SharkFest '16

# Cisco ACI and Wireshark

## Getting Back Our Data

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SharkFest '16 • Computer History Museum • June 13-16, 2016

# Current Challenges for SPAN

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- connect through the CLI
- manually initiate a SPAN session on every required switch in the potential traffic path
- 10 / 40 Gbps
- Link Aggregation (Etherchannel)

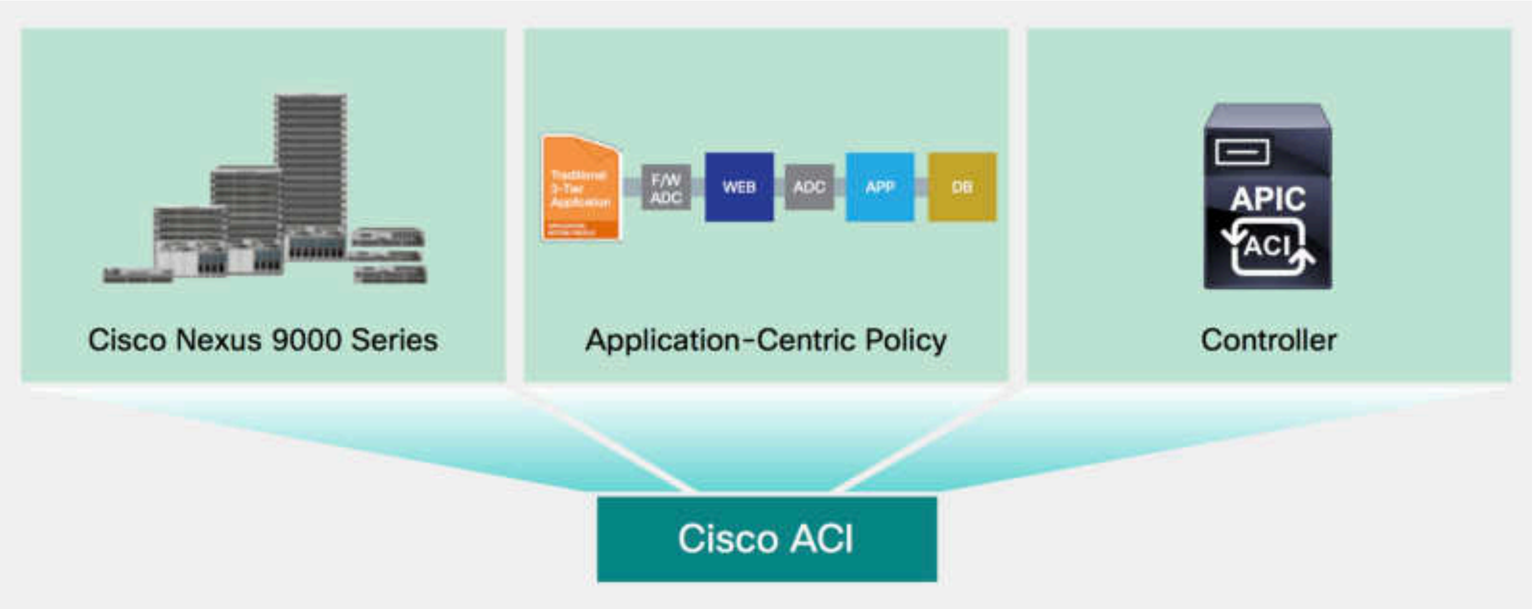
# Current Challenges for SPAN

- multitenant, transient data centers
- VMs / containers move between physical hardware outside the control of network engineers

