

**Bell**



# SR-aware SD-WAN

Enabling end-to-end application-responsive networking

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# Agenda

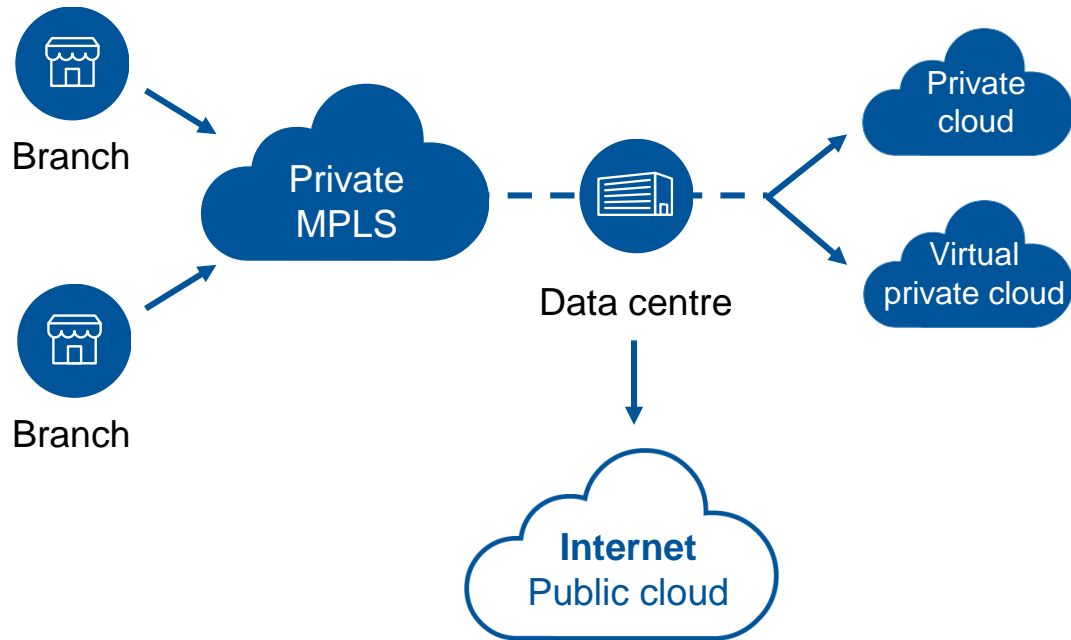
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- Service evolution with SD-WAN
- SR benefits for business services
- SD-WAN-SR overview
- Business SR deployment scenarios
- Bell lab test

