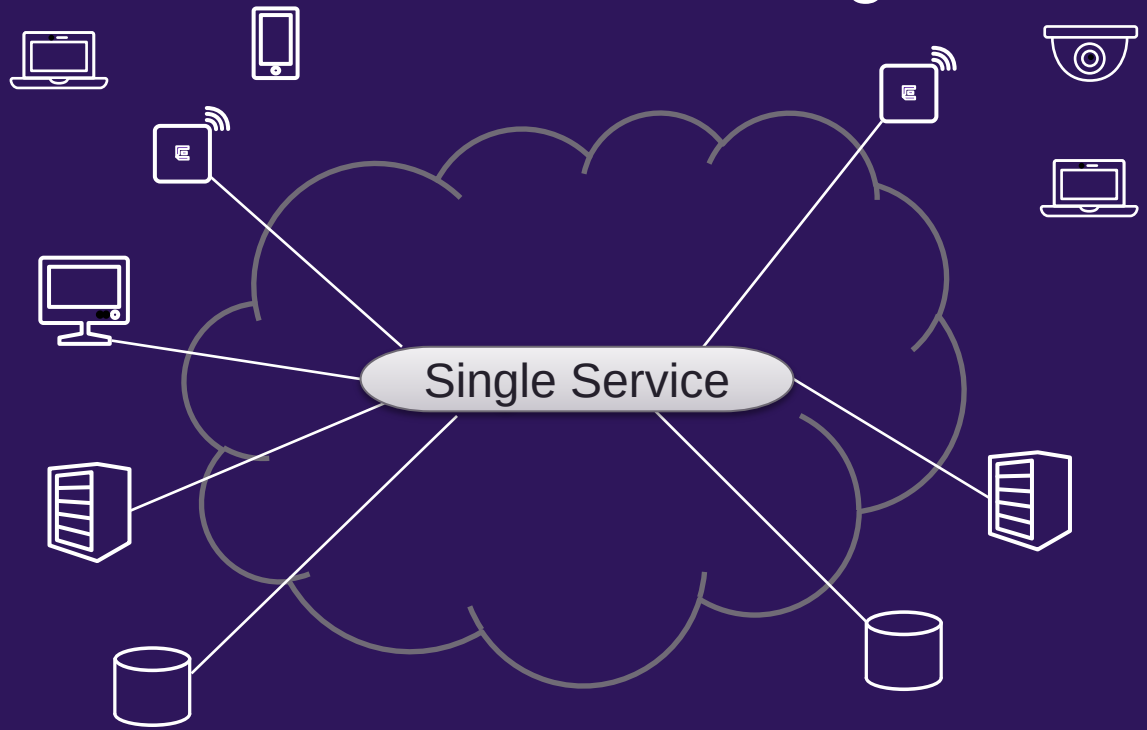
Simple	Secure	Intelligent
		

Policy-Driven Automation for Compelling Business Outcomes

The legacy network

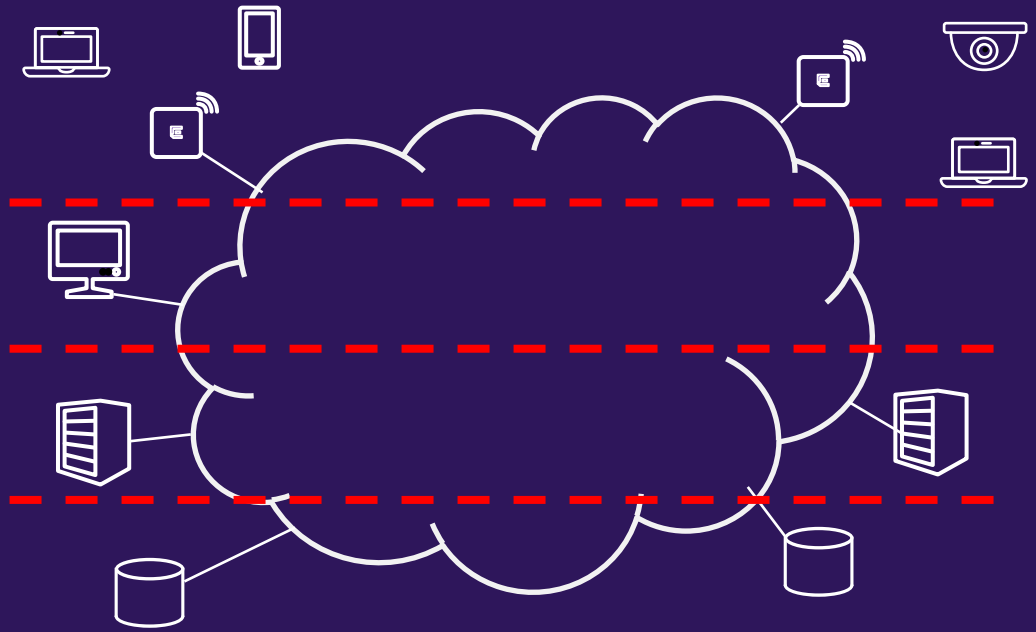


Probably runs OSPF
….VLANs at the edge



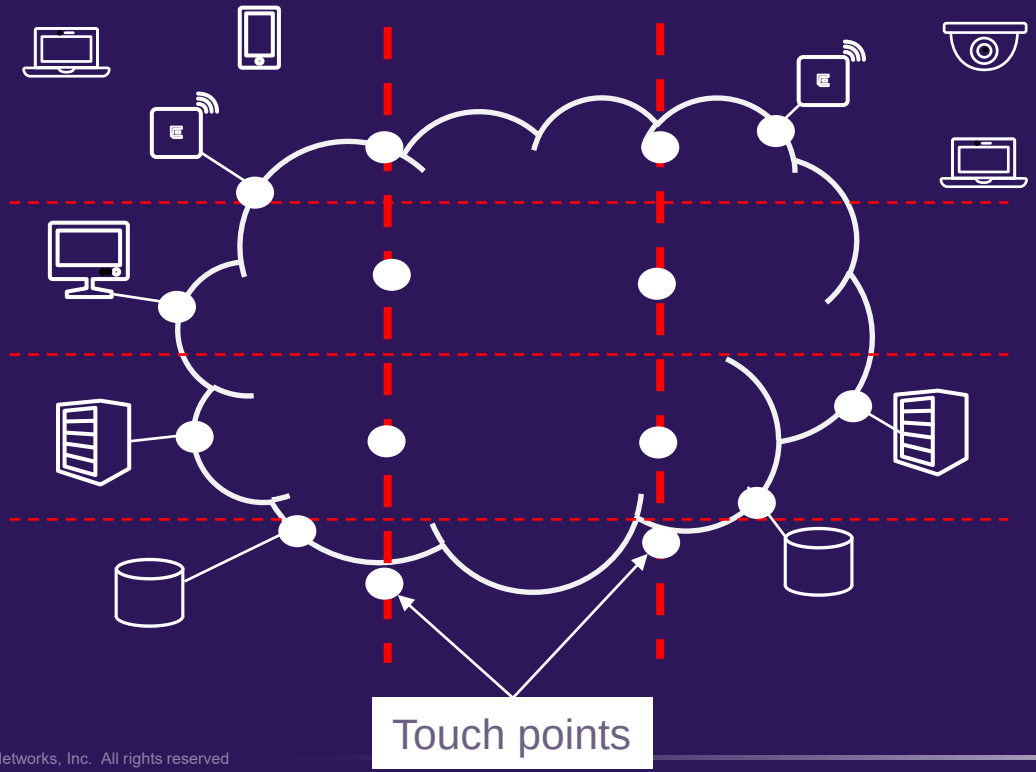
Is this secure? Does it fulfill all business requirements?

What makes a network complex to operate?



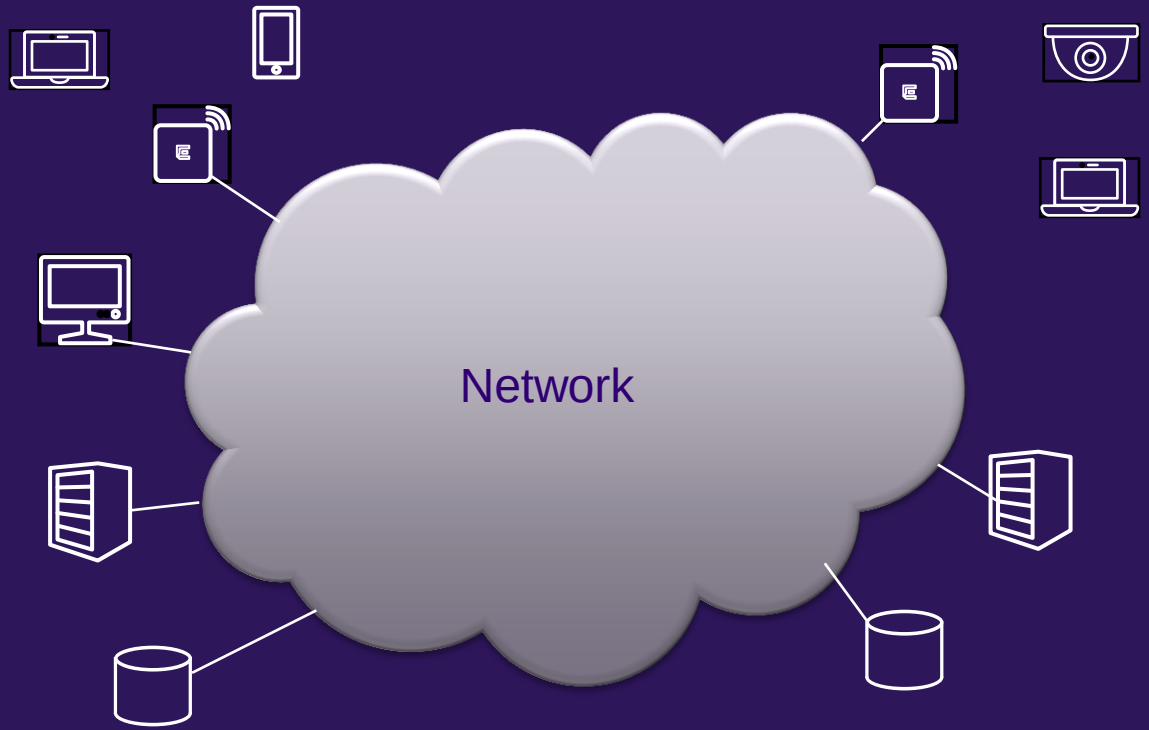
- **Logical Segmentation**
  - Creates multiple parallel instances
  - Many protocol instances

What makes a network complex to operate?

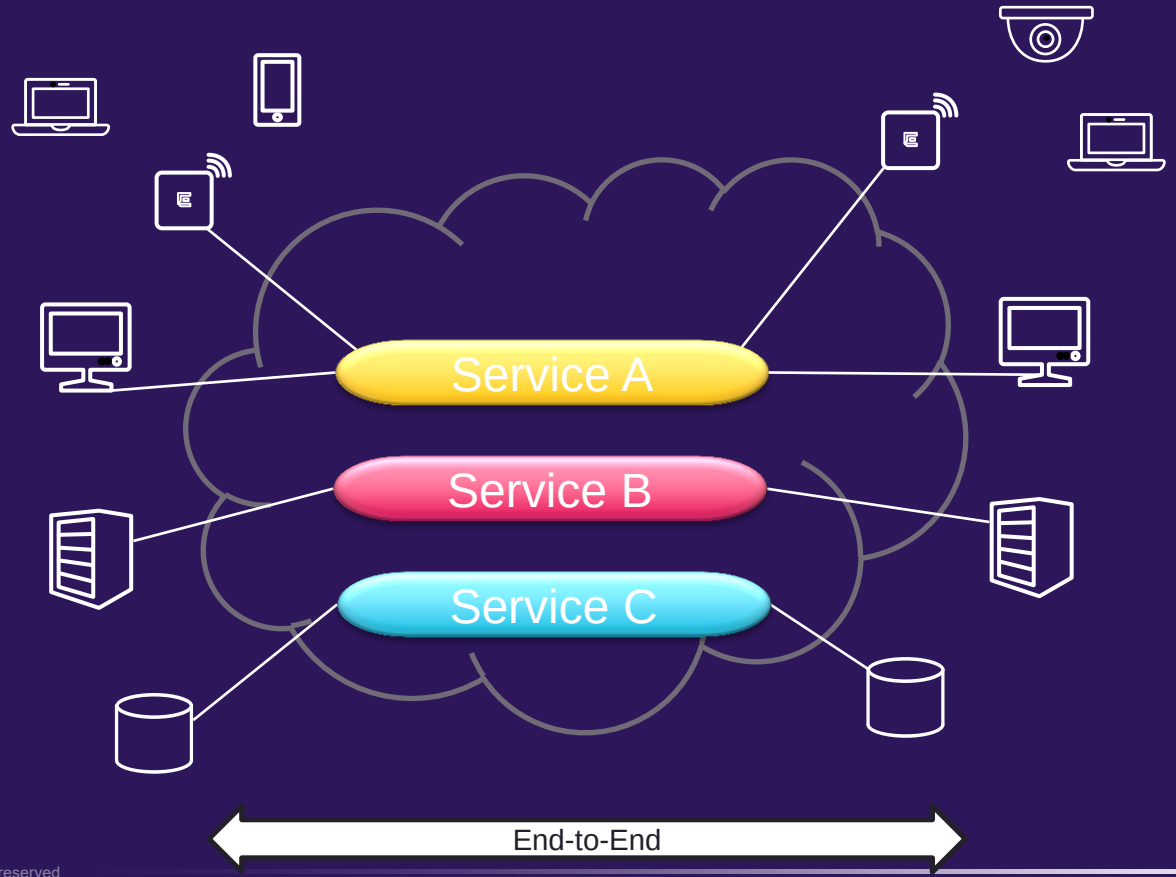


- Logical Segmentation
- **Physical Segmentation**
  - Technology breaks (LAN, MAN, WAN, DC)
  - Many Protocols