=> traffic path may not be known ahead of time

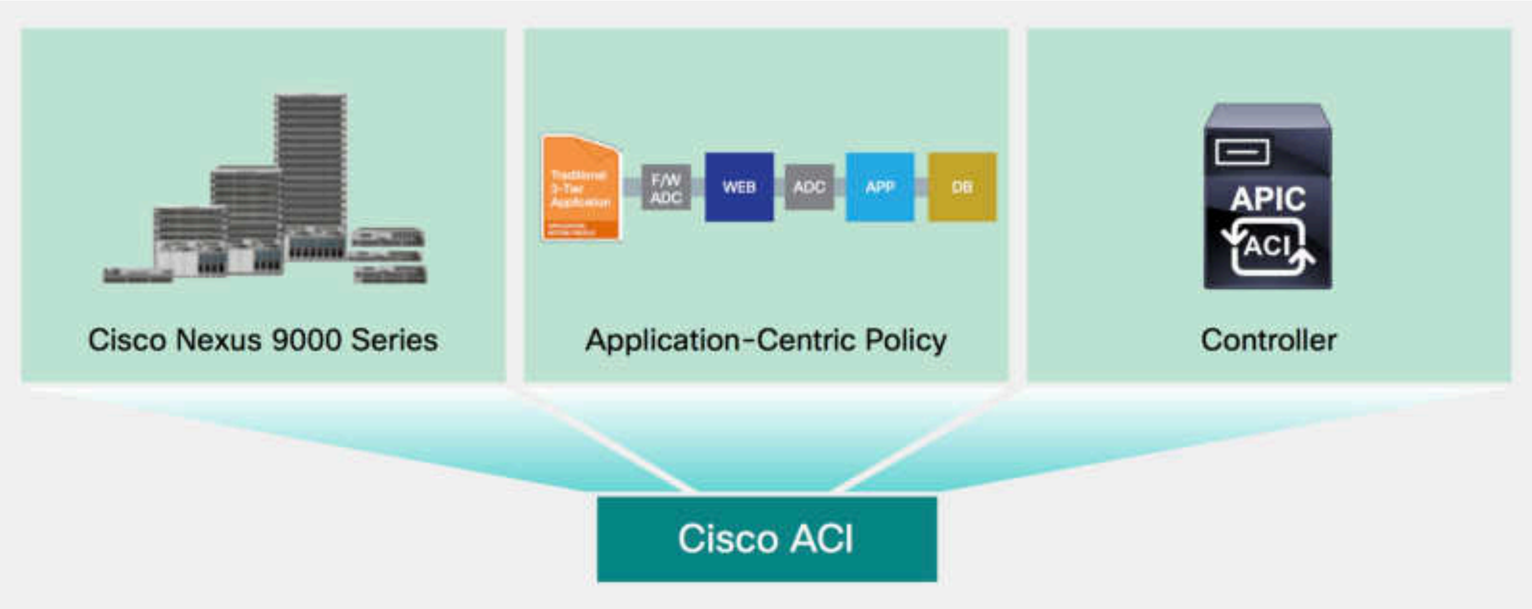
# New SPAN Concept with Cisco ACI

# Cisco ACI Benefits



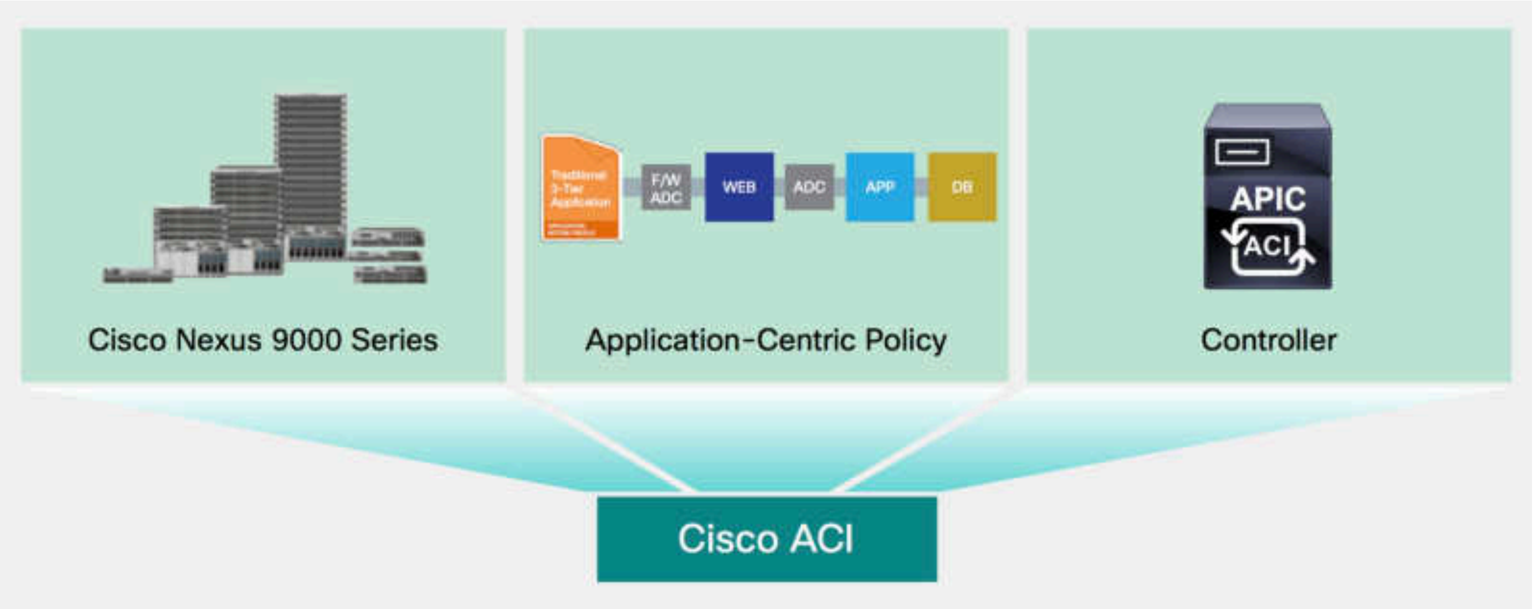
- new layer of policy abstraction
- on top of the switch hardware

# Cisco ACI Benefits



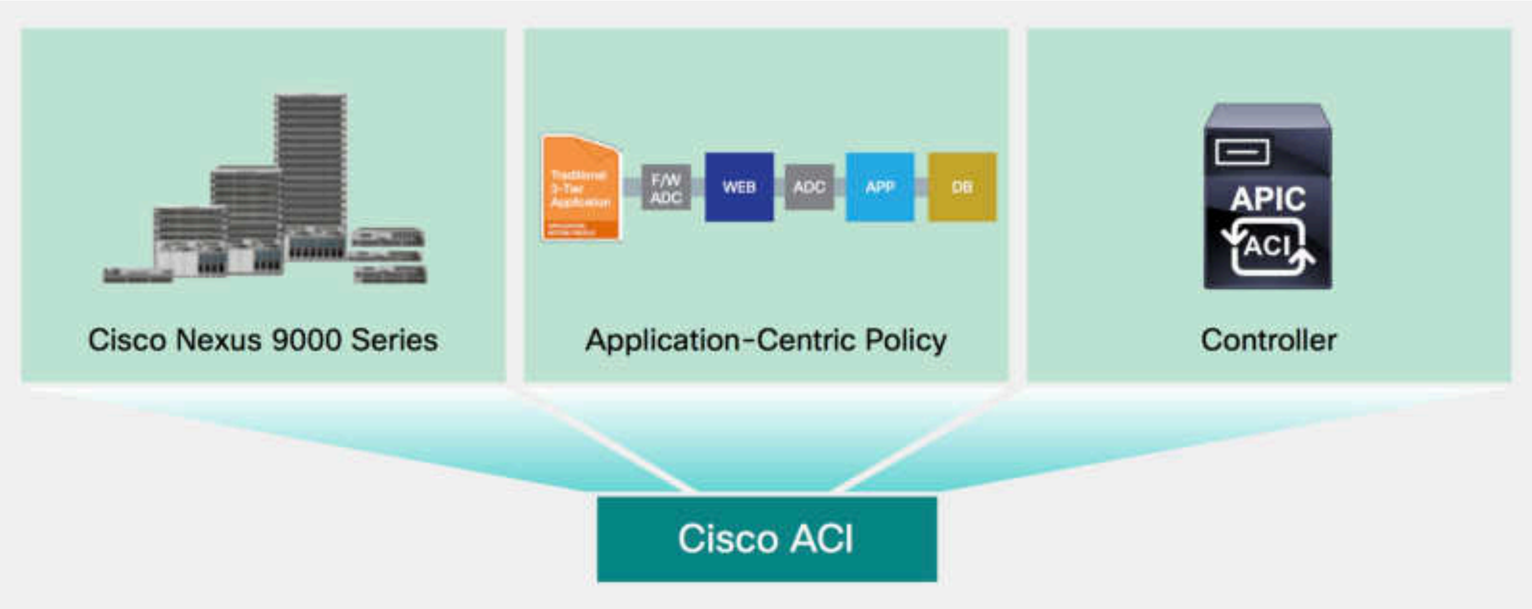
- includes the logical networking construct of endpoint groups (EPGs)

# Cisco ACI Benefits



- EPGs consume switch hardware resources only when relevant endpoints are present

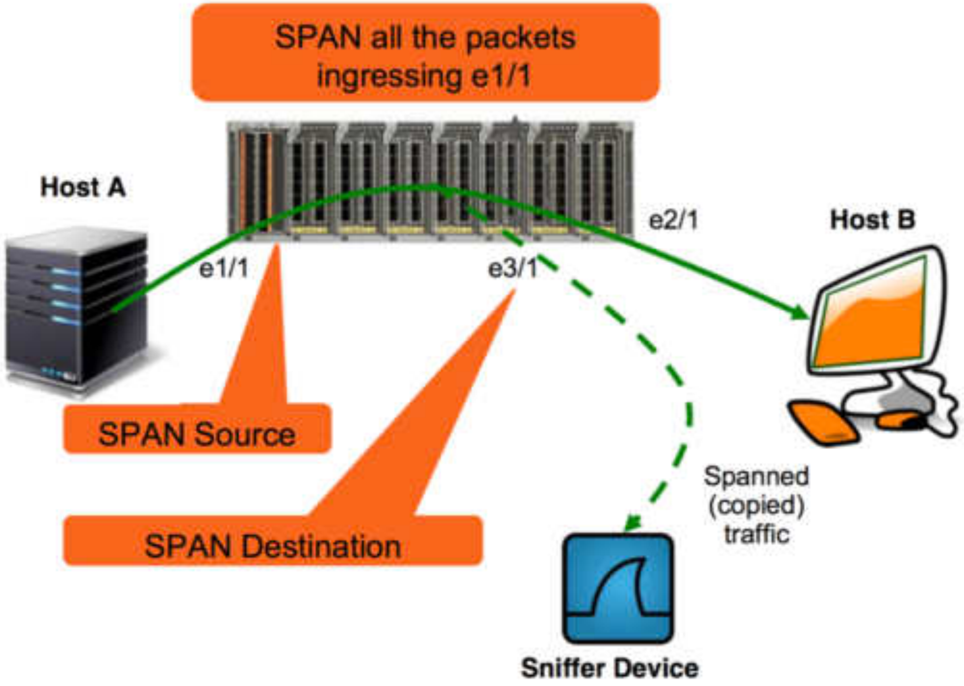
# Cisco ACI Benefits



- As workloads move around the data center, the EPG expands and contracts to meet resource needs

