SRv6 uSID   Build Anything
IPM   Measure Everything

Clarence Filsfils

We all love IP

- IP is at the heart of our industry

- We stream music over IP backbones

- Sensors protect our home over IP

- We leverage cloud workloads over IP

- Mobile industry runs over IP

- We got accustomed that IP cannot achieve anything alone

- Plethora of shim layers: MPLS, GTP, NSH, UDP/VxLAN…

- These shim's cannot be combined and require expansive translations

Segment Routing

- In 2012, a team at Cisco initiated a bold move: let's strengthen IP and allow IP to deliver any service by itself

- First phase: SR-MPLS: drastic simplification and scale up of MPLS

- Second first: SRv6 uSID: deliver any service over IP, without any shim
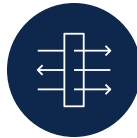
IP is back and better than ever.

Build anything

Simplified, scalable, and versatile networks that are self-sufficient
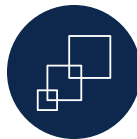
Self-sufficiency is standard

End-to-end policy
- From Host to Internet through DC, Access, Metro, Core, Cloud
- No protocol conversion or gateways at domain boundaries

Any service, without any shim
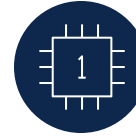- VPN, Slicing, Traffic Engineering, Green Routing, FRR, NFV

Better scale, reliability, cost, and seamless deployment in Brownfield

Essential embedded assurance

Active probing between Fabric Edges **along all ECMP paths**

High-capacity probe generation and ingestion powered by Silicon One (14MPPS)

Continuous **routing monitoring**

Advanced analytics and intelligent service optimization driven by AI

Measure everything

Embedded SLA monitoring and IPM within the network is essential

IP is back and better than ever.

Build anything

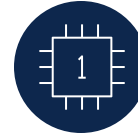Simplified, scalable, and versatile networks that are self-sufficient

SRv6 uSID

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IPM

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segment-routing.net

- Tutorials & presentations & deployment updates

- Public presentations from SRv6 operators

- MENOG22 & MENOG23 session on SRv6

segment-routing.net

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- Public presentations from SRv6 operators

- MENOG22 & MENOG23 session on SRv6

> - Today talk:
>   - Update on SRv6 deployment, Standardization and Ecosystem
>   - update Zain Kuwait SRv6 deployment

SRv6 uSID

- Build Anything
  - Any combination of underlay, overlay, service chaining, security...
  - VPN, Slicing, Traffic Engineering, Green Routing, FRR, NFV

- Any Domain
  - Access, Metro, Core, DC, Host, Cloud
  - End-to-End Stateless Policy
  - No protocol conversion or gateways at domain boundaries

- Seamless Deployment in Brownfield

- Built day-1 for Automation

- Standardized, Rich Eco-system, Rich Open Source (SONiC)

Outperform MPLS/VxLAN

Outperform MPLS - Daniel Voyer (Bell Canada)

- Native Optimum Slicing
  - SLID is encoded in Flow Label

- HW Linerate Push: 3 times better
  - J2 uSID linerate push: 30 uSIDs >> 10 MPLS Labels

- HW Counter and FIB consumption: 4 times better
  - uSID requires 4 times less counters and FIB entries than MPLS

- Routing scale: 20 times better
  - uSID supports summarization. MPLS requires host routes.

- Lookup efficiency: 2 to 3 times better
  - uSID can process 2 to 3 SIDs in a single lookup (LPM nature)

- Load-balancing: optimum and deterministic
  - uSID provides HW friendly entropy (fixed offset, shallow)

**Bell SRv6 uSID Deployment
Paris 2022**

Outperforms VxLAN – Gyan Mishra (Verizon)

- Seamless Host support for Network Programming
  - 6 uSID's in outer DA: RFC2460 IPinIP with opaque DA

- TE in the DC
  - elephant flows exist, asymmetric fabrics exist, TE is needed

- TE in the Metro/Core from the host
  - An SRv6 uSID DC allows for the application to control the network program in the metro/core without complex DPI and protocol conversion at the DC boundary,

- uSID DC provides lower MTU overhead (~5%)
  - Lower MTU overhead means lower DC cost

- Vendor, Merchant and SONIC/SAI maturity
  - uSID support across DC vendor (Cisco), Merchant (Cisco, Broadcom, Marvell), Sonic/Sai (Alibaba deployment)

