# Path Segment in MPLS Based Segment Routing Network

## draft-cheng-spring-path-segment-00

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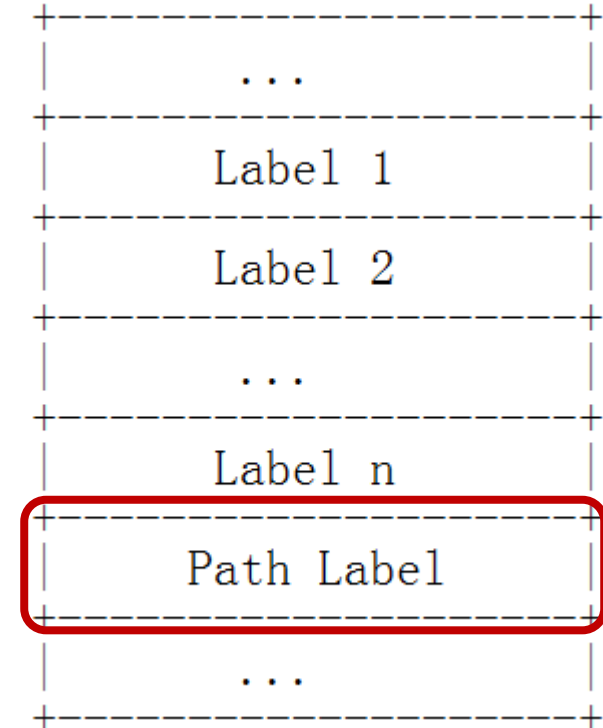Royi Zigler(Broadcom)

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# Problem Statements

- For SR-MPLS, an SR path is represented as a stack of labels
- Such SR path states only maintained at the ingress node and carried in each packet
- A controller may have the states as well, but
- Other nodes (intermediate or egress) do not have the states
  - When a packet reaches an intermediate or the egress node, some or all of the labels have been popped, intermediate or egress nodes can not determine from which SR path the packet is received.
- Path identification is pre-condition of:
  - Performance measurement and traffic statistic
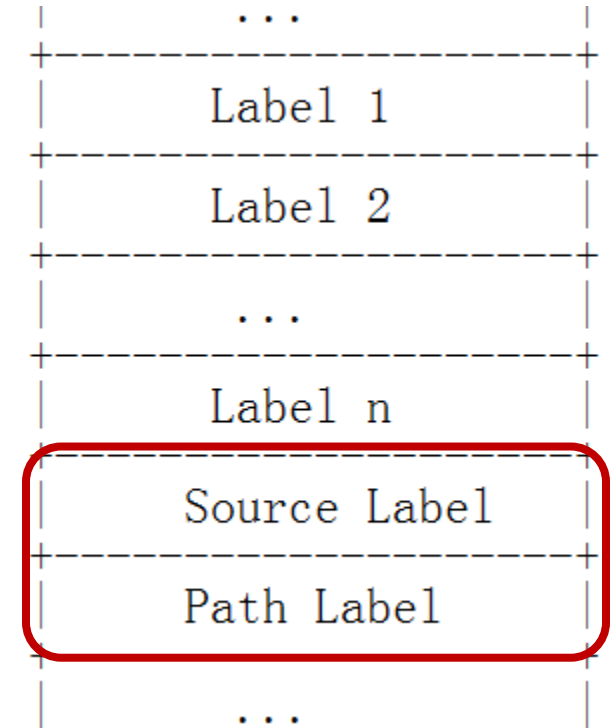  - 1+1 path protection
  - …

