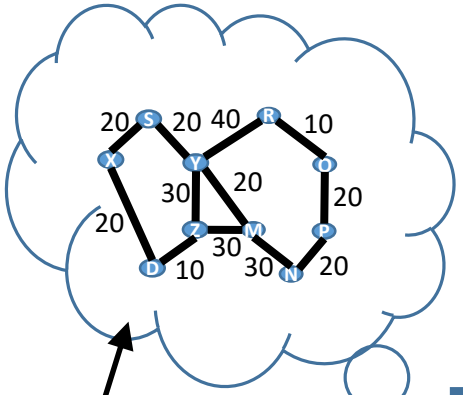
Explicitly advertising the TE protocols enabled on links in ISIS

Chris Bowers
Shraddha Hegde
Paul Mattes
Mohan Nanduri
Spencer Giacalone
Imtiyaz Mohammad
IETF 99, Prague

SR centralized bandwidth accounting application



centralized bandwidth accounting for SR LSPs

SR controller

Program SR label stacks

SR ingress router

S
R
X
Y
O
Z
M
P
D
N

20G
20G
40G
10G
20G
30G
20G
20G
30G
10G
30G
20G

Learn topology via IGP or BGP-LS (including link bandwidth)

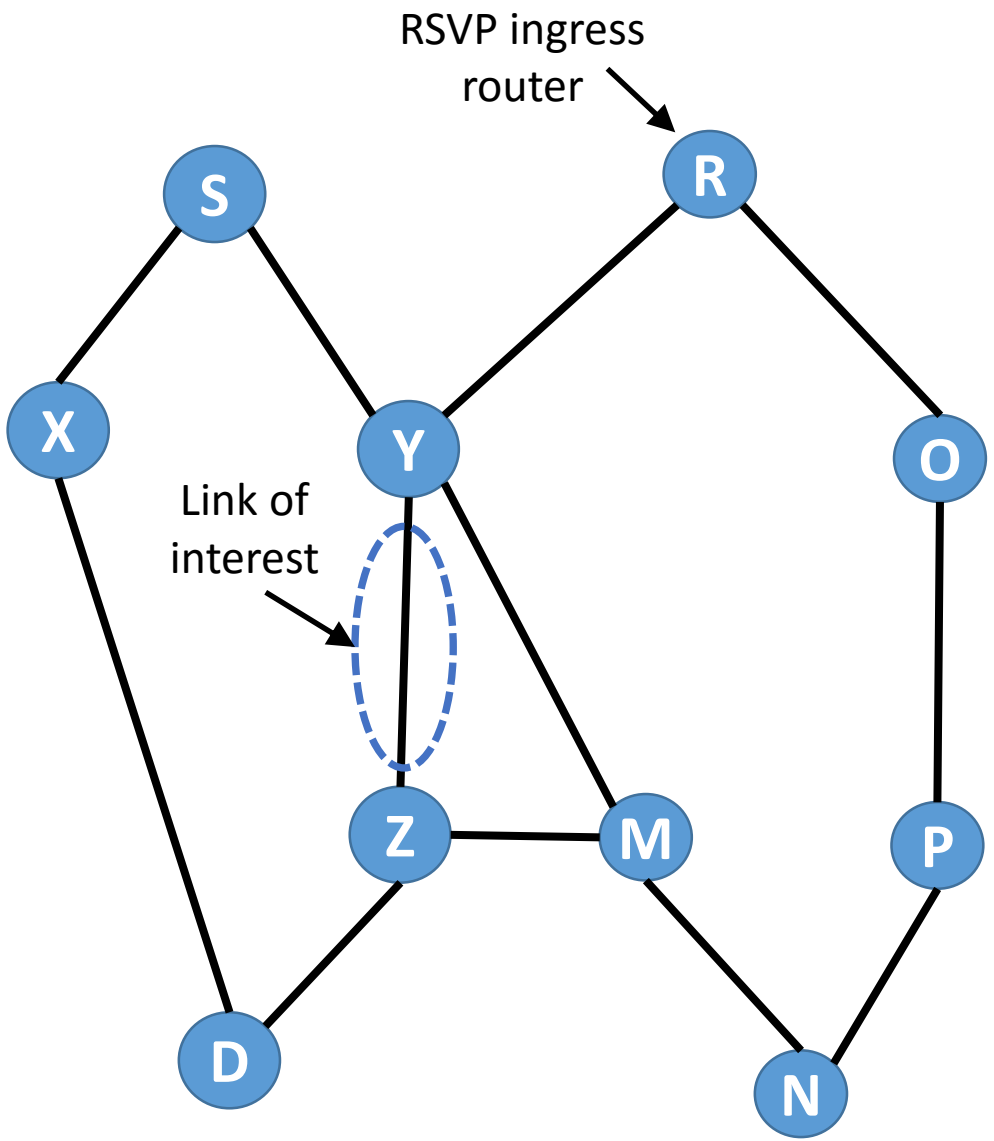
Advertisement from Y

LSPDU
Source = SYS-ID-Y
Extended IS Reach TLV (22)
Neighbor = SYS-ID-Z
Metric = 10
IPv4 intf addr sub-TLV (6)
Local address = 1.1.5.1
IPv4 Nbr addr sub-TLV (8)
Local address = 1.1.5.2
Maximum link BW sub-TLV (9)
30G

Scenarios involving SR and RSVP in the same network

- SR only network
  - No problem
- RSVP only network
  - No problem
- SR and RSVP both in the network on the same links
  - No problem
- SR on some links and RSVP on other links
  - Short-term workaround
  - Long-term solution

RSVP may also be running in the network. How does an RSVP ingress router figure out that a remote link has RSVP enabled on it?



- This was never actually standardized for either ISIS or OSPF.
- For ISIS, different implementations have used different criteria.