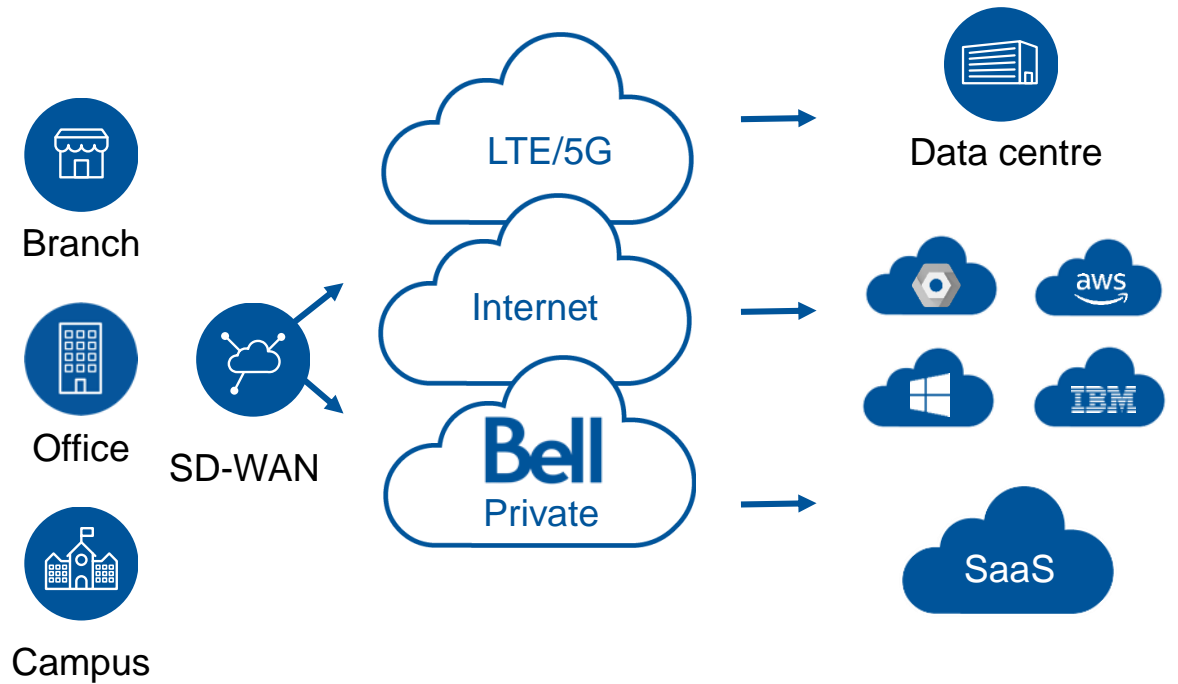
# Service evolution with SD-WAN

# Network adapting to new cloud service delivery model

## Yesterday

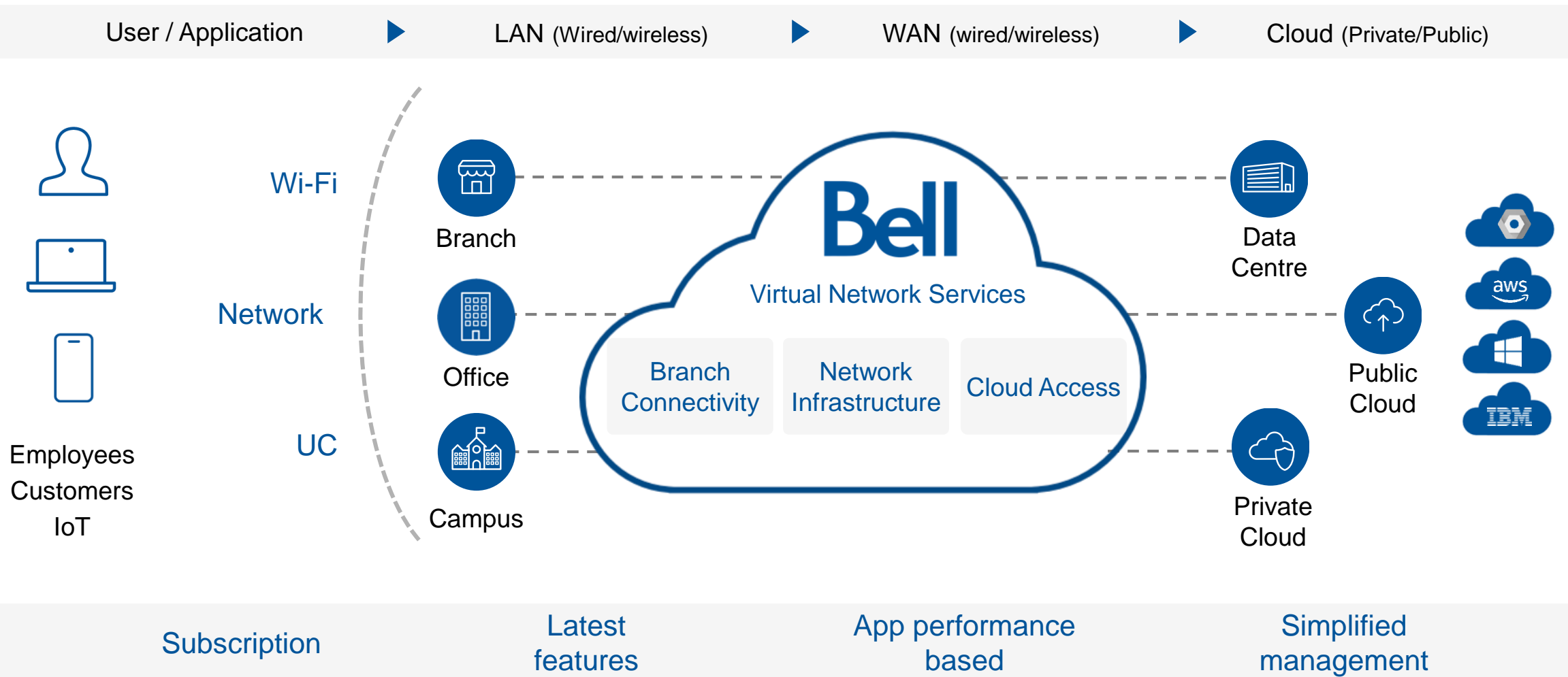


## Today



SD-WAN Edge Intelligence, common architecture for best-in-class app performance and Internet connectivity becomes business critical

