

# Protecting traffic-engineered SR paths against node failure

draft-hegde-spring-node-protection-for-sr-te-paths

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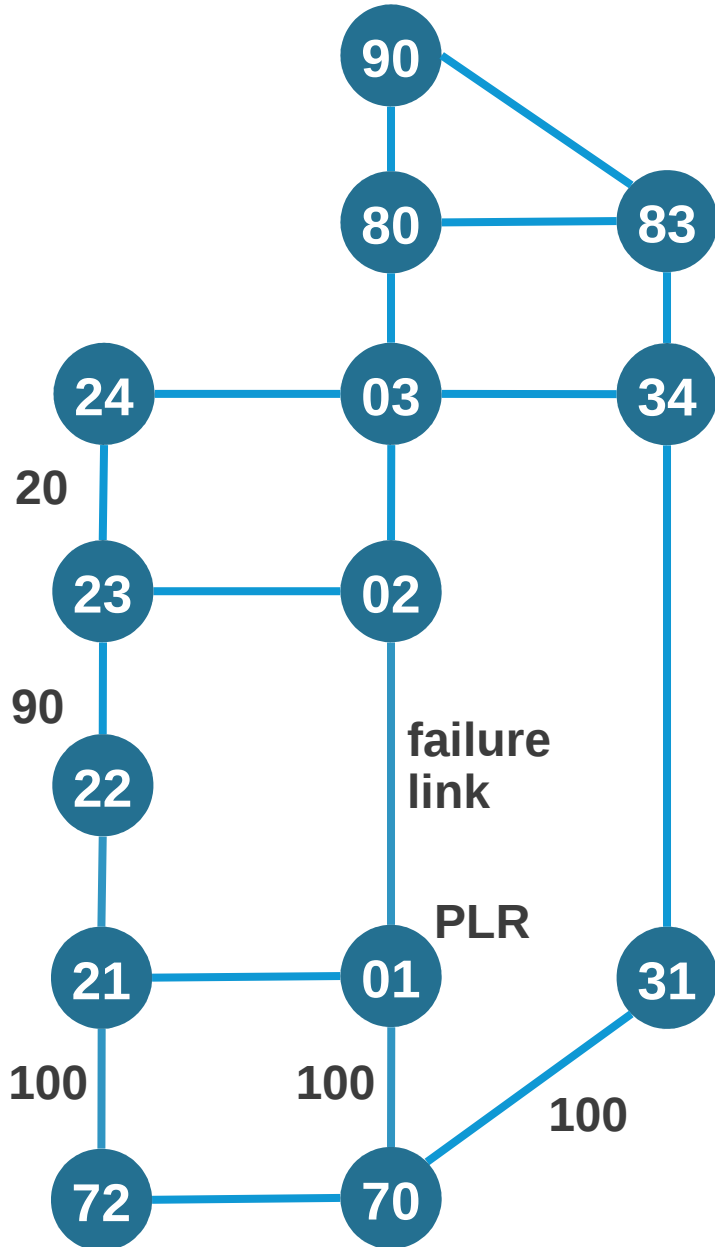
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# Protecting a traffic engineered SR path (link protection example)



Node 70 sends packet on outgoing intf 70->01 with label stack = [101002, 102080, 180083, 183090] to instantiate path 70->01->02->03->80->83->90

Protection for failure of link 01-02 (without node protection)

Forwarding entry on 01:  
Incoming label = [101002]  
Primary NHLFE:  
outgoing intf = 01->02, Pop (assuming PHP)

