
# Cisco Segment Routing

## SRv6 Network Programming
**Network as a Computer**

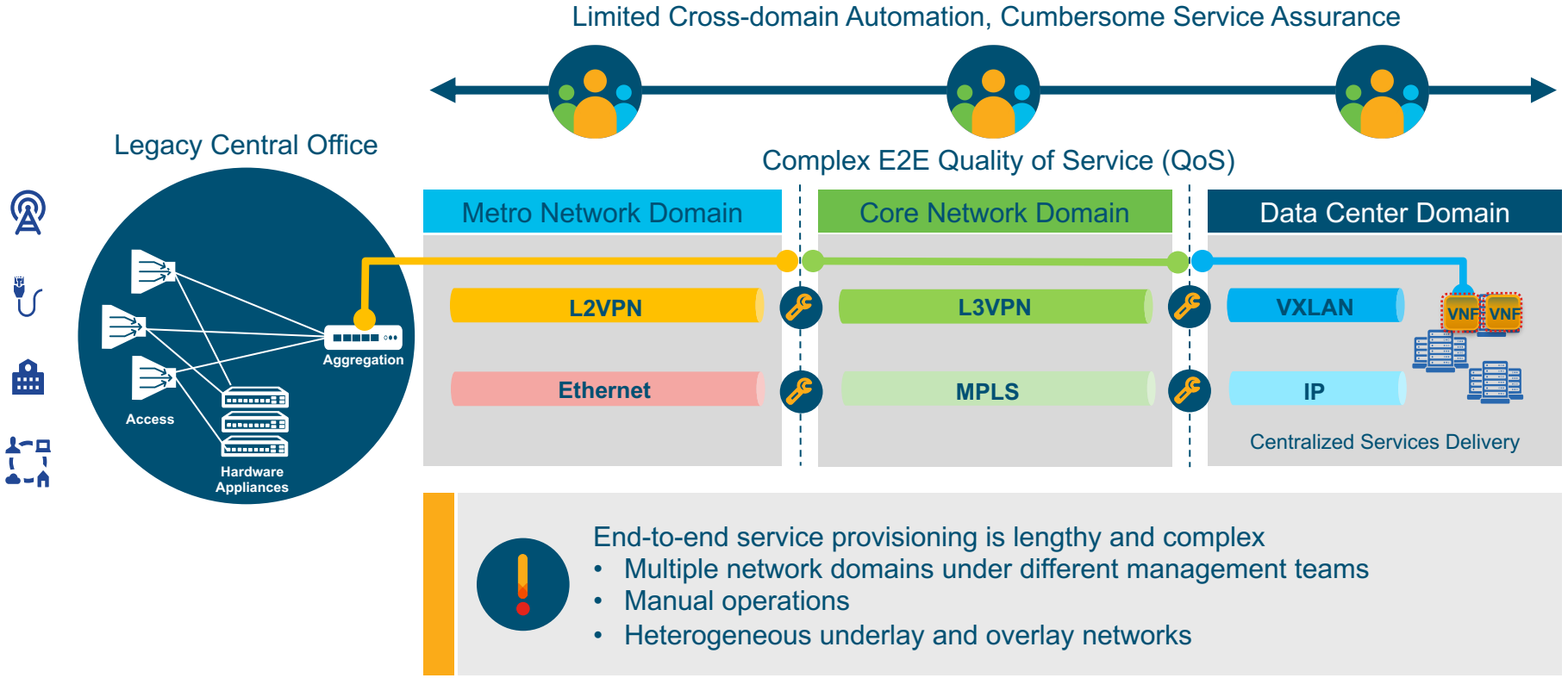
## Meet-Up

Bertrand Duvivier

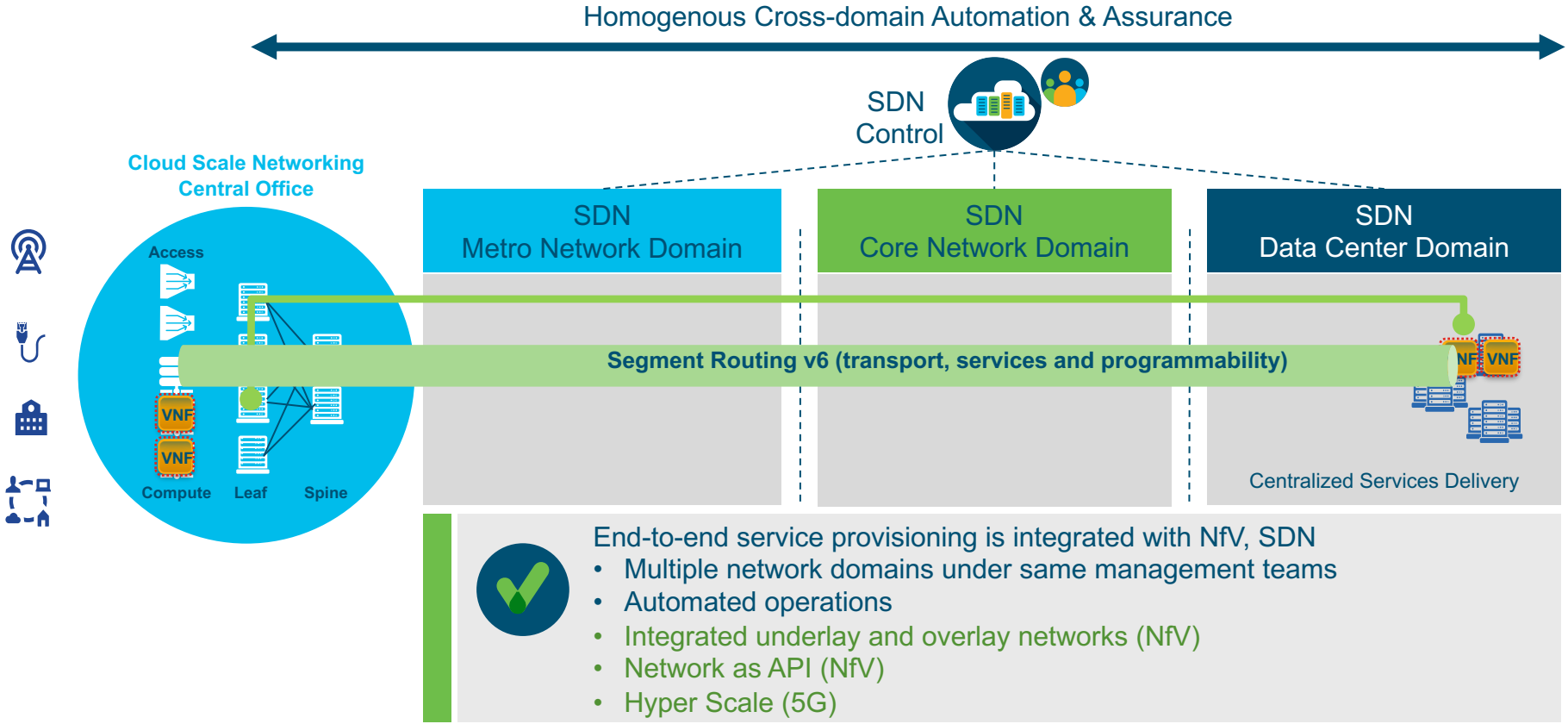
Cisco Systems

September 2019

# Understanding Today's Service Creation



# SRv6: SDN, NfV, 5G ready
# “Network as an API” for Service Creation



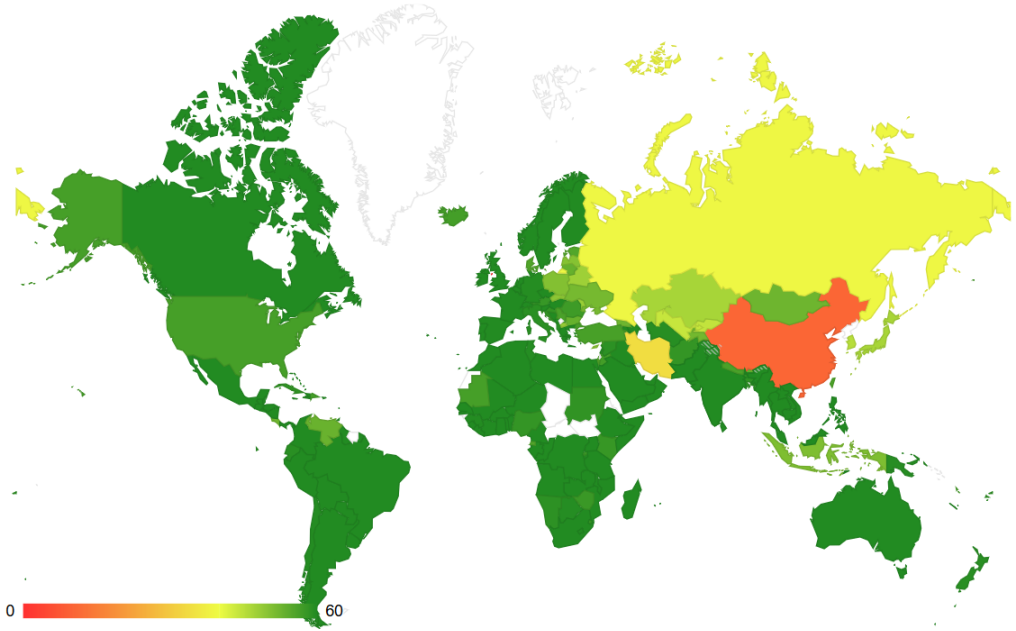

End-to-end service provisioning is integrated with NfV, SDN

- Multiple network domains under same management teams
- Automated operations
- Integrated underlay and overlay networks (NfV)
- Network as API (NfV)
