Overlay tehnologije u DC okruženju

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About me

- Network engineer for 15+ years
- 10+ years developer experience
- 10 years in banking sector
- 5+ years in Combis
  - Started with Routing & Switching
  - Last 5 years working on data center networking, servers, load balancers

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Challenges of Traditional Data Center Networking

- Limited scalability
- Complexity
- Limited Agility
- Spanning tree
  - high convergence time
  - unused (blocked) links
- Suboptimal Forwarding
  - Path defined by root switch or FHRP Active

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Overlay Technologies in DC

- Why:
- Efficient (HW) resource utilization
  - Flexible grow and shrink of network
  - Multi-Tenant support
  - Security and Isolation
- How
  - Virtual network on top of physical
  - Frame in IP encapsulation
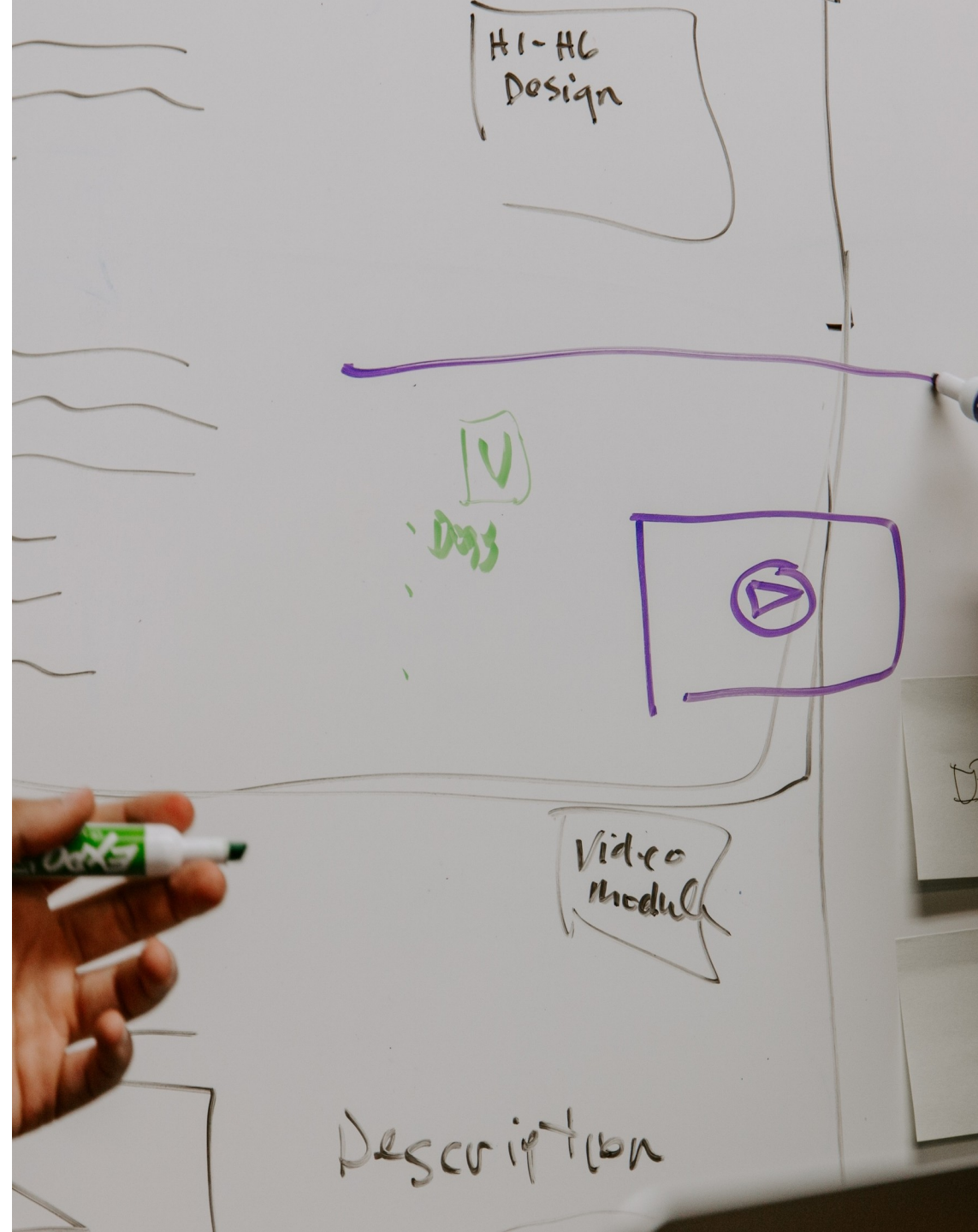
Advantages of Overlay Networks