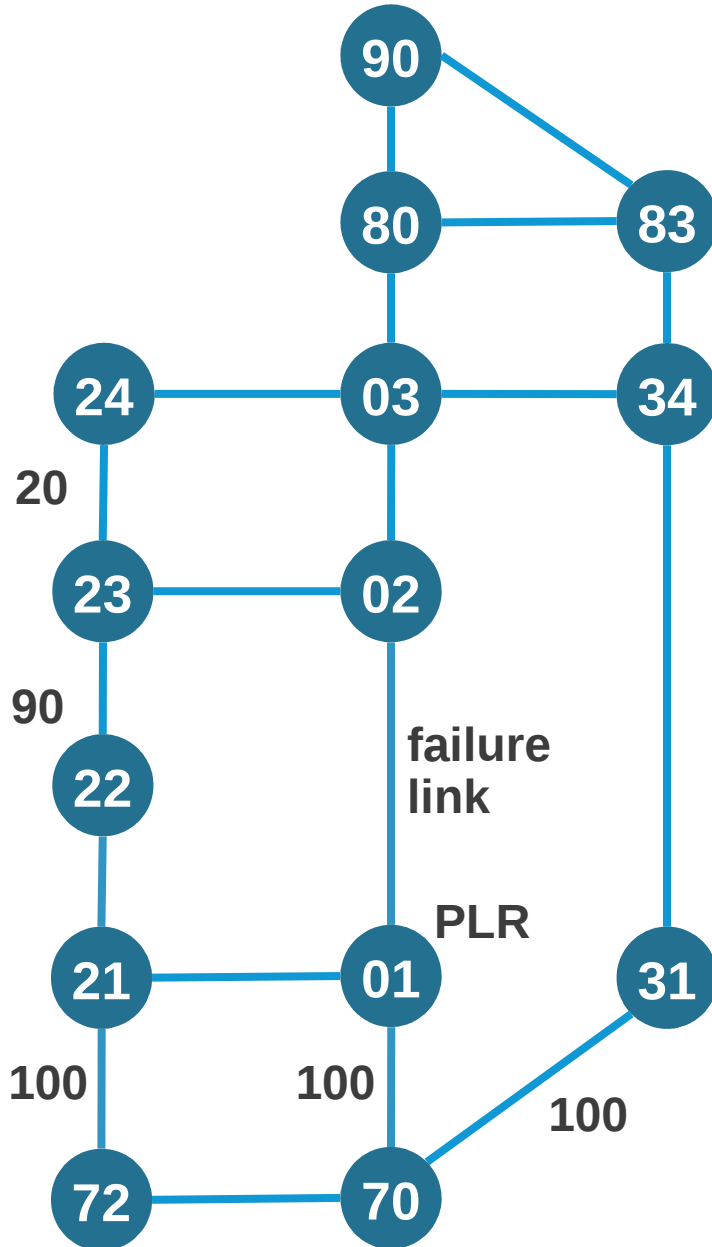
Backup NHLFE:  
outgoing intf = 01->21, Pop, Push [121022, 722023, 123002]

Right after failure of link, packet leaving 01 on intf 01->21 has label stack = [121022, 722023, 123002, 102080, 180083, 183090]

End-to-end path immediately after failure:  
70->01(->21->22->23->)02->03->80->83->90

All metrics are 10 unless otherwise shown  
Node XY has node-sid index = XY and SRGB = 1XY000  
(for example node 83 has index = 83 and SRGB = 183000)  
Link from node AB to node XY has adj-sid = 7AB0XY

# Protecting a traffic engineered SR path (node protection example)



Node 70 sends packet on outgoing intf 70->01 with label stack = [101002, 102080, 180083, 183090] to instantiate path 70->01->02->03->80->83->90

Protection for failure of link 01-02 (with node protection)

Forwarding entry on 01:  
Incoming label = [101002]  
Primary NHLFE:  
outgoing intf = 01->02, Pop (assuming PHP)