# Support for Local and Remote Destinations

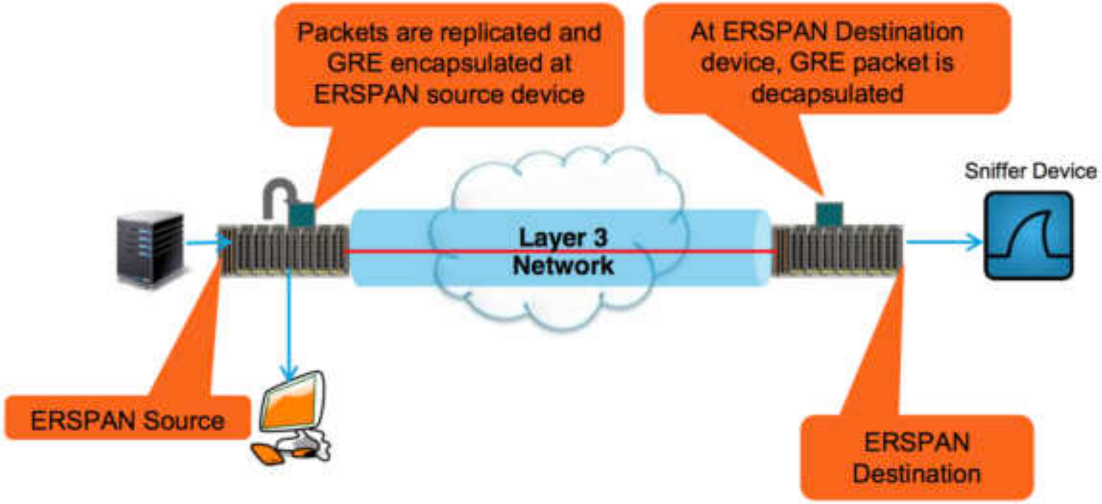
- Originally SPAN traffic could be mirrored only locally on the switch
- Extensions such as RSPAN and ERSPAN allowed traffic to be encapsulated and sent to a remote switch or device



- Cisco ACI supports local and remote (ERSPAN) destinations in the various types of SPAN

# Continued Support for SPAN, RSPAN and ERSPAN

- Cisco ACI thus continues to make available
  - Remote SPAN (RSPAN)
  - Encapsulated RSPAN (ERSPAN)
- virtual workloads need to be spanned directly within a virtual switch (vSwitch)
  - Cisco ACI can be paired with Cisco Application Virtual Switch (AVS)
  - used to create and manage Virtual SPAN (vSPAN) sessions
  - providing a full end-to-end SPAN

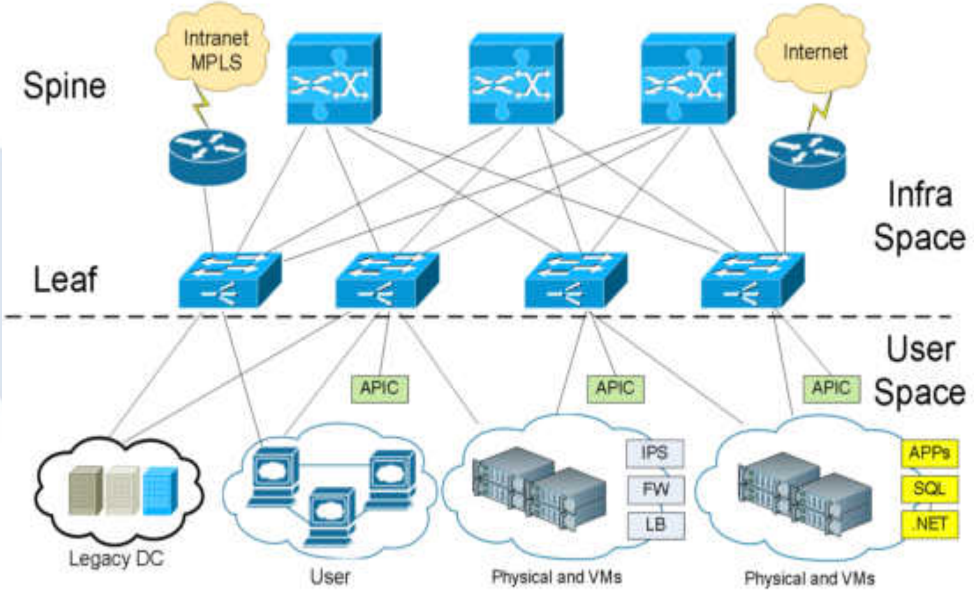

Packets are replicated and GRE encapsulated at ERSPAN source device

At ERSPAN Destination device, GRE packet is decapsulated

ERSPAN Source

ERSPAN Destination

# How ERSPAN Reaches the Destination



- ERSPAN packets are injected into the destination EPG on the source leaf switch
- outer source address set to the generated IP address
- outer destination IP address set to the destination IP address
- packet then follows the same forwarding path as normal traffic in this EPG

# ERSPAN Types I and II

- Cisco ACI uses a “merchant+” methodology
  - Broadcom and Cisco chips combined in one chassis
- Tenant and Access SPAN use Type I (Broadcom chips)
- Fabric SPAN uses Type II (Cisco chips)

- ERSPAN Type I and Wireshark:
  - by default Wireshark will not decode the packets
  - choose „*Preferences > Protocols > ERSPAN*“
  - select “*Force to decode fake ERSPAN frame*”

# New SPAN Types

# SPAN Type Use Cases

- Tenant SPAN
  - Mirror all traffic to and from an EPG to a remote destination
- Fabric SPAN
  - Mirror all traffic to and from my spine switches to a remote destination
- Access SPAN
  - Mirror all traffic to and from leaf host ports locally or to a remote destination
- Virtual SPAN
  - Mirror a virtual interface on a virtual machine to a remote destination

# SPAN Type Comparison

| SPAN Type | Source | Filter | Destination |
|---|---|---|---|
| Fabric SPAN | Fabric port | ● Bridge domain<br>● Private network | Remote (ERSPAN Type II) |
| Access SPAN | Access port | ● Tenant<br>● Application profile<br>● Endpoint group | ● Remote (ERSPAN Type I)<br>● Local |
| Tenant SPAN | Endpoint group | – | Remote (ERSPAN Type I) |
| Virtual SPAN | Virtual machine interface | – | ● Remote (ERSPAN Type I)<br>● LSPAN (virtual machine interface) |