# Bell Virtual Network Services



# SD-WAN business challenges

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## Well-known facts

- SD-WAN app performance view (E2E SLA) differs from MPLS VPN (PHB)
- Services overlay and infrastructure underlay are not tied together
- Optimizing use of high performance underlay requires tuning at SD-WAN edge
- Difficult to capture additional revenue with customized solutions and services

## The opportunity

- Product: innovative services by integrating services and infrastructure
- Network: capture savings provided by technological advances
- **Accelerate the pace of transformation**

SR makes the Network more flexible and agile



SR benefits for business services



# Product priorities – SR alignment

Product directions	SR benefits
<b>Access agnostic</b> Every service over any access	<b>Consistent treatment of traffic</b> Across access types
<b>On-demand / dynamic services</b> Fast service activation / fast service changes	<b>Centralized control</b> Less elements to touch in order to provision service (edge only)
<b>Value added / differentiated services</b> Granular offerings customized to customer	<b>Easy traffic engineering</b> Customized SLA's
<b>Service virtualization</b> Service composition	<b>Service Programming</b> Bring traffic to service

# Segment Routing value in delivering Business Services

Bell	Customer
Simplification	Product / feature velocity
Automation / orchestration	On-demand / self-service / granularity
Traffic engineering	SLA / path control
Streaming telemetry	Service assurance
Optical / packet / physical / virtual	Multi-layer
Opaque service identifier	Secured
Automated sub-50msec (TILFA)	E2E network reliability
Monetize entire SP infrastructure	Choice of performance / price options