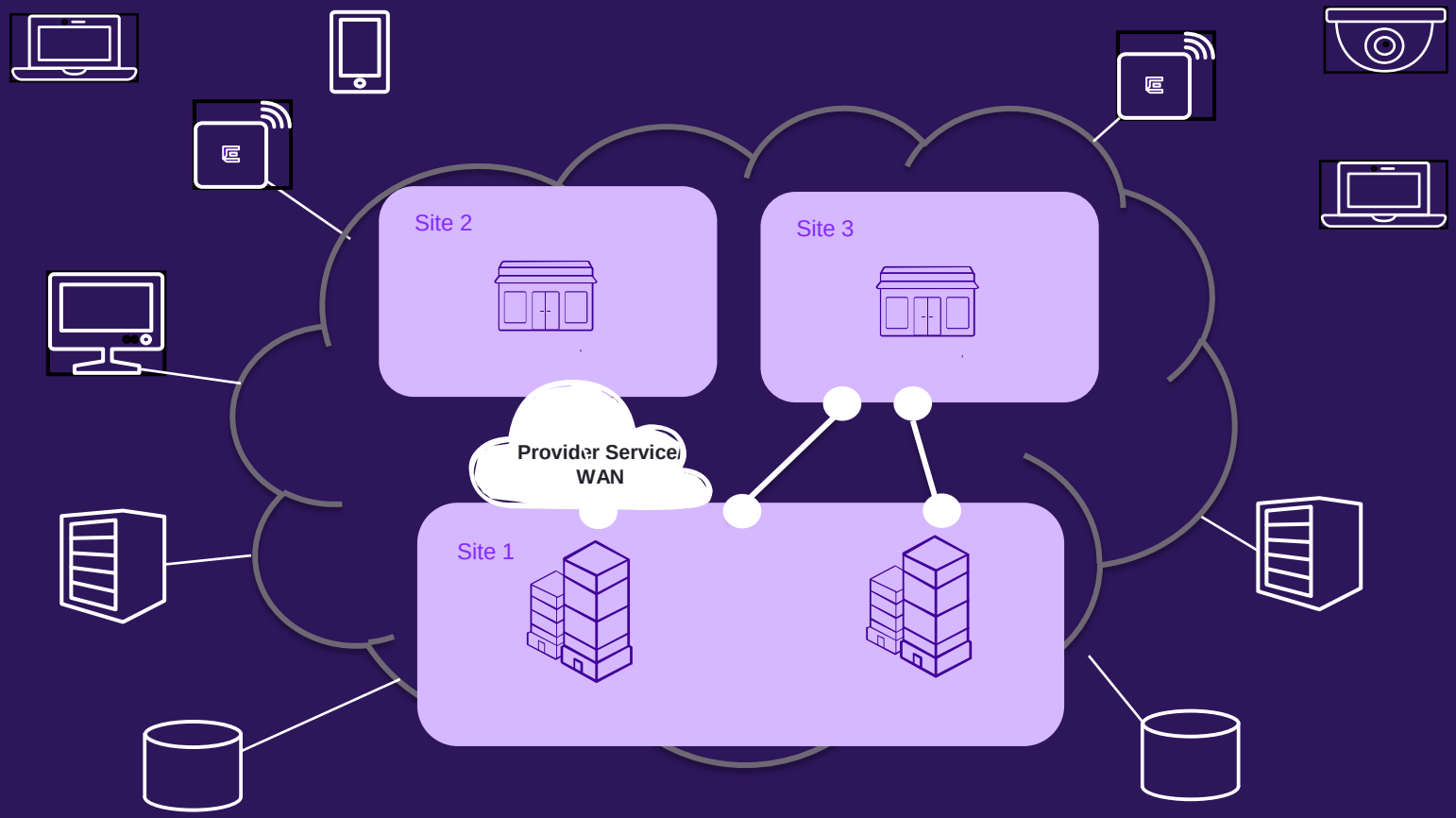
Getting from here



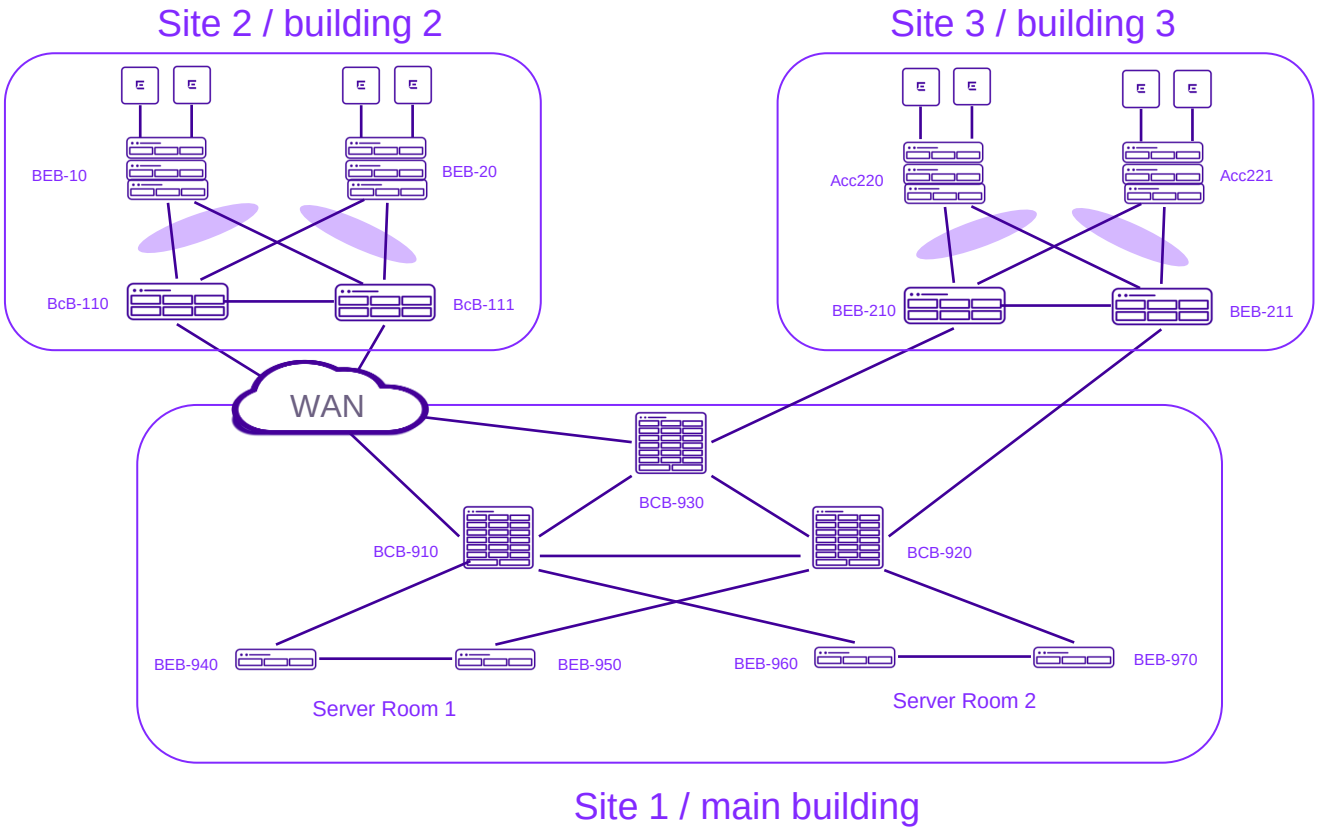
To here



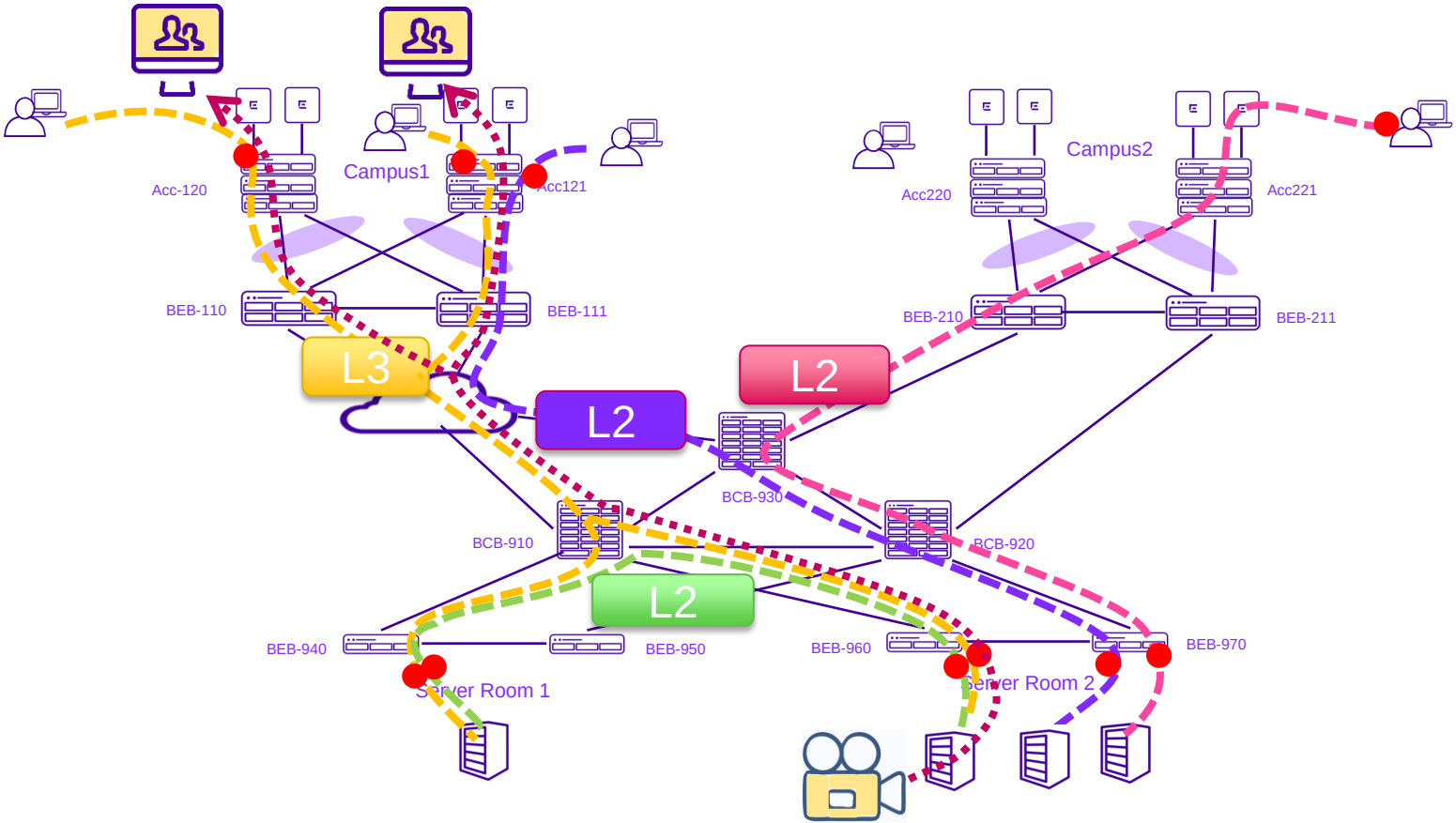
A reference network



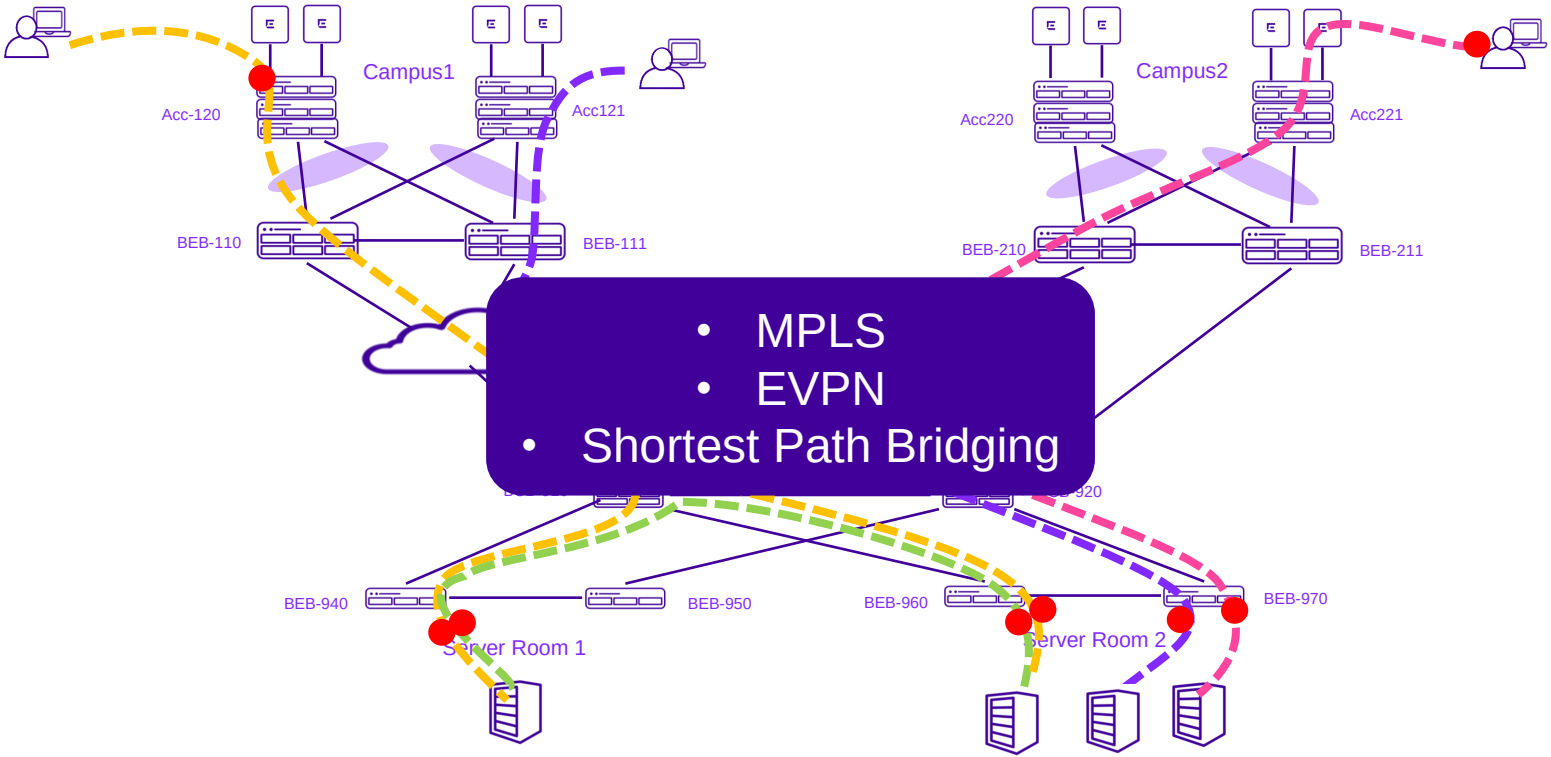
A reference network



Layer 2 and layer 3 services

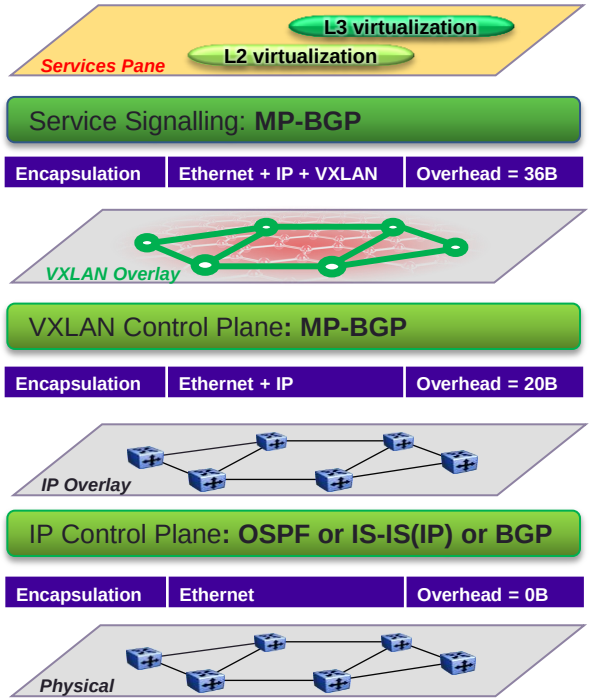


Alternative fabric solutions



Comparing fabrics

EVPN over VXLAN



EVPN over VXLAN

- *RFC 4271 "A Border Gateway Protocol 4”*
- *RFC 4364 “BGP/MPLS IP Virtual Private Networks (VPNs)”*
- *RFC 4760 “Multiprotocol Extensions for BGP-4”*
- *RFC 7348 “Virtual eXtensible Local Area Network (VXLAN)”*
- *RFC 7432 “BGP MPLS-Based Ethernet VPN”*
- *RFC 7938 “Use of BGP for Routing in Large-Scale Data Centers”*
- *RFC 8300 “Network Service Header (NSH)”*
- *RFC 8365 “A Network Virtualization Overlay Solution Using Ethernet VPN (EVPN)”*
- *draft-ietf-bess-evpn-prefix-advertisement-11*
- *draft-ietf-bess-evpn-inter-subnet-forwarding-05*

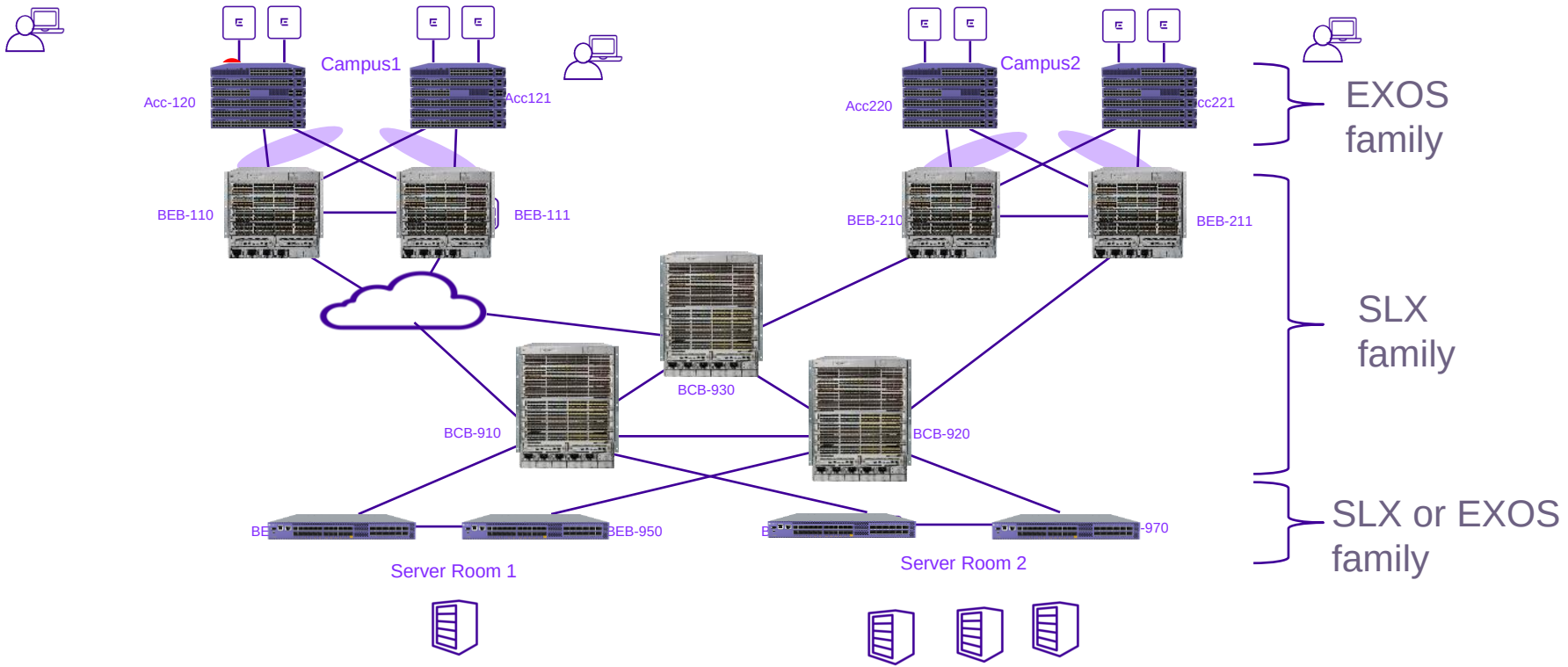
Cisco:

- *Locator/ID Separation Protocol (LISP) VXLAN control plane*
- *EIGRP or OSPF IP control plane*
- And *Cisco TrustSec*

Extreme Fabric Connect

- *IEEE 802.1Q-2014 (clause 27 & 28)*
- *Layer 3 virtualization & IP MC: Privat IS-IS TLV (ext. 184, 185 og 186)*

Extreme Networks
IP Fabric / EVPN solution



Comparing fabrics

MPLS backbone

Service Signalling: **MP-BGP, LDP and PIM**

MPLS Data Plane

MPLS Control Plane: **LDP or RSVP**

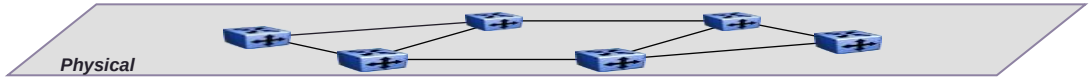
Encapsulation	Ethernet + MPLS label	Overhead = 8B

