# Extensions to BGP for
# SR Tunnel/Path Ingress Protection

draft-chen-idr-sr-ingress-protection-00

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# Introduction

- Critical, Real Time Live Traffic in SR Path
- SR Path Fast Protection needed
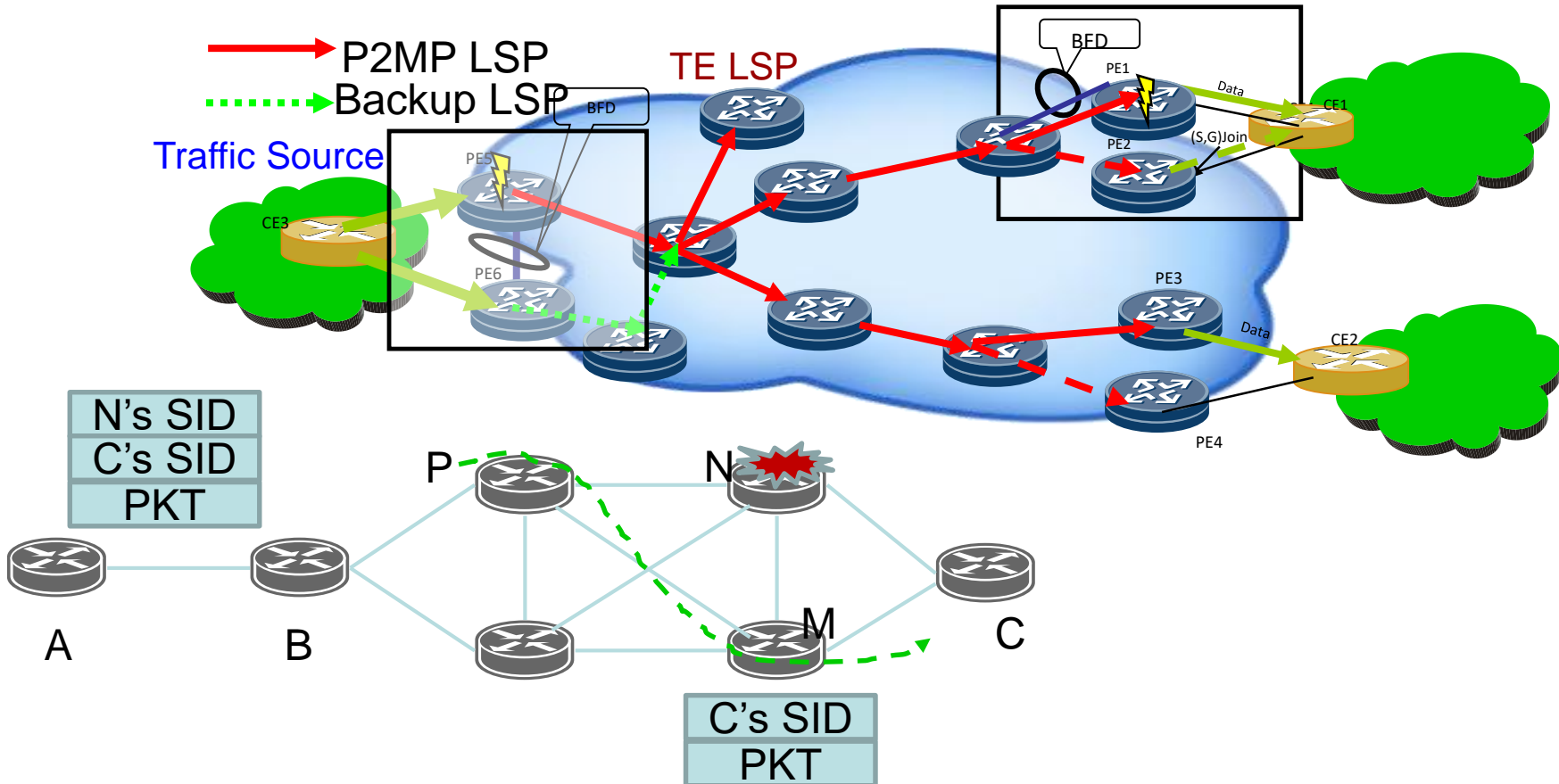
Real Time Trade for Stock

Remote Surgery

Live Events
(World Cup)

# SR Path Protection Overview

- E2E fast protection for TE LSP exists (E2E: Ingress fast protection/RFC8424, midpoint/RFC4090, egress/RFC8400)
- Midpoint, egress fast protection for SR path proposed (a few drafts)
- Ingress fast protection for SR path is needed