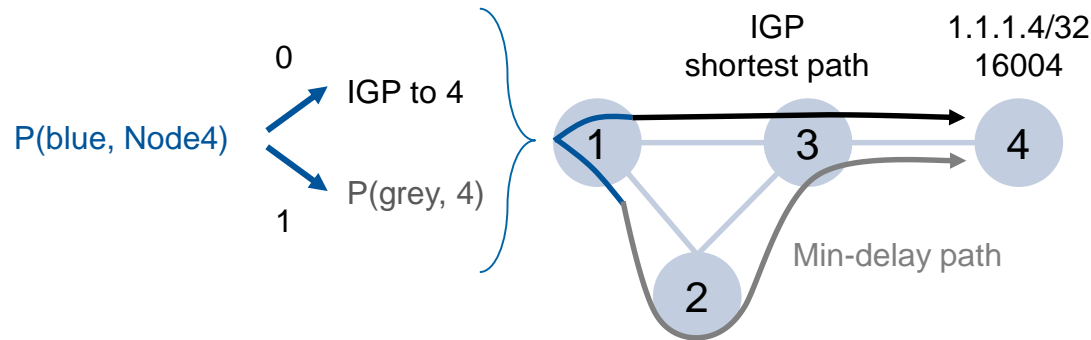
# SD-WAN-SR overview

# Per-Flow Policy (PFP) – Per-Flow SR Policy mechanisms

## Per-Flow SR Policy

Per-Flow Policy (blue, Node4) @ Node1

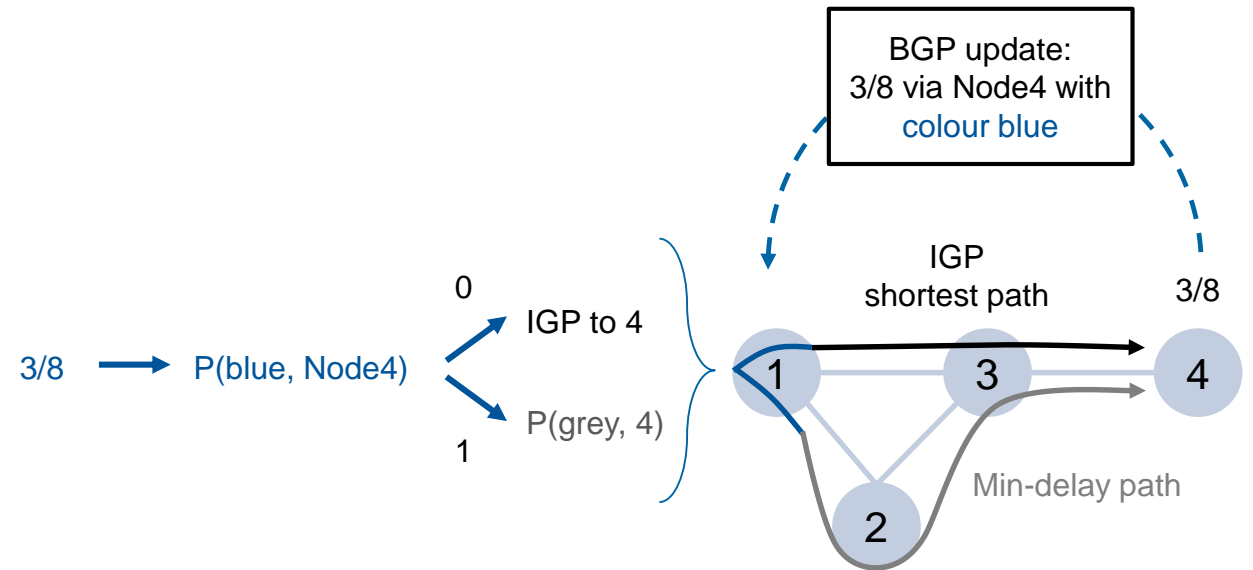
- FC=0 → IGP shortest path == 16004
- FC=1 → Per-Destination SR Policy (grey, Node4)



## Per-flow Automated Steering (AS)

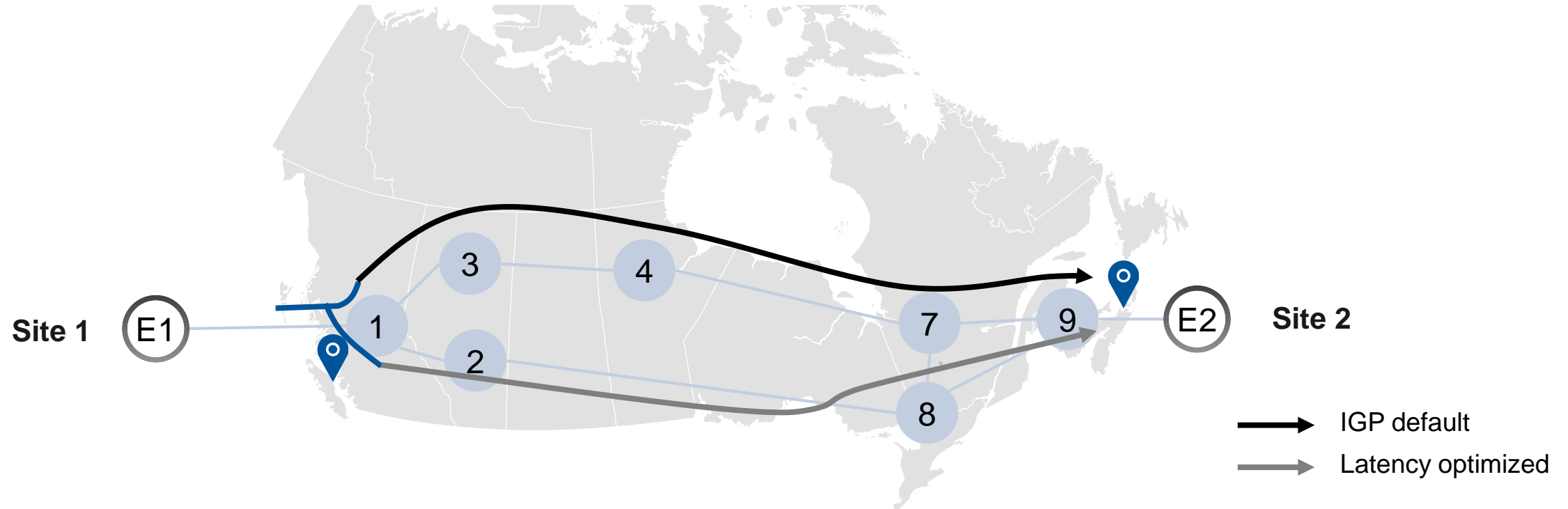
AS automatically steers a service route on the policy (C, E):

