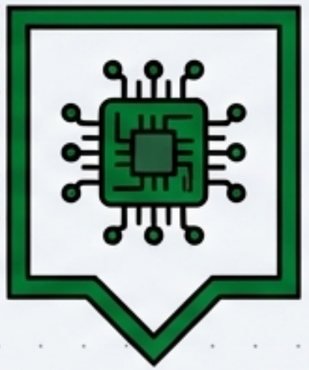
praslab

The Multi-Vendor Segment Routing Field Manual

Nokia SR OS | Cisco IOS XR Interoperability Guide

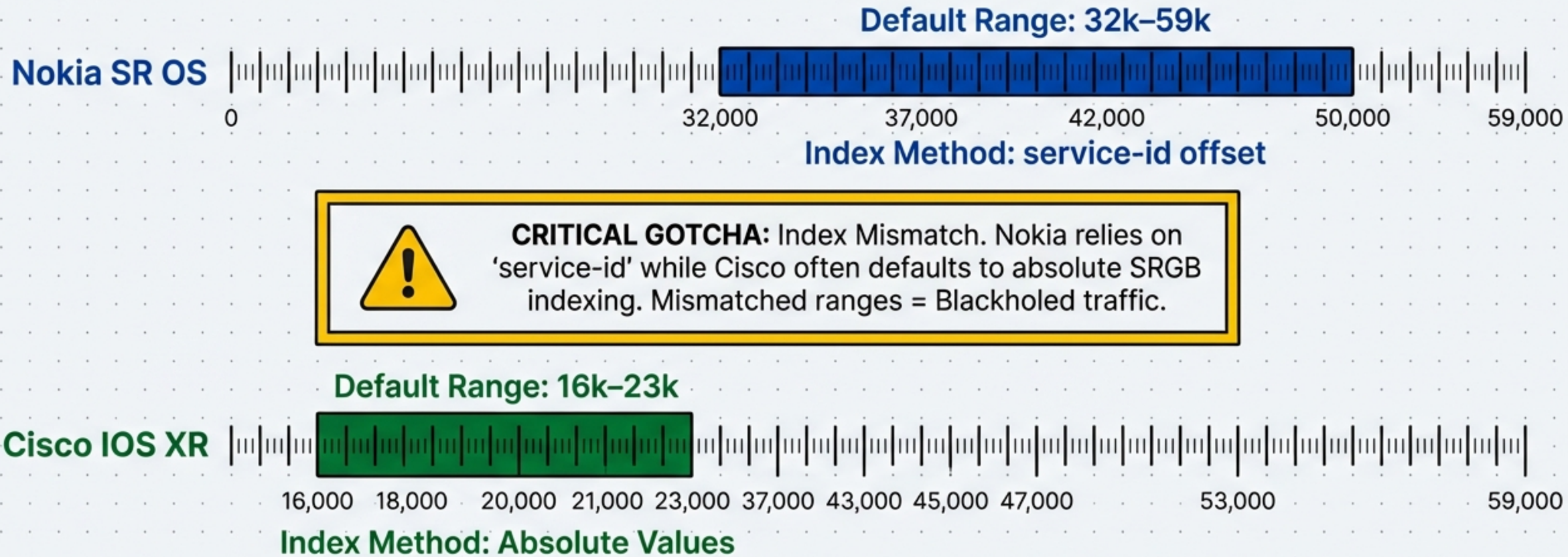
A 4-Week Mastery Programme for Network Engineers

Operational Roadmap: The 4-Module Sprint

Week 1: SR Foundations	Week 2: Traffic Engineering	Week 3: Advanced SR	Week 4: Deployment & Ops
			
SRGB, Prefix-SIDs, IS-IS Extensions	SR-TE Policies, Colour/Endpoint, Dynamic Paths	SRv6 Locators, TI-LFA, Microloop Avoidance	Troubleshooting Matrix, Inter-domain, EVPN

The Rosetta Stone: Aligning the Global Block

The foundation of multi-vendor SR is mapping the Global Block.
Without alignment here, label switching fails before it begins.