- Scalability
- Flexibility
- Agility
- Workload Mobility
- Simplified Management
- Isolation and segmentation
    - Enhanced security
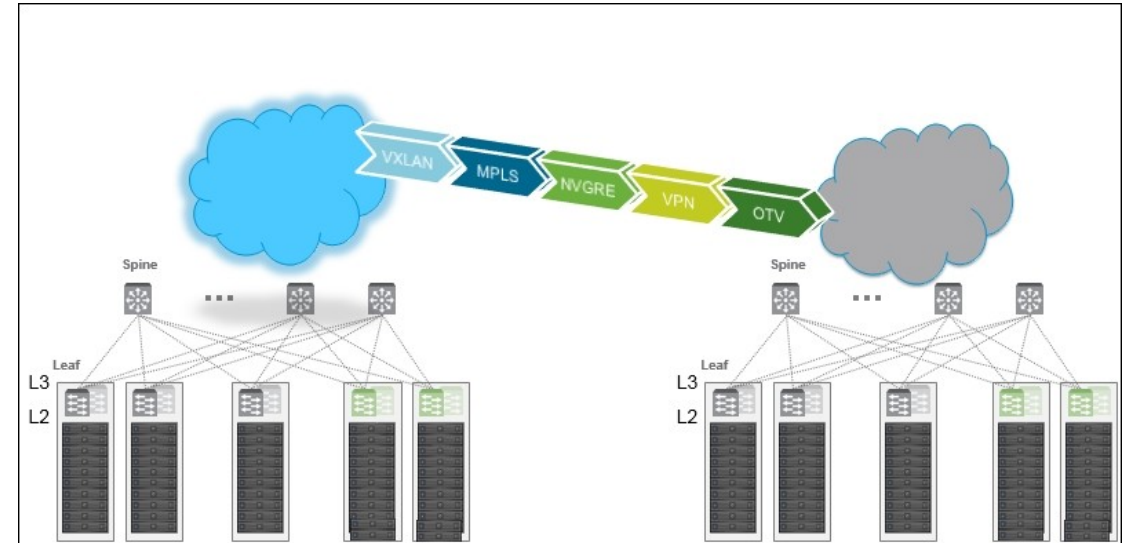- Support for Hybrid and Multi-Cloud Deployments

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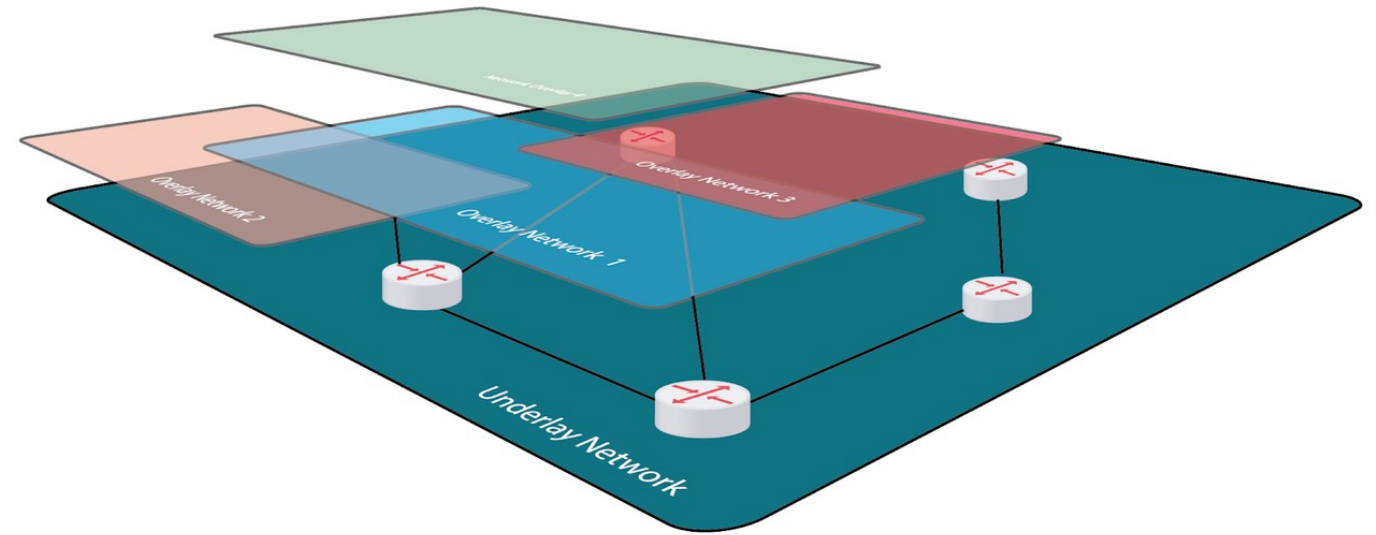
Common Overlay Protocols