Encapsulation	Ethernet + IP	Overhead = 22B

IP Control Plane: **OSPF or IS-IS(IP)**

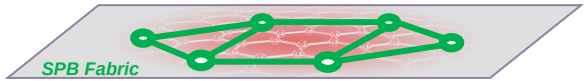
Ethernet Data Plane

Encapsulation	Ethernet	Overhead = 0B



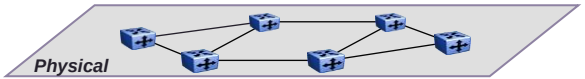
Extreme Fabric Connect / SPB

Encapsulation	Ethernet MAC-in-MAC	Overhead = 22B

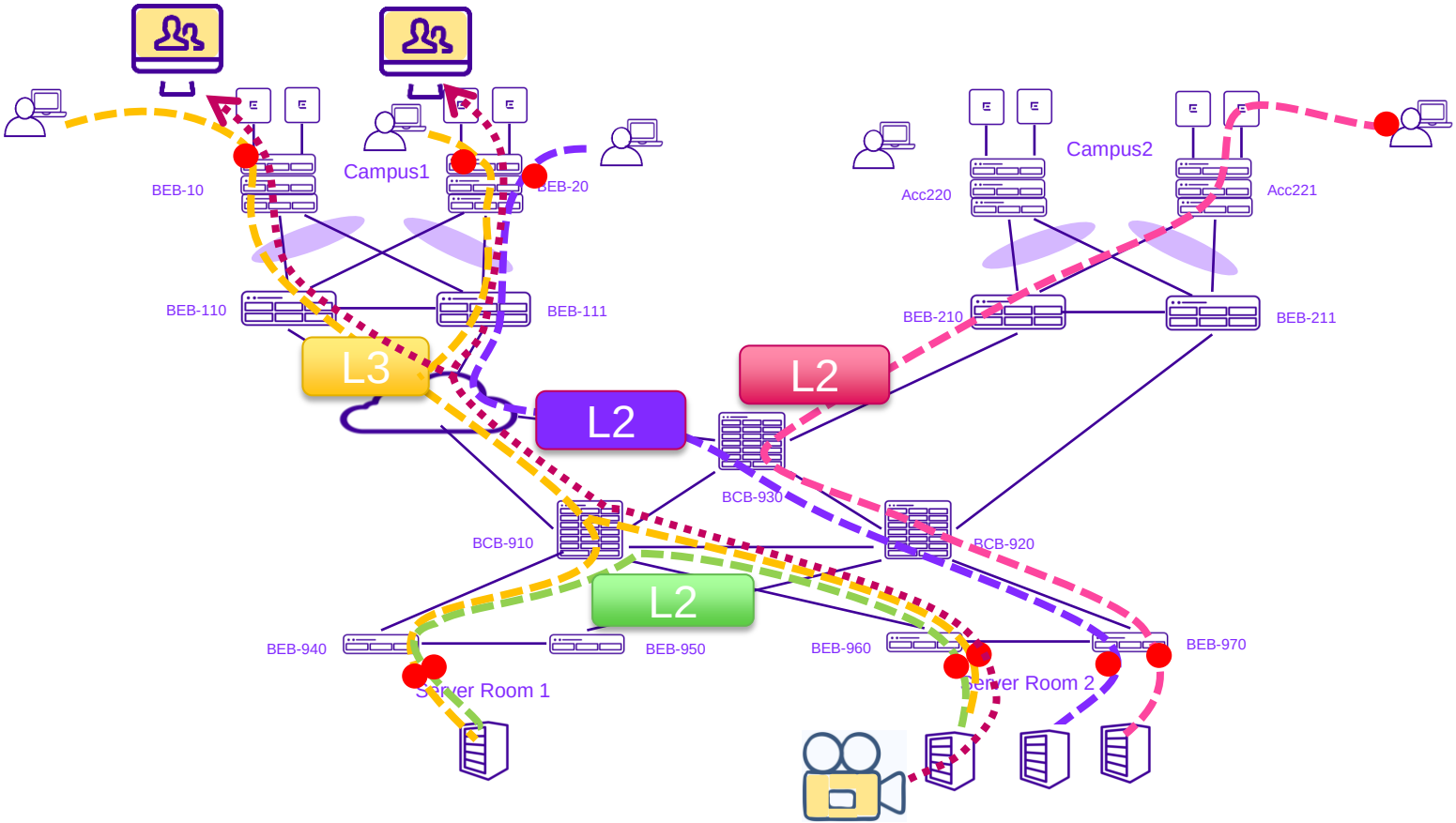


Ethernet Control Plane and Service Signalling: **IS-IS**

Encapsulation	Ethernet	Overhead = 0B

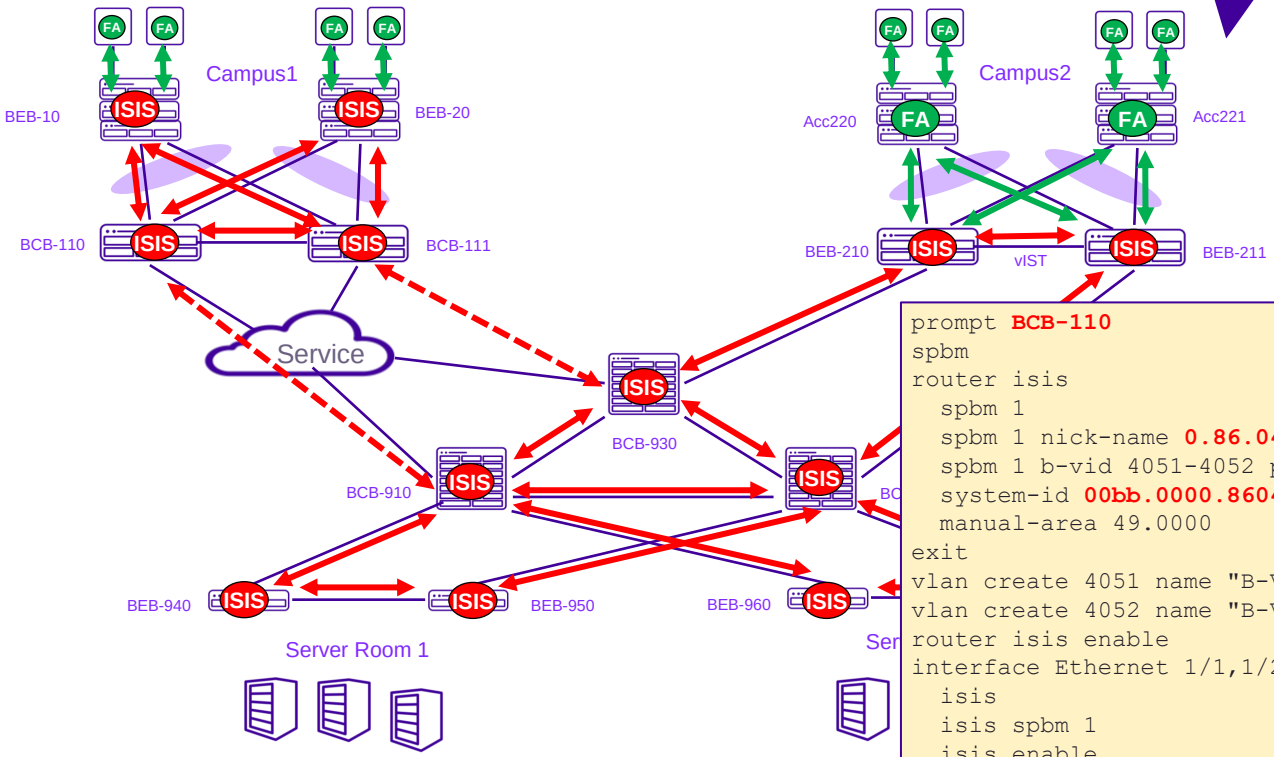


Extreme Fabric Connect – based on Shortest Path Bridging



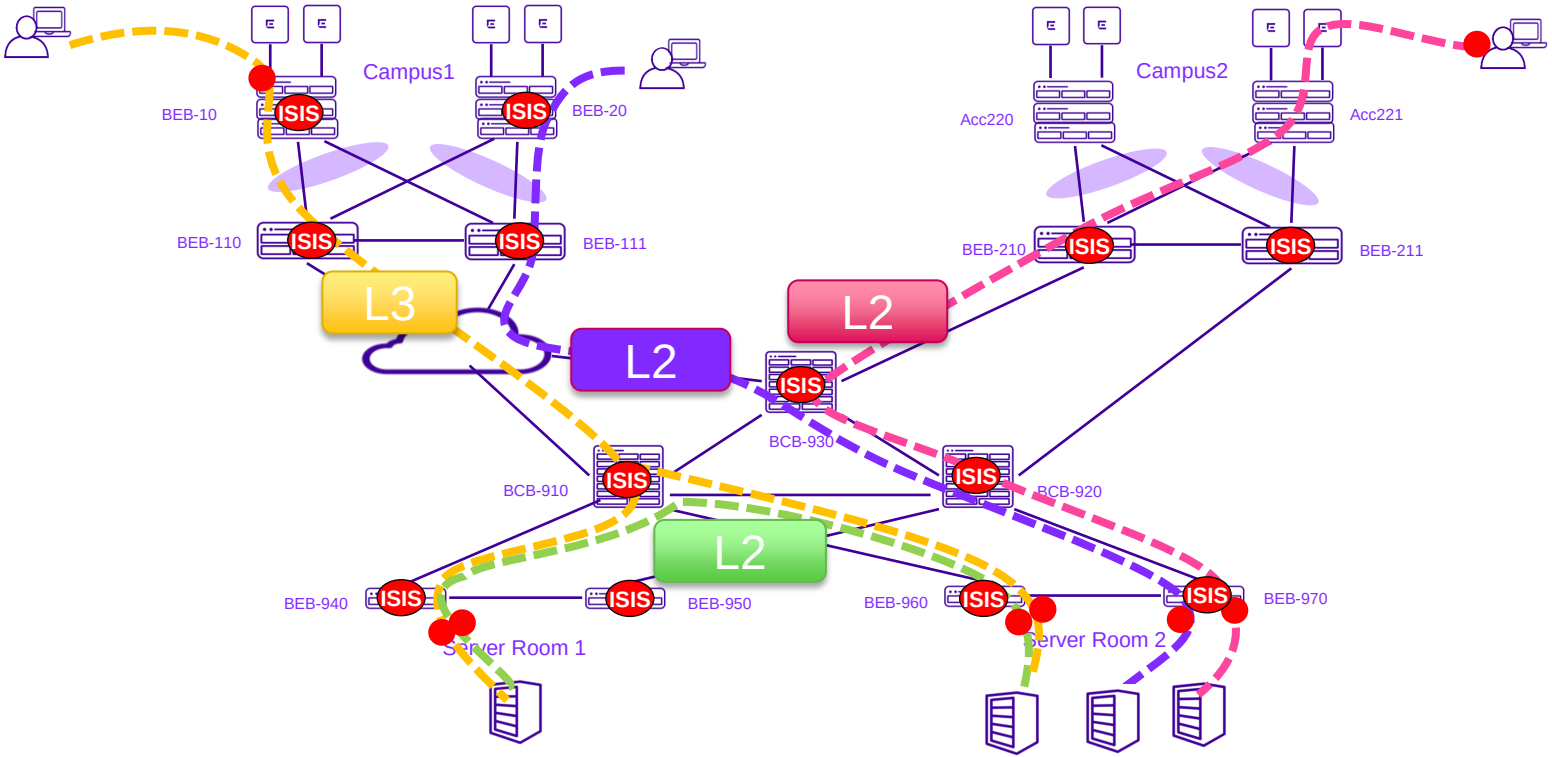
Fabric Configuration overview

that's it!

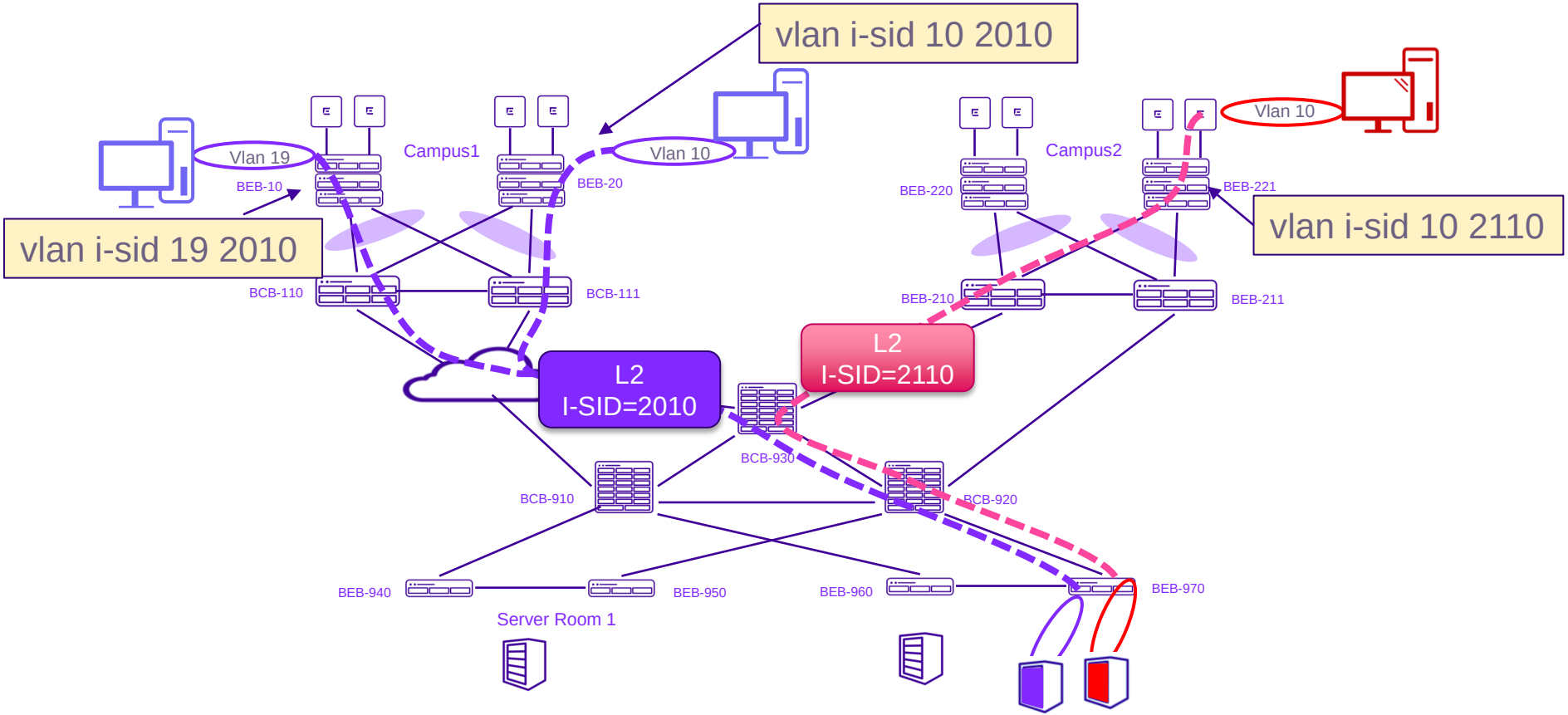



```
prompt BCB-110
spbm
router isis
  spbm 1
  spbm 1 nick-name 0.86.04
  spbm 1 b-vid 4051-4052 primary 4051
  system-id 00bb.0000.8604
  manual-area 49.0000
exit
vlan create 4051 name "B-VLAN-1" type spbm-bvlan
vlan create 4052 name "B-VLAN-2" type spbm-bvlan
router isis enable
interface Ethernet 1/1,1/2,1/21,1/23
  isis
  isis spbm 1
  isis enable
exit
```

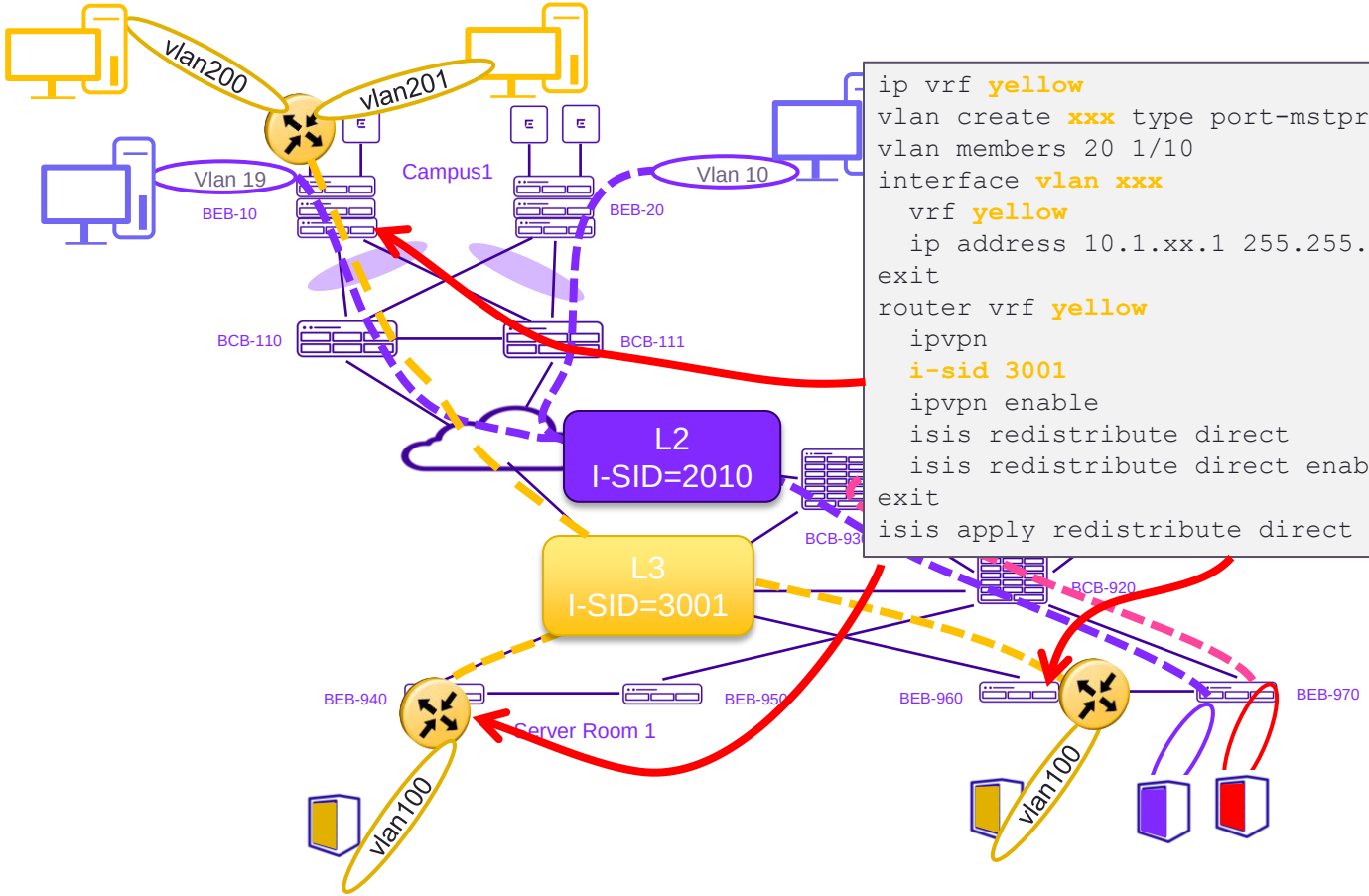
How does Fabric Connect work?