LSPDU
Source = SYS-ID-Y

Extended IS Reach TLV (22)
Neighbor = SYS-ID-Z
Metric = 10

IPv4 intf addr sub-TLV (6)
Local address = 1.1.5.1

IPv4 Nbr addr sub-TLV (8)
Local address = 1.1.5.2

Maximum link BW sub-TLV (9)
30G

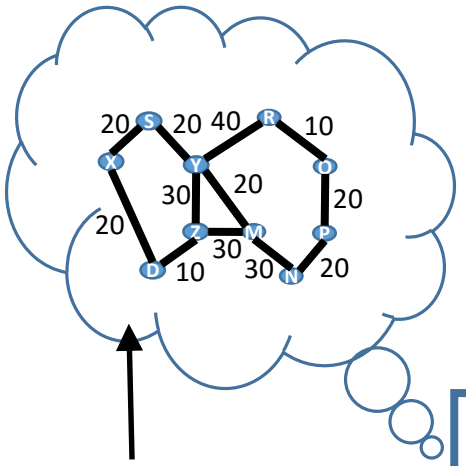
Max reservable BW sub-TLV (10)
25G

Unreserved BW sub-TLV (11)
Priority 0 = 12G

For a given implementation, does the presence of a particular ISIS TLV/sub-TLV for a link trigger inclusion in the traffic-engineering database of that link for use by CSPF to find paths to signal using RSVP?

TLV / sub-TLV Implementation	X	Y	Z	Superset of TLV/sub-TLVs that trigger RSVP
22 (Extended IS Reachability TLV, includes wide metrics in TLV)	No	No	No	No
22 / 3 (Admin Group)	No	Yes	Yes	Yes
22 / 4 (Link Local/Remote Id)	No	No	No	No
22 / 6 (IPv4 Interface Address)	No	No	No	No
22 / 8 (IPv4 Neighbor Address)	No	No	No	No
22 / 9 (Max Link Bandwidth)	No	Yes	Yes	Yes
22 / 10 (Max Reservable Link Bandwidth)	No	Yes	Yes	Yes
22 / 11 (Unreserved Bandwidth)	Yes	Yes	Yes	Yes
22 / 14 (Extended Admin Group)	No	Yes	No	Yes
22 / 18 (TE Default metric)	No	No	No	No
22/20 Link Protection Type	No	Yes	Yes	Yes
22/21 Interface Switching Capability	No	Yes	Yes	Yes
22/22 TE Bandwidth Constraints	No	Yes	Yes	Yes
22/33-39 TE Metric Extensions from RFC7810	No	No	No	No
138 (SRLG TLV)	No	Yes	Yes	Yes