# Tenant SPAN

# Tenant SPAN

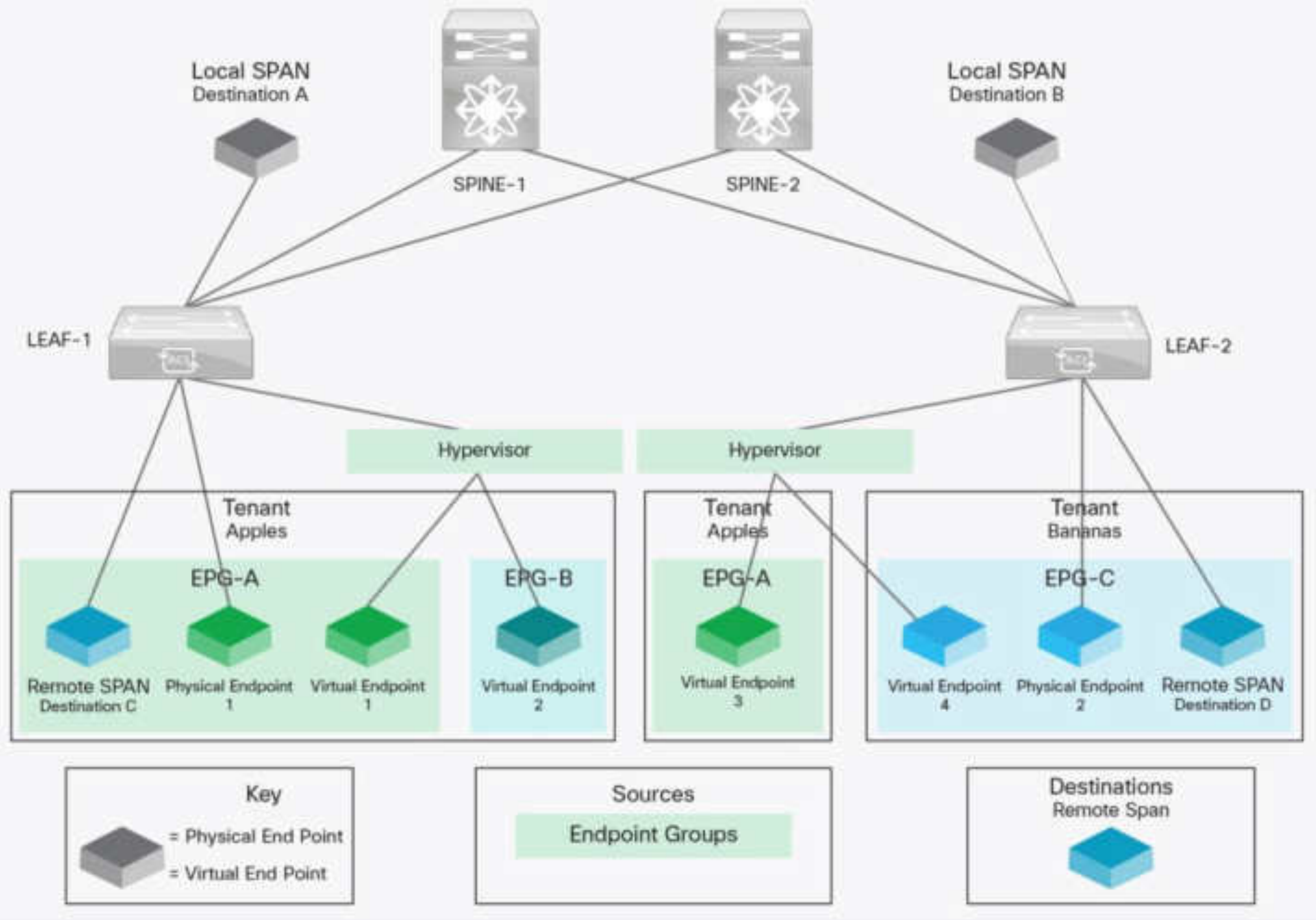
- Tenant SPAN aggregates SPAN sessions across multiple leaf switches transparently and on demand
- administrator is free to describe semantically how traffic should be replicated
- Cisco Application Policy Infrastructure Controller (APIC) will command the appropriate hardware resources to initiate SPAN sessions on demand to capture relevant traffic

# Tenant SPAN - Main Facts

- source can be only an EPG
- destination can be only ERSPAN
  - ERSPAN encapsulation Type I
- direction can be:
  - Inbound
  - Outbound
  - Both
- no filtering is possible

# Tenant SPAN - Use Case

- use Tenant SPAN when you:
  - do not know where the physical source is
  - know that you want to capture all traffic in and out of any physical port that belongs to this EPG



# Fabric SPAN

# Fabric SPAN - Main Facts

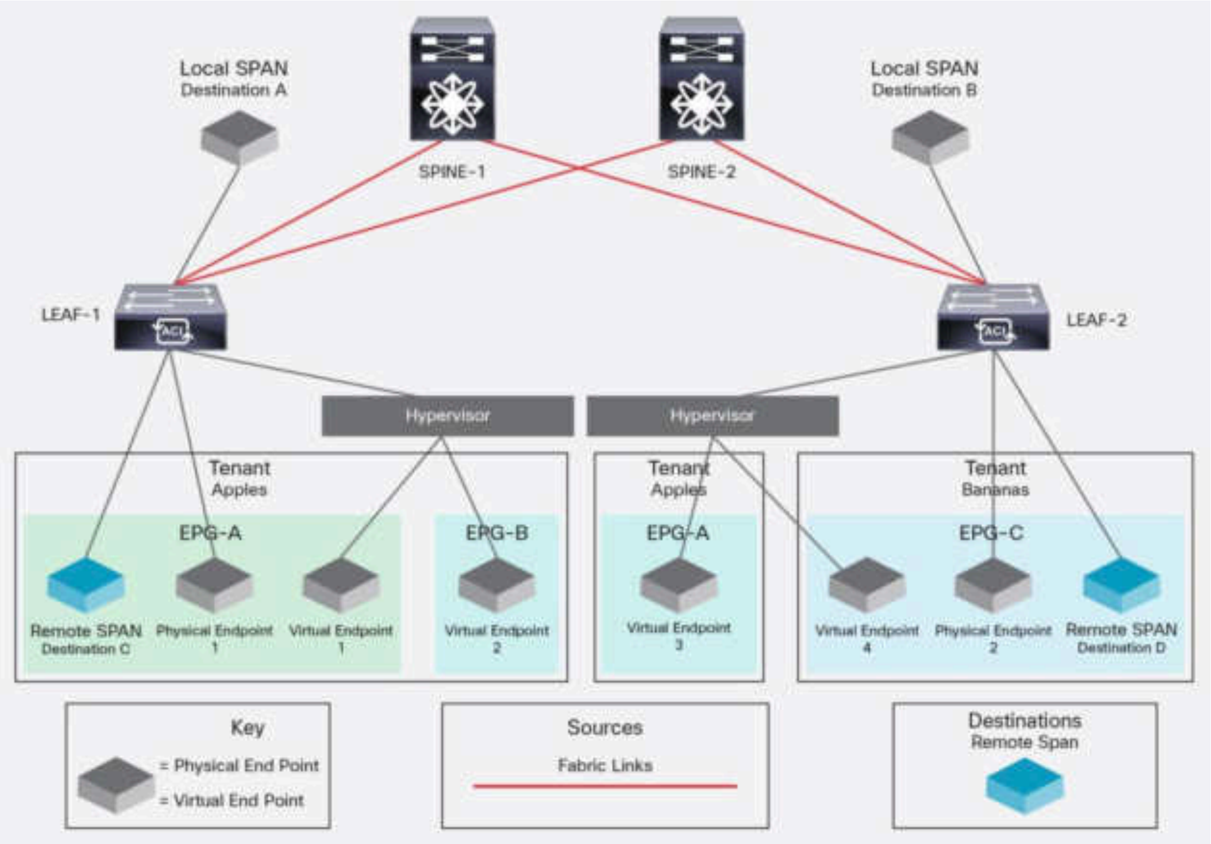
- source must be a fabric (uplink) port on a leaf or spine switch
  - 1/49 to 1/60 on Cisco Nexus® 9396 (leaf switch)
  - 1/49 to 1/54 on Cisco Nexus® 9372 (leaf switch)
  - 1/1 to 1/36 on Cisco Nexus® 9336 (spine switch)
- destination can be only ERSPAN
- ERSPAN encapsulation is Type II

# Fabric SPAN - Main Facts

- direction can be:
  - Inbound
  - Outbound
  - Both
- filter options are:
  - Private network
  - Bridge domain
- multiple source paths are supported
- can have multiple switches (leaf or spine) with the same SPAN policy

# Fabric SPAN - Use Case

- to mirror traffic that is traversing the spine switches within the fabric
- choose one or more fabric ports (on leaf or spine)
- replicate the traffic to a remote location