Control plane
- BGP EVPN

Data Plane
- VXLAN
- Geneve
- NVGRE

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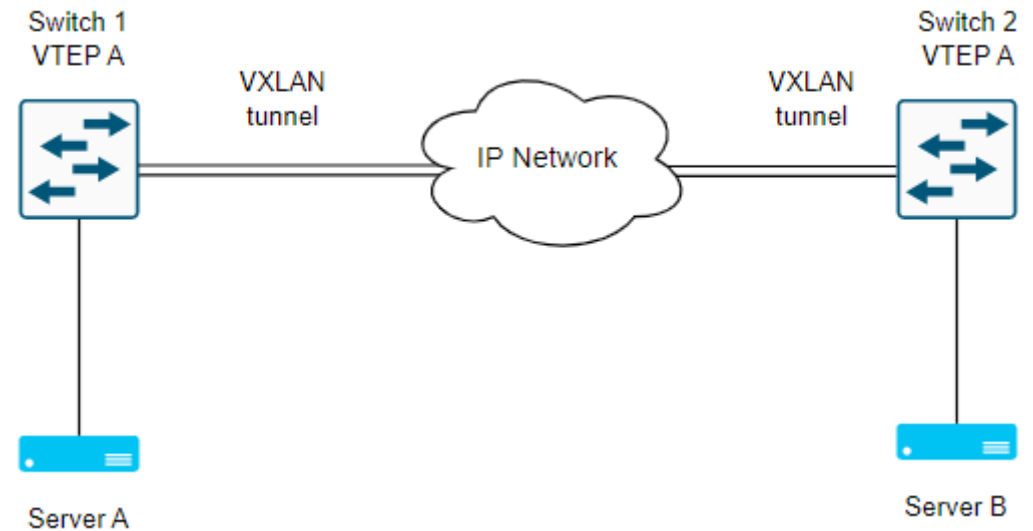[we create together]

VXLAN: Enabling Scalable Network Virtualization

- Scalable
- Encapsulation
  - Frame in UDP
- Flexible
- Supports Multi-Tenancy
- Supports Workload Mobility
- Security using segmentation and isolation
- Cloud connectivity

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# Geneve: Flexibility and Extensibility in Overlay Networking