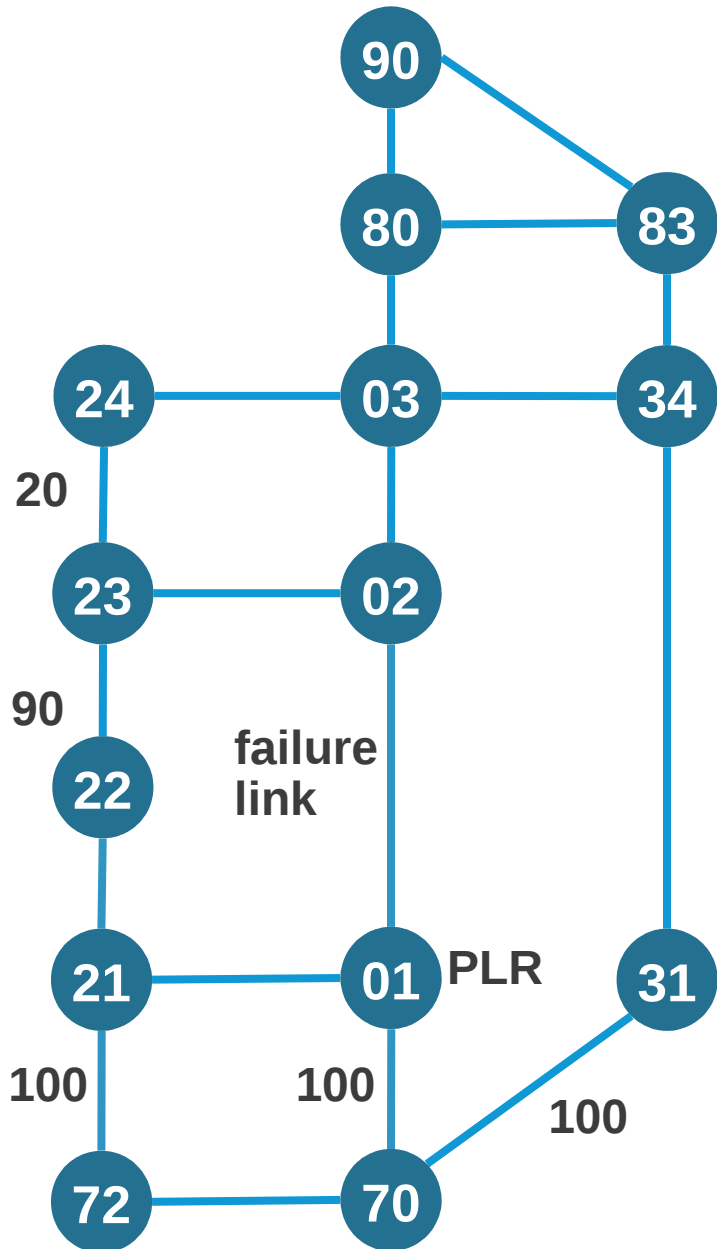
Incoming labels = [101002, 102080]  
Backup NHLFE:  
outgoing intf = 01->21, Pop, Pop, Push [121022, 722023, 123024, 124080]

Right after failure of link, packet leaving 01 on intf 01->21 has label stack = [121022, 722023, 123024, 124080, 180083, 183090]

End-to-end path immediately after failure:  
70->01(->21->22->23->24->03->)80->83->90

All metrics are 10 unless otherwise shown  
Node XY has node-sid index = XY and SRGB = 1XY000  
(for example node 83 has index = 83 and SRGB = 183000)  
Link from node AB to node XY has adj-sid = 7AB0XY

# Why PLR needs to look at the second label for node protection



Path A: Node 70 sends packet on outgoing intf 70->01 with label stack = [101002, 102080, 180083, 183090] to instantiate path 70->01->02->03->80->83->90

Incoming labels = [101002, 102080]

Backup NHLFE:

outgoing intf = 01->21, Pop, Pop, Push [121022, 722023, 123024, 124080]

Label stack leaving intf 01->21:

[121022, 722023, 123024, 124080, 180083, 183090]

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Path B: Node 70 sends packet on outgoing intf 70->01 with label stack = [101002, 102034, 134090] to instantiate path 70->01->02->03->34->83->90

Incoming labels = [101002, 102034]

