draft-ali-spring-srv6-oam-00.txt
SRv6 OAM

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Reference Topology

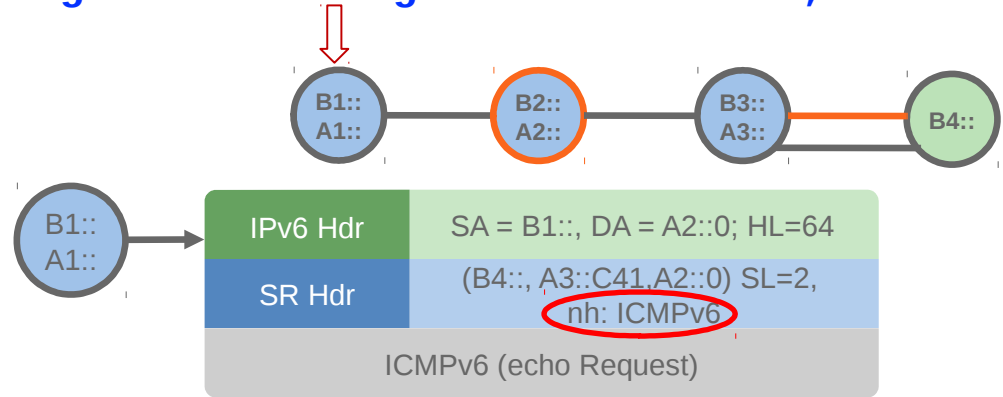**1** — **2** — **3** = **4**

k (blue) SRv6 Capable

k (green) classic IPv6 Node

k (yellow) classic IPv4 Node

○ Message Processing Node

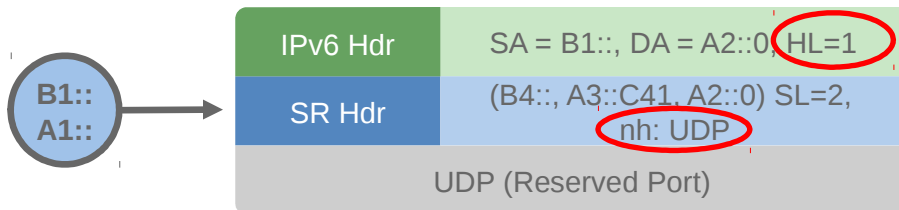# ICMPv6 Ping Via a SID list

`# ping B4:: via segment-list A2::0,A3::C41`

- The originator node constructs an SRH using the segment list specified by the user and adds it to IPv6 packet.

- All other ICMPv6 related processing remains unchanged.

- No changes are required at the transit node.

- No changes are required at the destination node.

Traceroute
Via a SID list


```
# traceroute B4:: via
    segment-list A2::0,A3::C41
```

Diagram: B1::/A1:: — B2::/A2:: — B3::/A3:: — B4::

| IPv6 Hdr	SA = B1::, DA = A2::0, HL=1
SR Hdr	(B4::, A3::C41, A2::0) SL=2, nh: UDP
	UDP (Reserved Port)

- The originator node constructs an SRH using the segment list specified by the user and adds it to traceroute probe packet.

- All other IPv6 traceroute related processing remains unchanged.

- No changes are required at the transit node.

- No changes are required at the destination node.

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ICMPv6 Ping to a SID Function

