## Scope:

Applying SR to implement an MPLS traceroute option lowering the total number of end-to-end LSP validations as compared to commodity MPLS traceroute.

## Framework and properties:

- High number of ECMP paths may reduce the number of "forwarding addresses" to execute a particular forwarding path in the midst of en end-to-end path being traced.
- An end point might need to add MPLS traceroutes with a high number of IP destination addresses to validate all forwardings (of fail to validate them).
- SR allows to forward an MPLS OAM packets with any IP destination address to any node along the path. Use SR to reduce the number of MPLS OAM traceroutes if a large number of ECMP paths are present.
- Doesn't require new protocol elements requires local implementation adaption however.
- Vendors: if you've implemented that independently, please speak up.
- Running code for Deutsche Telekom's (LDP) MPLS OAM code. Operators like it.

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ECMP: 4096 = 2\*4\*(8\*12+8\*4)\*4 path combinations between RS and RD.

RFC 8029 (and RFC8287?) MPLS traceroute operation starting at RS:

Top segment is RD node-ID. R120 8 IP destination addresses 8 Interfaces 12 Interfaces Likely no ECMP forwarding on R110 some interfaces R130 R121 16 IP destination

✓ 4 Interfaces 8 Interfaces addresses 8 IP destination addresses 4 Interfaces 4 Interfaces RD RS 4 Interfaces Routers R2xx, architecture mirrors the above 4 Interfaces 16 IP destination addresses 32 multipath IP addresses per MPLS traceroute

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ECMP: 4096 path combinations between RS and RD.

Using SR topology information in router RS, all IP addresses may reach all nodes: <u>E.g., Top Label at RS Node-ID 110</u>, stack below commodity MPLS OAM packet to RD