Protocol Activation: Configuring the Core

Nokia SR OS

```
configure router isis 100
  segment-routing
  prefix-sid-range 32 10000 index 1000
```

Cisco IOS XR

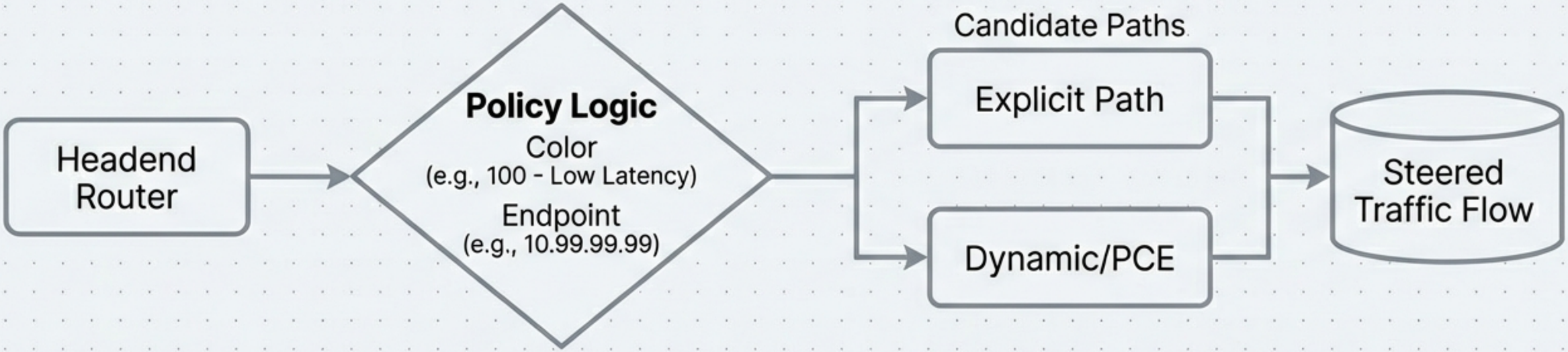
```
segment-routing mpls

router isis 100
  segment-routing mpls
    global-block 16000 8000
```

Functional Equivalent

Traffic Engineering Logic: The Policy Model

Forget RSVP tunnels. SR-TE uses Source Routing based on intent.



Nokia

Uses “path-list” preferences.

Cisco

Uses “path explicit-hop” or dynamic calculation.

Constructing the Policy: Syntax Comparison

Nokia SR OS

```
configure sr-te-policy "BluePolicy"
   endpoint 10.99.99.99 color 100
   path-list "ExplicitPath" preference 100
```

Cisco IOS XR

```
sr-te policy color 100 endpoint ipv4 10.99.99.99
  path explicit-hop 10.1.1.2 10.2.2.2
```

Note the structural difference: Nokia defines the policy as a named object ('BluePolicy'), whereas Cisco defines it directly by its attributes (Color/Endpoint).