- C == colour of the service route
- E == next-hop

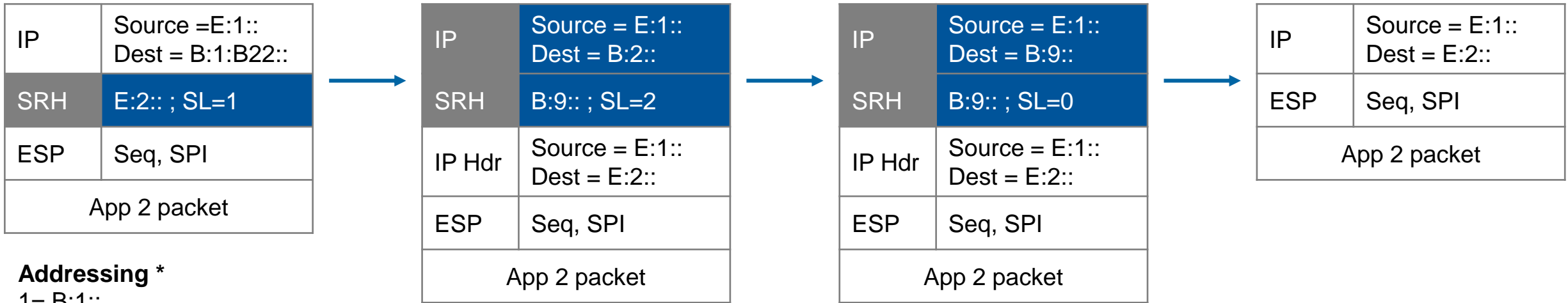


# Application A uses best-effort

- E1 and E2 are SD-WAN edge nodes with address E:1:: and E:2::
- Application A at Site 1 sends a packet to a destination at Site 2
- E1 encrypts packet to site 2 and encapsulate in IPsec packet to E:2::
- E1 uses default PCP marking, packet follows IGP path