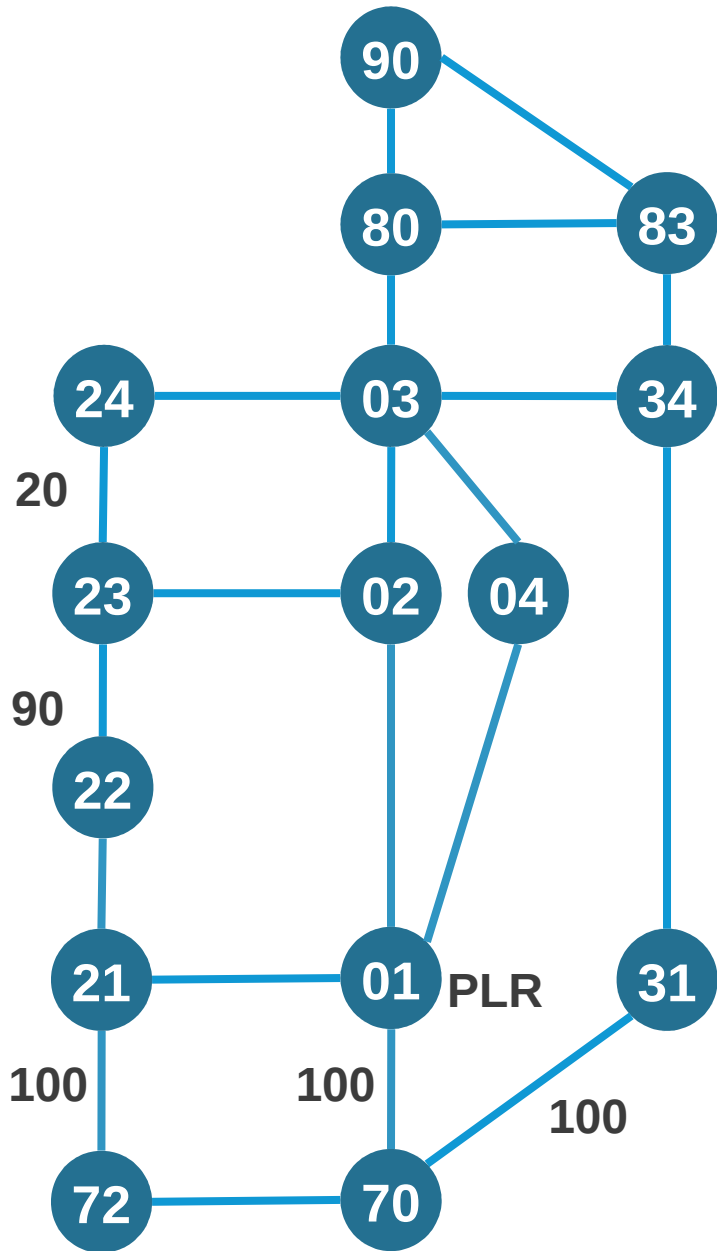
Backup NHLFE:

outgoing intf = 01->21, Pop, Pop, Push [121022, 722023, 123024, 124034]

Label stack leaving intf 01->21:

[121022, 722023, 123024, 124034, 134090]

# Why PLR needs to look at the second label in the context of the first label for node protection



Path A: Node 70 sends packet on outgoing intf 70->01 with label stack = [101002, 102080, 180083, 183090] to instantiate path 70->01->02->03->80->83->90

Incoming labels = [101002, 102080]

Backup NHLFE:

outgoing intf = 01->04, Pop, Pop, Push [104080]

Label stack leaving intf 01->04:  
[104080, 180083, 183090]

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Path B: Node 70 sends packet on outgoing intf 70->01 with label stack = [101004, 104080, 180083, 183090] to instantiate path 70->01->04->03->80->83->90

Incoming labels = [101004, 104080]

Backup NHLFE:

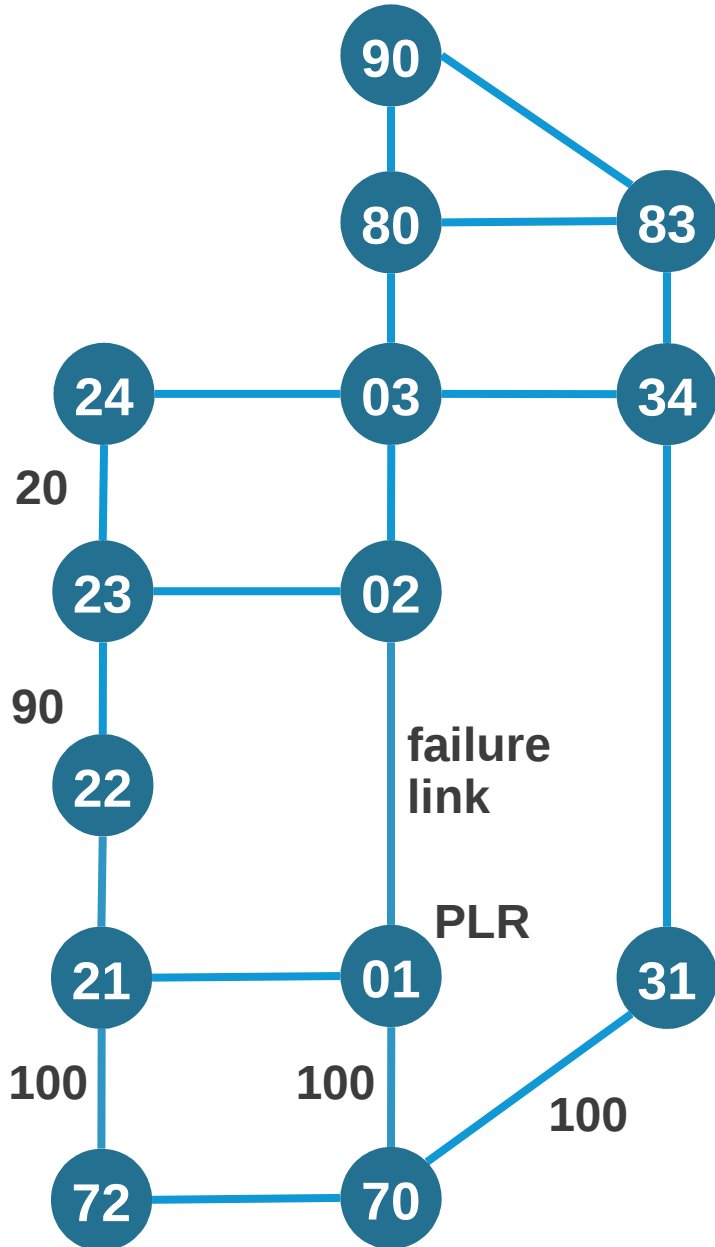
outgoing intf = 01->04, Pop, Pop, Push [102080]

Label stack leaving intf 01->02:  
[102080, 180083, 183090]

Second label only has meaning in context of first label.

Second label only has meaning in context of first label.

# Example where first label is adj-sid



Node 70 sends packet on outgoing intf 70->01 with label stack = [701002, 102080, 180083, 183090] to instantiate path 70->01->02->03->80->83->90

Protection for failure of link 01-02 (with node protection)

Forwarding entry on 01:  
Incoming label = [701002]

Primary NHLFE:  
outgoing intf = 01->02, Pop

Incoming labels = [701002, 102080]