R2#ping A4::DC45
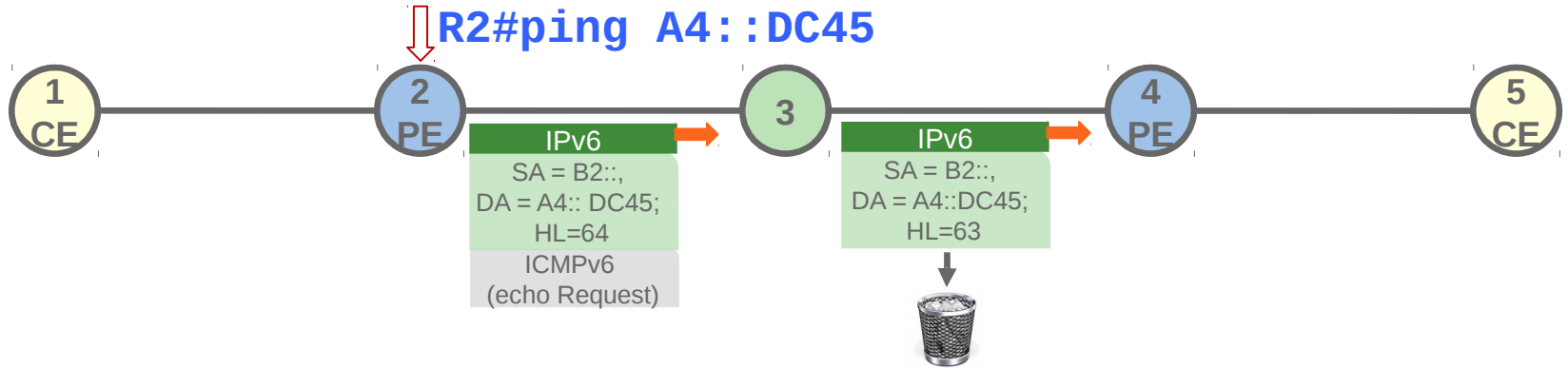
- This is the case of the use of IPv6 ping to ping a SID function.

- Forwarding chain on Egress will be incomplete; Egress cannot forward a packet with DA = A4::DC45 (e.g., there is no inner IP header).

- Ping to a SID function requires punting for OAM packets.

Pinging a SID Function
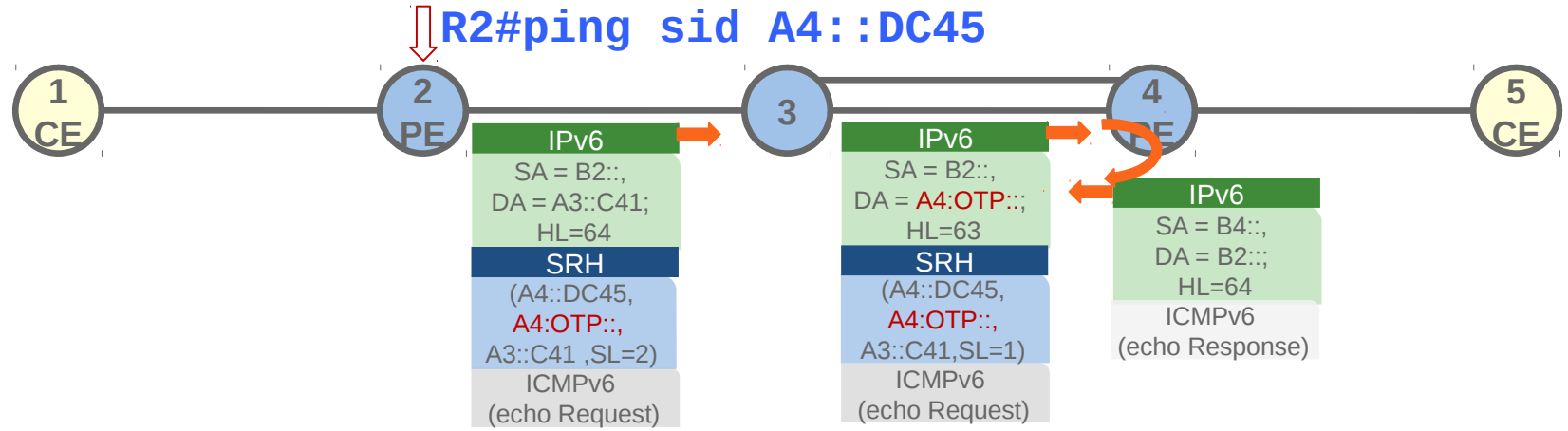
R2#ping sid A4::DC45

- An:OTP:: SID is instructed in front of the target SID where punt behavior needs to be programmed. E.g., A4::C45 in this example.