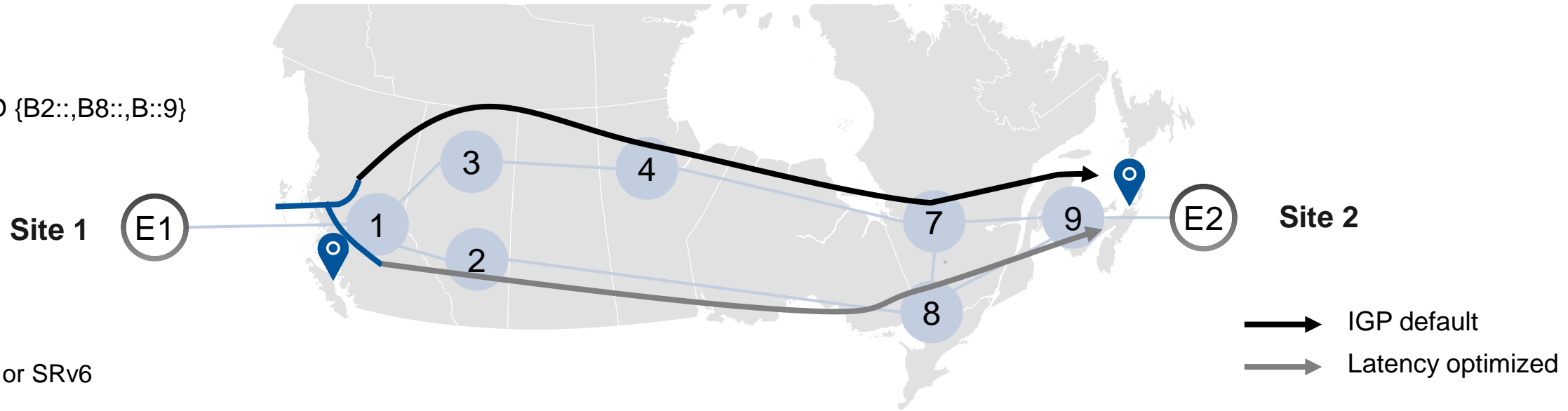


# Application B requires low latency



**Addressing \***

- 1= B:1::
- 2= B:2::
- ...
- 9= B:9::
- B22:: B-SID {B2::,B8::,B:9}



\* SR-MPLS or SRv6

→ IGP default  
→ Latency optimized

# Performance monitoring

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## Enterprise-based

- Send probes with the related Binding SID
- Enhances SD-WAN default mechanisms

## SP-based

- The SP can enable per-SR-policy perf monitoring
  - latency
  - loss
- These metrics can be leveraged by SD-WAN controller and provided to the enterprise
- Simple reporting
- Additional data to select which application to steer on which Binding SID
- Embedded OAM

# Business SR deployment scenarios





# SD-WAN and SR Controllers

## SD-WAN Controller

- Manages SD-WAN VPNs, SD-WAN policies, Enterprise Edge
- Policies are enterprise managed

## SR Controller (PCE)

- Provides service provisioning for SR policies, Service Provider Edge
- Provider owned and managed