- Hyper Scale (5G)

# IPv6 adoption is a reality

Display content data

World | Africa | Asia | America | Europe | Oceania




% Web pages available over IPv6

*Sources: 6lab.cisco.com – Web content*
*Cisco VNI Global IP Traffic Forecast, 2016-2021*

Global IPv6 traffic **grew 241%** in 2016

Globally IPv6 traffic **will grow 16-fold** from 2016 to 2021

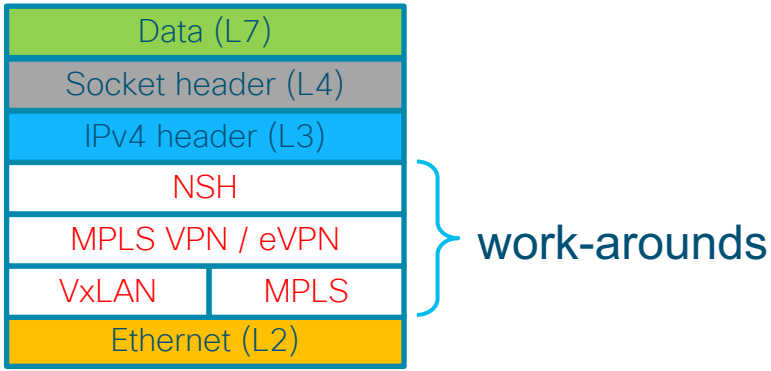
IPv6 **will be 37%** of total Internet traffic in 2021


# SRv6 path to simplicity

# IPv4 limitations & work-arounds

| Network Functions | IPv4 |
|---|---|
| Reachability | IPv4 Header |
| Engineered Load Balancing | MPLS Entropy Label, VxLAN UDP |
| VPN | MPLS VPN's, VxLAN |
| Traffic Engineering | RSVP-TE, SR-TE MPLS |
| Source Routing | SR-TE MPLS |
| Service Chaining | NSH |

Address space 32 bit limitation
No optional header
IPv4 header doesn't support
- VPN
- Traffic Engineer
- Service Chaining
- Engineered Flow optimization
- Source-Routing



# SRv6 Solution

| Network Functions | IPv6 |
|---|---|
| Reachability | IPv6 Header |
| Engineered Load Balancing | IPv6 Header |
| VPN | IPv6 Header |
| Traffic Engineering | IPv6 Header |
| Source Routing | IPv6 Header |
| Service Chaining | IPv6 Header |