Tracing a SID Function (hop-by-hop)
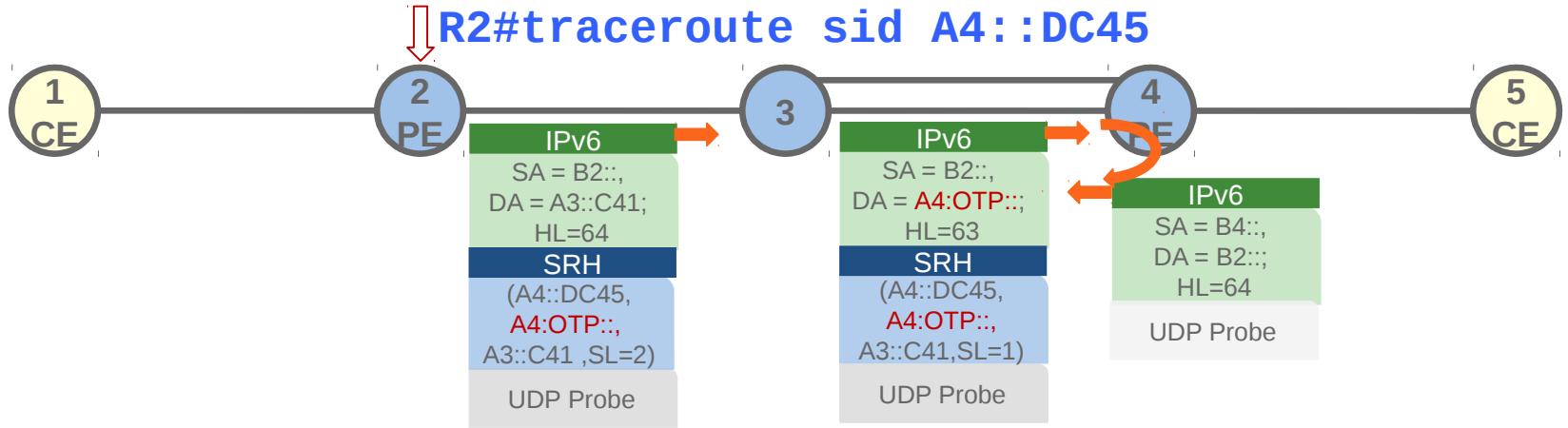
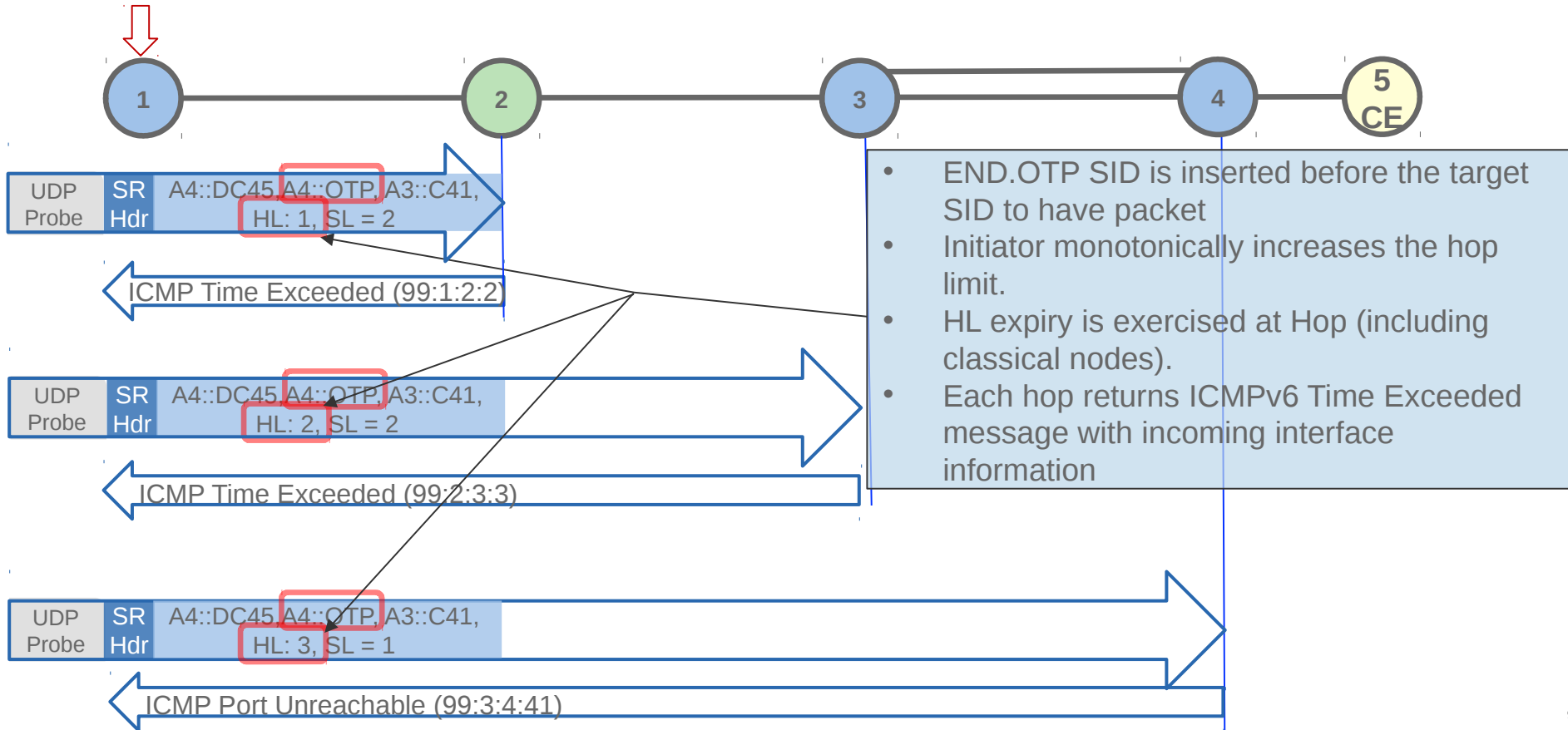- An::OTP:: SID is instructed in front of the target SID where punt behavior needs to be programmed. E.g., A4::C45 in this example.
  - Due to addition of the An::OTP:: OAM SID to SRH, no change to PSP behavior is required.