Creating layer 2 networks

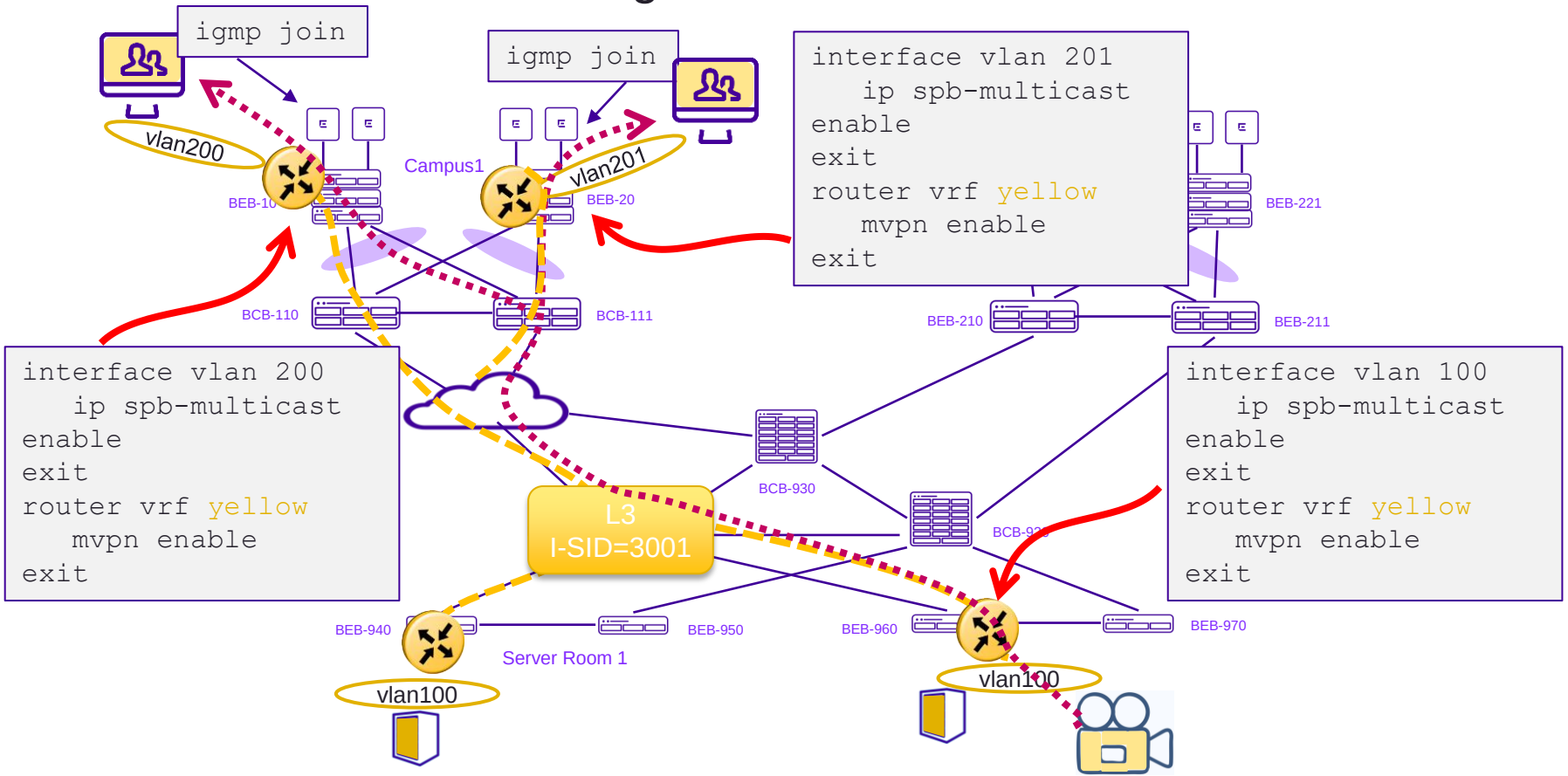


Creating layer 3 networks

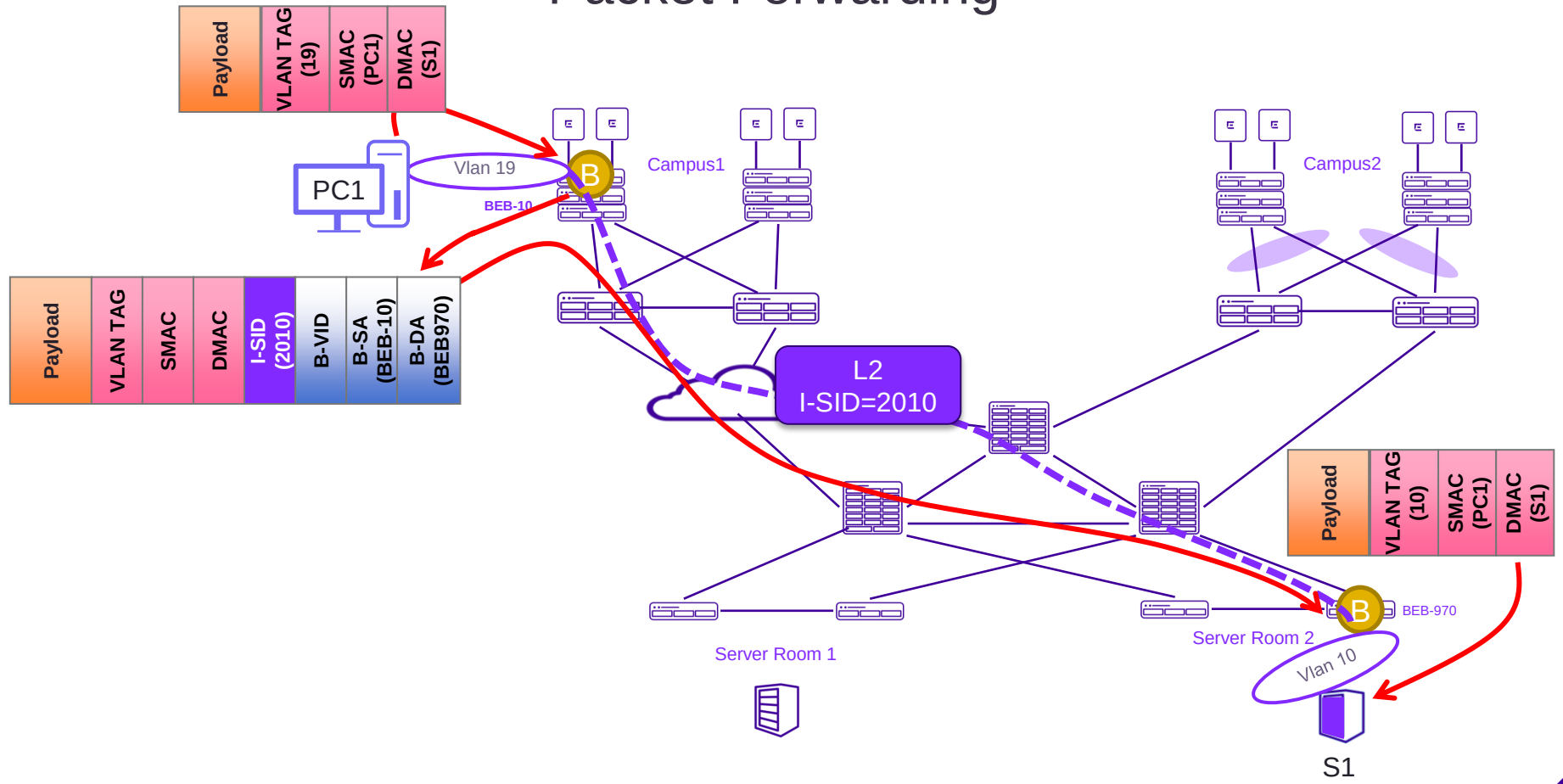



```
ip vrf yellow
vlan create xxx type port-mstprstp 0
vlan members 20 1/10
interface vlan xxx
  vrf yellow
  ip address 10.1.xx.1 255.255.255.0
exit
router vrf yellow
  ipvpn
  i-sid 3001
  ipvpn enable
  isis redistribute direct
  isis redistribute direct enable
exit
isis apply redistribute direct vrf yellow
```