- Scalable
- Encapsulation
  - Frame in UDP
- Flexible (even more than VXLAN)
- Header Flexibility
  - Variable header length
  - Optional Fields, TLV
- Enhanced Security
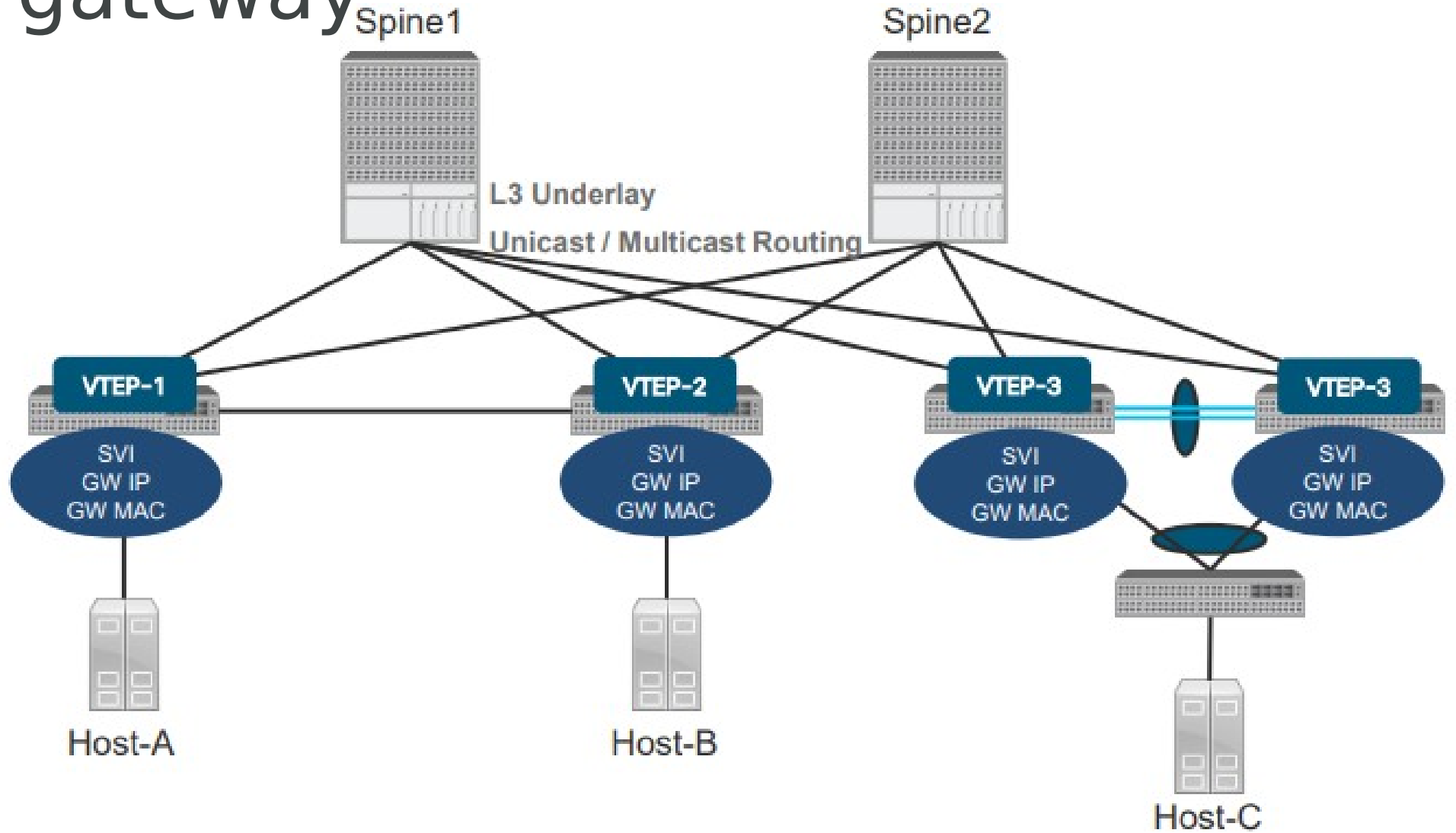 - Built-in encryption
- Multi-Tenancy support