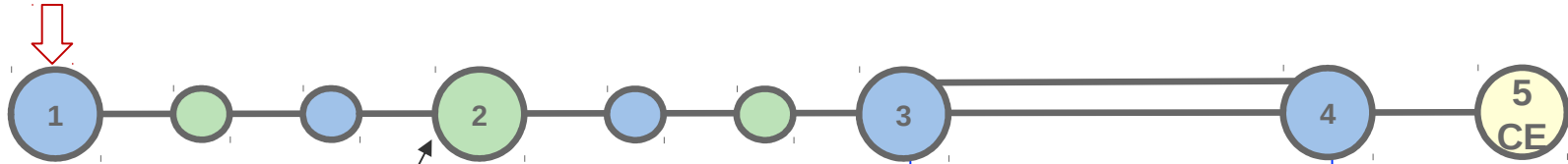
Proof of Transit
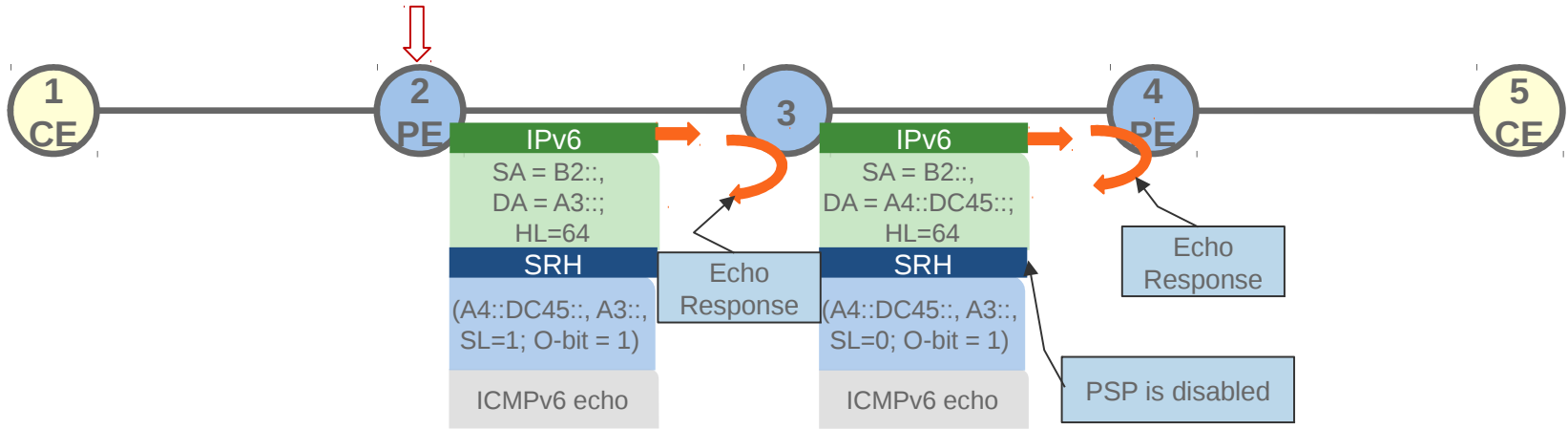
- Service provider wants to validate if a policy is visiting all segments in the sid-list.
- The ingress injects an out-of-band ping probe with O-bit set in the SRH.