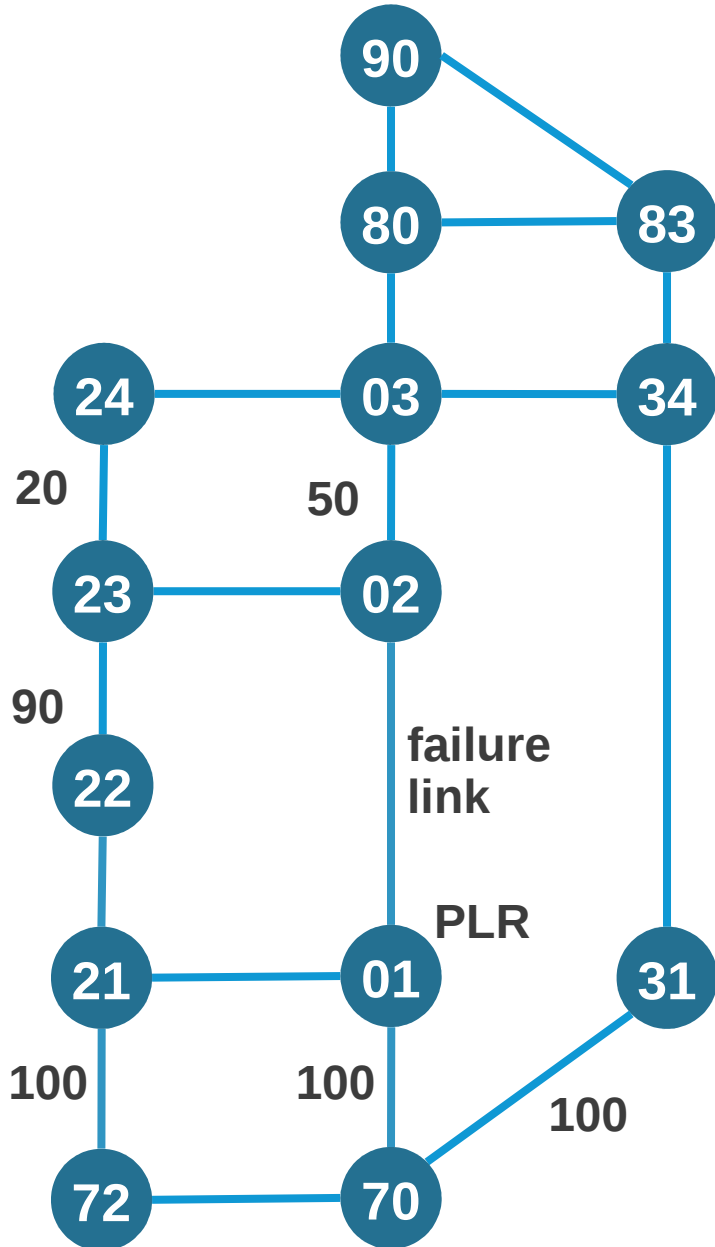
Backup NHLFE:  
outgoing intf = 01->21, Pop, Pop, Push [121022, 722023, 123024, 124080]

Right after failure of link, packet leaving 01 on intf 01->21 has label stack = [121022, 722023, 123024, 124080, 180083, 183090]

End-to-end path immediately after failure:  
70->01(->21->22->23->24->03->)80->83->90

All metrics are 10 unless otherwise shown  
Node XY has node-sid index = XY and SRGB = 1XY000  
(for example node 83 has index = 83 and SRGB = 183000)  
Link from node AB to node XY has adj-sid = 7AB0XY

# Example where second label is adj-sid



Node 70 sends packet on outgoing intf 70->01 with label stack = [101002, **702003**, 103090] to instantiate path 70->01->**02->03->80->90**

Protection for failure of link 01-02 (with node protection)

Forwarding entry on 01:  
Incoming label = [101002]  
Primary NHLFE:  
outgoing intf = 01->02, Pop (assuming PHP)

Incoming labels = [101002, **702003**]  
Backup NHLFE:  
outgoing intf = 01->21, Pop, Pop, Push [121022, 722023, 123024, 124003]

Right after failure of link, packet leaving 01 on intf 01->21 has label stack = [121022, 722023, 123024, 124003, 103090]

End-to-end path immediately after failure:  
70->01(->21->**22->23->24->)**03->80->90

All metrics are 10 unless otherwise shown  
Node XY has node-sid index = XY and SRGB = 1XY000  
(for example node 83 has index = 83 and SRGB = 183000)  
Link from node AB to node XY has adj-sid = 7AB0XY

# **Next steps for draft-hegde-spring-node-protection-for-sr-te-paths**

- **Request that chairs consider conducting a poll for WG adoption**