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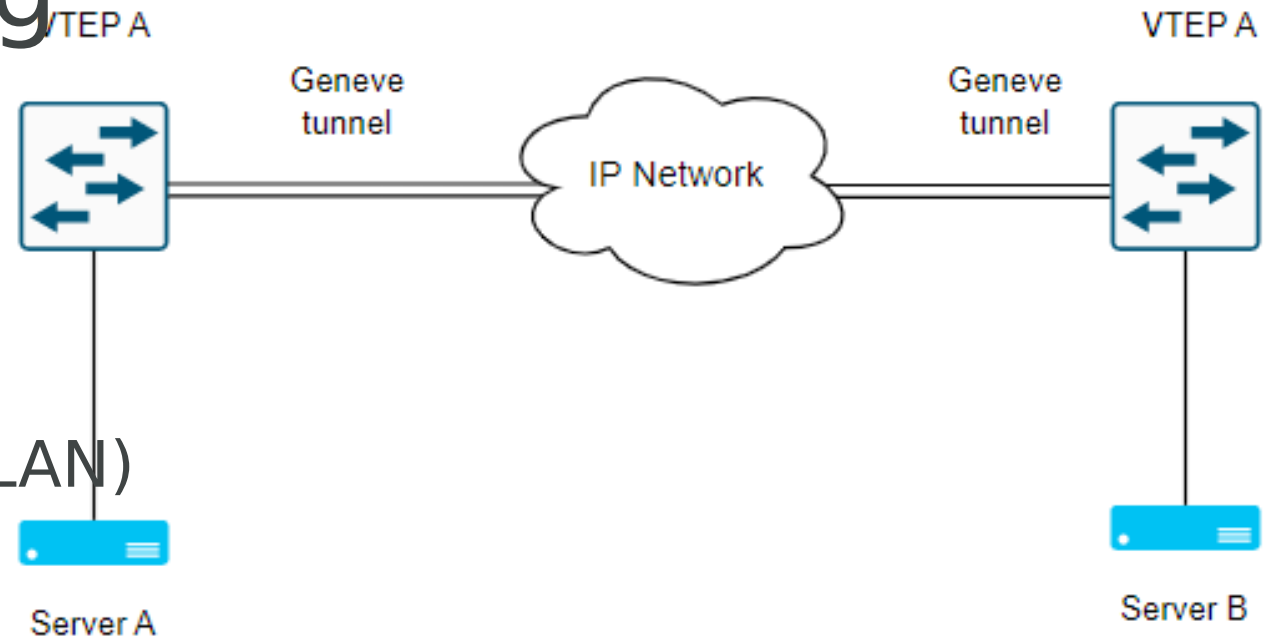
BGP EVPN Control Plane

- Control plane learning of L2 & L3
- Scalable multi-tenant overlay networks
- Integrated bridging and routing