SR on some links and RSVP on other links



centralized bandwidth accounting for SR LSPs

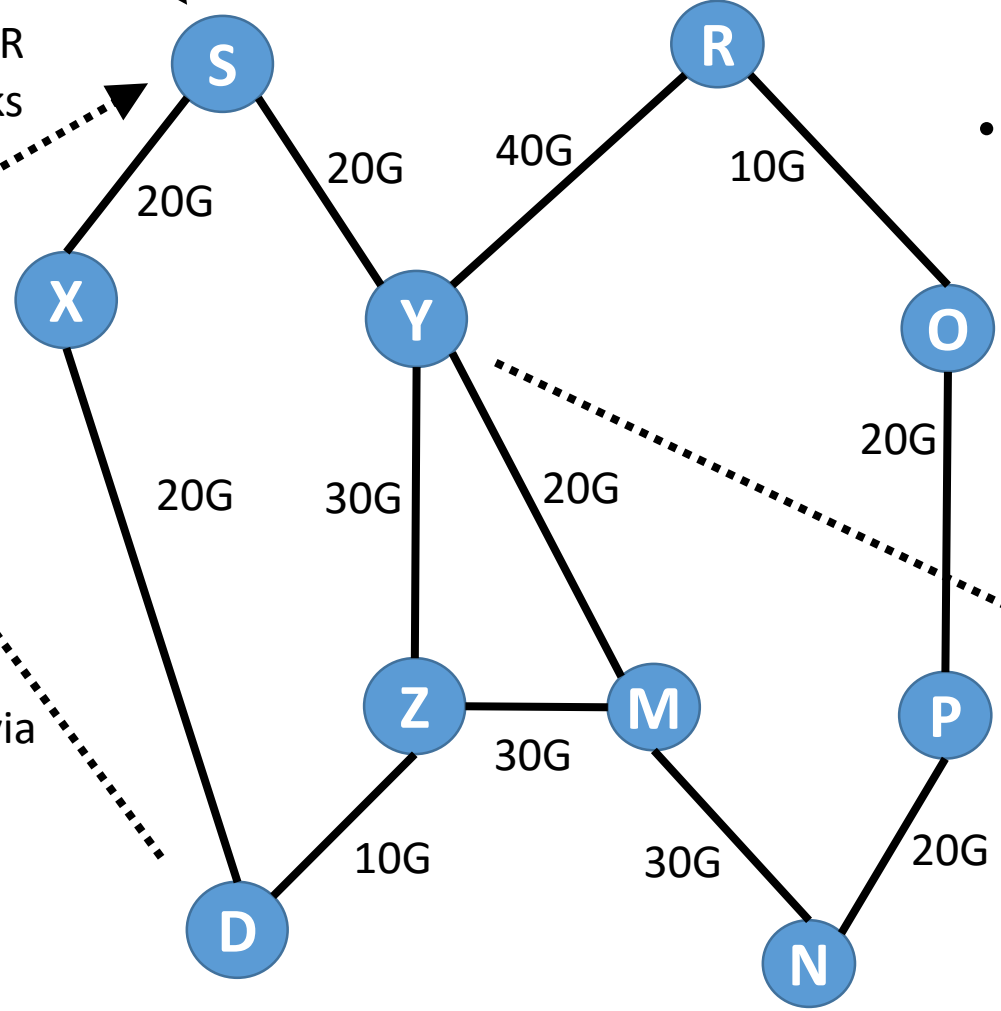
SR ingress router

RSVP ingress router

Program SR label stacks

SR controller

Learn topology via BGP-LS (including link bandwidth)