Verification: Confirming the Steering

Nokia CLI

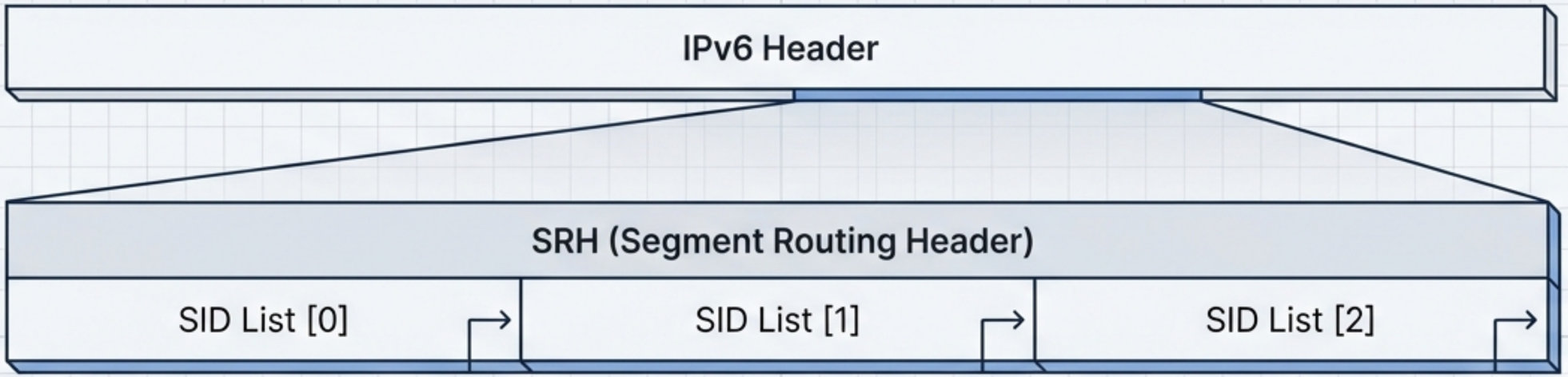
```
> tools dump sr-te-policy
  ...
  Status: Up
  Active Path: Explicit
  ...
```

Cisco CLI

```
# show sr-te policy detail
  ...
  Operational status: Up
  Valid Candidate Path
  ...
```

Troubleshooting Tip: If the policy is down, check the candidate path validity first. A valid path requires reachability to every SID in the list.

The SRv6 Shift: Locators and Functions



Nokia SR OS

```
srv6
  locator "Loc1" 2001:db8:1::/48
  advertisement-protocol isis100
```

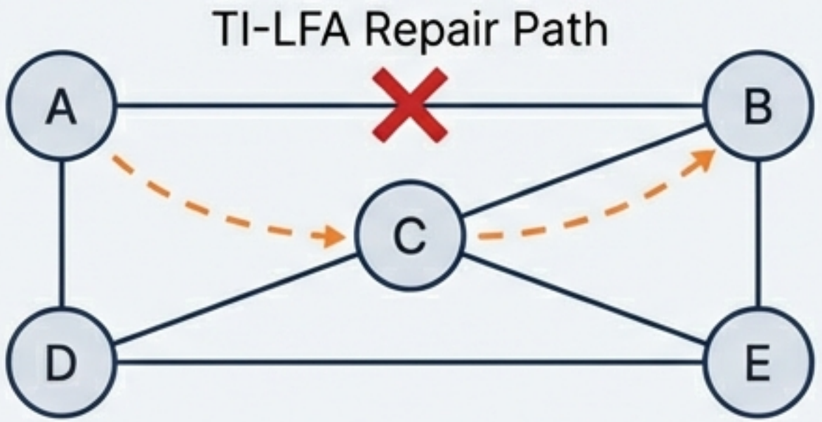
Cisco IOS XR

```
segment-routing srv6
   locator Loc1
   address ipv6 2001:db8:1::/48
```

The Locator (e.g., 2001:db8:1::/48) effectively replaces the MPLS label stack, routing traffic to a specific node function.

Automated Resiliency: TI-LFA & Microloop Avoidance

Topology Independent LFA provides sub-50ms protection without complex backup tunnels. It calculates a repair path that is guaranteed loop-free.