# Access SPAN

# Access SPAN - Main Facts

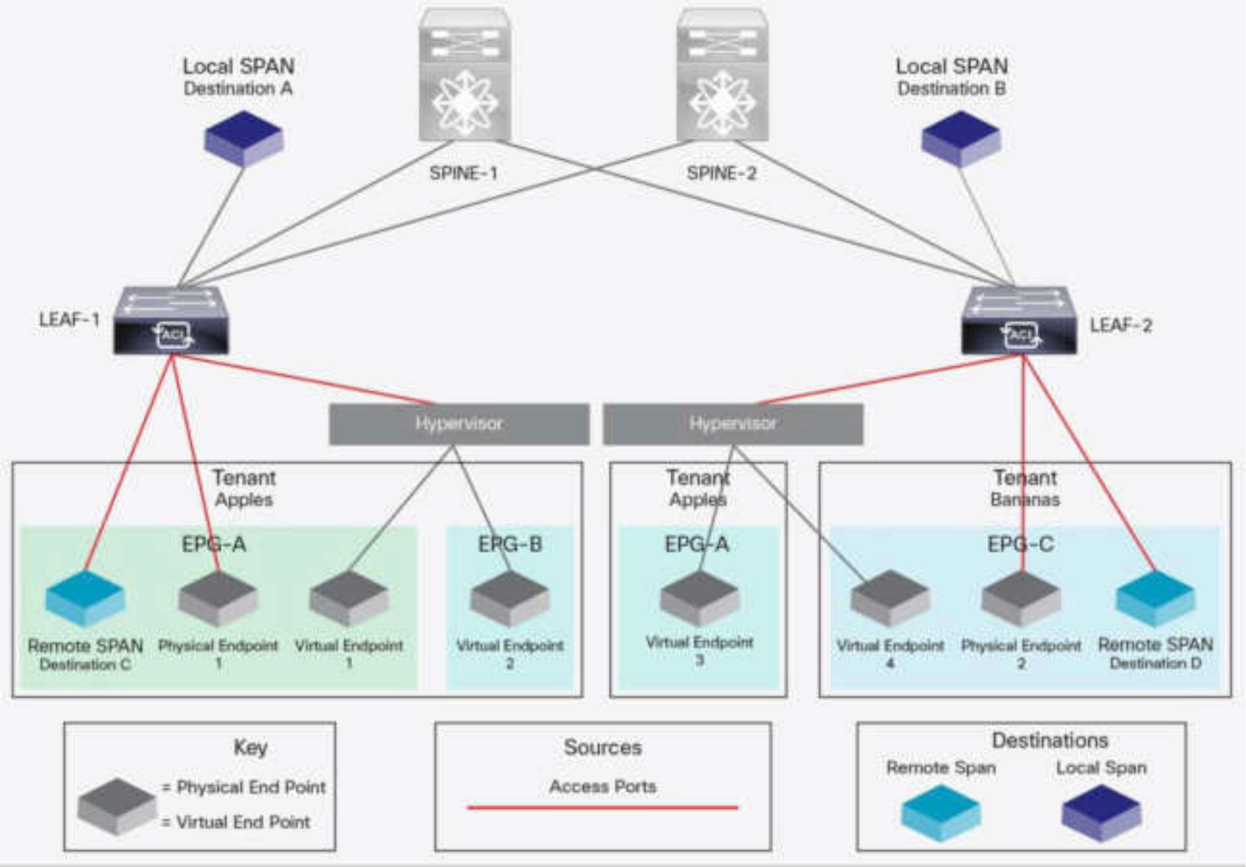
- source port can be any access port
- destination can be another access port (not a port channel or virtual port channel [vPC]) or ERSPAN
- ERSPAN encapsulation is Type I
- direction can be:
  - Inbound
  - Outbound
  - Both

# Access SPAN - Main Facts

- filter options are:
  - Tenant
  - Application profile
  - Endpoint group
- multiple source paths are supported

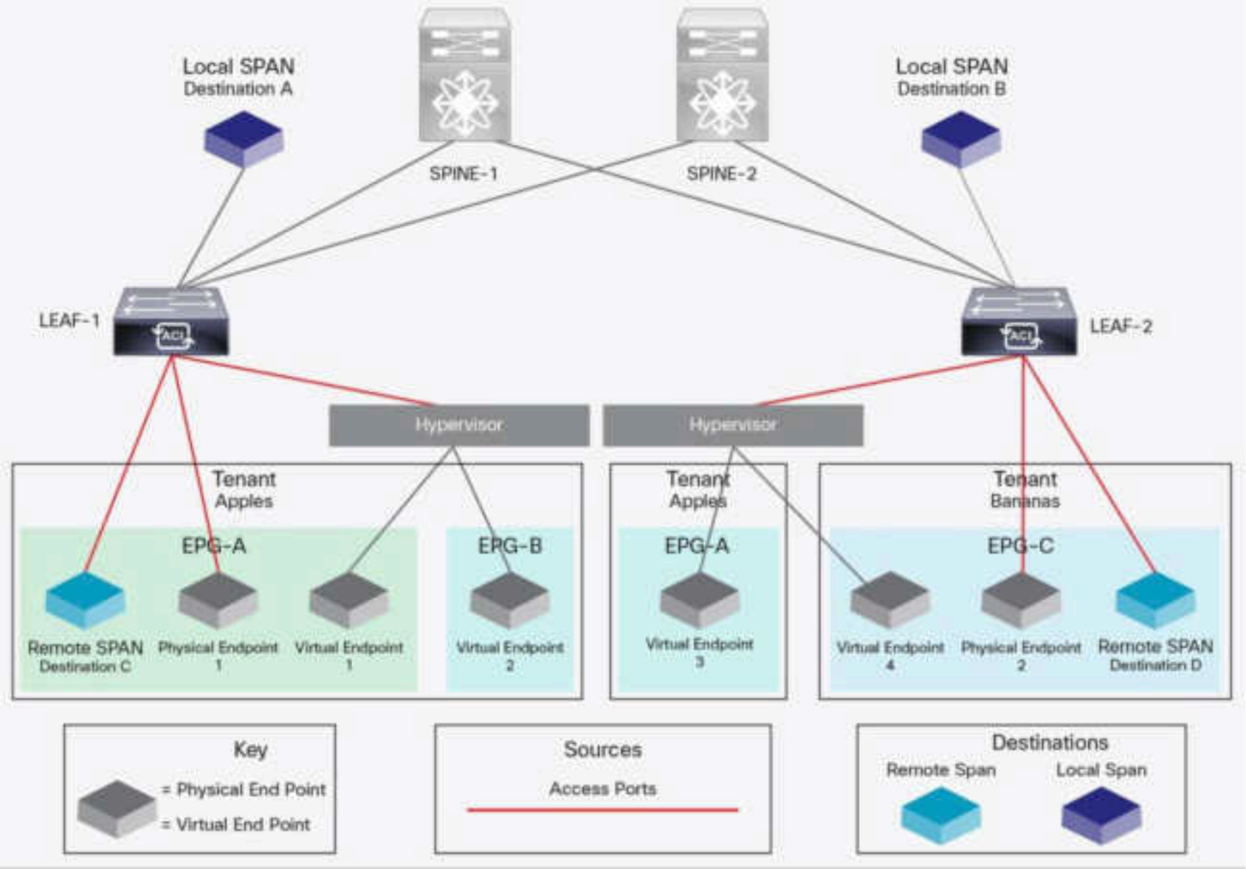
# Access SPAN - Use Case

- to mirror traffic that is flowing to and from any host-facing ports on a leaf switch
- locally mirror the traffic to a switch port, or you can send it to a remote destination