Hop-by-Hop Traceroute

Node diagram: 1 — 2 — 3 — 4 — 5 CE

- END.OTP SID is inserted before the target SID to have packet
- Initiator monotonically increases the hop limit.
- HL expiry is exercised at Hop (including classical nodes).
- Each hop returns ICMPv6 Time Exceeded message with incoming interface information

First probe:
| UDP Probe | SR Hdr | A4::DC45, A4::OTP, A3::C41, HL: 1, SL = 2 |

ICMP Time Exceeded (99:1:2:2)

Second probe:
| UDP Probe | SR Hdr | A4::DC45, A4::OTP, A3::C41, HL: 2, SL = 2 |

ICMP Time Exceeded (99:2:3:3)

Third probe:
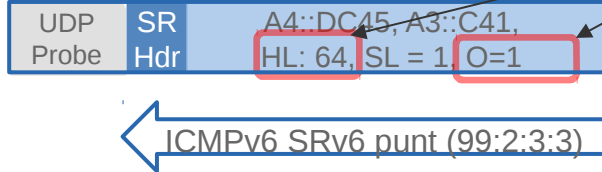| UDP Probe | SR Hdr | A4::DC45, A4::OTP, A3::C41, HL: 3, SL = 1 |

ICMP Port Unreachable (99:3:4:41)

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SRv6 Overlay Traceroute

As Hop Limit is set to 64, all classic transit and SRv6 pure transit nodes are skipped in the overlay traceroute.

- O-bit is set and hop limit is set to 64.
- As Hop Limit is set to 64, the classic and SRv6 transit nodes does not respond.
- At each segment node, SRH.Flags.O=1 causes a time-stamped copy of the packet punted and processed.
- Each segment node returns ICMPv6 message with incoming interface information

UDP Probe | SR Hdr | A4::DC45, A3::C41, HL: 64, SL = 1, O=1

ICMPv6 SRv6 punt (99:2:3:3)

ICMP Port Unreachable (99:3:4:41)

Next Steps

- Solicit WG review and comments/inputs/feedback.