IPv6 Address 128bits
IPv6 Flow Header
- Engineered Flow optimization

SRv6 Header
- Source-Routing
- Traffic Engineering
- VPN
- Service Chaining

Shipping | Unique Functionality | Higher Scale

# SRv6: Simplicity at Hyper Scale

## Applicability Examples

**Reachability**

End-to-End

**Scalability**

Summarization

## Solution

SRv6 with Summarization and End-to-End Reachability

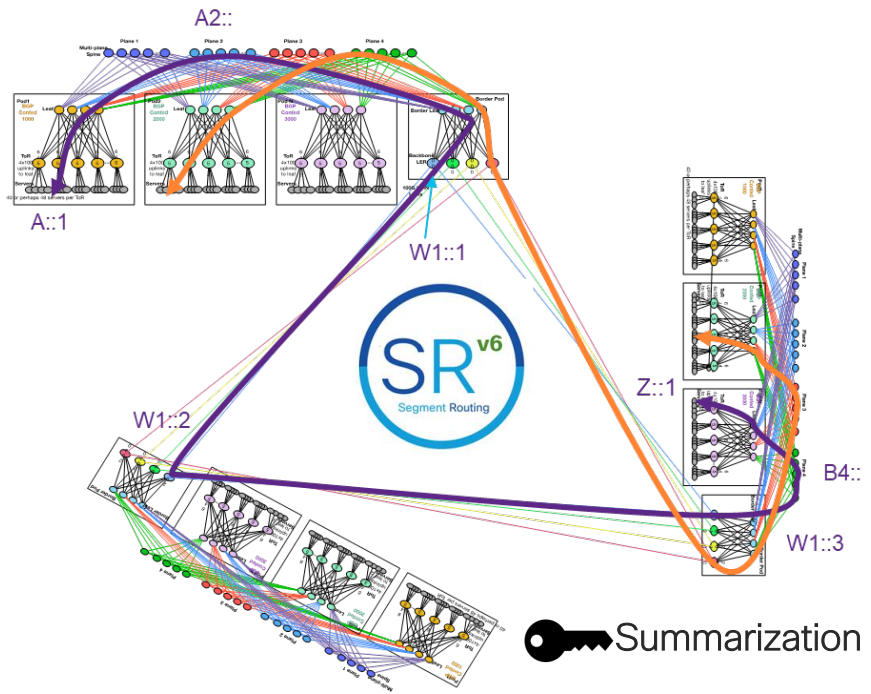
- Use of IPv6 summarization (not available in MPLS)
- Use of IPv6 huge address space for end-to end reachability
- Use of SRv6 Micro-Segments (uSIDs) for Scale and MTU Optimization