Nokia CLI

```
fast-reroute ti-lfa
```

Cisco CLI

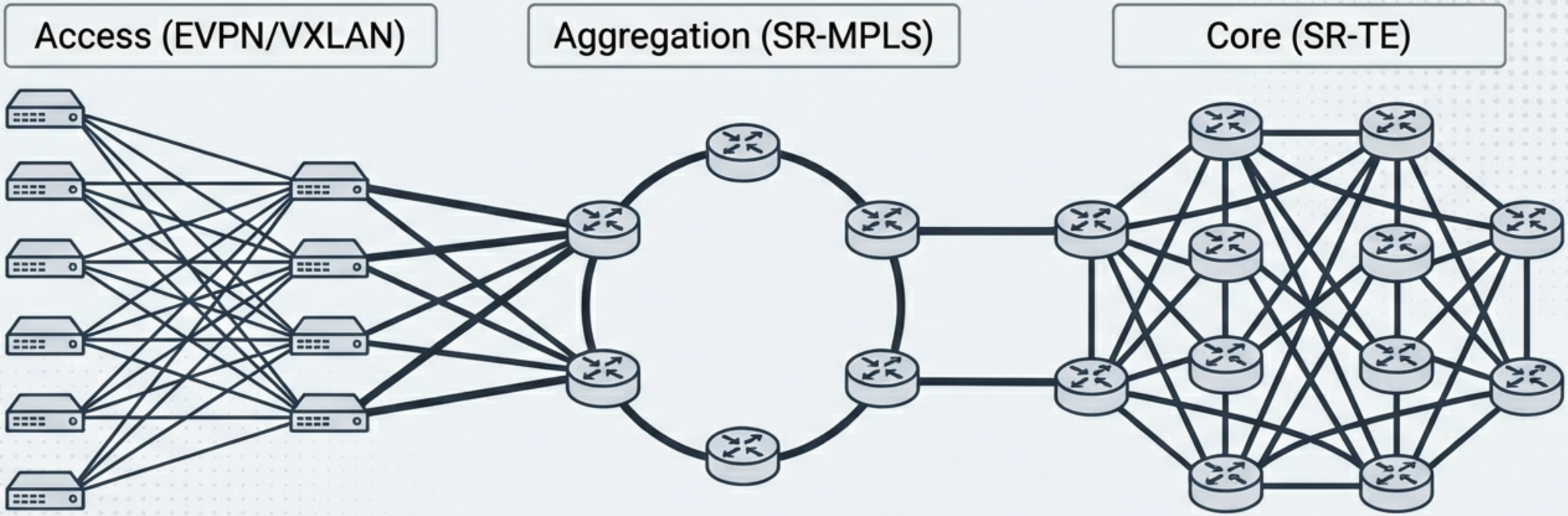
```
topology-independent-lfa
```

One command enables instant protection.

The Troubleshooting Matrix

Issue	Nokia Check	Cisco Check	Fix
SRGB Mismatch	`show router isis prefix-sids`	`show segment-routing mpls global`	Align ranges (Check Service-ID vs Absolute).
No SIDs Learned	`debug router isis sr`	`debug isis sr-adjacency`	Check IGP adjacency & Flood status.
TE Policy Down	`show sr-te-policy`	`show sr-te policy candidates`	Verify Endpoint reachability & Color match.

