SRv6

Technology and Deployment Use-Cases

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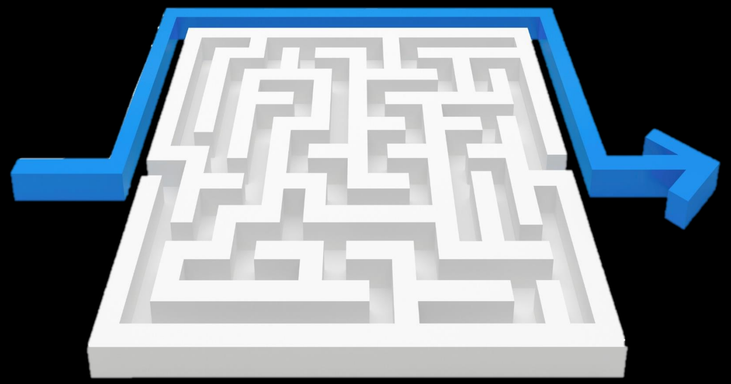
Cisco Fellow

Simplicity **Always Prevails**



~~LDP~~

~~RSVP-TE~~

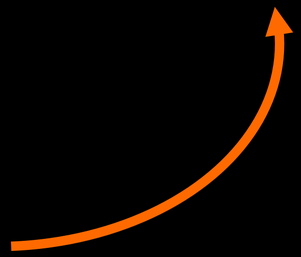
~~Inter-AS Option A/B/C~~

~~MPLS~~

~~UDP/VxLAN~~

~~NSH~~

Furthermore with more scale and functionality



SRv6 - Reminder

Network Program

- A network program is a list of instructions (128-bit SRv6 SID)
- An instruction can be bound to any behavior
  - TE/FRR: END, END.X
  - VPN: END.DX, END.DT
- Often a single instruction is enough and is encoded in DA (without SRH)

SRv6 MicroProgram

uInstruction1 | uInstruction2 | … | uInstructionN

- Any instruction can hold a micro-program
- Ultra-scale and minimum MTU overhead
- HW linerate and widespread adoption: Custom and Merchant
  - Facilitate legacy HW reuse
- 100% leverage of SRH and SRv6 Network Program

Deployments at record-speed

- 100M SRv6 subscribers with 2.5 years of commercial service
- China is pervasively deploying SRv6
- ~100 deployments, 10 with PR

SoftBank	Indosat	China Unicom	MTN Uganda
Iliad	China Telecom	China Bank	Noia
Rakuten	Bell Canada	Cernet2	Line

Mature industry

- 25 HW linerate implementations
  - Cisco Systems, Huawei, Nokia, Juniper, ZTE, Arrcus, Kaloom
  - Broadcom, Barefoot, Intel SmartNIC, Marvell, Mellanox
  - Spirent, Ixia
  - Multiple Interop Reports
- Over a dozen open-source platforms
  - Linux, FD.io VPP, P4, iptables, nftables, snort, SERA, ExaBGP, GoBGP, GoBMP, Contiv-VPP, Calico-VPP

Mature IETF

- Proposed Standard
  - RFC 8402 SR Architecture
  - RFC 8754 SRv6 DataPlane
  - RFC 8986 SRv6 Network Programming
- Last steps to Proposed Standard RFC
  - ISIS
  - BGP
  - BGP-LS

Rich FCS roadmap

- We started SR-MPLS in 2012, SRv6 in 2017
- From an FCS and deployment viewpoint,
  the core of any SR deployment is at parity SR-MPLS vs SRv6
  - TILFA
  - uLoop Avoidance
  - Flex-Algo: Low-Cost/Low-Delay Slicing
  - PerfMon: Link Latency (for Low-Delay slice)
  - ODN/AS into Flex-Algo
  - Seamless Inter-Domain SRv6 with summarizing and slicing
  - L3VPN (IPv4 and IPv6), IPv4 Internet, IPv6 Internet, PW
  - VPN GW to interconnect “new” SRv6-VPN buildup with legacy VPN