**SRv6 uSID DC Use-Case
Paris 2023**

Rich SRv6 uSID Ecosystem

Open-Source Networking Stacks

Network Equipment Manufacturers

Merchant Silicon

Smart NIC / DPU

Open-Source Applications

Partners

SRv6 uSID

SRv6 is Proposed Standard

Architecture
- SR Architecture – RFC 8402
- SRTE Policy Architecture – RFC 9256

Data Plane
- SRv6 Network Programming – RFC 8986
- IPv6 SR header – RFC 8754

Control Plane
- SRv6 BGP Services – RFC 9252
- SRv6 ISIS – RFC 9352
- SR Flex-Algo – RFC 9350

Operation & Management
- SRv6 OAM – RFC 9259
- Performance Management – RFC 5357

Strong Commitment and Leadership

Editor of   96% IETF RFCs
Co-author of   100% IETF RFCs

Over 80000 uSID routers deployed

Inter-DC/Metro Traffic
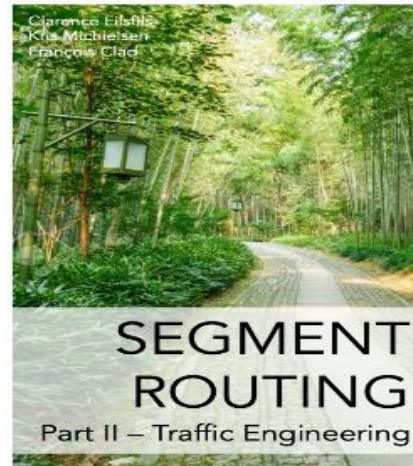Engineering across all of China
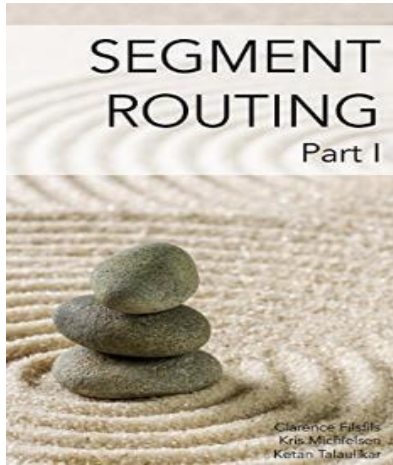Eddie Ruan

14k+ devices, 70% services on uSID
Akash Agrawal

# Simplicity Always Prevails

Stay up-to-date

segment-routing.net

Zain SRv6 deployment
Transforming Networking for Enterprises

Omar Alsharad, *Network Engineering Division – **Zain***

About Me: Omar AlSharad

- Cloud Network Engineer at Zain. Specializing in optimizing the performance of Zain's core network.

- Previously worked as a Radio Access Engineer at Qualcomm in San Diego, California.

- Bachelor's degree and Master's degree in electrical and computer engineering from San Diego State University.

- Proud holder of the Cisco CCDevE certification.

Zain: A Regional Telecommunications Leader
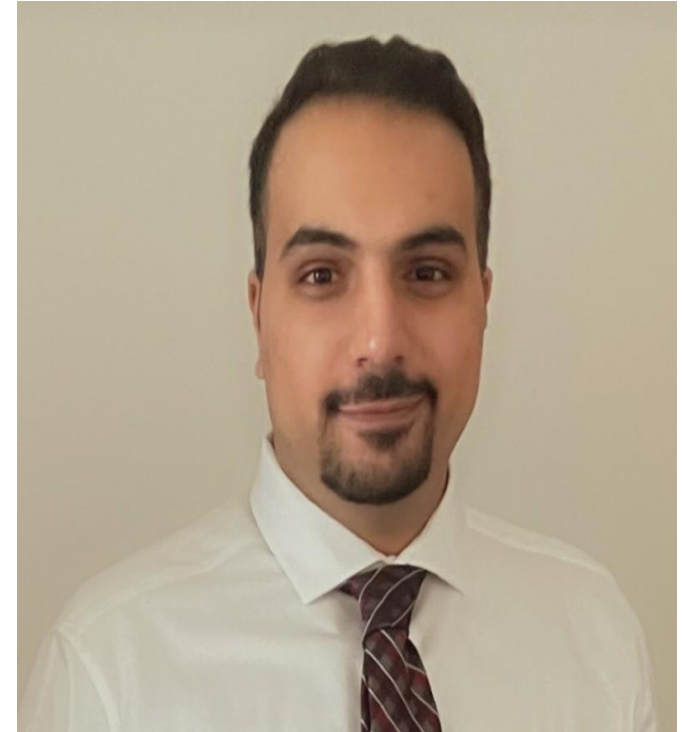
Zain Kuwait's Network Evolution: Leading with SRv6