- ARP suppresion
- Optimal forwarding for E-W and N-S traffic
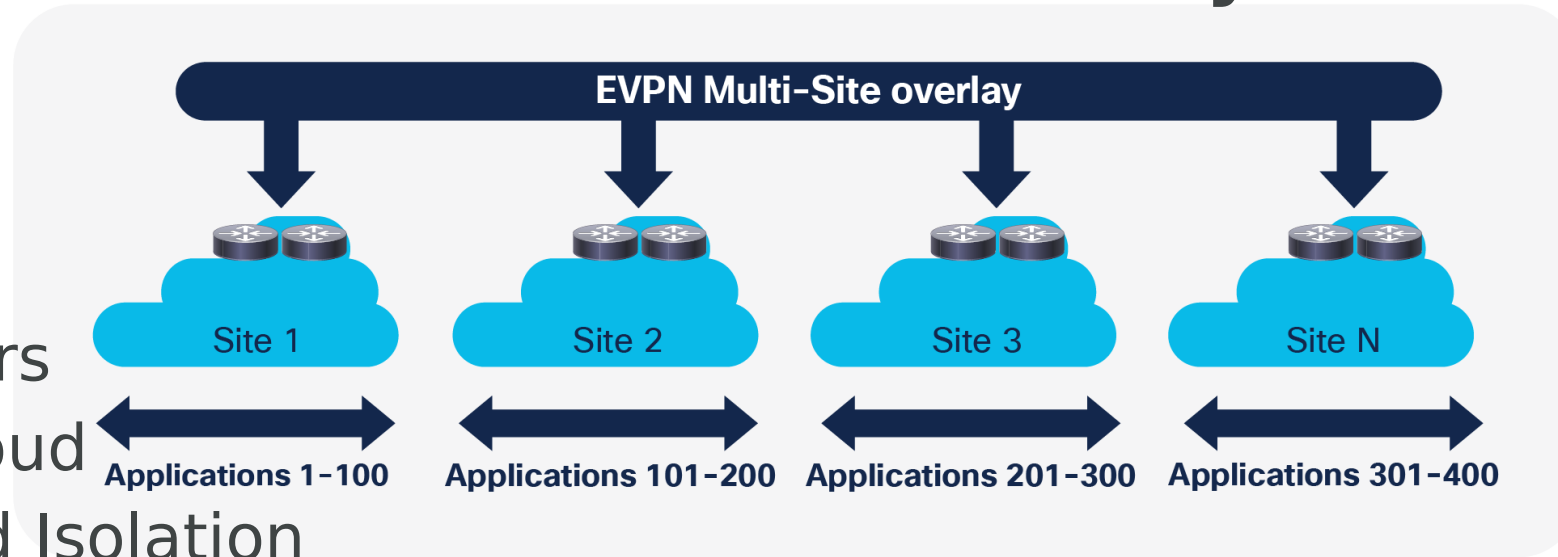- Anycast gateway function
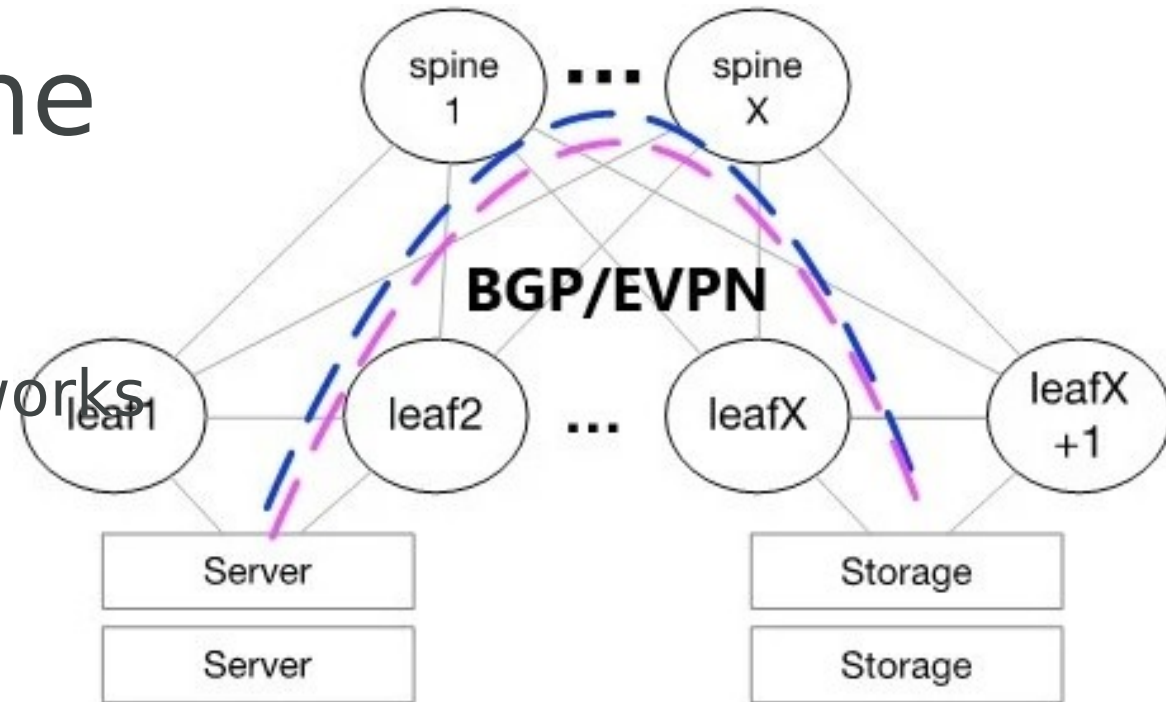
Anycast gateway

* Picture from: https://www.ciscolive.com/cdam/r/ciscolive/emea/docs/2020/pdf/BRKDCN-3040.pdf

Applications and Use Cases of Overlay Technologies

- Active/Active data centers
- Network extension to cloud
- Traffic Segmentation and Isolation
- Scalable And Flexible Network Architectures
  - Spine and Leaf (Clos)
- Multi-tenant infrastructure
- Deliver services across the entire fabric in minutes

EVPN Multi-Site overlay

Site 1 | Site 2 | Site 3 | Site N

Applications 1-100 **Applications 101-200** **Applications 201-300** **Applications 301-400**