Alibaba-Cisco partnership

- Joint communicated to industry: Alibaba use-case and SRv6 benefits
- Collaboration on key SRv6 IETF documents
- Collaboration for SRv6 SONiC / SAI / P4 development
  - First milestone completed (Sept 21):
    SAI v1.9 includes a thorough model for SRv6 including uSID (micro-programs)

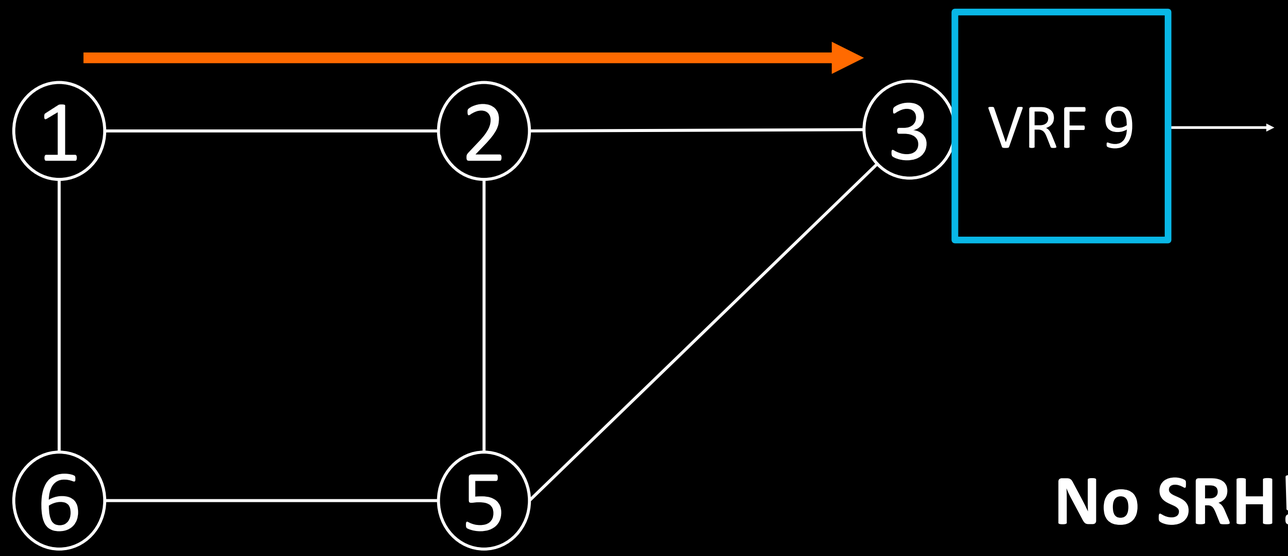
The Deep Edge Podcast with Dennis Cai on SRv6 uSID:
https://www.buzzsprout.com/1010419/4702961-alibaba-dennis-cai-talks-about-segment-routing-episode-18

SRv6 Deployed Use-Cases

VPN over Best-Effort 5G Slice

Network Program: B:3:V(9)

B:** locator block is associated with **ISIS base algo (Low Cost, Best Effort)