Advertisement from Y

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Neighbor = SYS-ID-Z
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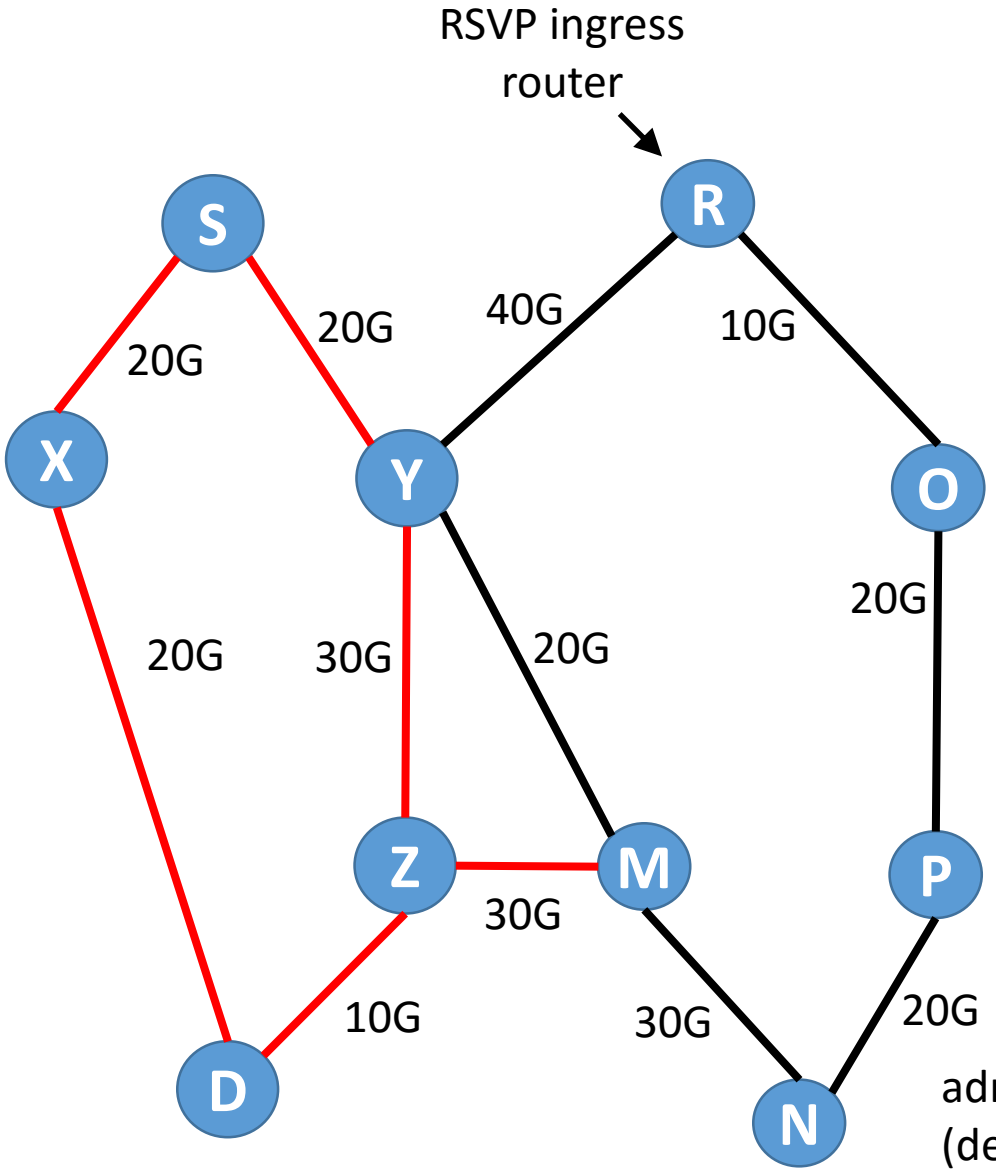
Local address = 1.1.5.1
IPv4 Nbr addr sub-TLV (8)
Local address = 1.1.5.2
Maximum link BW sub-TLV (9)
30G

- For some implementations, R will assume that RSVP is enabled on Y-to-Z link, due to presence of Max link BW sub-TLV.
- Network operator may not want Y-to-Z link to be used for RSVP.

Short term workaround using administrative groups



- Operator configures routers to advertise administrative group 4 for those links without RSVP enabled.
- Operator configures constraints on R to exclude links with administrative group 4 from CSPF for RSVP LSPs.
- Administrative group chosen to mean RSVP-not-enabled-on-link is local to network, not assigned by IETF.

administrative group 4 (defined by operator to mean RSVP-not-enabled-on-link)