Removing Complexity and enabling 400G everywhere with one click

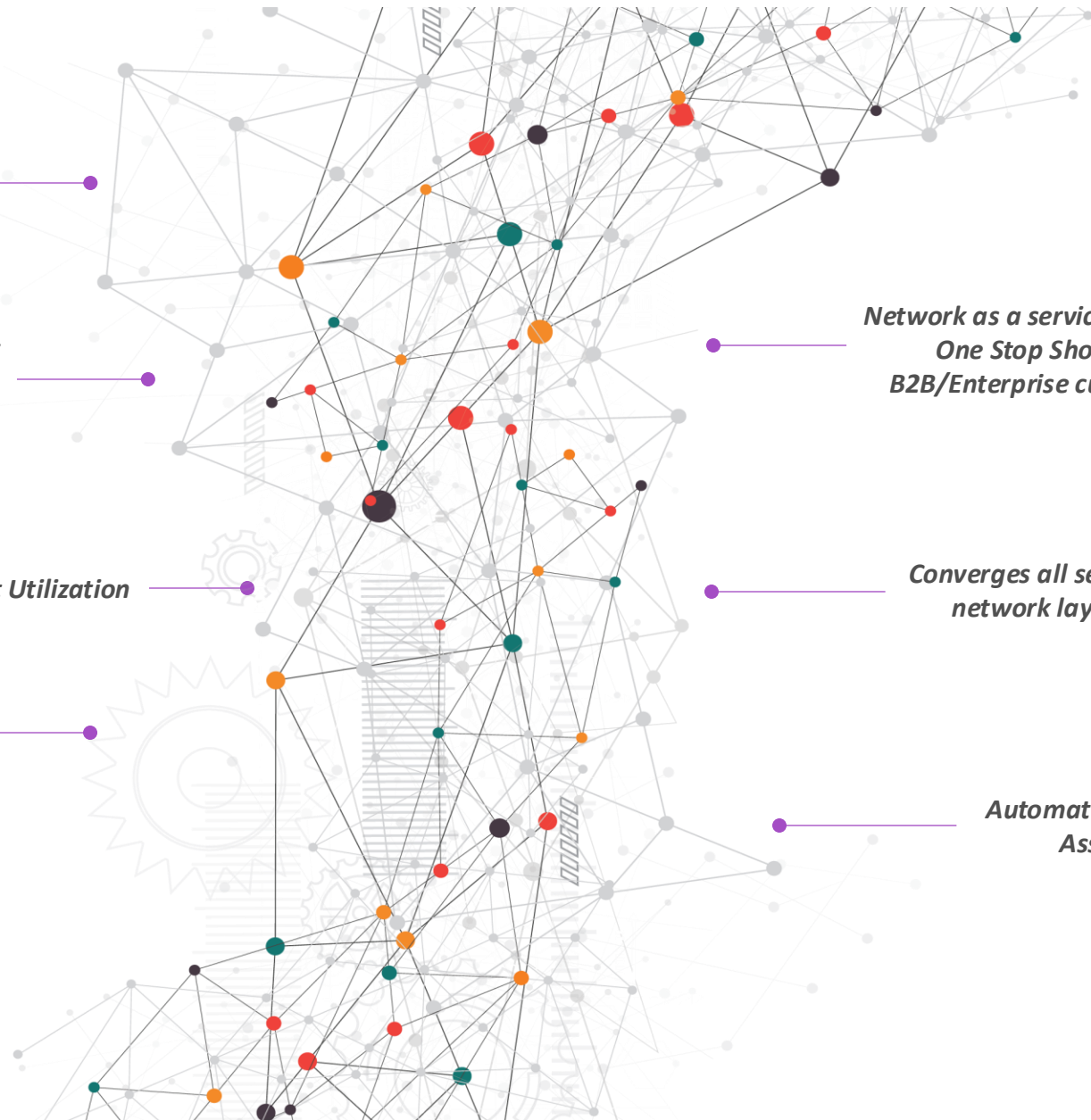Sustanability and NetZero Initaitive – less power, less rack space, less cooling needed with RON