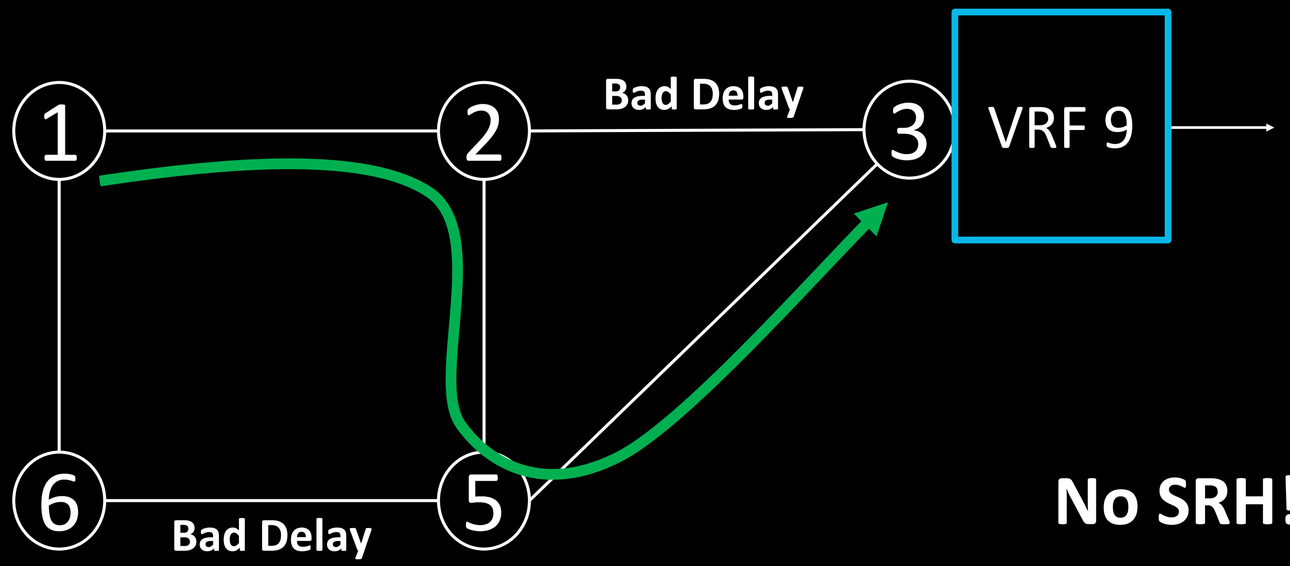


No SRH!

VPN with Low-Delay 5G Slice – Flex-Algo option

Network Program: D:3:V(9)

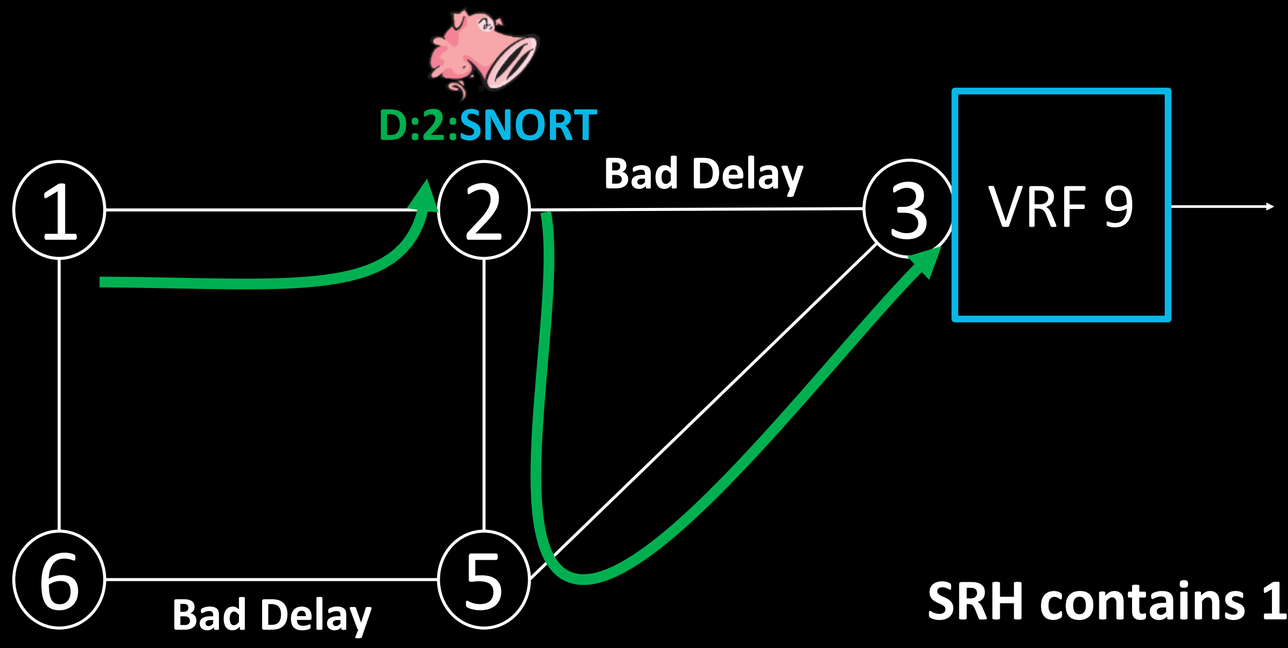
***D:** locator block is associated with **Low Delay** Flex-Algo*