# Access SPAN - Use Case

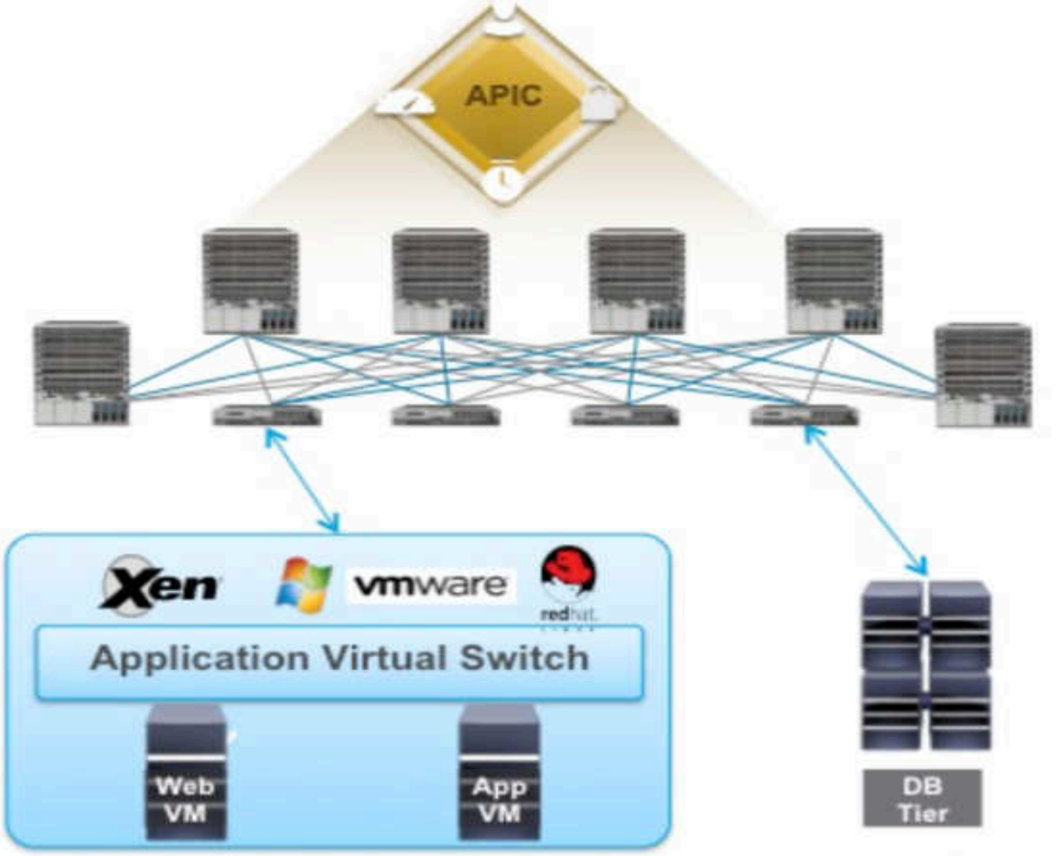
- local destination is useful when you want to help ensure that the mirrored traffic does not leave this switch
- important decision to make when planning network capacity



# Virtual SPAN

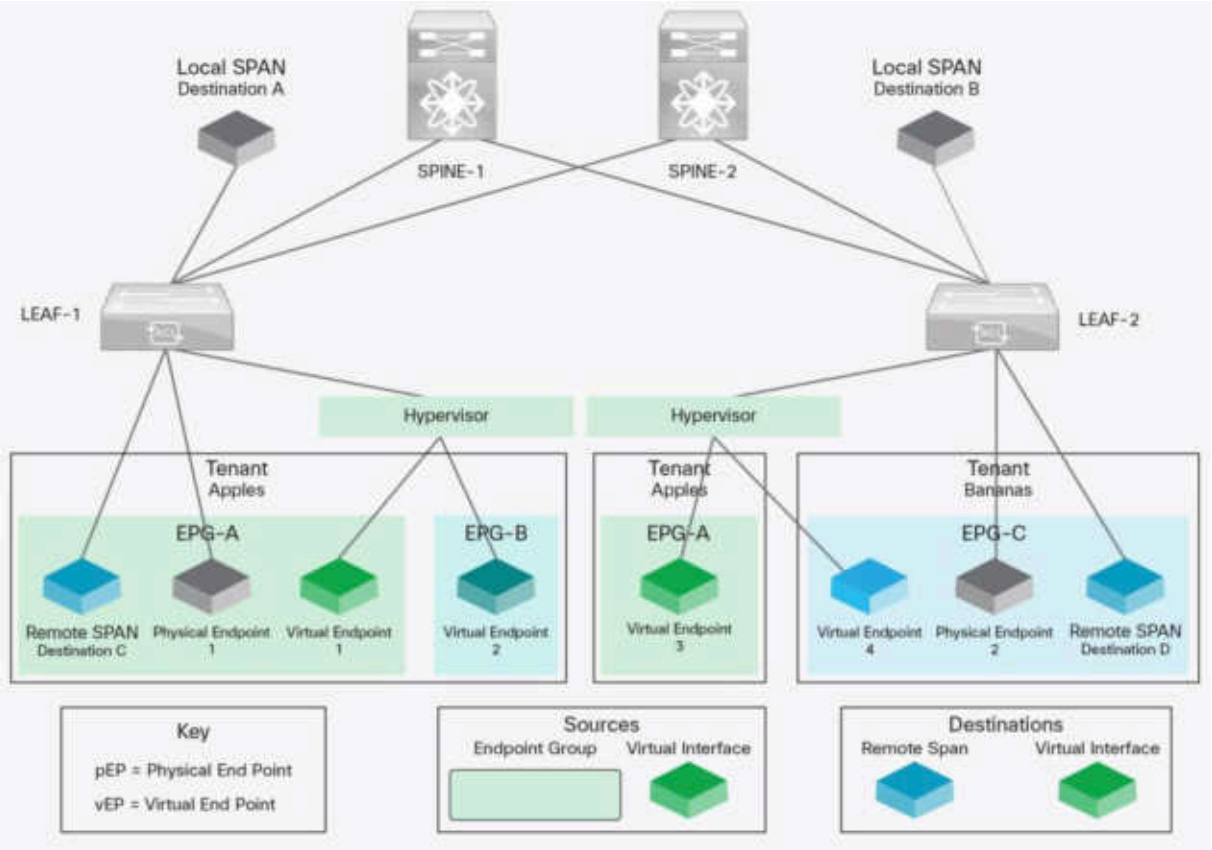
# Virtual SPAN - Main Facts

- vSPAN requires Cisco Application Virtual Switch
- source can be an EPG or a virtual interface
- destination can be ERSPAN or a virtual interface
- no filtering is possible
- direction can be:
  - Inbound
  - Outbound
  - Both