## Benefits

Simplicity at Hyper scale

- Easily scale beyond 100K network nodes

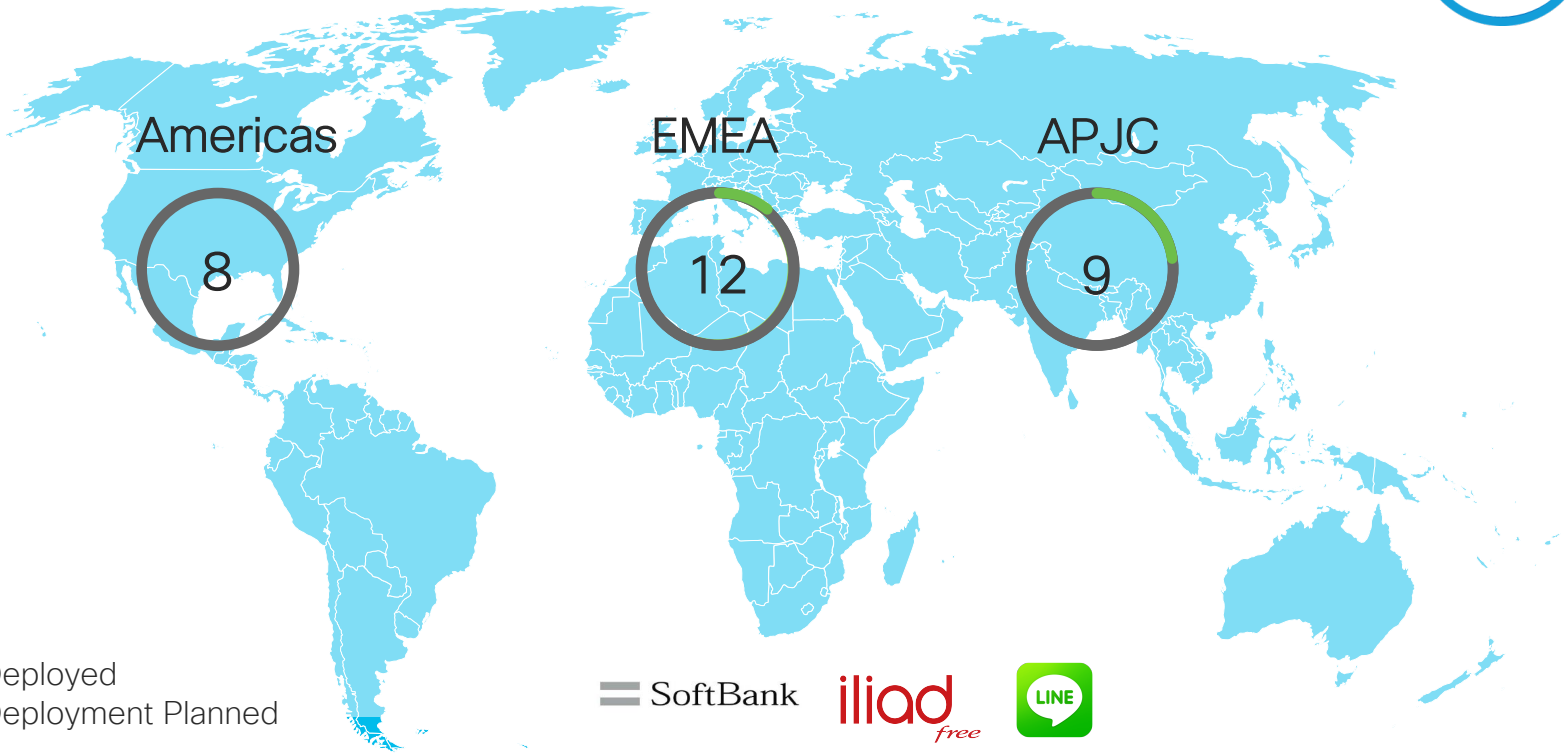
Simple | Scalable | NFV | 5G Slicing




Interested? SRv6 Introduction on segment-routing.net


# Customer Traction

# SRv6 is happening in 2019!



SoftBank

# Cisco Supports SoftBank on First Segment Routing IPv6 Deployment in Prep for 5G

[Press Release - https://newsroom.cisco.com/press-release-content?type=webcontent&articleId=1969030](https://newsroom.cisco.com/press-release-content?type=webcontent&articleId=1969030)



## Cisco Supports SoftBank on First Segment Routing IPv6 Deployment in Prep for 5G

CISCO

NEWS PROVIDED BY
Cisco Systems, Inc. →
Feb 24, 2019, 02:00 ET

SHARE THIS ARTICLE

BARCELONA, Spain, Feb. 24, 2019 /PRNewswire/ -- Mobile World Congress -- Cisco announced today its collaboration with SoftBank on the world's first Segment Routing IPv6 (SRv6) deployment.

With the anticipation of the coming 5G era, Cisco has been assisting SoftBank to deploy state-of-the-art Segment Routing IPv6 (SRv6) networks nationwide to build a future network architecture that is extremely scalable, with improved reliability, flexibility and agility, all while helping to reduce CapEx and OpEx.

Current mobile networks are deployed as divided networks, with several layers and complicated control plane processing, which makes it difficult to respond to strict quality requirements like in the case of 5G. Deploying SRv6 in a 5G mobile network simplifies network layers and integrates user plane functions from end-to-end with only IPv6 protocol, making things simple, controllable, and flexible.

"Converging 5G features into the end-to-end IPv6 layer with Segment Routing capabilities, is the key to embodying 5G in a simple, scalable architecture," **said Mr. Junichi Miyakawa, Representative Director & CTO for SoftBank.** "With the depth of portfolio and strong network knowledge that Cisco brings to the table, we knew together we could bring our vision to life."

