SRv6-uSID Deployment

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Bell Domains and services

Bell Network 3.0 is a journey to…

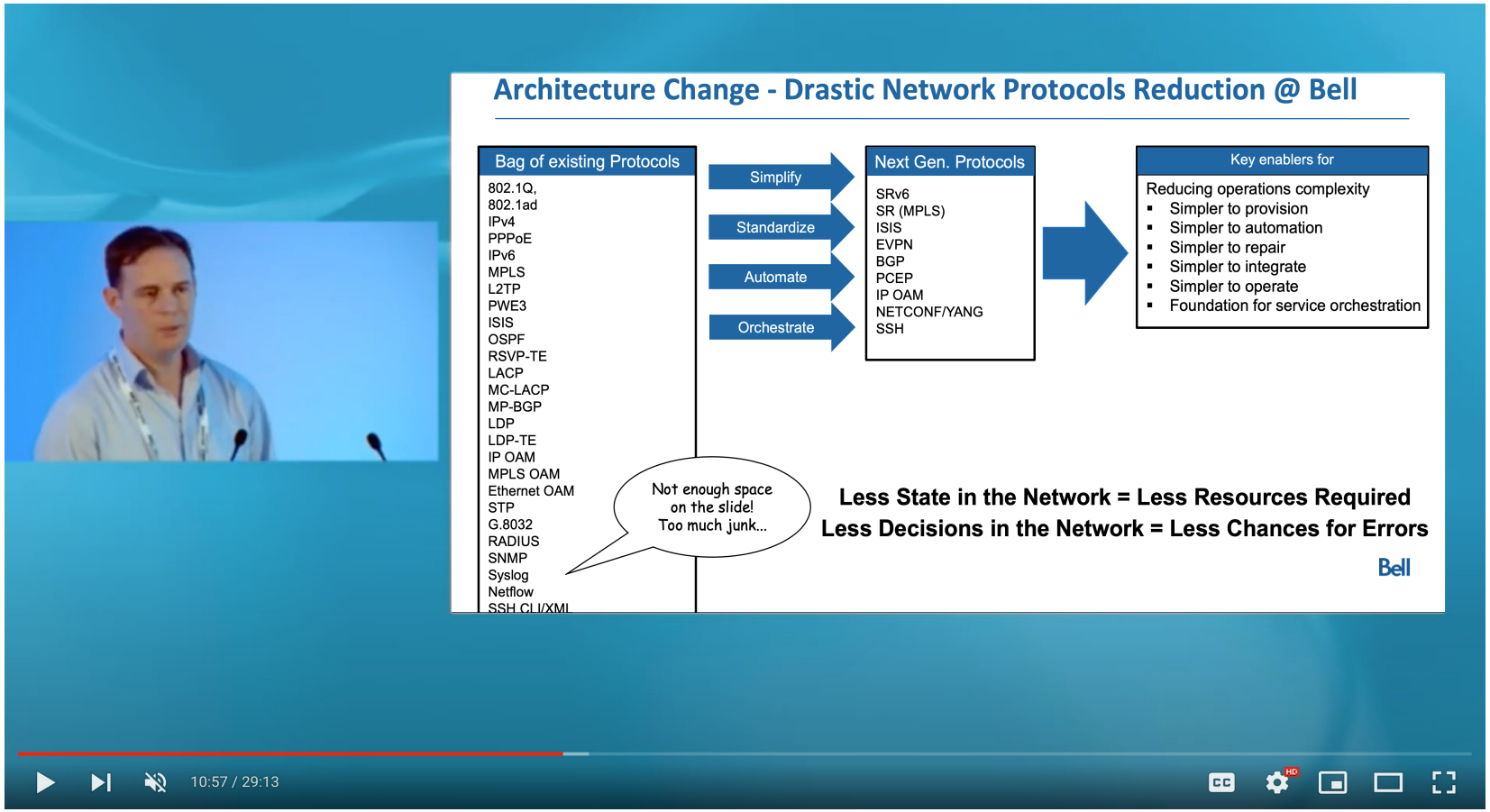
Transform how Bell delivers the best customer experience with seamless access to a software-driven, cloud-based ecosystem

Bell Deployed one of the first SR-MPLS networks

- One of the first SR-MPLS deployments
- Deployment went very well (positive tone) TI-LFA was the first benefits collected
- But then why shifting to SRv6 so quickly?
  - Answer: “the power of SRv6 uSID’s”
- SRv6 - Enhancing network visibility with Path Tracing