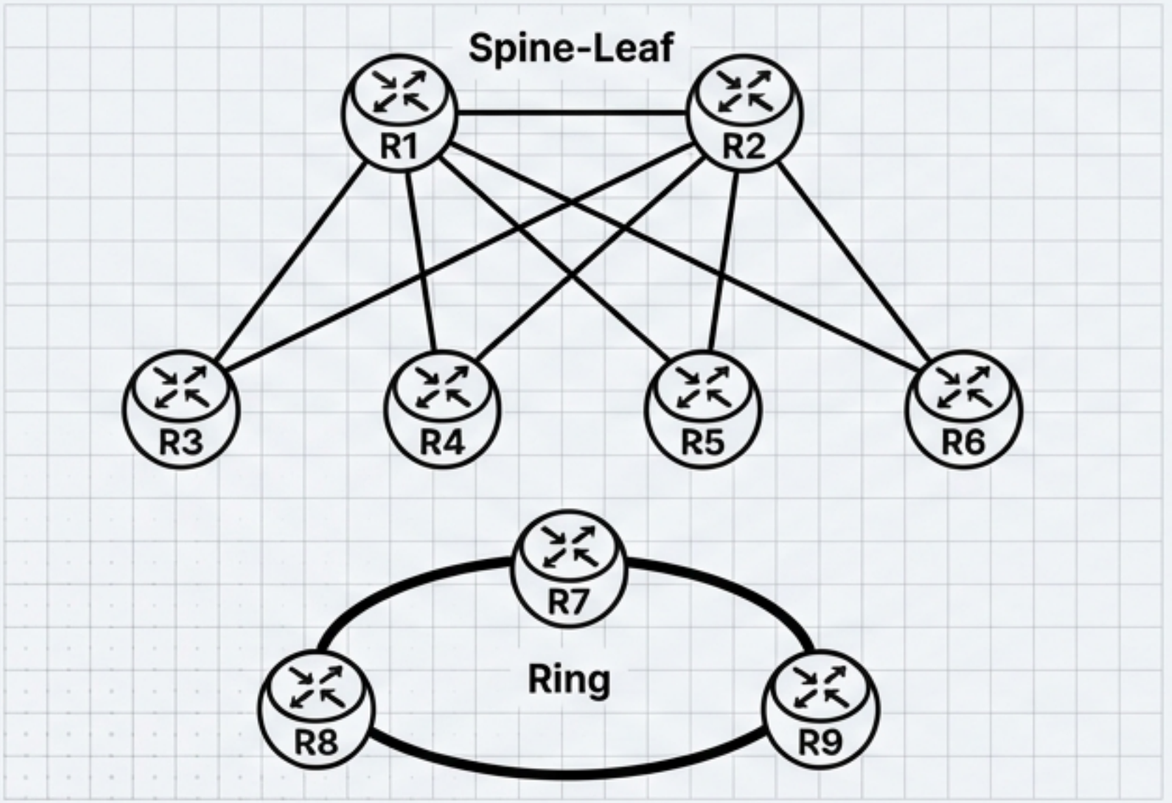
Deployment Architectures: EVPN & Inter-Domain



- **1. EVPN Integration:** BGP Prefix-SIDs carry the overlay routing.
- **2. Inter-Domain:** Using EPE (Egress Peer Engineering) to steer traffic between autonomous systems.

End-to-end policy enforcement from the access leaf to the peering edge.

The Lab Environment: Build Specifications



Environment Requirements

- Platform: **GNS3 / EVE-NG**
- Nokia Node: **vSim (SR OS v24.10.R1)**
- Cisco Node: **vXR (IOS XR v7.11.1)**

This curriculum relies on high-fidelity simulation. Ensure your .gns3a files match these software versions to avoid syntax deprecation errors.

Knowledge Check: Common Interop Pitfalls

SRGB Indexing

Nokia uses a Service ID offset (Cobalt Blue); Cisco uses absolute values (Forest Green). (Don't mix them up!)

Policy Naming

Cisco defines policies by Color/Endpoint tuples (Forest Green); Nokia uses string names (Cobalt Blue).

IPv6 Config

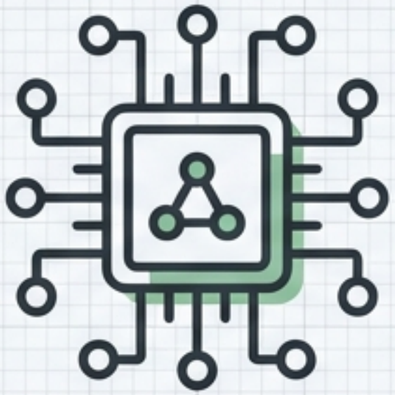
Enabling 'srv6' on Nokia (Cobalt Blue) requires defining the 'advertisement-protocol'.

Verification

"`tools dump`" (`JetBrains Mono`) is your best friend on Nokia (Cobalt Blue); "`show ... detail`" (`JetBrains Mono`) is the go-to on Cisco (Forest Green).

Ready to deploy?

Download the 60-page Companion PDF.



Get the 12 GNS3/EVE-NG Topologies.

Watch the 5-Minute Explainer Animation.

Master the syntax. Control the traffic. Bridge the vendor gap.