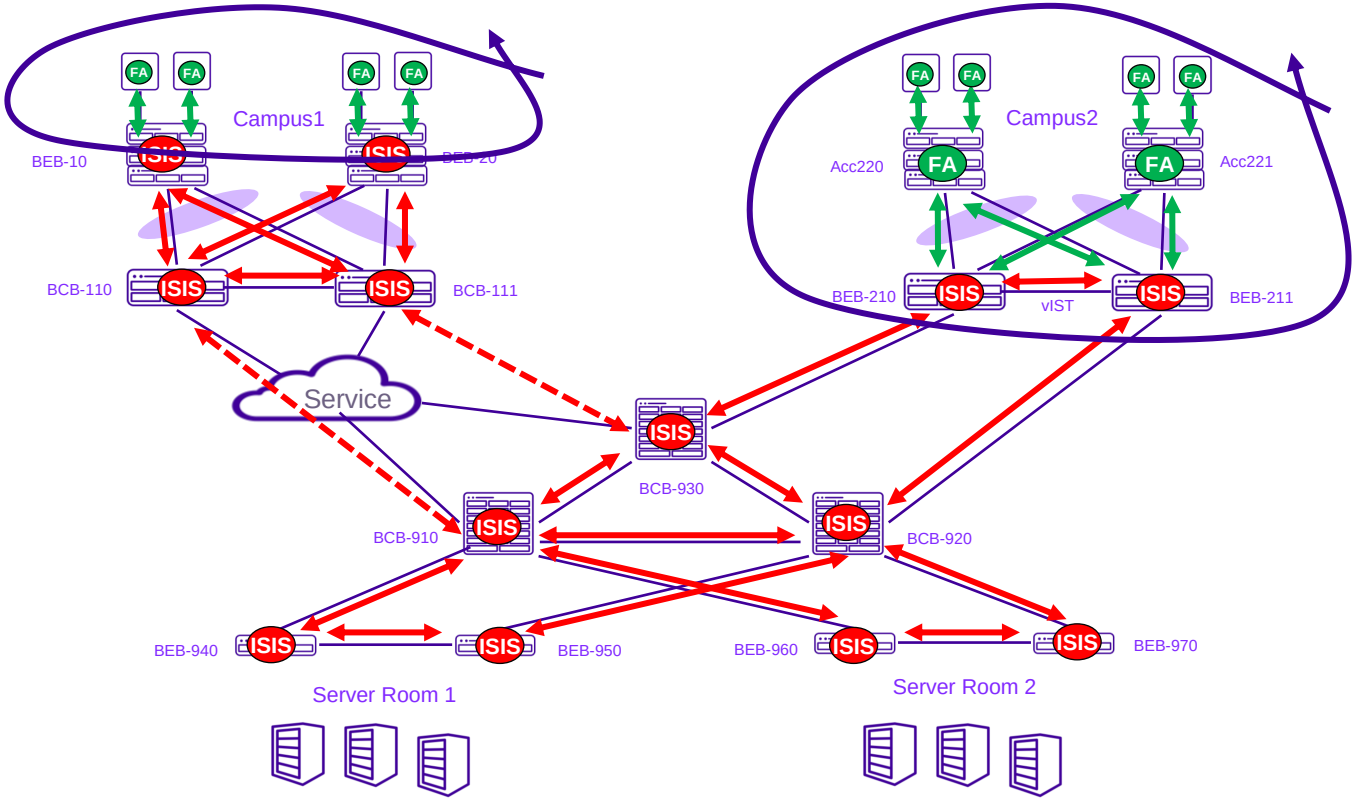
Creating IP multicast services



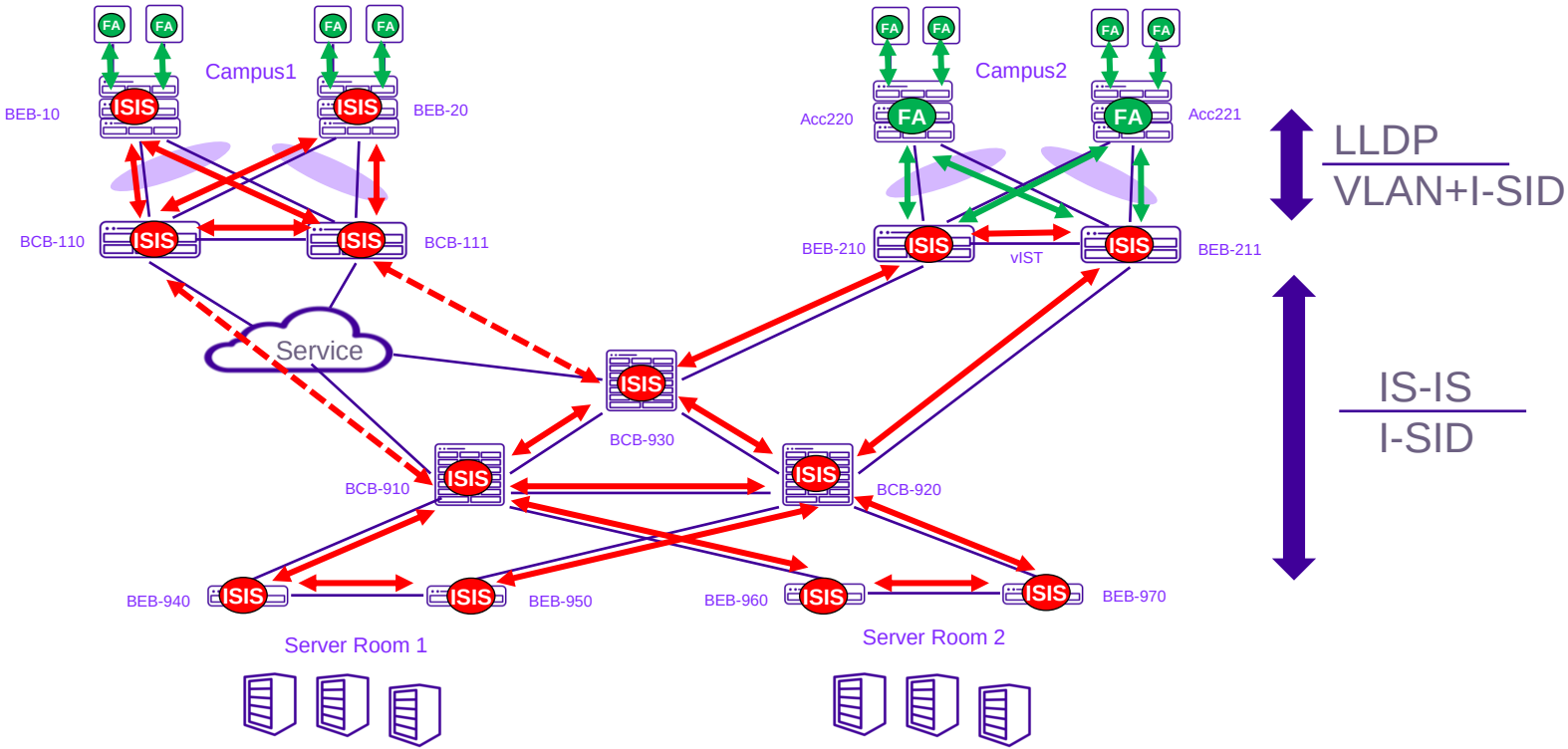
Packet Forwarding



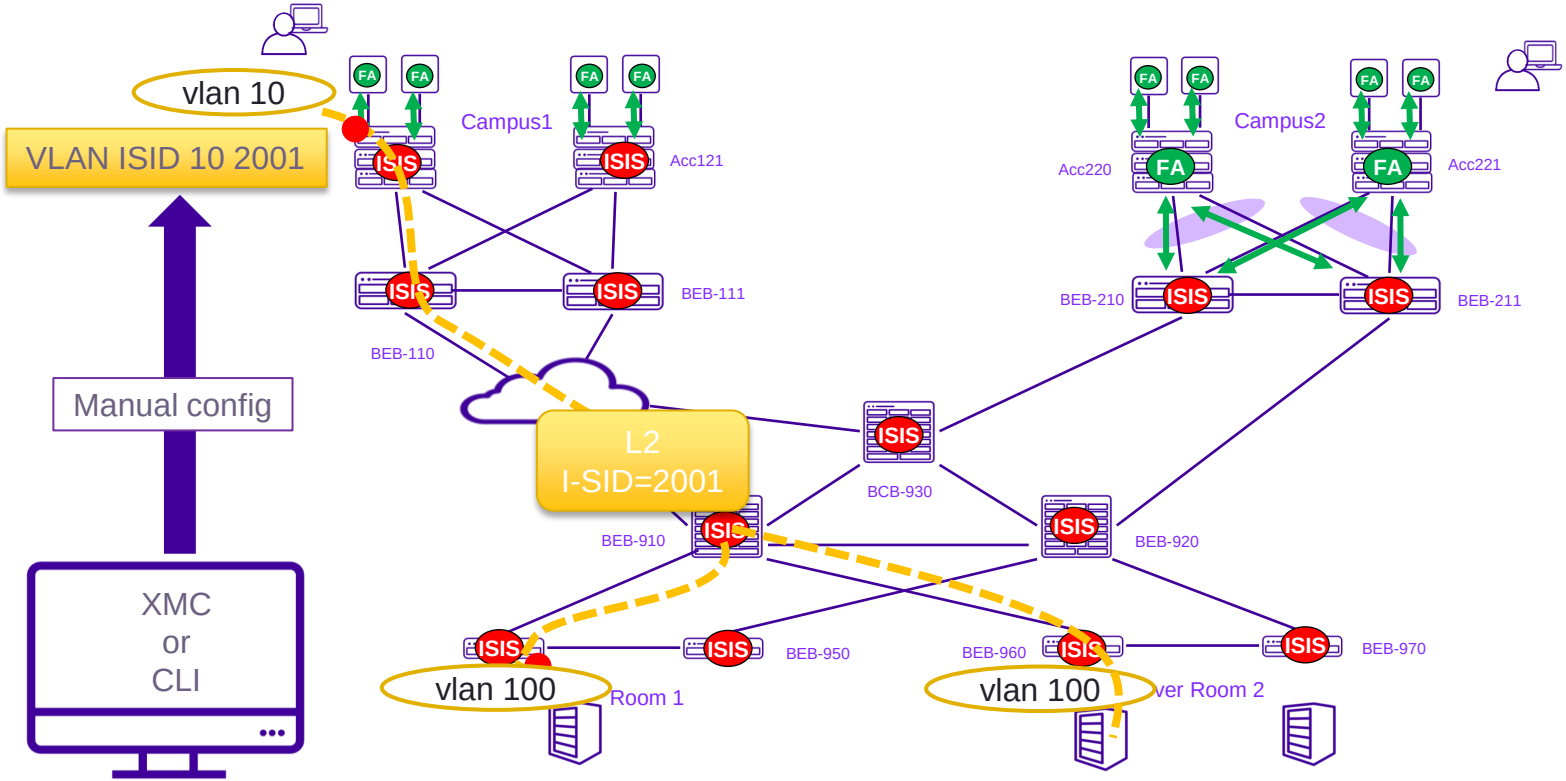
Edge access automation and extension



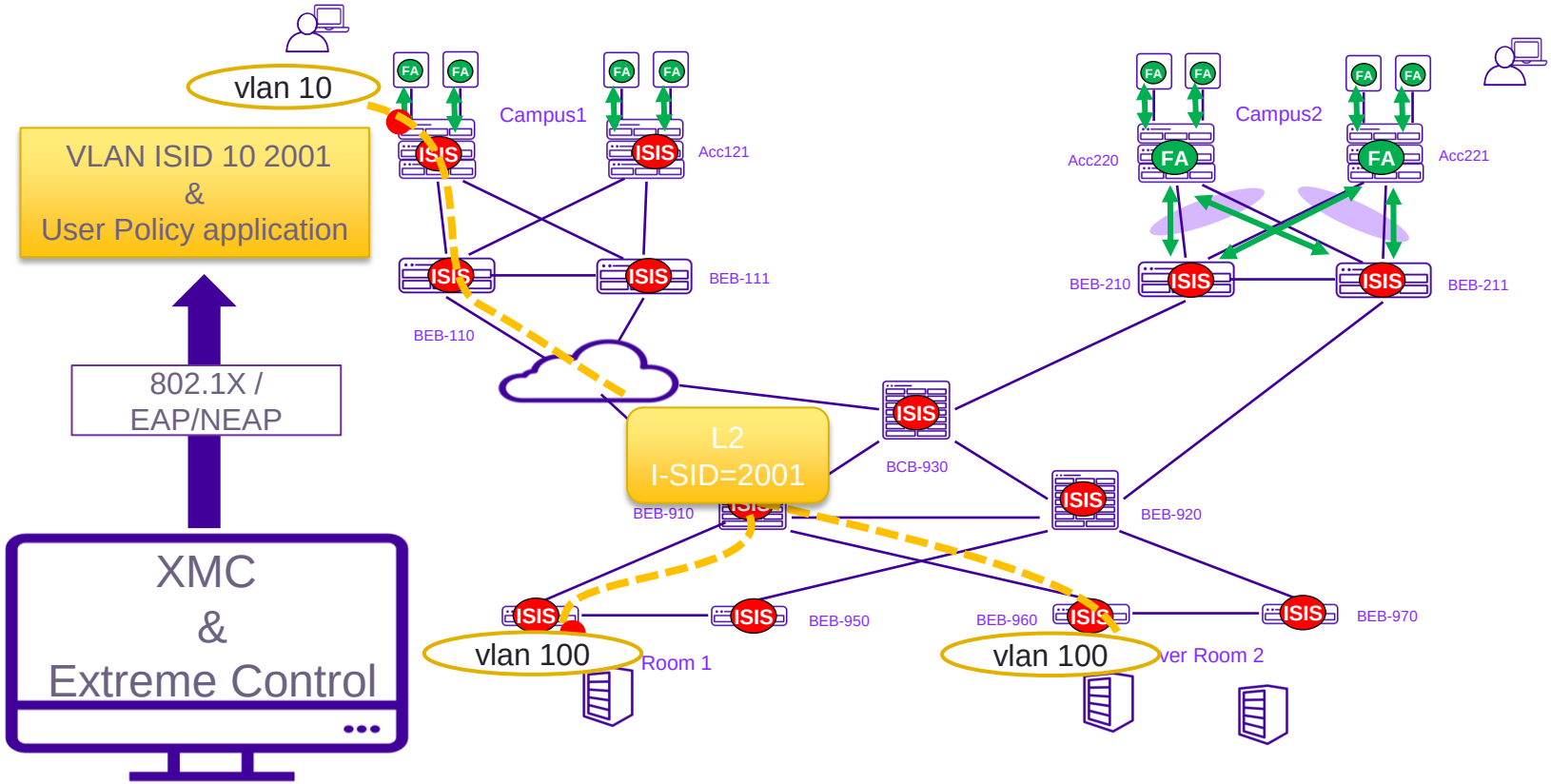
Fabric Attach – based on IEEE 802.1qcj



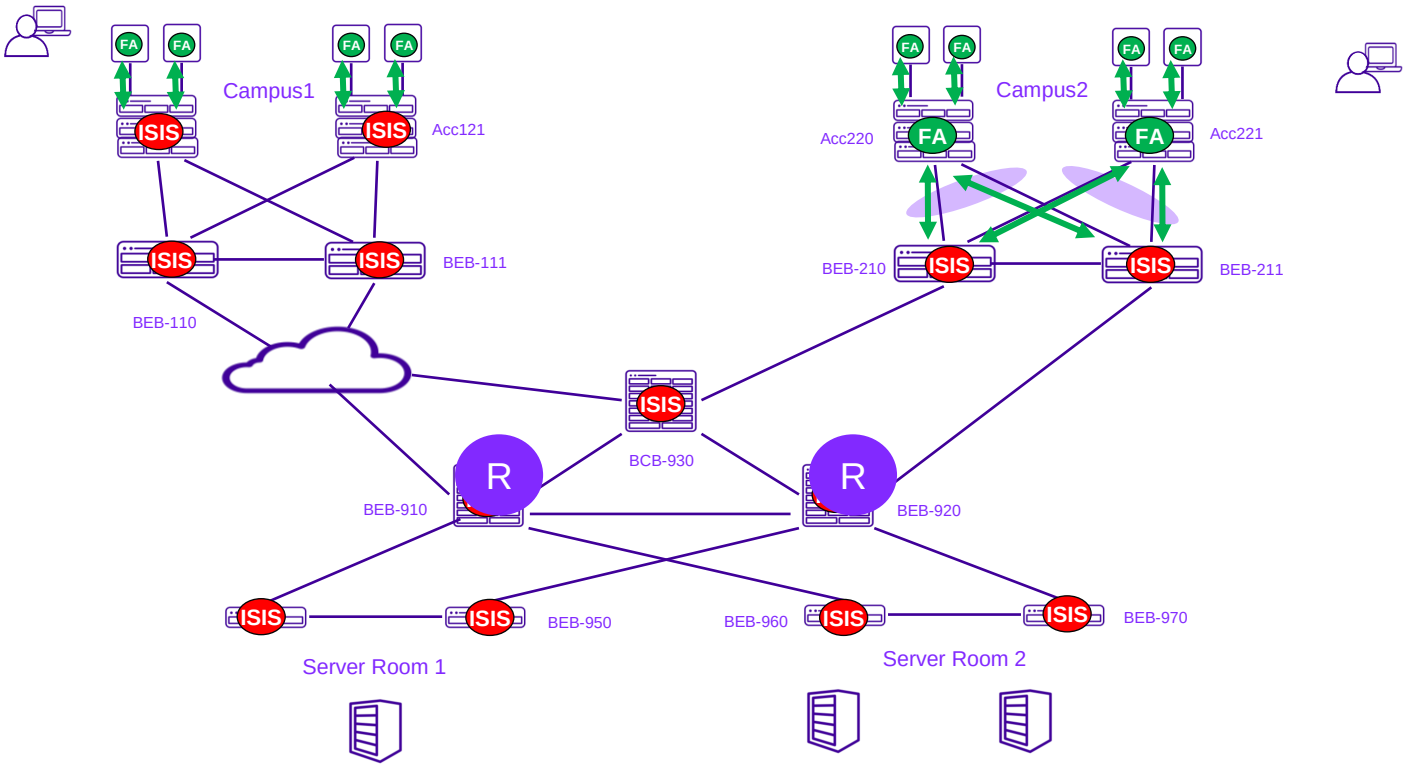
User Access



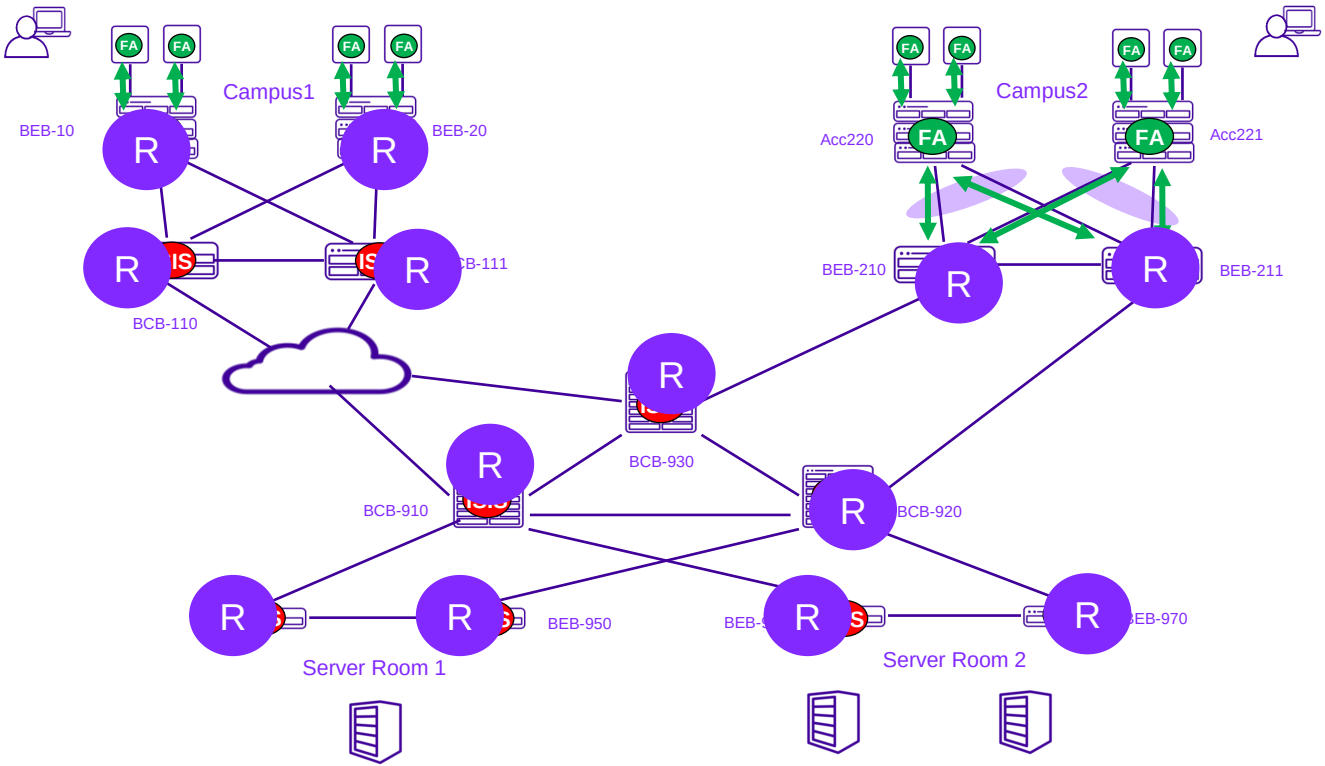
User Access Automation



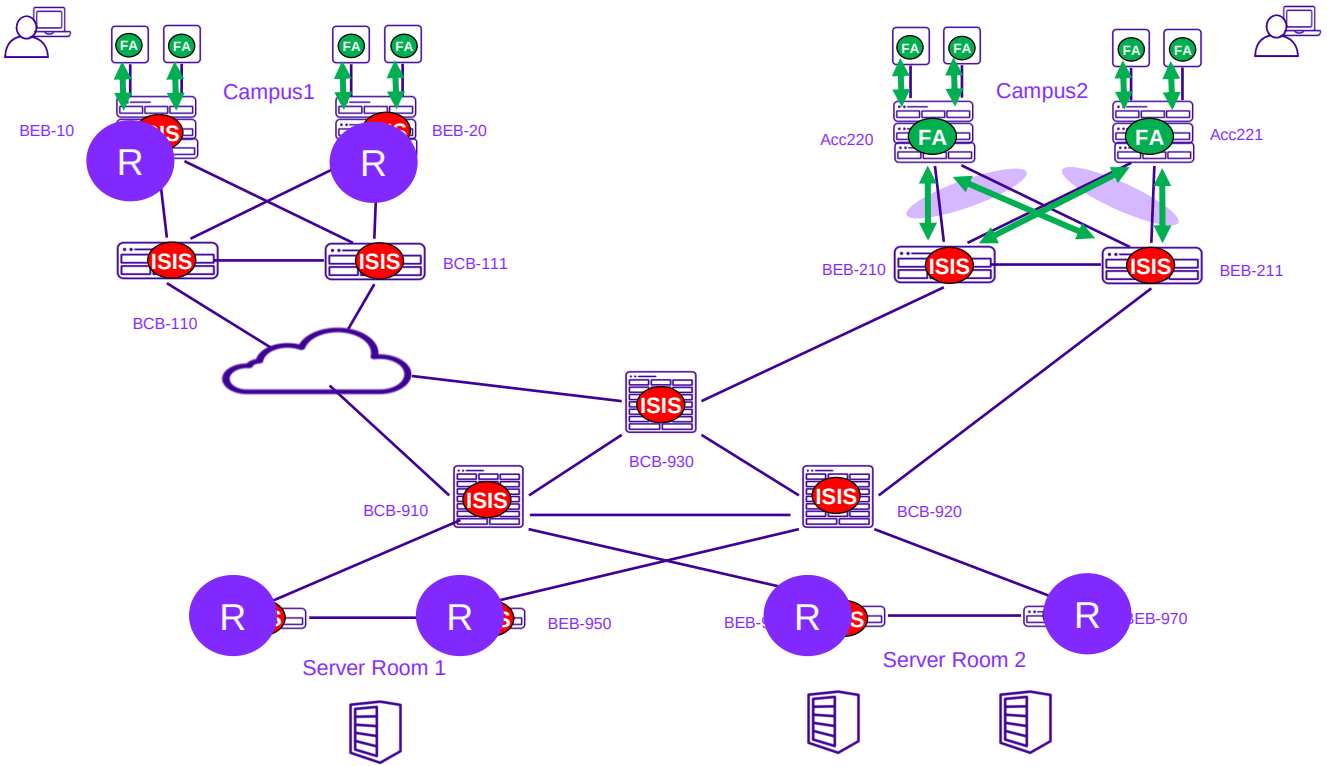
Where to route? – Centralized Routing



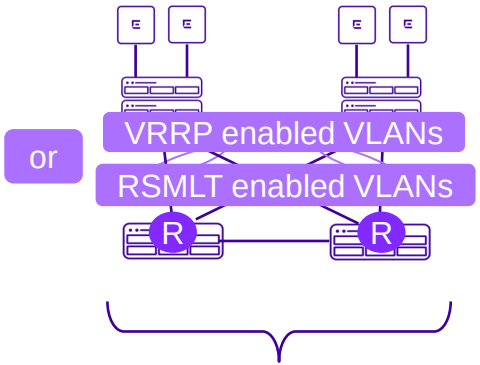
Where to route? – Distributed Routing



Route where you need!

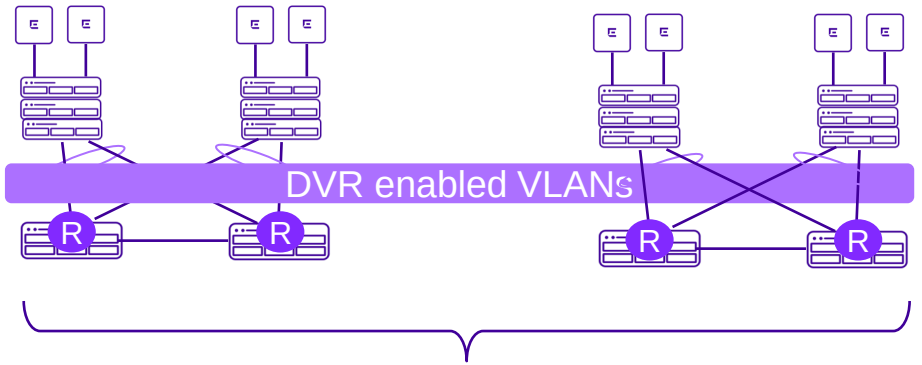


Default Gateway Options



Use if Subnet is only connected to pair of nodes

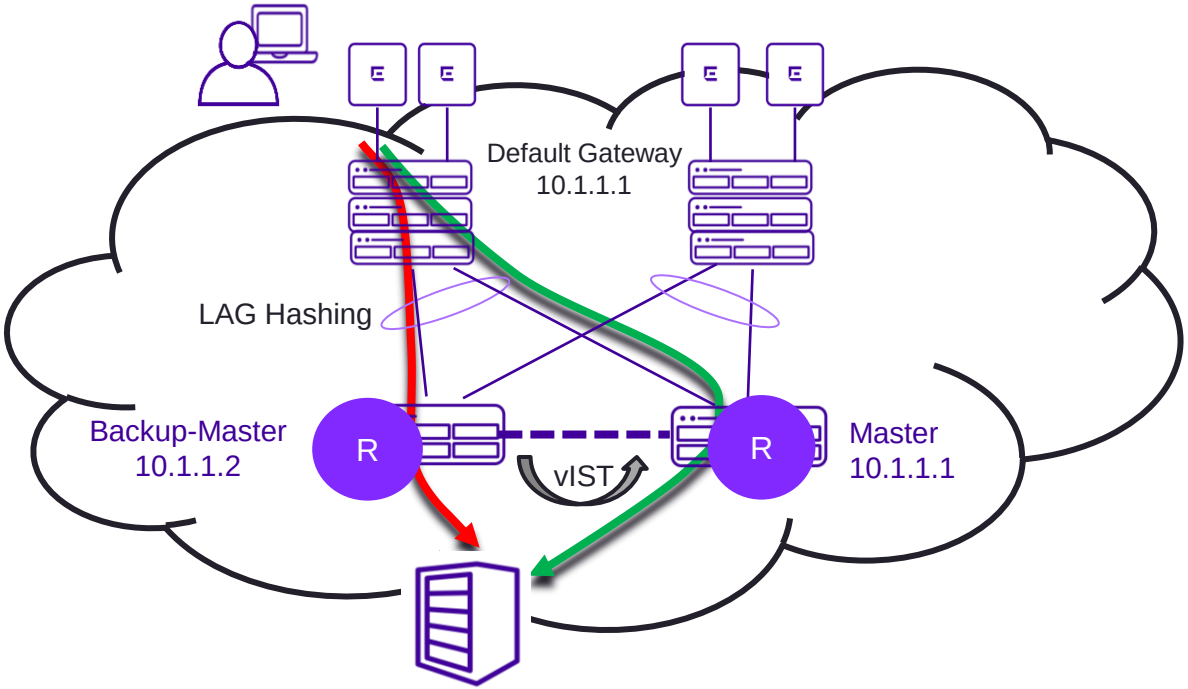
RSMLT = Routed “MLAG”