Unified End-to-End SRv6 uSID Dataplane

- Remove the complexity of getting MPLS to the host/socket/container
- Remove SR-MPLS/LDP /SRv6 GW at the DC & Network edge
- Simplification



Why SRv6-uSID @Bell

- Summary of the gains from Dan B's session
- + other OPEX gains,
- Not having MPLS
- Not having BGP3107 – simpler interconnect
- Not having vXLAN/MPLS gateways
- Having summarization

Reduce carrier network services costs by up to 90%
footprint by 75%
power consumption by as much as 66%

Daniel Bernier
Technical Director, Bell Canada

Jesper Eriksson,
VP Product Management, NoviFlow inc

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Routing Scale

	SRv6 uSID	MPLS
Unique Nodes in the SR domain	15M-240M	0.8M
Unique Services per node	512k	0.2M
ISIS Summarization	Yes	No
BGP3107 complexity tax to scale ISIS Host Routes	No	Yes

- Available functionalities: 256 blocks (/32's). For each block, we have 16 bits space for uSID ID's. 8k are reserved for the LIB, 57k for GIB.
  - ➢256*57k Global ID = 15M Global ID. In the future we could go up to 4096 blocks
- If more than 8k for LIB, then 8 Wide-LIB spaces could be added for a total of 8*64K = 512k services
- More information on segment-routing.net

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HW Scale

	SRv6 uSID	MPLS
Linerate steering into SR Policy of N SID's	N=26	N=~12
Number of counters associated to a remote ISIS node	1	4
Number of dataplane entries associated to remote ISIS node	1	4

- Blog: https://www.segment-routing.net/demos/26-usid-push-linerate/ with NCS5700 – Jericho2
- 1 vs 4: ip2ip, ip2mpls, mpls2ip, mpls2mpls

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Other Benefits

	SRv6 uSID	MPLS
SR Domain Security	Same	Same
Optimal Load balancing	yes	no

SRv6: 20-bit rich flow entropy at fixed offset within outer IPv6 header (Flow Label)
MPLS: DPI to random location without guaranteed outcome:

- label stack walk to inner IP header fields
- label stack to Entropy Label (plus additional label stack overhead and PE complexity)

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A few notes on our deployment

- We deploy SRv6 uSID with a negligeable sub-space of FD/8
  - 0.0015% of FD/8 private space (/24 out of /8 = 2^(-16))
- We have conducted many SRv6 uSID Interoperability with different vendors
  - Cisco, Ciena, Nokia, Juniper, Arrcus, FD.IO, Intel, Noviflow,

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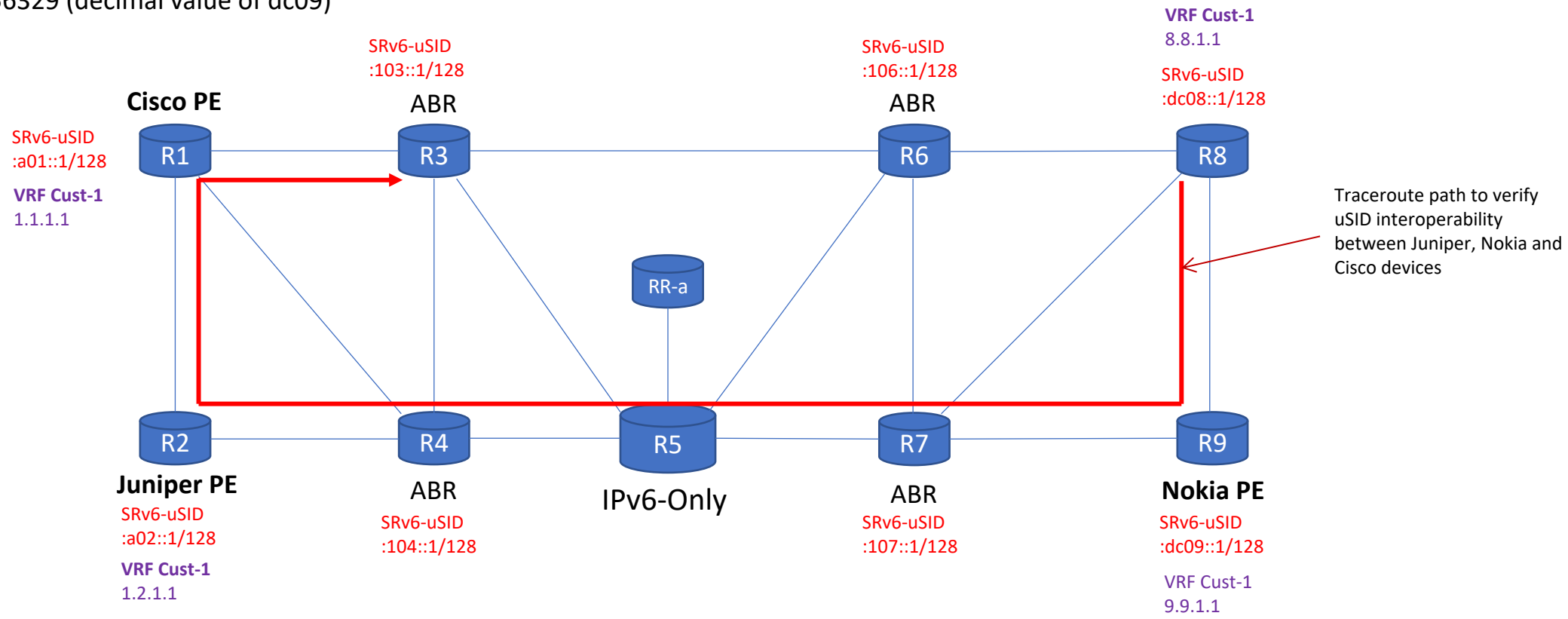
uSID Interop testing