Snort firewall, VPN & Low-Delay slice

Network Program: D:2:SNORT, then D:3:V(9)

***D:** locator block is associated with **Low Delay** Flex-Algo*

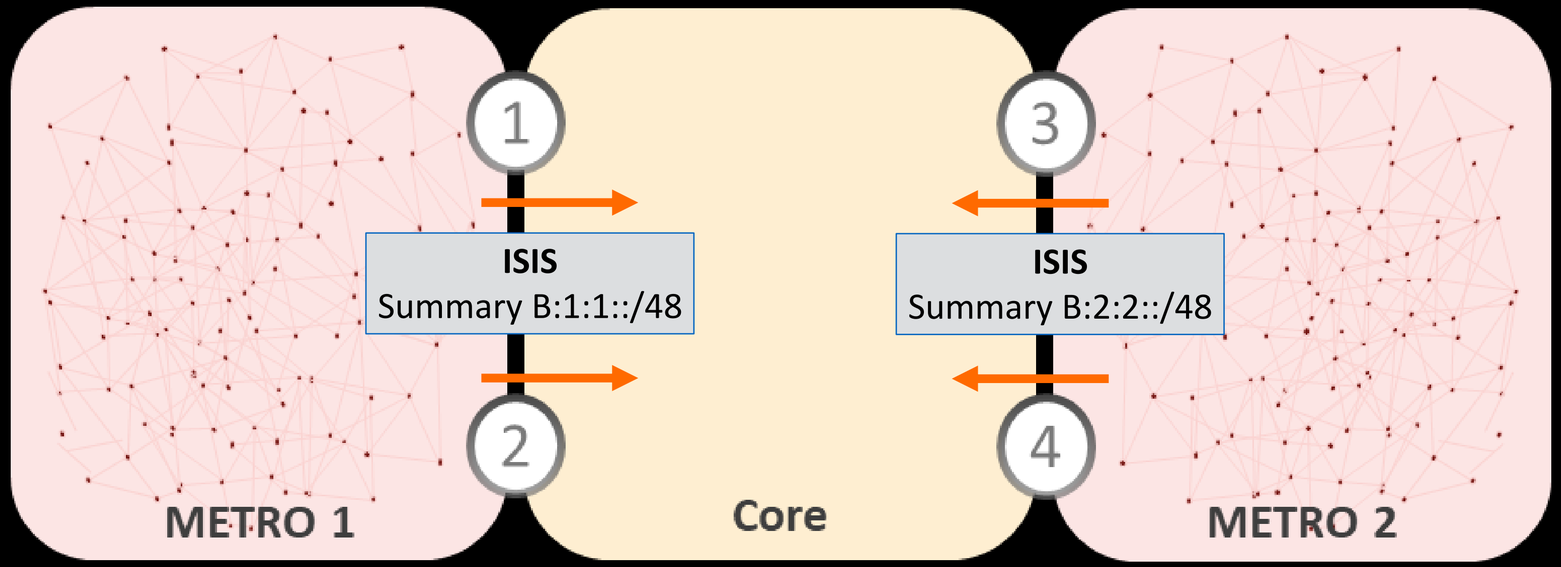


SRH contains 1 Single SID!