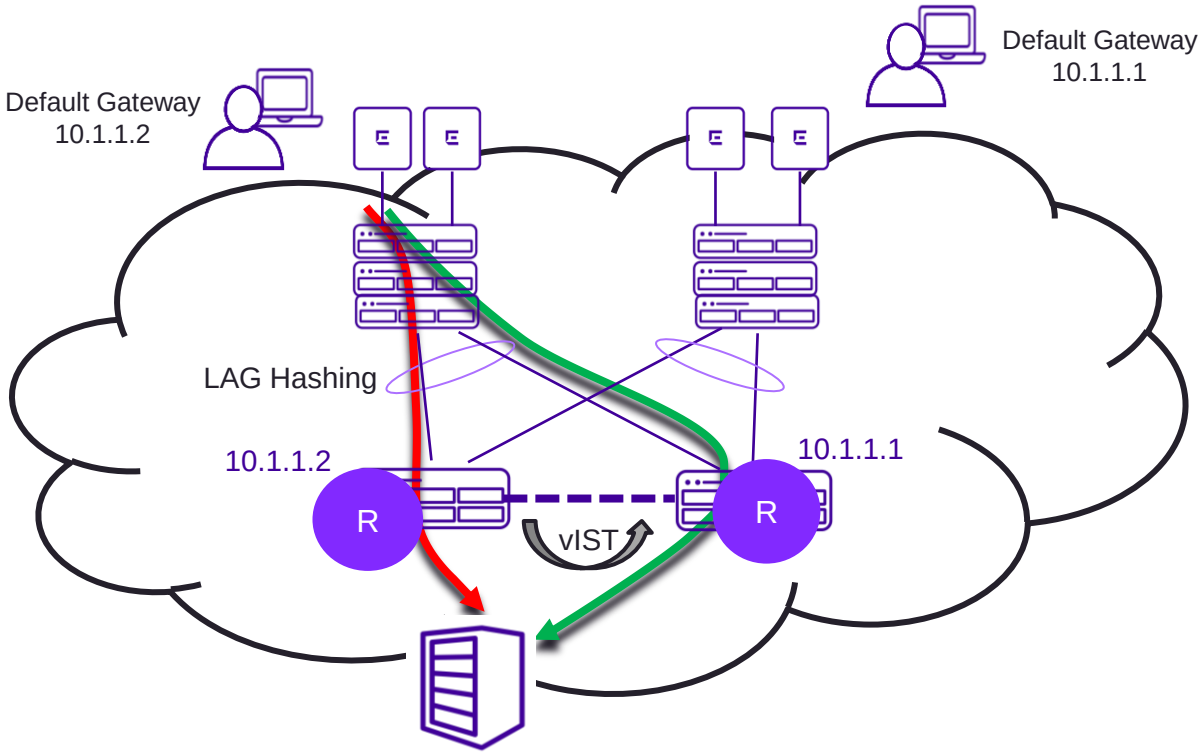
Use if Subnet is stretched across network (e.g. data center)

DVR = Distributed Virtual Routing

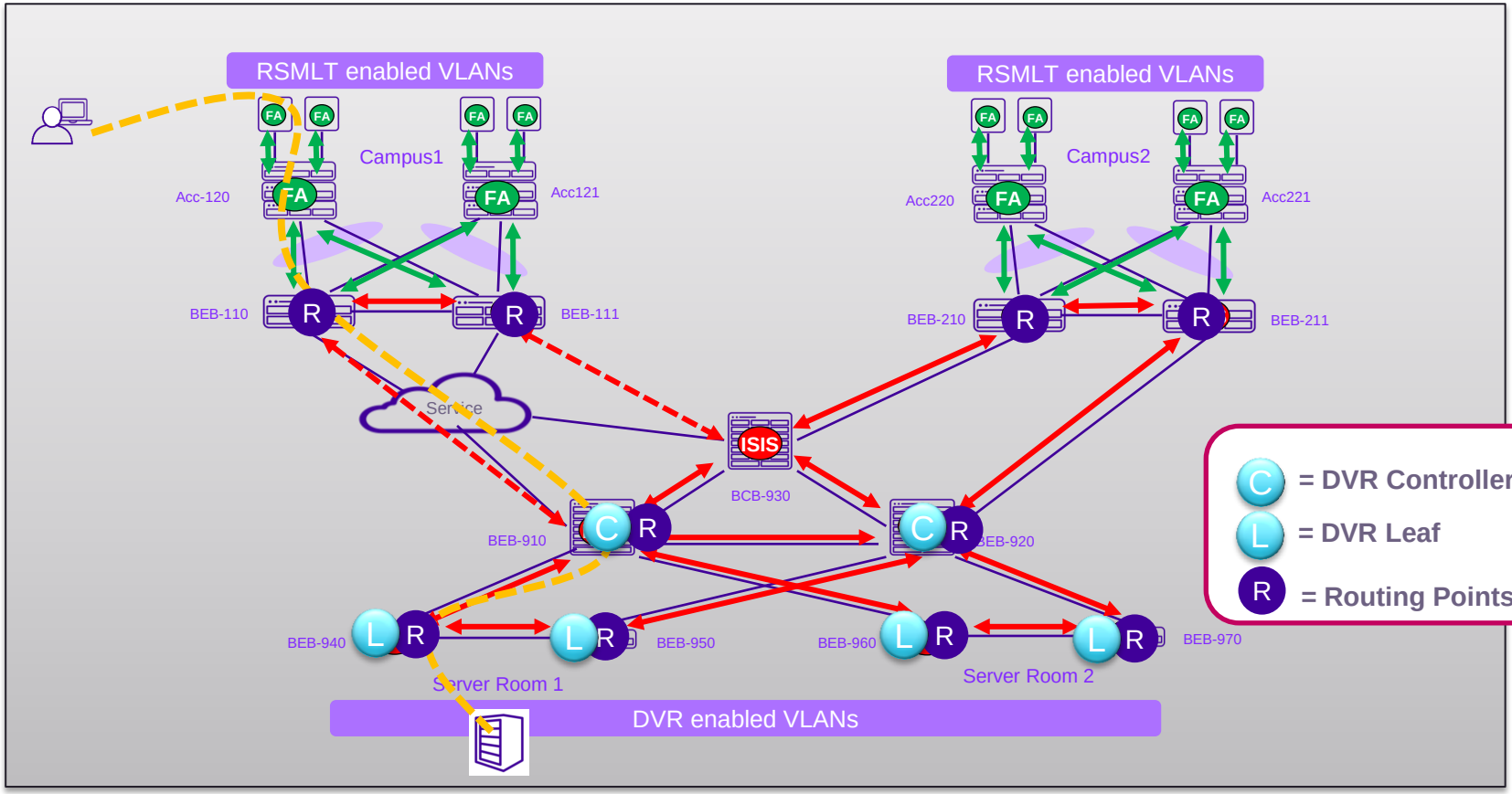
Default Gateway Option = Virtual Router Redundancy Protocol



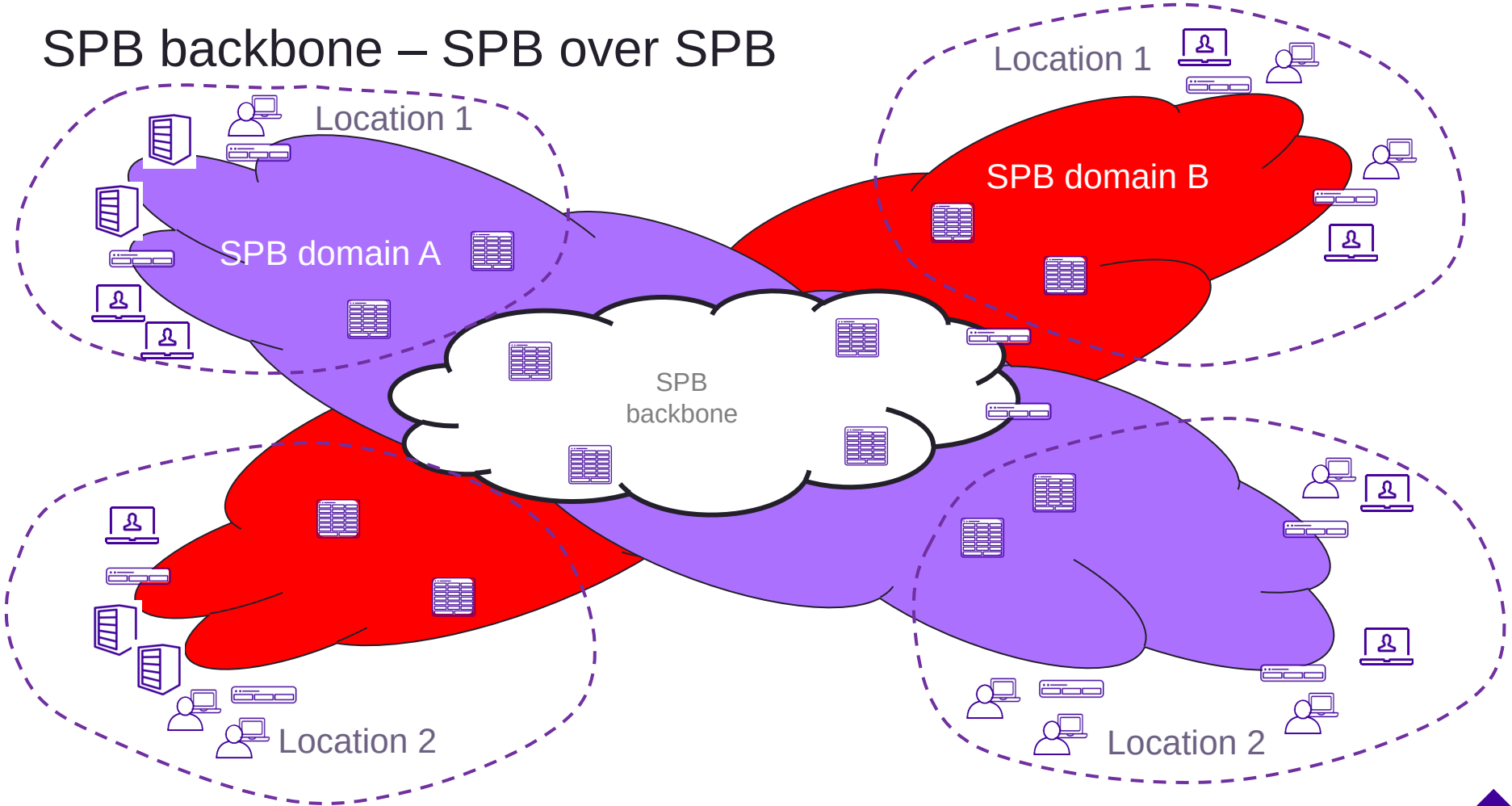
Default Gateway Option = Routed Split MLT



Default Gateway Option = Distributed Virtual Routing

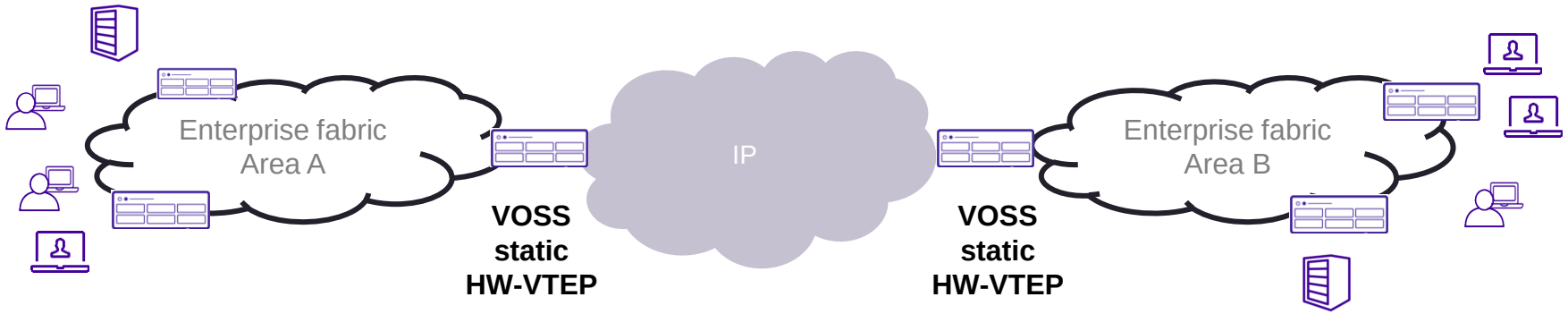


SPB backbone – SPB over SPB

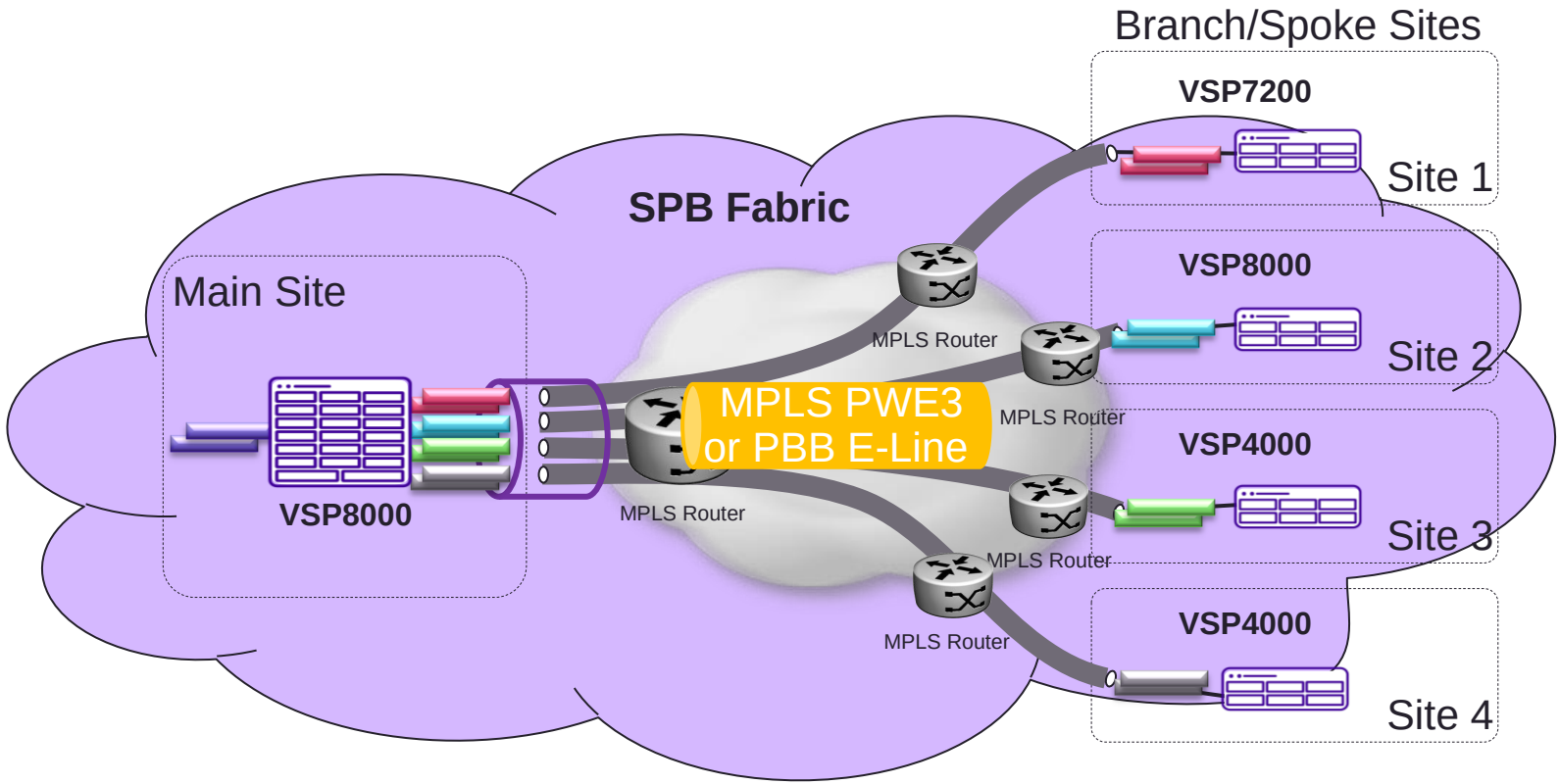


Interconnecting Fabrics

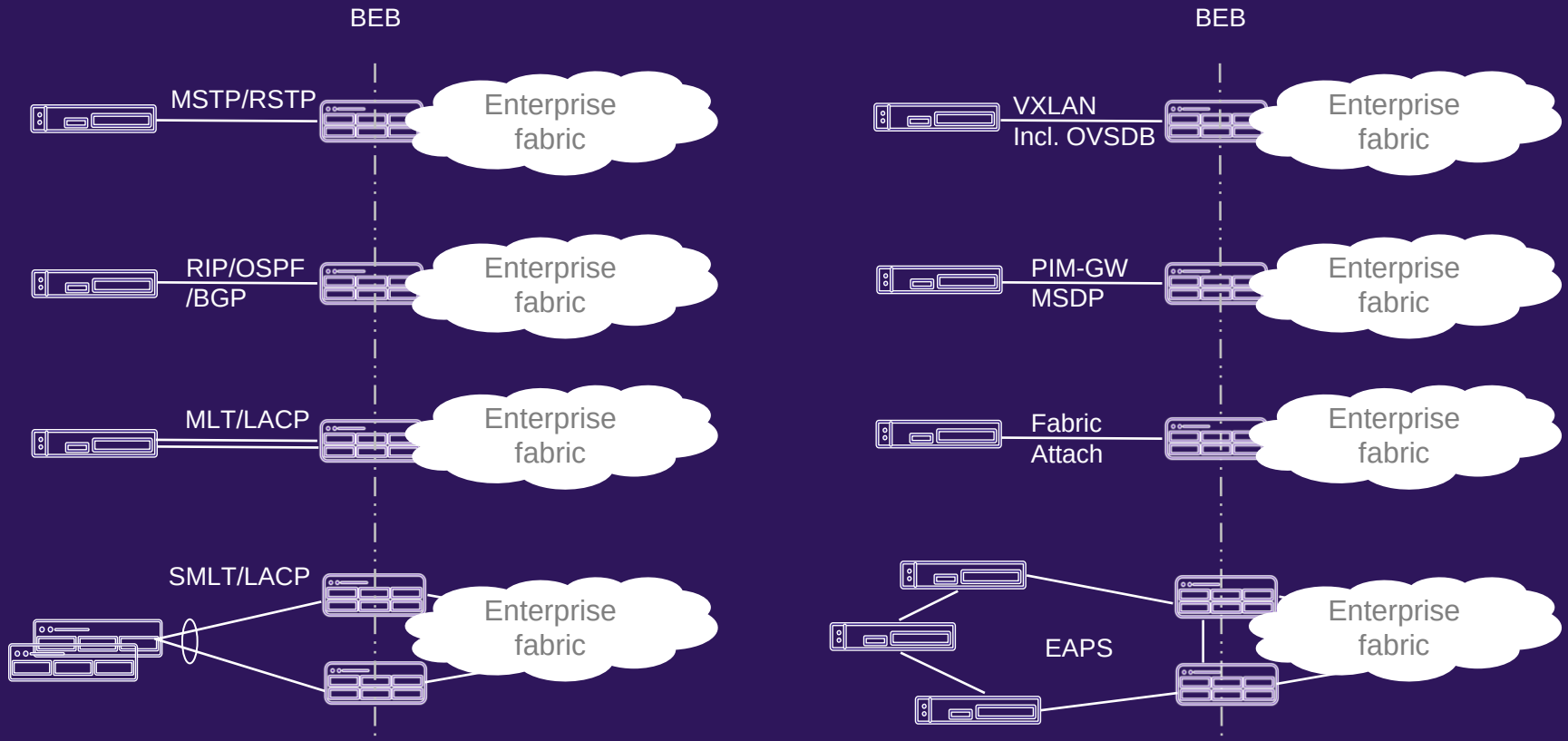
Fabric Connect areas interconnect using VXLAN Gateway function