Maximize on the Asset Utilization

TCO Saving of ~ 46%

Network as a service (NaaS) One Stop Shop for our B2B/Enterprise customers

Converges all services onto a single network layer - SRv6 for Slicing with 5GSA core

Automation, Provisioing and Assurance everywhere

zain

01 Simplified Network Operations

02 Scalability for Growth

03 Enhanced Service Performance

04 Programmability and Automation.

05 Future-Ready Technology

Why Zain Chose SRv6

SRv6 Deployment: 14 Sites Live and Growing

1. **Deployment Highlights:**
   - 14 Sites Fully Deployed
   - More coming very soon

2. **Impact on Wholesale Customers:**
   - Onboarding Key Wholesale Partners
   - Enhanced Service Offerings

3. **Use Cases and Benefits:**
   - Support for high-capacity data demands from wholesale partners.
   - Simplified interconnections for faster service delivery and expansion.
   - High-performance routing and segmentation, ensuring reliability for critical services.
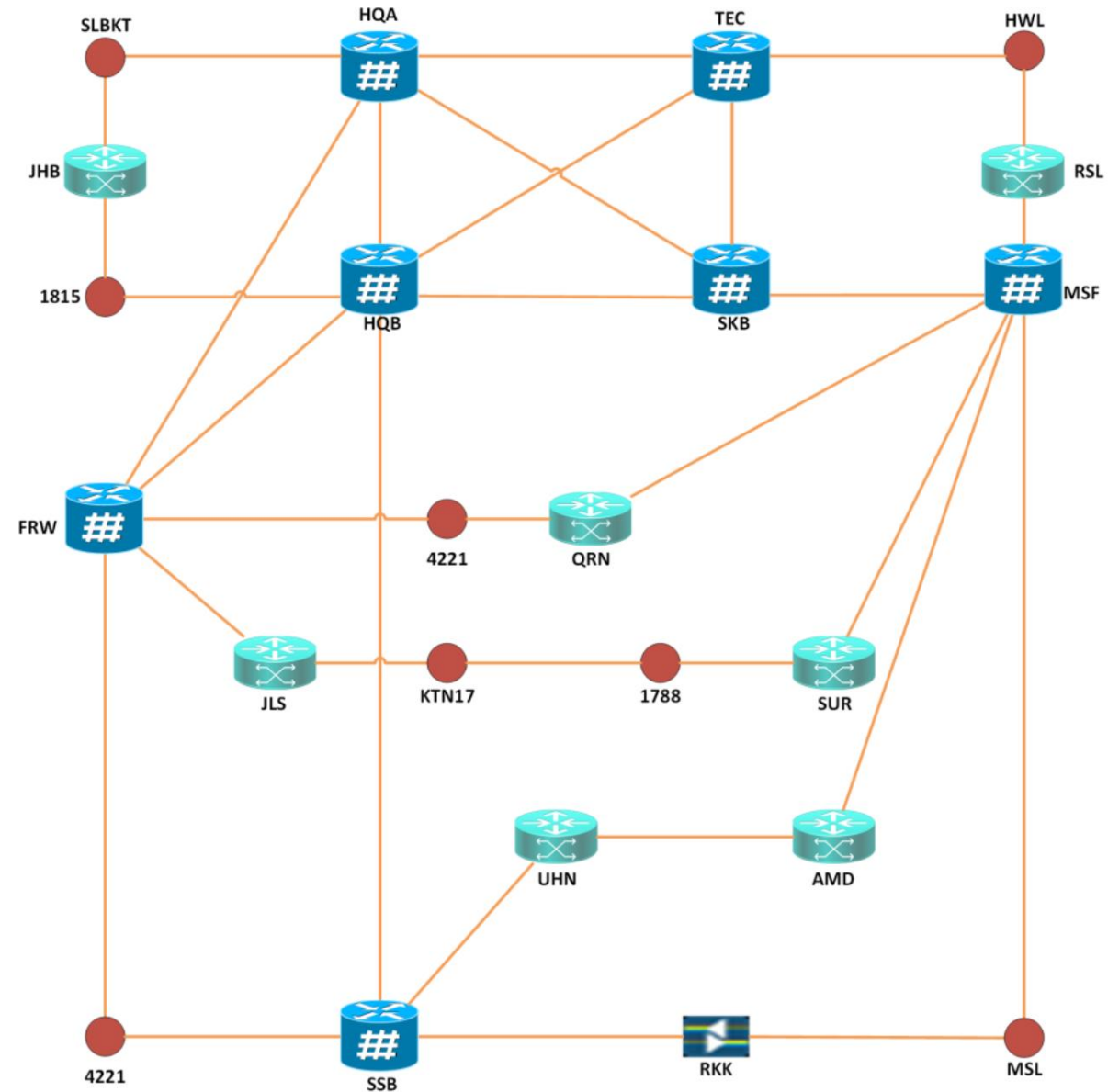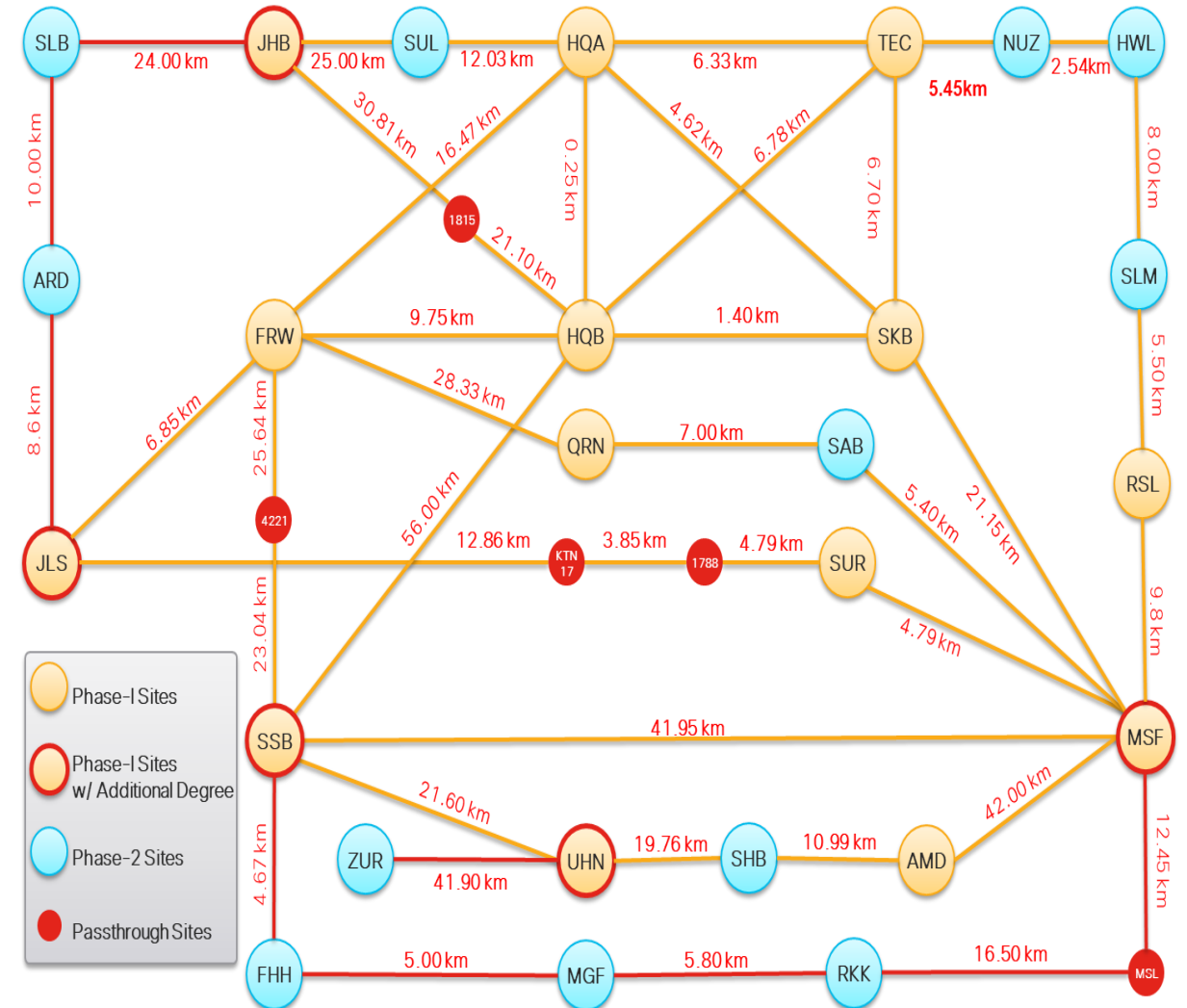