# Path Segment

- One label option
  - A SR path is uniquely identified by a single label at the measurement point (MP)
  - The label is assigned from the label space of the MP (e.g., egress), could be from SRLB or SRGB
  - Unique in the context of the MP
  - Inserted at the ingress and immediately follows the label that directs the packet to the MP, for example
    - If the egress is the MP, the Path segment label will immediately follow the last label of the SR path
  - The MP MUST pop the path segment label

```
+------------------------+
|          . . .         |
+------------------------+
|        Label 1         |
+------------------------+
|        Label 2         |
+------------------------+
|          . . .         |
+------------------------+
|        Label n         |
+------------------------+
|       Path Label       |
+------------------------+
|          . . .         |
+------------------------+
```
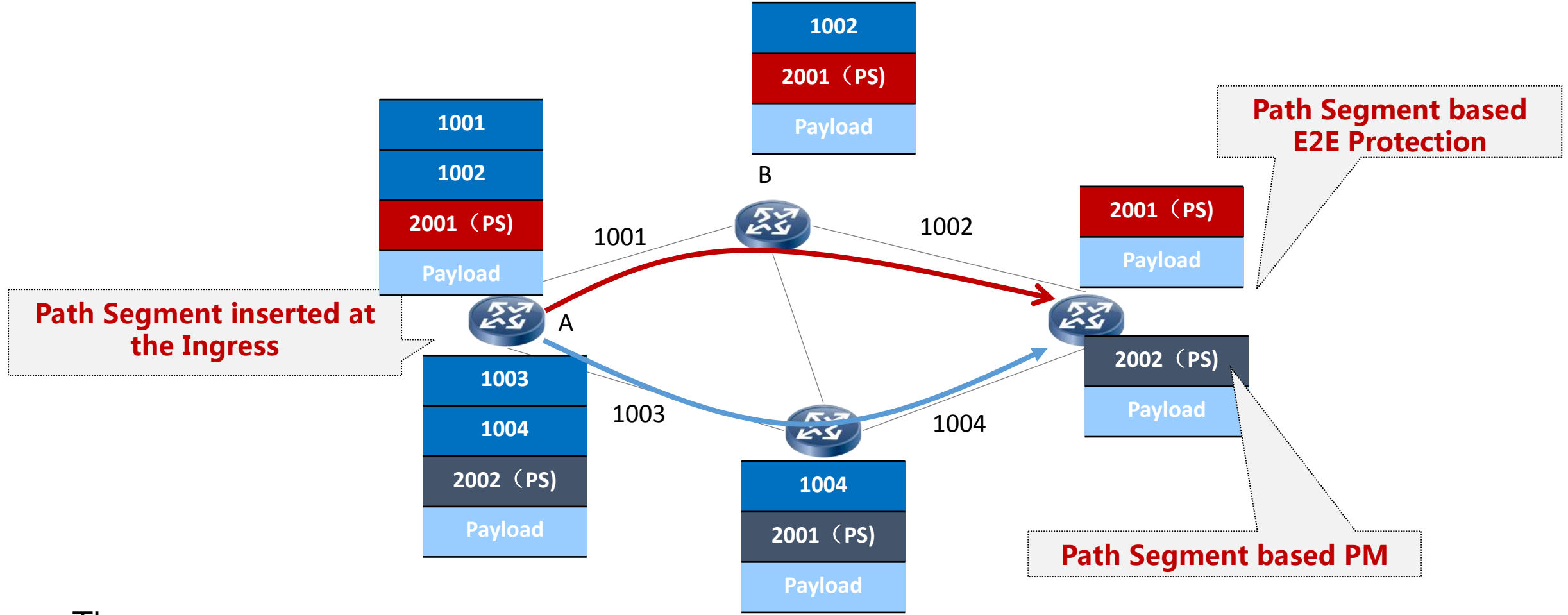
# Path Segment (Cont.)

- Two labels option
  - An SR path is identified by the combination of a "Source Identifier" and a local "Path identifier"
  - Each node will be assigned an extra Node Label (Source Label) as the Source Identifier
    - It MUST NOT be used for forwarding,
    - It also indicates a Path label immediately following
  - The ingress of an SR path will assign a local label (Path Label) as the Path identifier
  - Unique within an SR domain if SRGB of each node is the same
  - Otherwise unique in the context of the MP
  - Both the Source and path labels are inserted at the ingress and follow the label that directs the packet to the MP, for example
    - If the egress is the MP, then the Source Label will immediately follow the last label of the SR path, and the Path label will immediately follow the Source label
  - The MP MUST pop the Source and Path label

```
|            . . .            |
+-----------------------------+
|          Label 1            |
+-----------------------------+
|          Label 2            |
+-----------------------------+
|            . . .            |
+-----------------------------+
|          Label n            |
+-----------------------------+
|        Source Label         |
+-----------------------------+
|         Path Label          |
+-----------------------------+
|            . . .            |
```

# Applications of Path Segment(PS)



- Three use cases:
  - Path Segment based performance measurement;
  - Path Segment based "1+1" path protection;
  - Path Segment based path correlation, e.g., associate two unidirectional paths to form a bi-directional path.

# Next steps

- Solicit more reviews and comments
- Four options proposed so far:
  - Two in this document
  - Another two in draft-hegde-spring-traffic-accounting-for-sr-paths

# Thanks