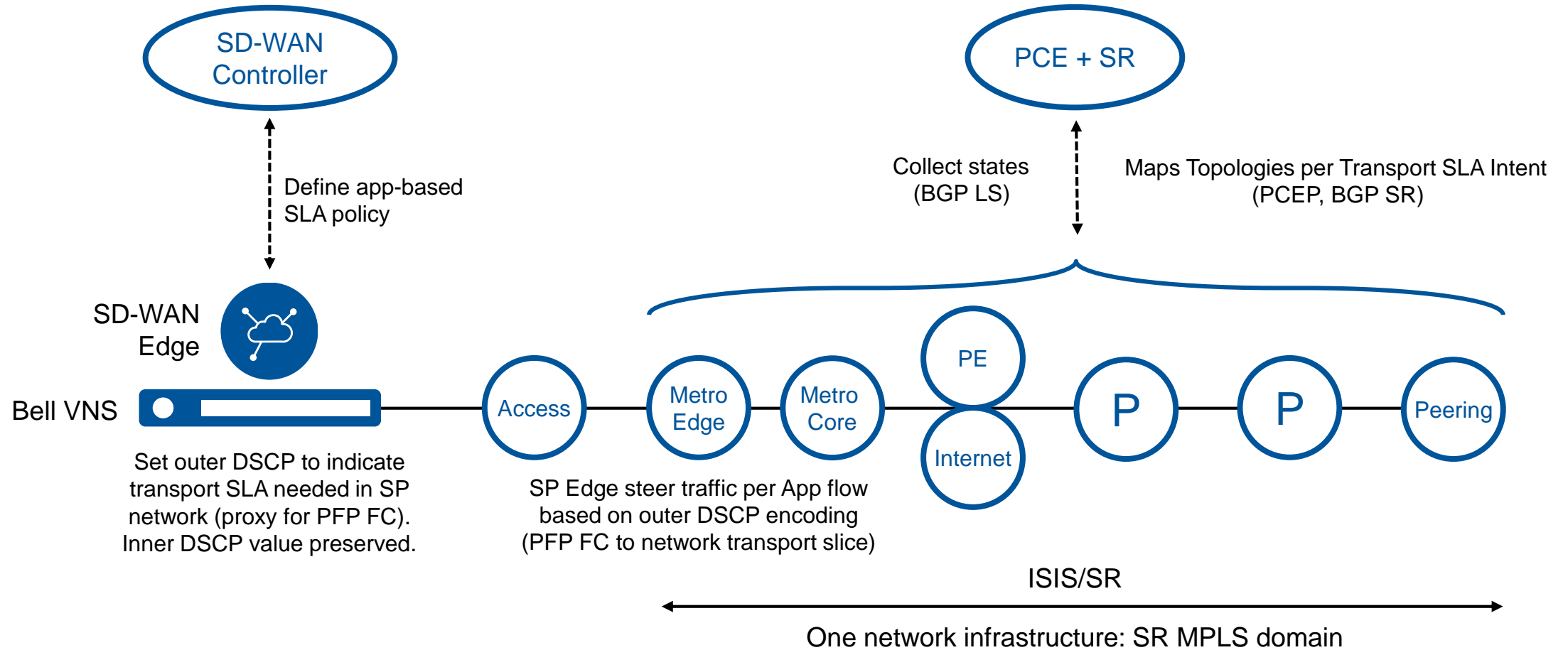
Application Overlay  
Enterprise



Transport Underlay  
Service Provider

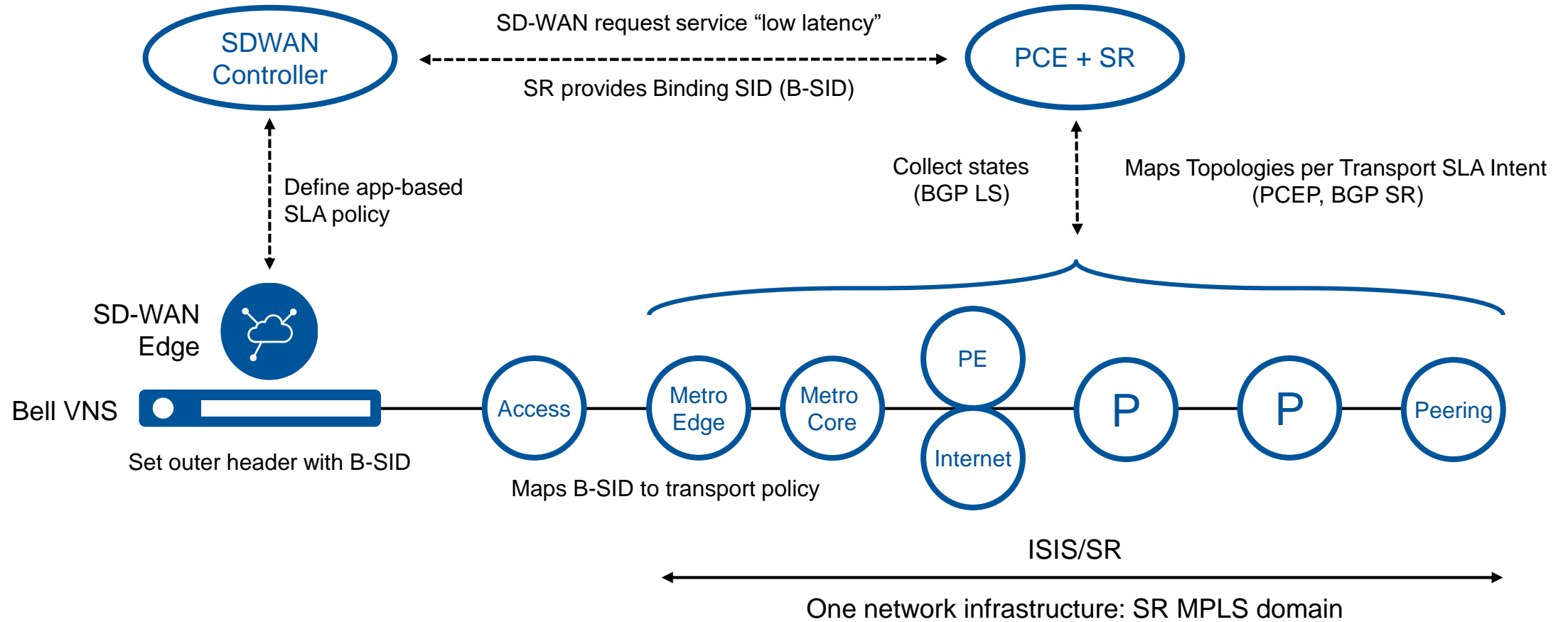
# Bell Architecture (future 1) – SD-WAN-SR

## Enterprise leverages pre-defined transport slices



# Bell Architecture (future 2) – SD-WAN-SR

## Enterprise request on-demand specific transport SLA (e.g. low latency)



Bell lab test



## Goals to validate

- SD-WAN controller components
- PCE / SR controller components
- Multiple topologies
- Edge SD-WAN (enterprise)
- Edge SR (service provider)
- Path default and latency-optimized

# Summary – SD-WAN-SR

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- What does this mean for the industry?
  - Underlay differentiation for SDWAN
  - Secured, Automated, Service Assured SLA

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