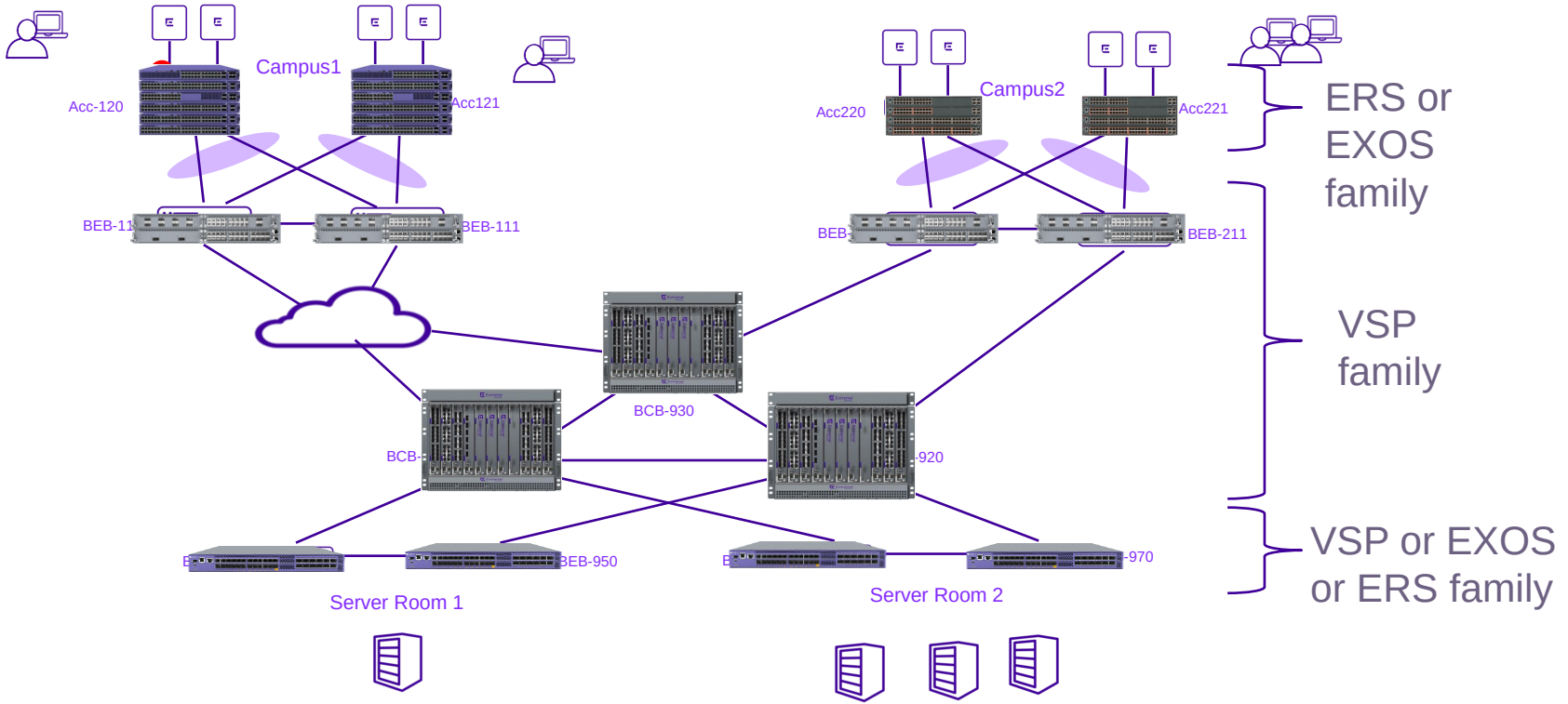
SPB Fabric over MPLS Pseudo-wire/E-Line Provider Network



Interconnecting with non-fabric networks



Extreme Networks
Fabric Connect / SPB solution



Campus fabric
VSP Switching family

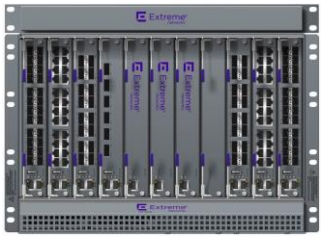
CORE

AGGR

EDGE

VSP8200
80x1G/10G SFP+, 4x40G

VSP7400-32C
32x40G/100G



VSP8600 – 8 Slot Modular
Up to 192x10G (Fiber/Cu)
Up to 128x40G QSFP+
Up to 48x100G QSFP28

VSP8400 – 4 Slot Mini Modular
Up to 96x1G/10G (Fiber/Cu)
Up to 24x40G QSFP+
Up to 8x100G QSFP28

VSP7200
48x1G/10G (Fiber/Cu), 6x40G

VSP7400-48Y8C
48x10G/25G, 8x100G

MicroVSP

VSP4850
48x1G Cu (30W), 2x10G SFP+

VSP4450
12x1G Cu (30W),
36x1G SFP, 2x10G SFP+

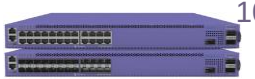
VSP4900

Campus fabric edge

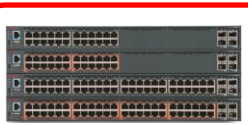
EXOS and ERS switch familes

X870
10G/40G/100G

X670
10G/40G/100G



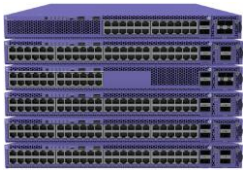
X590
10G/25G/40G/50G/100G



ERS5900
1G/2,5G/10G
SPB

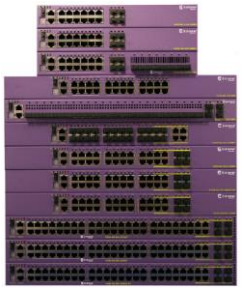
ERS4900
1G/10G
SPB

X670
1G/40G



X465
1G/25G/40G

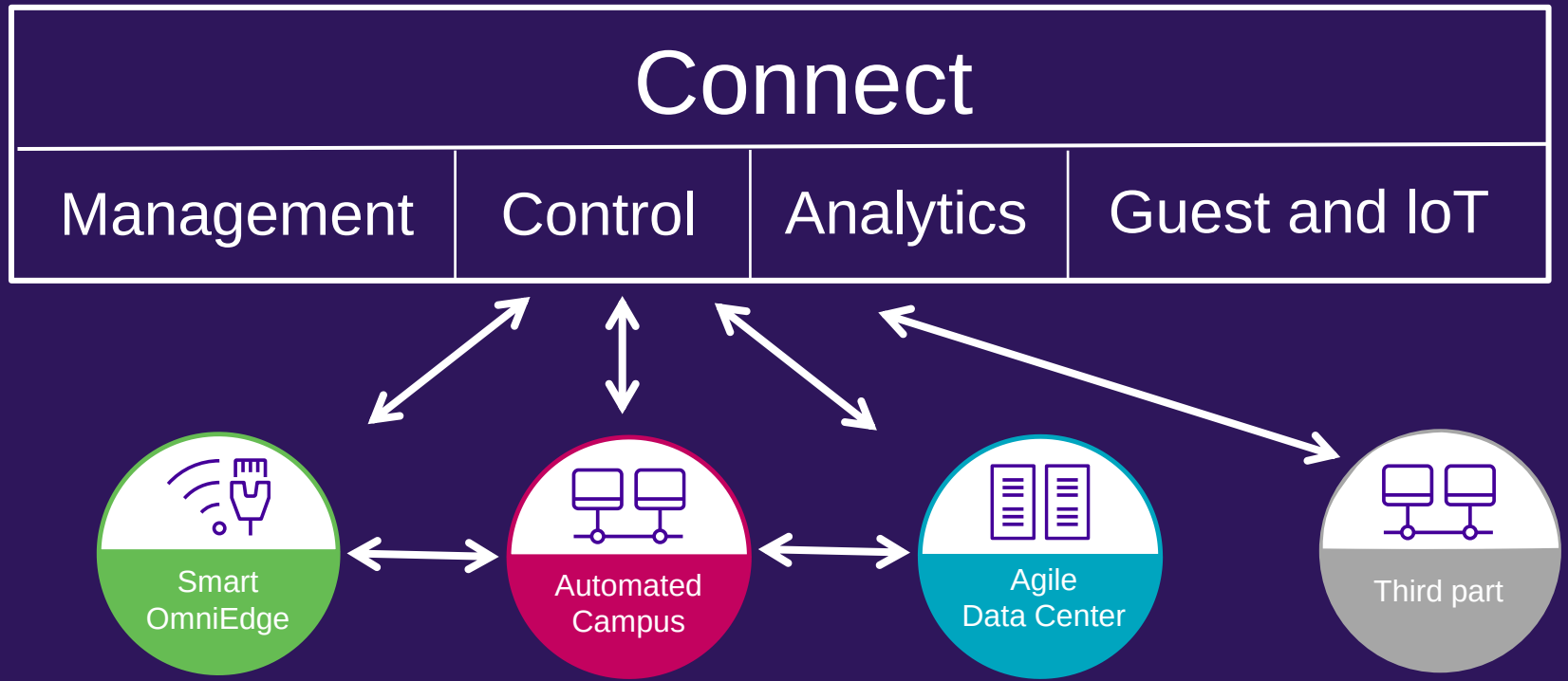
X450
1G/10G



X440-G2
1G/10G

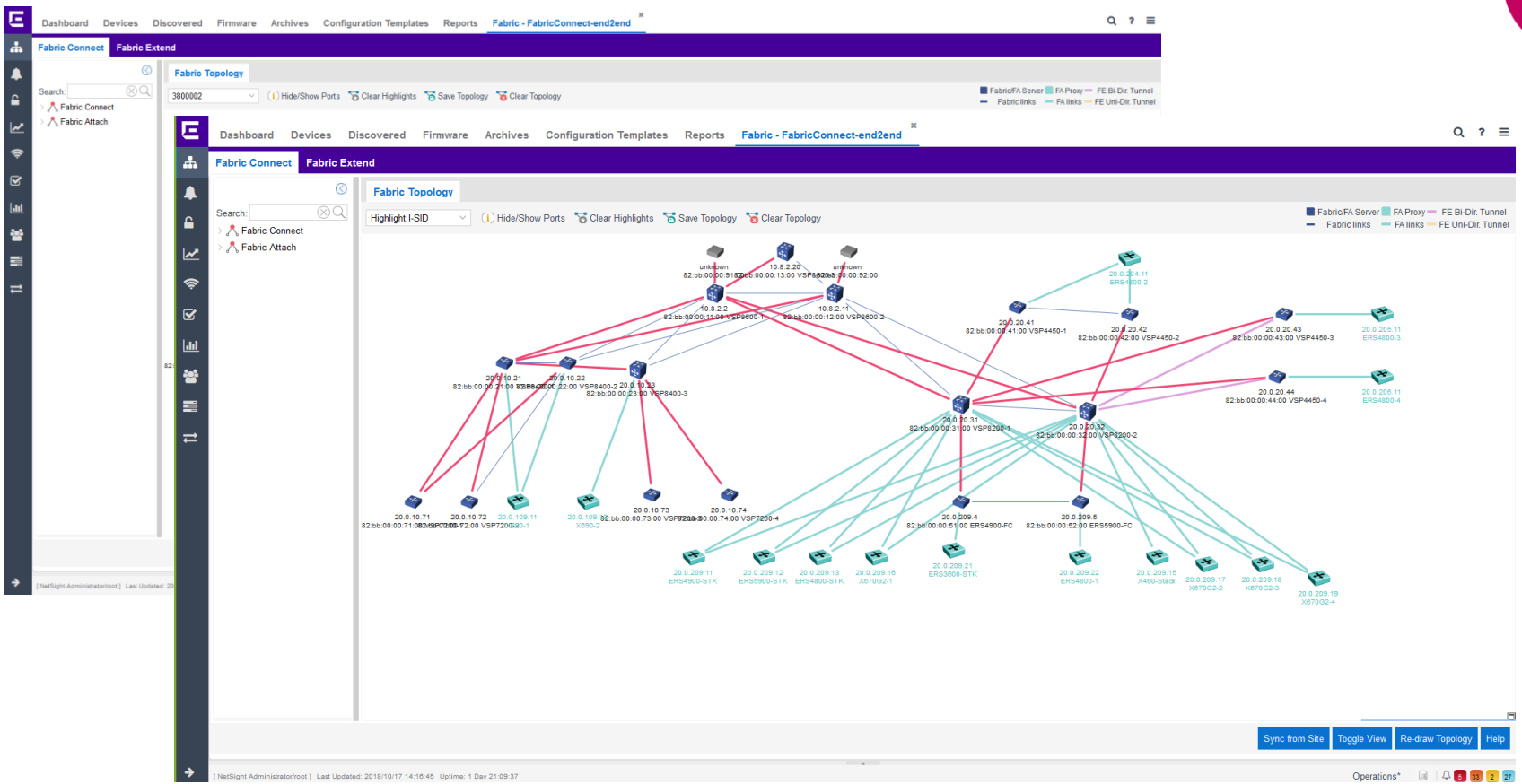
ERS3600
1G/10G

Extreme Management Center



Path Visualization in XMC Fabric Manager

Automated Campus



Fabric Connect Customer Experience Research

Table 1: Summary of key metrics		
Parameters:	**Number of times better (average)**	**Average % less**
Implementation time	10.8x	91%
Configuration time	6.5x	85%
Wait time	3x	66%
Troubleshooting	6.5x	85%
Failover time	2553x	100%
Outages due to human error	n/a	100%

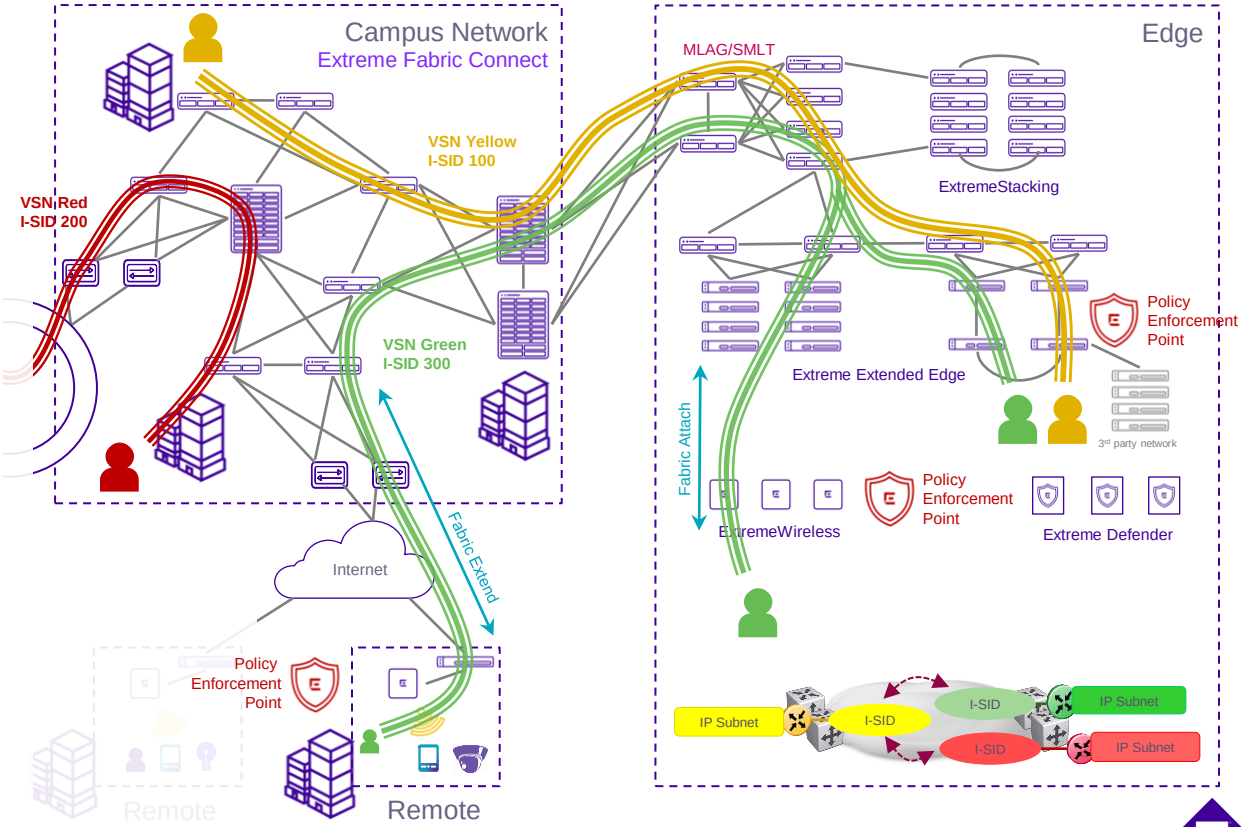
Based on interviews with 28 Fabric Connect customer