Advertisement from Y

LSPDU
Source = SYS-ID-Y

Extended IS Reach TLV (22)
Neighbor = SYS-ID-Z
Metric = 10

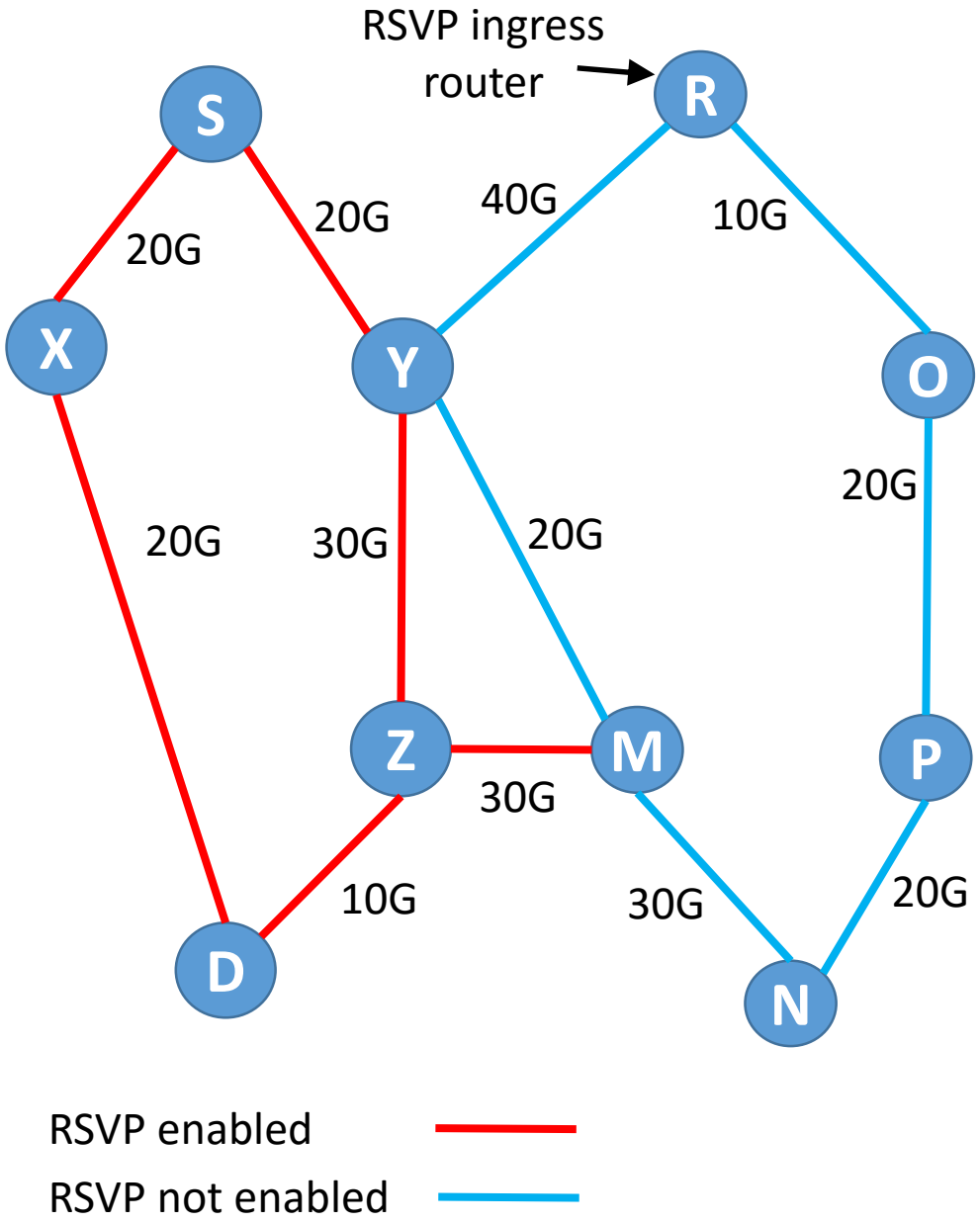
IPv4 intf addr sub-TLV (6)
Local address = 1.1.5.1

IPv4 Nbr addr sub-TLV (8)
Local address = 1.1.5.2

Maximum link BW sub-TLV (9)
30G

administrative group sub-TLV(3)
0….0100

Long term solution using TE protocol sub-TLV



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Advertisement from Y

LSPDU
Source = SYS-ID-Y
Extended IS Reach TLV (22)
Neighbor = SYS-ID-Z
Metric = 10
IPv4 intf addr sub-TLV (6)
Local address = 1.1.5.1
IPv4 Nbr addr sub-TLV (8)
Local address = 1.1.5.2
Maximum link BW sub-TLV (9)
30G
TE protocol sub-TLV (TBD)
RSVP = NOT enabled

Advertisement from Y

LSPDU
Source = SYS-ID-Y
Extended IS Reach TLV (22)
Neighbor = SYS-ID-M
Metric = 10
IPv4 intf addr sub-TLV (6)
Local address = 1.1.8.1
IPv4 Nbr addr sub-TLV (8)
Local address = 1.1.82
Maximum link BW sub-TLV (9)
20G
TE protocol sub-TLV (TBD)
RSVP = enabled

Proposed encodings

```
Type  : TBD suggested value 40
Length: Variable
Value :
  0                   1                   2                   3
  0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                         Flags                                 |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Traffic-Engineering Protocol sub-TLV

Value	Protocol Name
0x01	RSVP
0x02	Segment Routing

Flags for the protocols

Feedback

- What is the interpretation of the SR protocol flag?
  - Concern: The SR topology is congruent with the IGP topology. We shouldn’t have a flag that can be interpreted as modifying the SR topology because that creates ambiguity about what topology the SPF algorithm should be run on.
  - Valid use case: It can be useful for an ingress router or centralized application to know whether or not it should expect to be able to forward traffic over a link using labels distributed via SR.
  - Proposed textual changes: Describe this use case and explicitly say that the presence or absence of the SR protocol flag does not affect the SR topology. In particular, it does not affect the shortest paths computed on that topology.

Next steps

- Publish updated version with text to address concerns about SR flag

- Request chairs to start working group adoption poll