Highlights (for testing only)

1. Cisco R1 and Nokia R9 acting as PE's
2. L3VPN name: cust-1
3. IPv6 P2P – link-local
4. Nokia IPv6 loopback : fccc:cc00:dc09:1/128
5. Nokia locator0: fccc:cc03::/32 with micro-segment-locator value 56329 (decimal value of dc09)

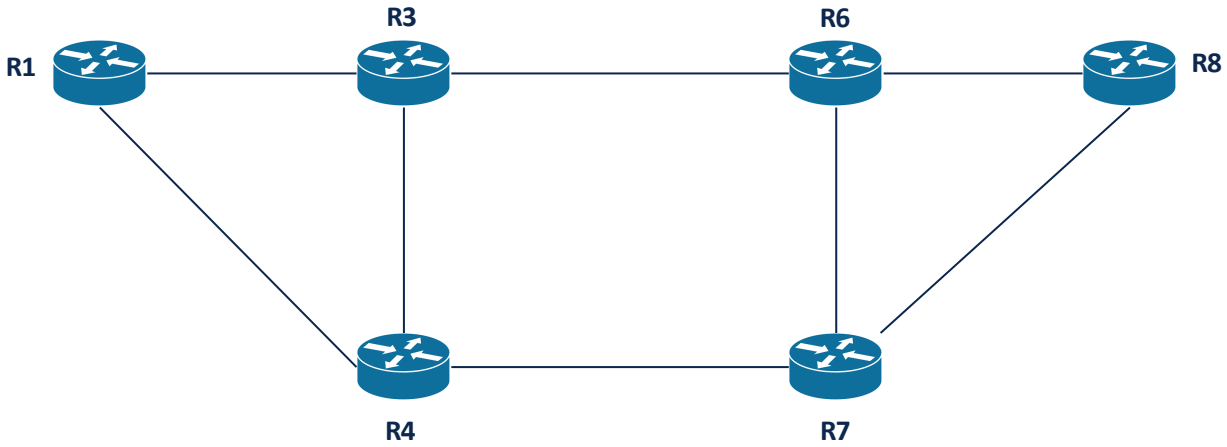


Why Path Tracing ?

- ECMP Fabric is difficult to troubleshoot.
  - The number of ECMP Paths can grow quickly (parallel links)
  - To better utilize the ECMP fabric, we need to have entropy between the different flows
  - We need to monitor the status of ECMP Paths
  - Which ECMP Path is used by a given Flow
- Path Tracing:
  - Deterministic solution to detect the packet path, end-to-end delay and per-hop delay
  - Implemented in HW: allows us to measure the exact experience as the customer packet
  - We can co-relate the Path Tracing data and the routing information to detect issues including:
    - Blackholing paths
    - Wrong/Non-expected paths
    - Any path with non coherent latency

Path Tracing status at Bell

- Successfully deployed Path Tracing in our Lab
  - SRv6 uSID with Path Tracing enabled
- Path Tracing Analytics
  - ECMP Analytics App:
    - > Blackholing paths
    - > Wrong/Non-expected paths
    - > Any path with non coherent latency



Thank You