Extreme Fabric Connect – a fabric technology for Enterprise Networks

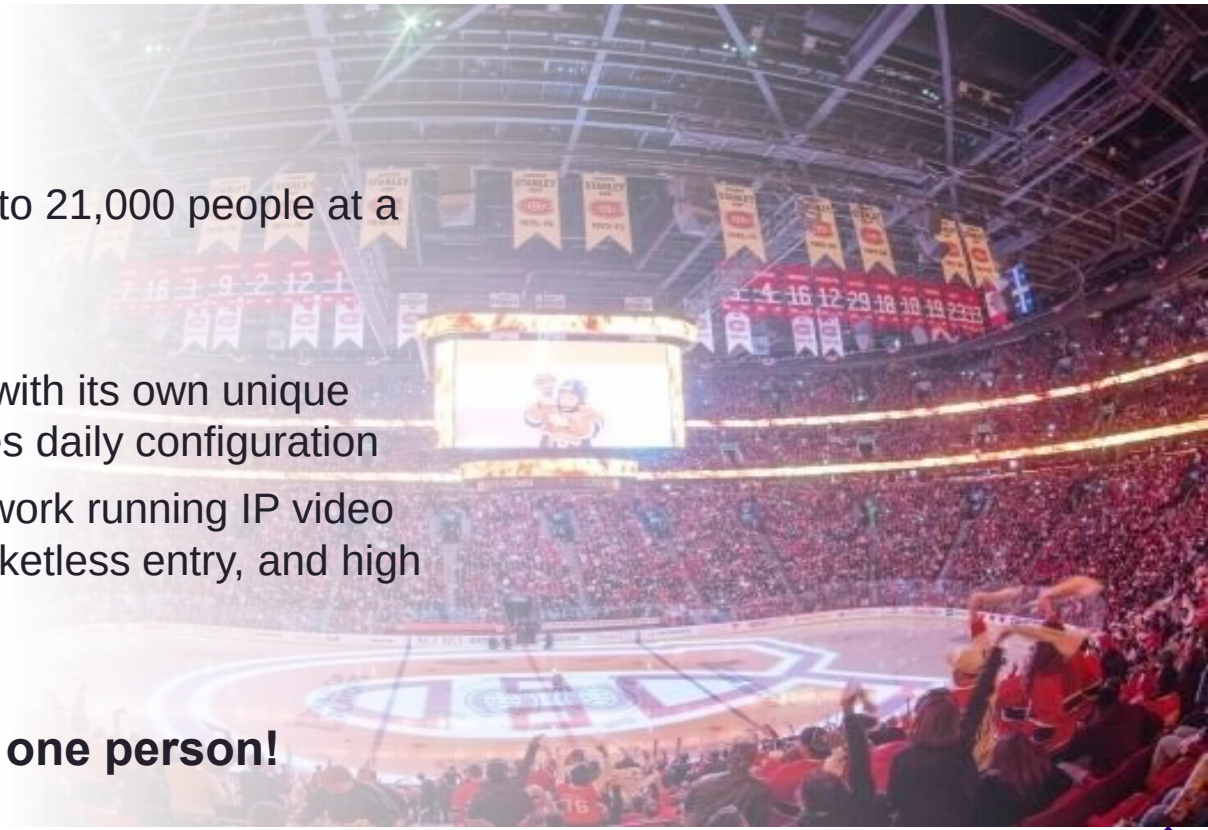
Service Features:
- L2 and L3 VPN services
- Mixed L2/L3
- Inter-VSN Routing
- Native multicast support
- Integrated OAM/CFM
- Fabric extension over IP

Security:
- Hyper-segmentation (zoning)
- Stealth infrastructure
- Policy-based dynamic profiles

Service Auto-Provisioning:
- Edge-only provisioning
- Network Access Control integration
- Service assignment on non-fabric devices (Fabric Attach)



Simplicity in Action: 1 Million visitors; Just one IT person



- One million visitors a year, up to 21,000 people at a time.
- 500 wireless access points
- ~200 events each year; each with its own unique requirements. Network requires daily configuration
- Technologically advanced network running IP video surveillance, door readers, ticketless entry, and high volumes of digital signage…

All this… managed by just one person!

Secure: Segmentation with Ease and at Massive Scale

Oslo University Hospital

- Largest hospital in Scandinavia
- ~1.2M patient treatments
- ~20,000 employees across 40 locations
- More than 50% of the total medical research in Norwegian medical centers performed at Oslo University hospital
- Wanted a secure, easy to manage segmented network

~1700 isolated networks for different user groups, services and applications - deployed with ease and without risk of error

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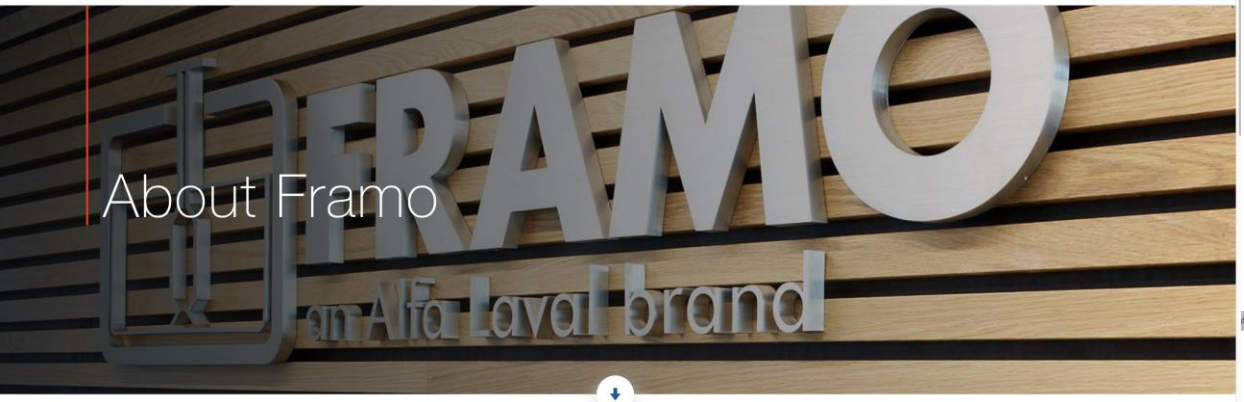
an Alfa Laval brand



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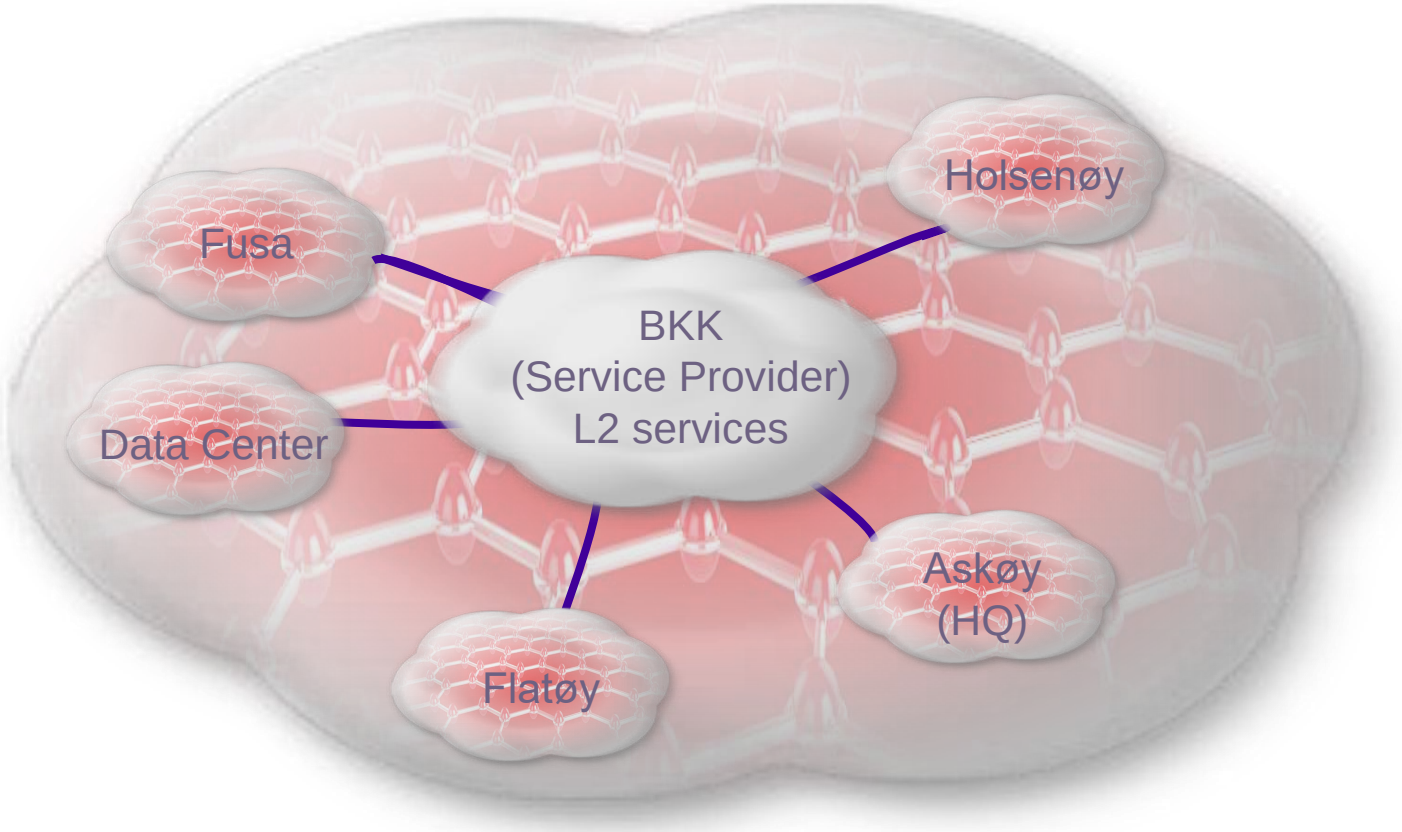
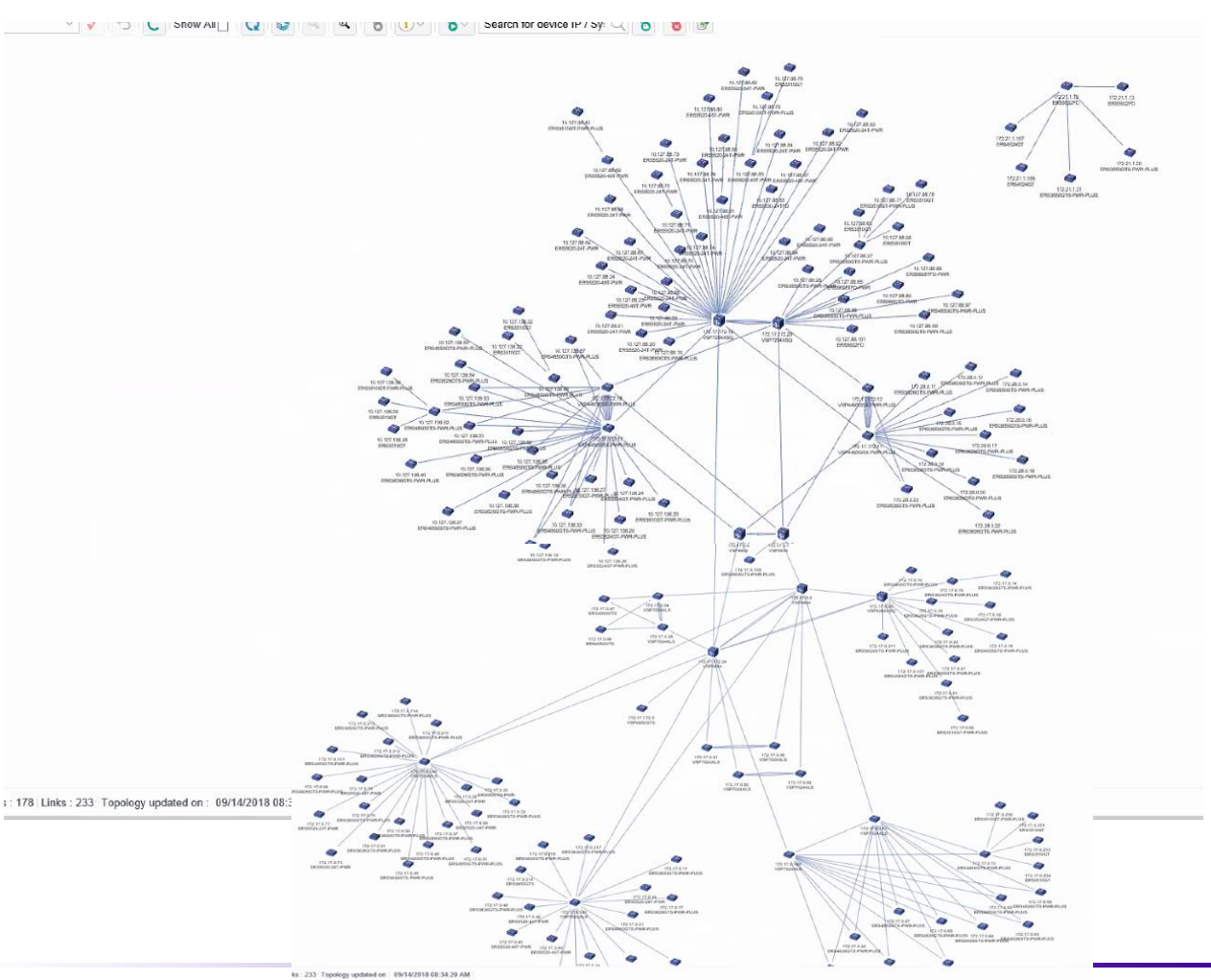
FRAMO – current SPB domain



The FRAMO network:

Physical infrastructure:

~ 178 nodes
~ 8000 ports

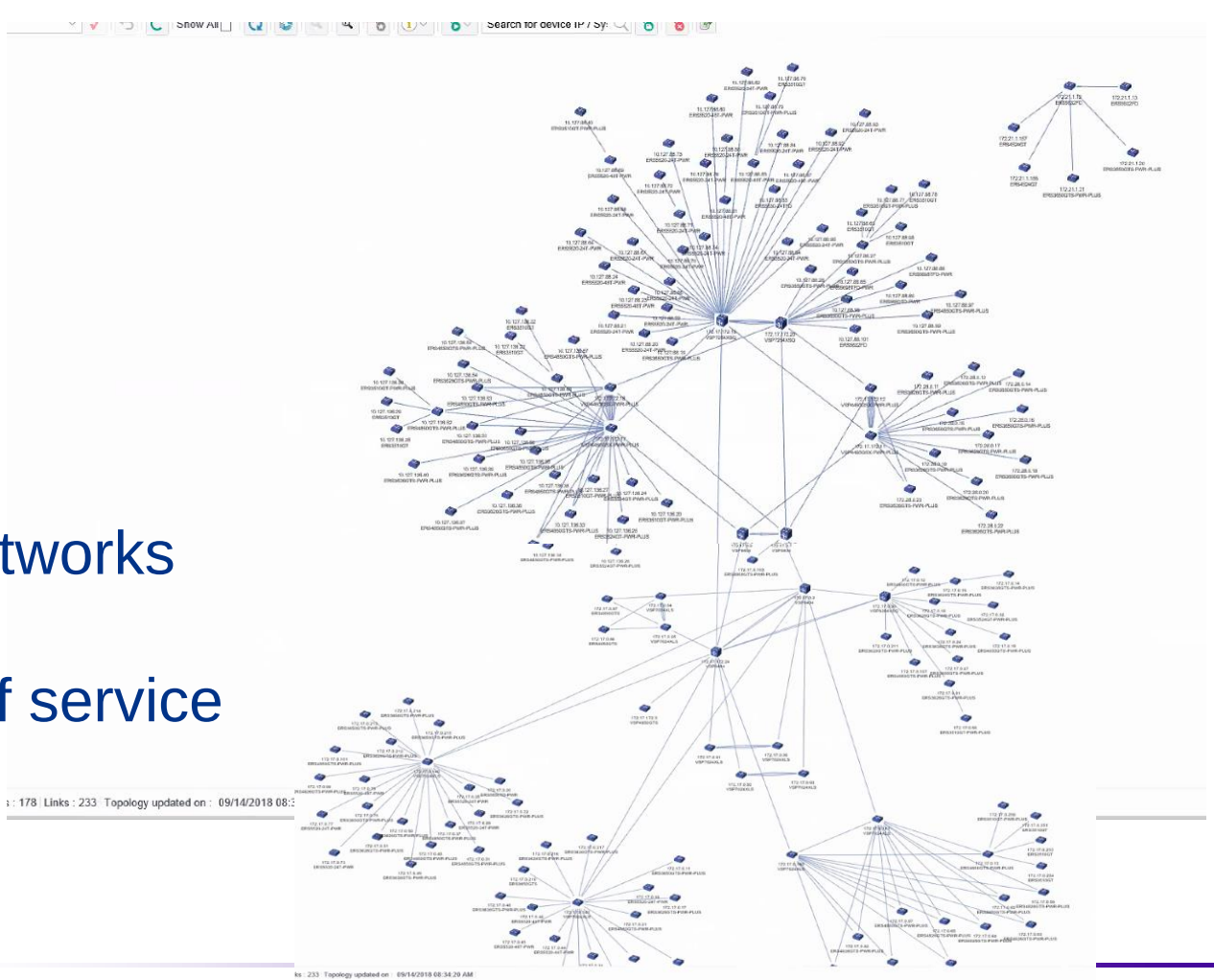


The FRAMO network:

Virtual infrastructure:

Mix of layer 2
And layer 3 networks

Independent of service provider



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