# BGP for SR Ingress Protection

- BGP extended for SR Tunnel/Path

- Natural to extend it for SR Ingress Protection
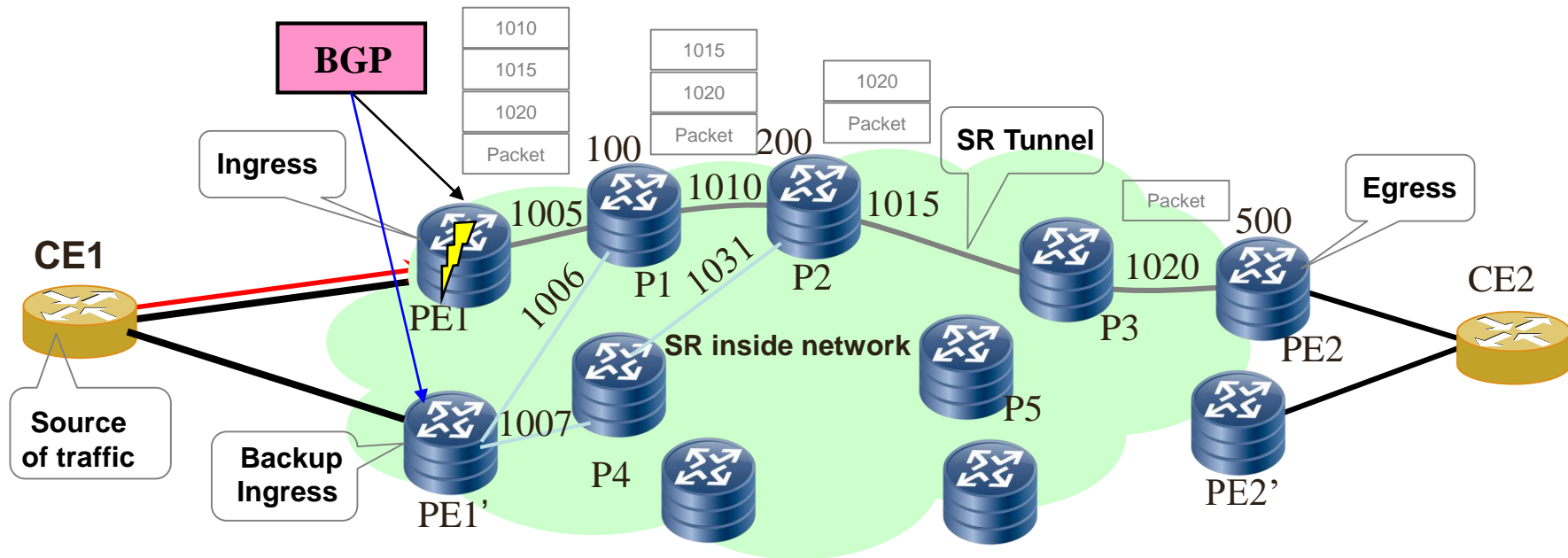
# Information Needed at Backup Ingress

- Backup SR Path (can be encoded in the same way as primary SR path)

- Primary Ingress Address if backup ingress detects failure of primary ingress

- Service Label/ID carried by SR path

- Description of Traffic carried by SR path

# Extensions to SR Policy Encoding

Tunnel Encaps Attribute contains a Tunnel TLV of type 15 (i.e., SR Policy TLV), which consists of sub-TLVs such as Binding SID sub-TLV, preference sub-TLV, Segment List sub-TLV.

A new sub-TLV SR Tunnel Ingress Protection sub-TLV is defined

```
Tunnel Encaps Attribute (23)
    Tunnel Type (15): SR Policy
        Preference sub-TLV
        Binding SID sub-TLV
        Explicit NULL Label Policy (ENLP) sub-TLV
        Priority sub-TLV
        Policy Name sub-TLV
        SR Tunnel Ingress Protection sub-TLV
            Primary Ingress sub-TLV
            Service sub-TLV
        Segment List sub-TLV
            Weight sub-TLV
            Segment sub-TLV
            Segment sub-TLV
            ...
        ...
```

# SR Tunnel Ingress Protection Sub-TLV
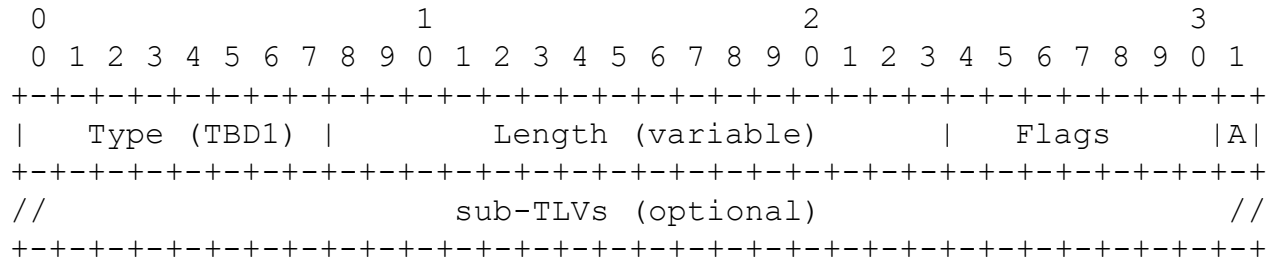
```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Type (TBD1)  |        Length (variable)     |    Flags    |A|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                     sub-TLVs (optional)                    //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

              SR Tunnel Ingress Protection sub-TLV
```

Flags: 1 octet. Flag A (one bit) is defined.
- A = 1: request backup ingress to let forwarding entry for backup SR path be Active
- A = 0: request backup ingress to let forwarding entry for backup SR path be Inactive initially and to make it active after detecting the failure of the primary ingress of the primary SR path.