# Virtual SPAN - Use Case

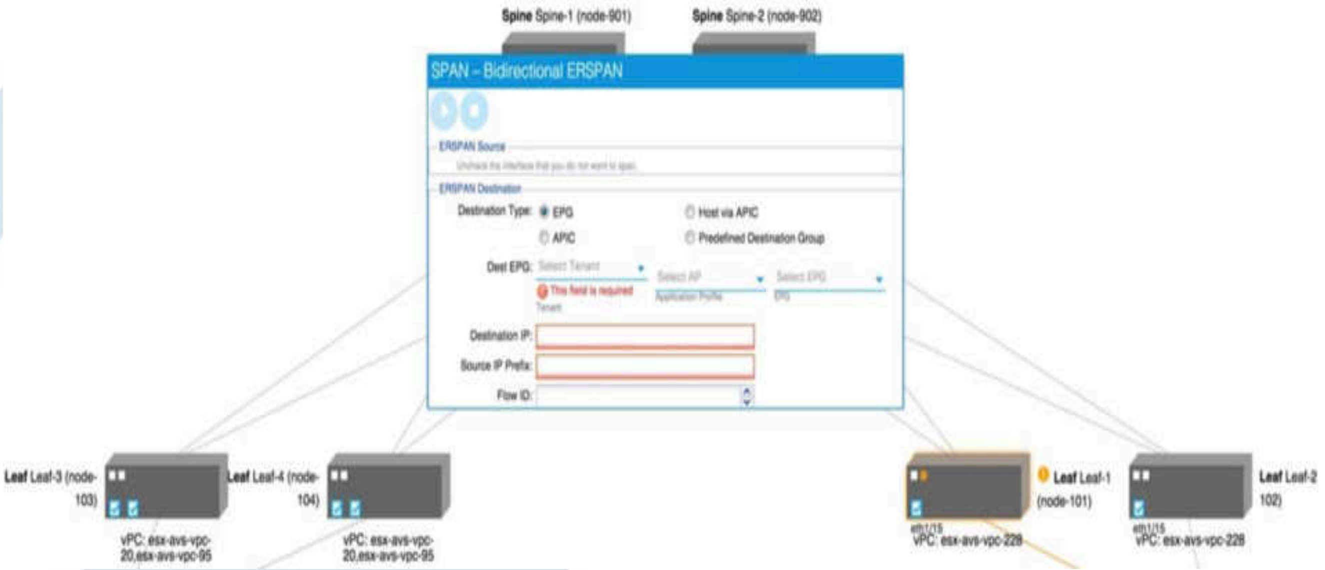
- take advantage of the Application Virtual Switch to mirror traffic from a virtual switch
- useful when traffic is being switched locally within the hypervisor and cannot be captured by the physical leaf switch



# Troubleshooting SPAN Wizard

# Troubleshooting SPAN Wizard

- Feature of *Cisco ACI Visibility and Troubleshooting Tool*
- available from the Operations tab
- using SPAN to troubleshoot two endpoints quickly
- *Troubleshooting SPAN Wizard* is especially useful for NOC teams



SPAN – Bidirectional ERSPAN

ERSPAN Source

Uncheck the interface that you do not want to span.

ERSPAN Destination

Destination Type: ● EPG ○ Host via APIC ○ APIC ○ Predefined Destination Group

Dest EPG: Select Tenant (Tenant) Select AP (Application Profile) Select EPG (EPG)

This field is required

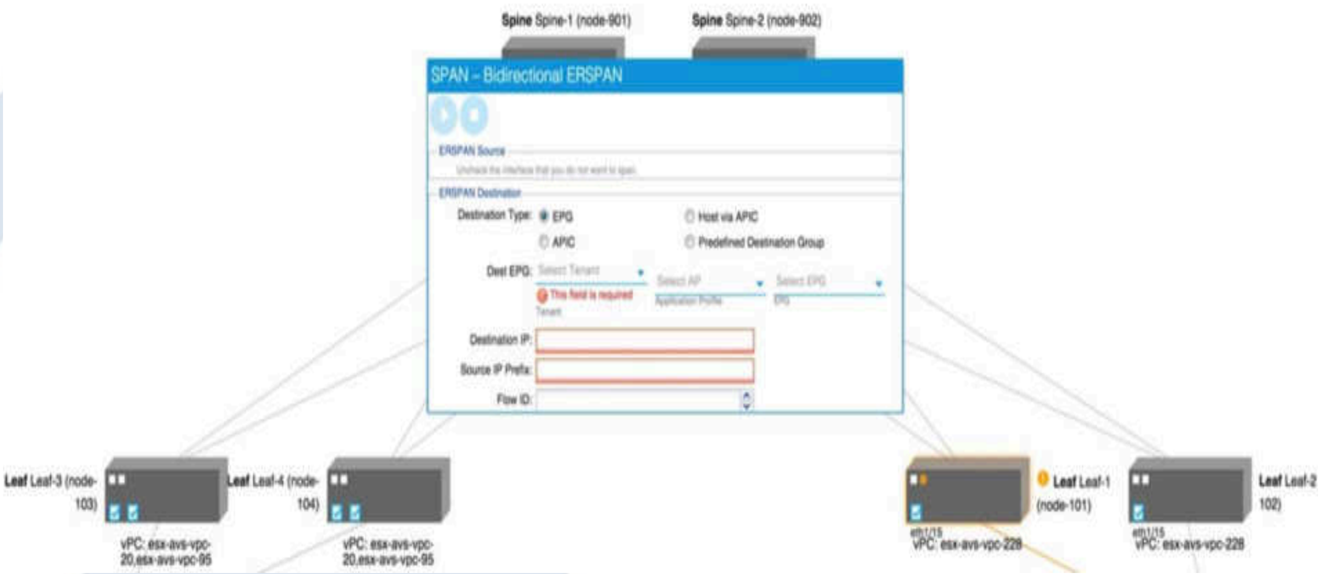
Destination IP:

Source IP Prefix:

Flow ID:

# Troubleshooting SPAN Wizard

- given two endpoints, the troubleshooting tool will dynamically build a temporary Access SPAN session
- mirror the necessary traffic to capture the flow



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Uncheck the interface that you do not want to span.

ERSPAN Destination

Destination Type: ● EPG ○ Host via APIC ○ APIC ○ Predefined Destination Group

Dest EPG: Select Tenant (Tenant) — This field is required; Select AP (Application Profile); Select EPG (EPG)

Destination IP:

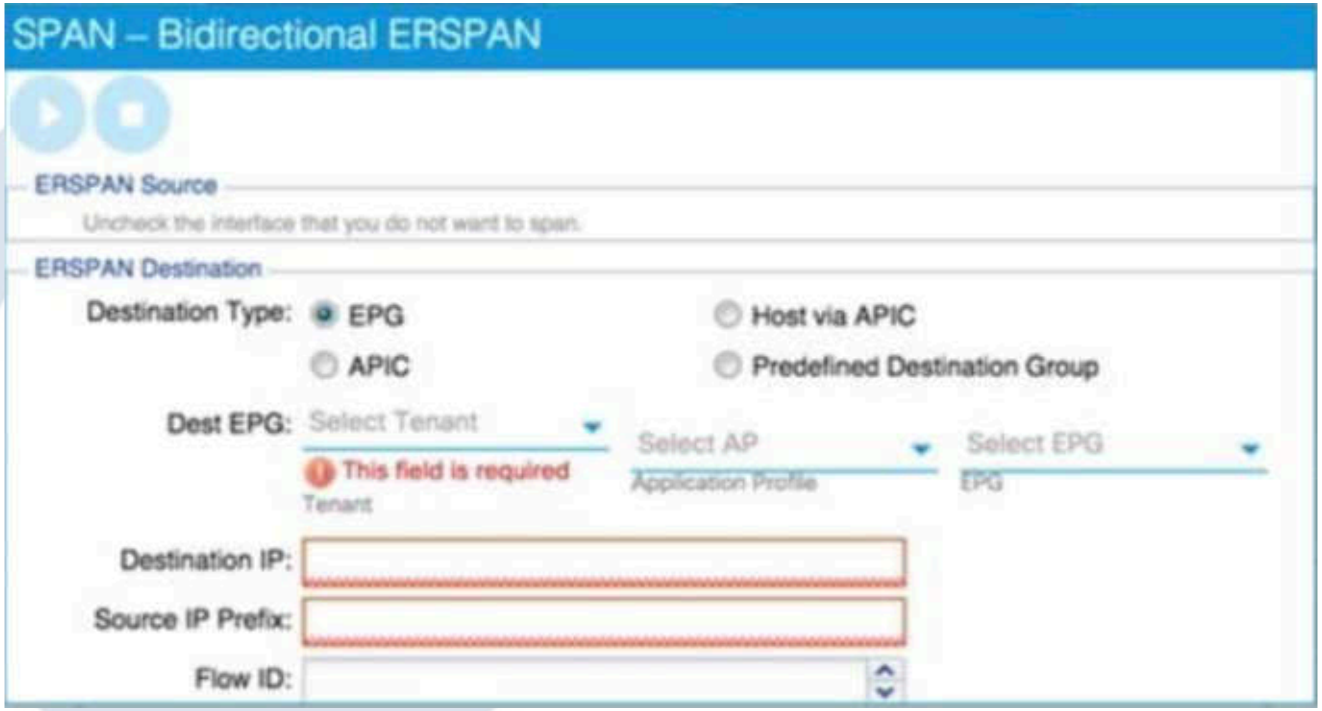
Source IP Prefix:

Flow ID:

- after the capture is complete, the SPAN session is taken down

# Troubleshooting SPAN Wizard

- two distinct destinations are introduced:
  - APIC
    - the APIC acts as a capture device from which the mirrored traffic can be downloaded or inspected
  - Host through the APIC
    - causes the APIC to act as a proxy, forwarding mirrored traffic to an external analyzer



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Dest EPG: Select Tenant (Tenant) — This field is required; Select AP (Application Profile); Select EPG (EPG)

Destination IP:

Source IP Prefix:

Flow ID:

# Scalability

# Scalability

- plan capacity appropriately when you use SPAN with Cisco ACI
- after SPAN traffic has been captured, it will compete with normal traffic on the fabric to be delivered
- be sure to plan for SPAN traffic accordingly to avoid link oversubscription

# Scalability

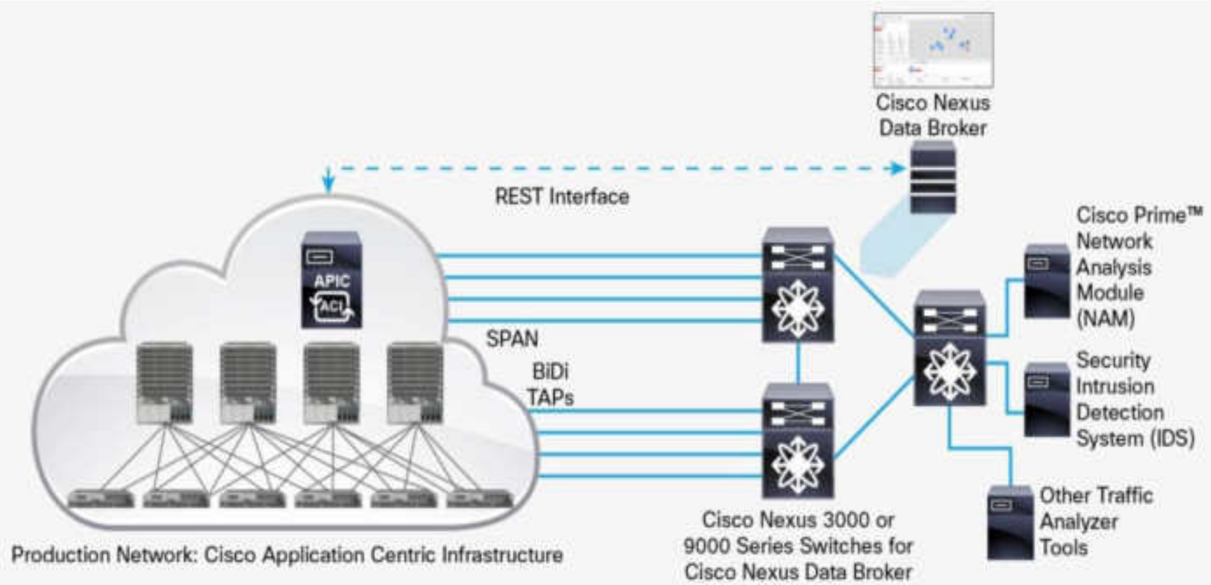
- For each leaf, you can have:
  - Four Tenant or Access SPAN sessions
  - Four Fabric SPAN sessions

- For each SPAN session, you may have:
  - Up to all leaf access ports as the source (Access SPAN)
  - Up to all fabric ports as the source (Fabric SPAN)
  - Up to 280 EPGs or bridge domains as the source (Tenant SPAN)

# Cisco Nexus Data Broker

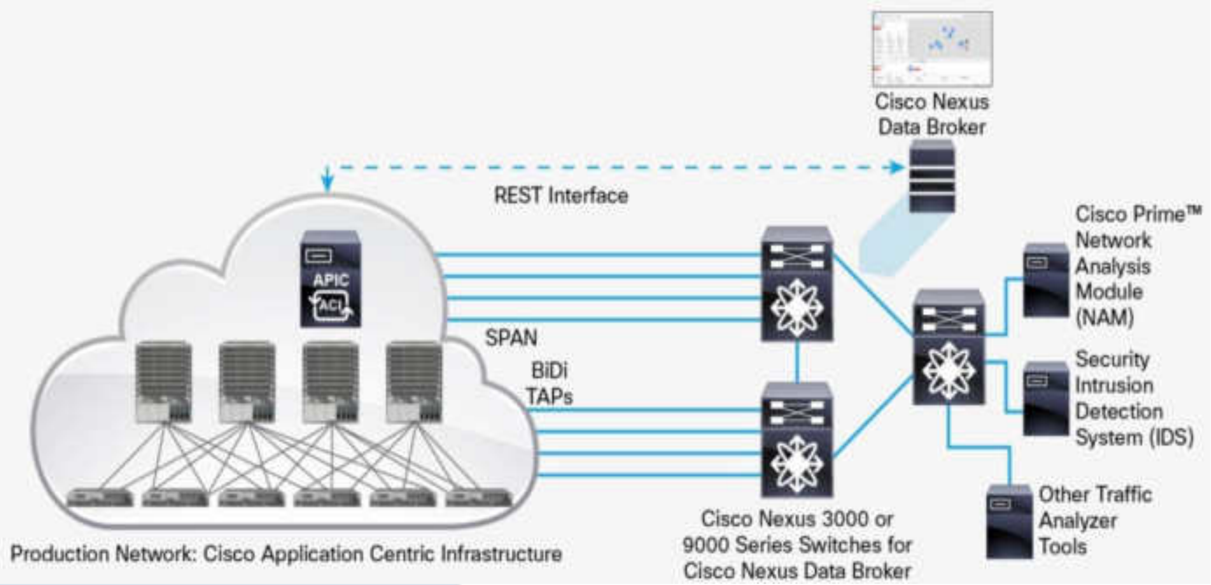
# Benefits

- Integration with Cisco ACI
- highly scalable solution
- options ranging from a small one-switch, embedded deployment to a centralized deployment across many data centers in different locations


Cisco Nexus Data Broker
REST Interface
APIC
ACI
SPAN
BiDi TAPs
Cisco Prime™ Network Analysis Module (NAM)
Security Intrusion Detection System (IDS)
Other Traffic Analyzer Tools
Production Network: Cisco Application Centric Infrastructure
Cisco Nexus 3000 or 9000 Series Switches for Cisco Nexus Data Broker

# Benefits

- central point for all monitoring configuration
- eliminates the need for users to use multiple systems
- monitor any part of networks in an automated and cost-effective way


Cisco Nexus Data Broker
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Cisco Nexus 3000 or 9000 Series Switches for Cisco Nexus Data Broker

# DEMO

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