Considerations for Implementing Overlay Technologies

- Vendor Support and Ecosystem
  - Risk of Vendor lock-in
- Multi-vendor overlay
  - Looks good on paper, in real world a challenge
- Think about future expansions
  - Design the physical network to be easily expanded
    - Clos (Spine and Leaf)
- Performance
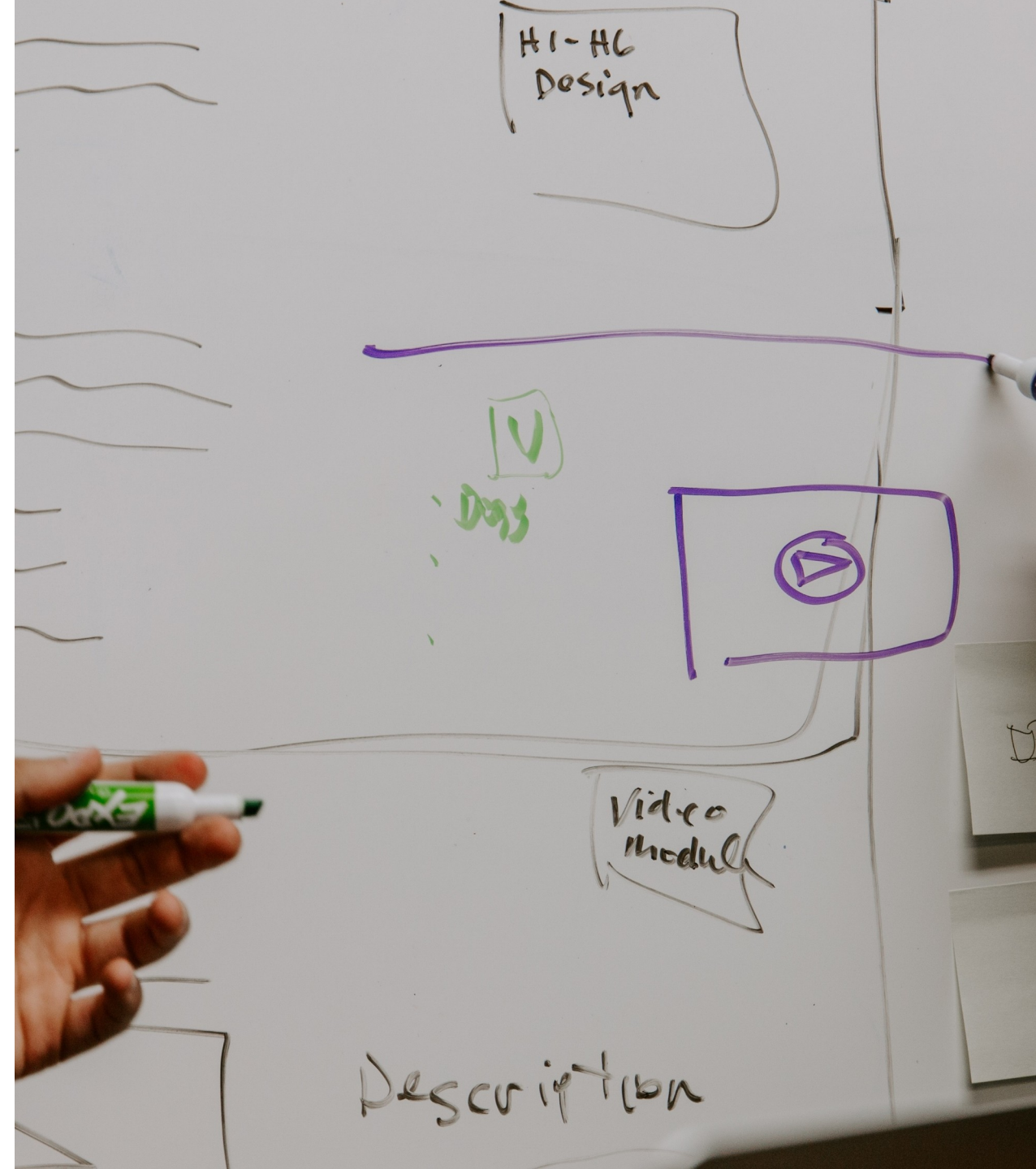 - Latency & throughput
  - Anycast gateway
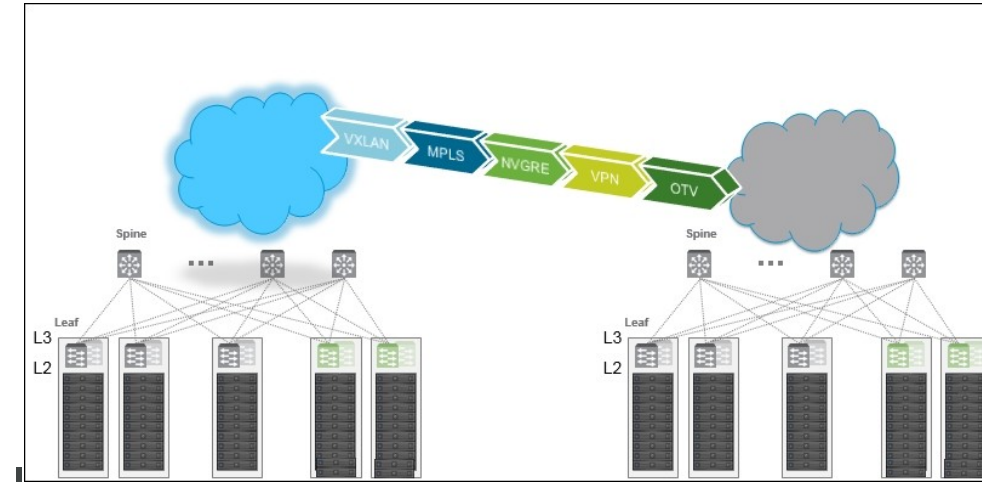
Challenges and Limitations of Overlay Technologies