Optional sub-TLVs:
- Primary-Ingress sub-TLV
    indicates the IP address of the primary ingress of a SR tunnel/path
- A Service sub-TLV
    contains a service ID or label to be added into a packet to be carried by a SR path/tunnel.

# Primary Ingress IPv4/6 Address Sub-TLV

Primary-Ingress IPv4 sub-TLV indicates the IPv4 address of the primary ingress of a SR tunnel/path.

```
     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
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |     Type (1)    |    Length (4)   |     Primary Ingress IPv4  |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |     Address (4 octets)           |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Primary Ingress IPv4 Address sub-TLV

Primary-Ingress IPv6 sub-TLV indicates the IPv6 address of the primary ingress of a SR tunnel/path.

```
     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
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |     Type (2)    |    Length (16)  |                           |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+                           +
    |          Primary Ingress IPv6 Address (16 octets)            |
    +                                                              +
    |                                                              |
    +                                                              +
    |                                                              |
    +                           +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                           |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Primary Ingress IPv6 Address sub-TLV

# Service Sub-TLVs

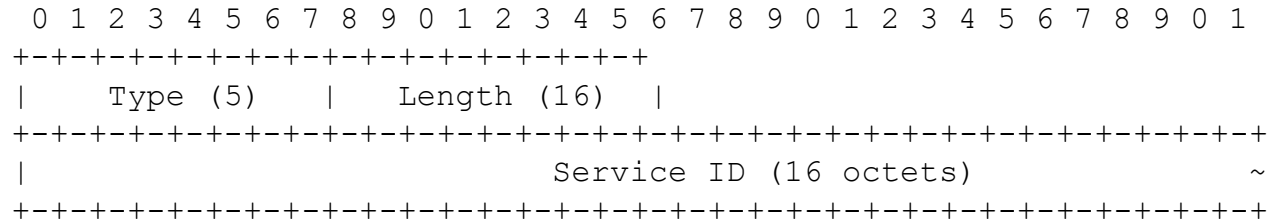A Service sub-TLV contains a service ID or label to be added into a packet to be carried by a SR path/tunnel. It has two formats: one for the service identified by a label and the other for the service identified by a service identifier (ID) of 32 or 128 bits.
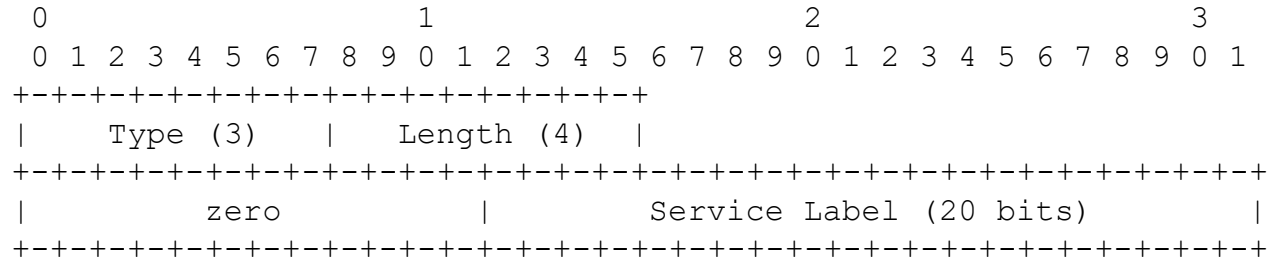
```
  0                   1                   2                   3
  0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |    Type (3)   |  Length (4)   |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |          zero               |        Service Label (20 bits)      |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

                    Service Label sub-TLV


  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
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |    Type (4)   |  Length (4)   |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                     Service ID (4 octets)                     |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

                  32 Bits Service ID sub-TLV


  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
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |    Type (5)   |  Length (16)  |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                     Service ID (16 octets)                  ~
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

                  128 Bits Service ID sub-TLV
```
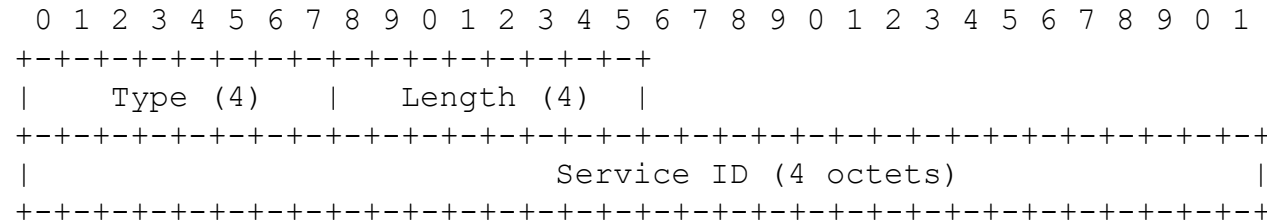
# Next Step

Comments