Expansion: 8 New Sites and Enhanced Automation with Cisco CNC
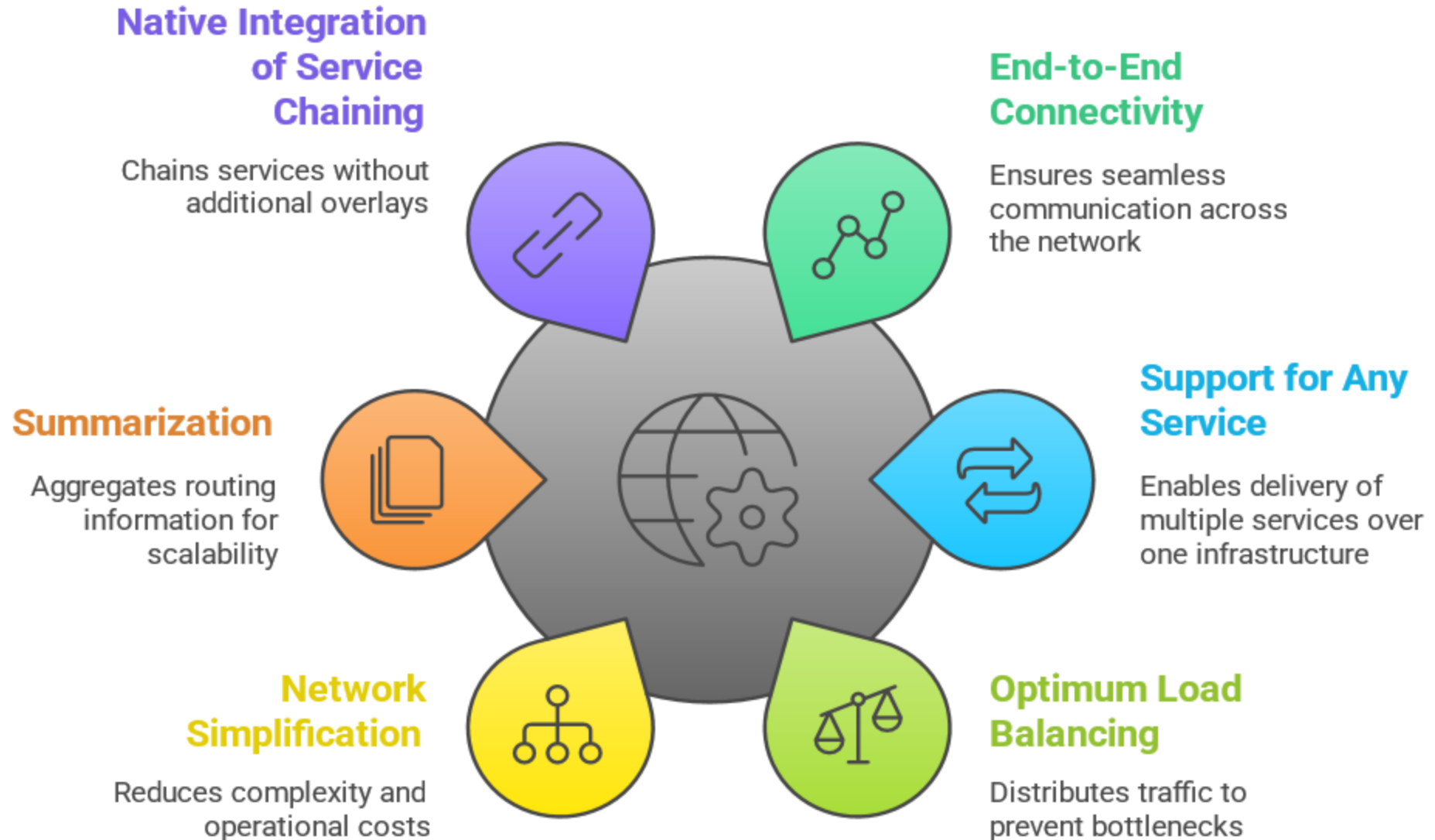
1. **Expansion Overview: business case**
   - **Adding 8 New Sites**
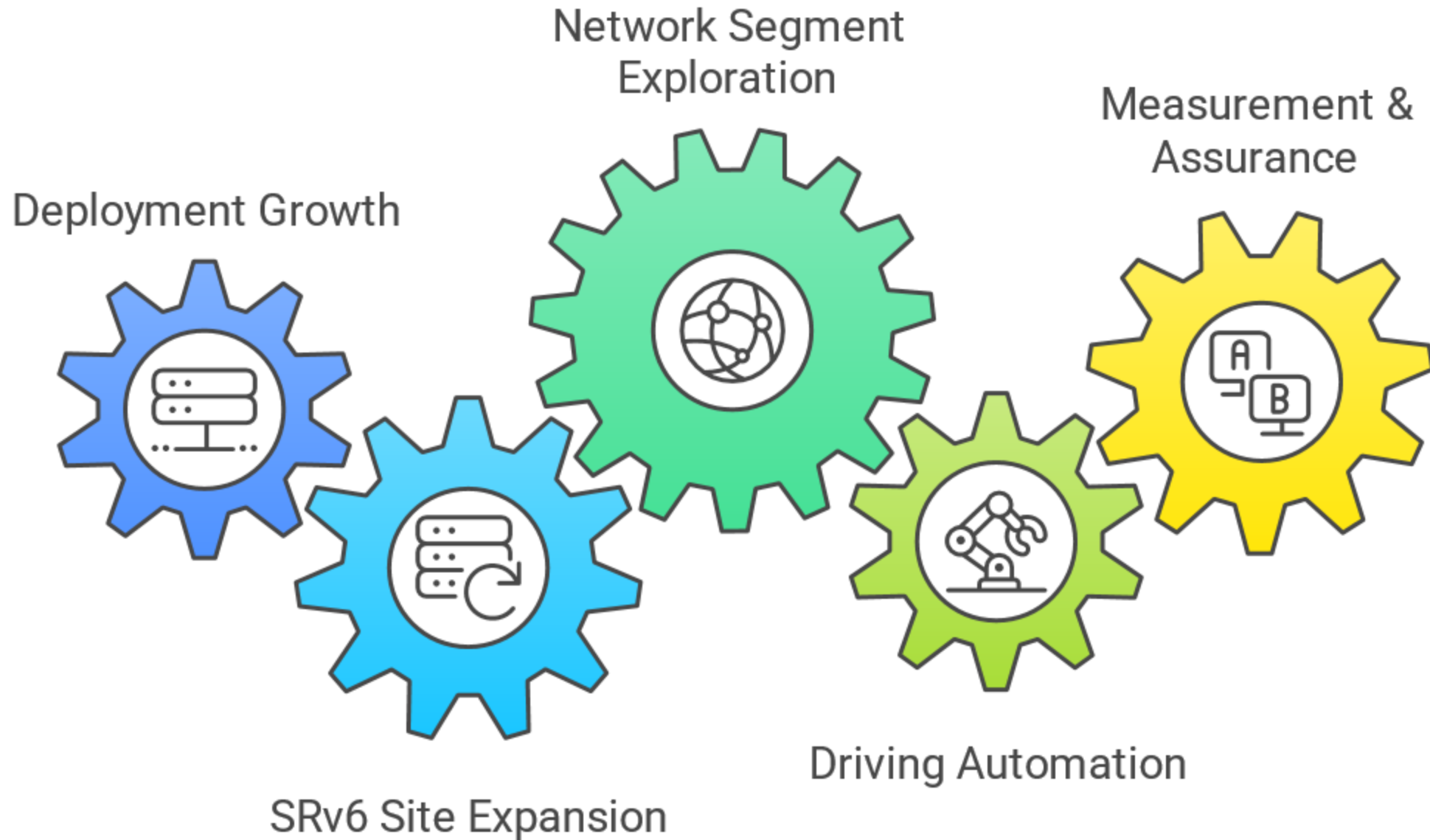   - **Strengthening Network Reach**

2. **Cisco CNC Automation:**
   - **Service Automation**
   - **Assurance Capabilities**

SRv6: Revolutionizing Network Performance and Efficiency

Native Integration of Service Chaining

Chains services without additional overlays

End-to-End Connectivity

Ensures seamless communication across the network

Summarization

Aggregates routing information for scalability

Support for Any Service

Enables delivery of multiple services over one infrastructure

Network Simplification

Reduces complexity and operational costs

Optimum Load Balancing

Distributes traffic to prevent bottlenecks

Next Steps: Expanding the SRv6 Journey

Deployment Growth

Network Segment Exploration

Measurement & Assurance

SRv6 Site Expansion

Driving Automation

Thank You