"SoftBank has kept an intense focus on improving service quality for its customers, which can be challenging when trying to reduce costs," **said Sumeet Arora, Senior Vice President of Service Provider Networks, Cisco.** "With the launch of SRv6 network programming, it is pioneering the next phase of IP networking through automation, and championing

Thanks to SRv6 network programming capabilities, Iliad is set to further disrupt the mobile market by delivering truly innovative service offerings

Iliad's NodeBox is SRv6 enabled

https://newsroom.cisco.com/press-release-content?type=webcontent&articleId=1978361

Press Release - https://newsroom.cisco.com/press-release-content?type=webcontent&articleId=1978361

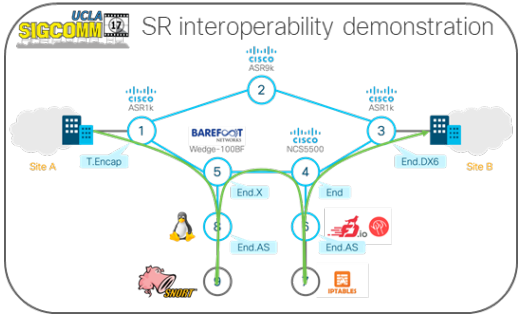
# SRv6 Ecosystem

## Merchant Silicon

BAREFOOT NETWORKS
BROADCOM
MARVELL

## Open-Source Applications

Pyroute2
SERA IPTABLES
TCPDUMP
WIRESHARK
SNORT




## Open-Source Networking Stacks

.io
P4

## Smart NIC

intel
Mellanox TECHNOLOGIES

## NFV Partners

TREND MICRO
ENEA Qosmos Division


# Network as a Computer

# SRv6 for anything


Group-Based Policy

TAG

Segments Left

| Locator 1 | Function 1 |
|---|---|
| Locator 2 | Function 2 |
| Locator 3 | Function 3 |

"Global" Argument (Shared between functions)

Metadata TLV

Optimized for HW processing
e.g. Underlay & Tenant use-cases

Optimized for SW processing
e.g. NFV, Container, Micro-Service

# Lead Operators

- Standardization
- Multi-Vendor Consensus




SPRING
Internet-Draft
Intended status: Standards Track
Expires: April 25, 2019

C. Filsfils
P. Camarillo, Ed.
Cisco Systems, Inc.
J. Leddy
Comcast
D. Voyer
Bell Canada
S. Matsushima
SoftBank
Z. Li
Huawei Technologies
October 22, 2018

SRv6 Network Programming
draft-filsfils-spring-srv6-network-programming-06

Contributors

Daniel Bernier
Bell Canada
Dirk Steinberg
Steinberg Consulting
Robert Raszuk
Bloomberg LP
Bruno Decraene
Orange
Bart Peirens
Proximus
Hani Elmalky
Ericsson
Prem Jonnalagadda
Milad Sharif
Barefoot Networks
David Lebrun
Universite catholique de Louvain
Stefano Salsano
Universita di Roma "Tor Vergata"
Ahmed AbdelSalam
Gran Sasso Science Institute
Gaurav Naik
Drexel University
Arthi Ayyangar
Arista
Satish Mynam
Innovium Inc.
Wim Henderickx
Nokia
Shaowen Ma
Juniper
Francois Clad
Kamran Raza
Darren Dukes
Patrice Brissete
Zafar Ali
Cisco Systems, Inc.

# SRv6 SID Allows

| | |
|---|---|
| Simplicity | Simplicity of IPv6 routing |
| Hyperscale | Hierarchical addressing & summarization |
| Functions | All overlay services and all underlay steering mechanisms |
| Programming | Service chaining and 5G mobility functions |
| Future-Proofing | Add new use-cases by introducing new functions |

# Stay up to date

ask-segment-routing@cisco.com

amzn.com/B01I58LSUO


segment-routing.net

linkedin.com/groups/8266623

twitter.com/SegmentRouting

facebook.com/SegmentRouting/


CISCO