Seamless Incremental Deployment

- As soon as the network supports plain IPv6 forwarding
  - A new SRv6-VPN service only requires PE upgrade
  - TE objective can be achieved with a few well selected TE waypoints
  - FRR is deployed incrementally

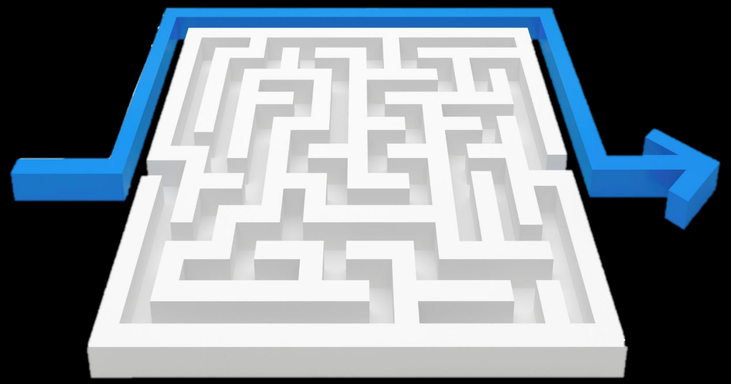
Prefix Summarization



- Back to basic IP routing and summarization
- No BGP inter-AS Option A/B/C

Conclusion

Simplicity **Always Prevails**



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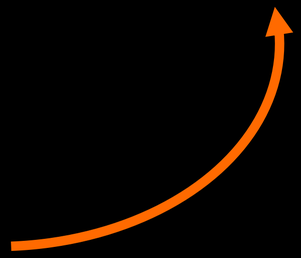
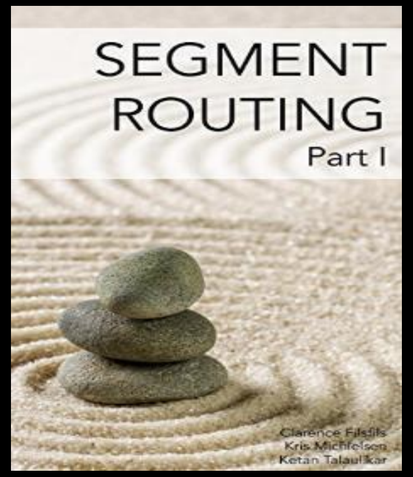


Deployment and Eco-system - @ record speed

- 100M live subscribers across > 12 major deployments
  - Softbank, Iliad, China Telecom, LINE corporation, Rakuten, Indosat Ooredoo, China Unicom, CERNET2, China Bank, MTN Uganda, and NOIA Network
- Mature industry
  - 25 HW linerate implementations across major vendors:
    Cisco Systems, Huawei, Nokia, Juniper, ZTE, Broadcom, Intel/Barefoot, Marvell, Mellanox, Arrcus, Kaloom, Spirent, Ixia
- Proposed Standards IETF RFC
  - RFC8402, RFC8754, RFC8986
- Mature open-source

Stay up-to-date



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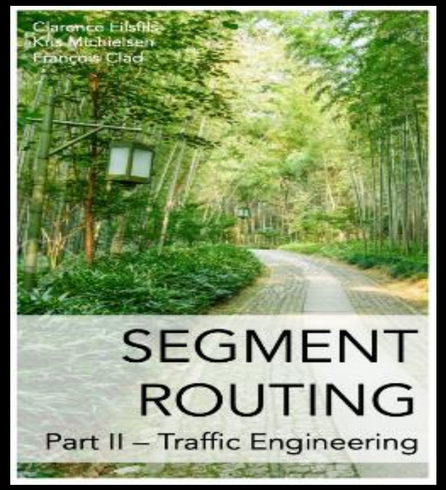

amazon.com/dp/B07N13RDM9

SRv6 Part III Coming by end CY21

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Alibaba Group 阿里巴巴集团 | APSARA CONFERENCE 云栖大会

CISCO

Thank you!

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