- Complexity of configuration
  - Depending on number of node
  - Central controllers
- Performance Overhead
- Limited Visibility into payload
- Underlying Network requirements

- Scalability issues
  - Each hardware node(switch) has its limits (memory, #ports)
  - Multicast for BuM traffic in POD/Site

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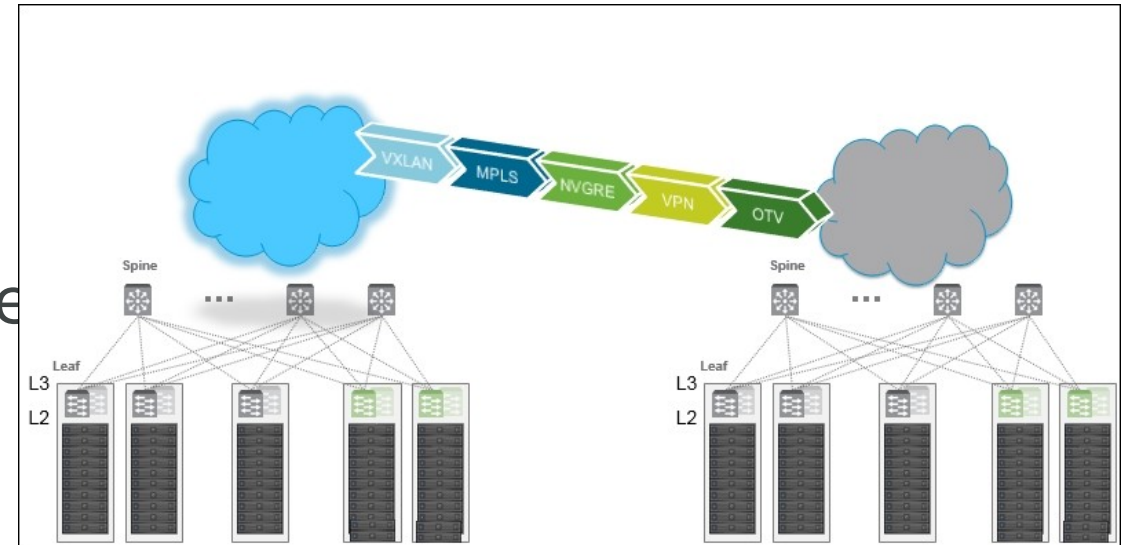
Best Practices for Deploying

- Evaluate Vendor Solutions and Standards

- Build topology for scalability and flexibility
  - Clos (Spine and Leaf)

- Use tested and supported (by vendors) protocols in production and play with new ones in the Lab

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Thank you!

Questions?