Support Shared Mesh Protection in MPLS-TP

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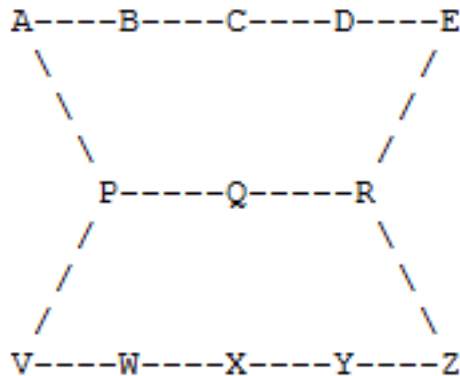
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Motivation

- Shared Mesh Protection is required in MPLS-TP Requirements (RFC5654)
    - [Req 68]: MPLS-TP SHOULD support 1:n (including 1:1) shared mesh recovery.
    - [Req 69]: MPLS-TP MUST support sharing of protection resources such that protection paths that are known not to be required concurrently can share the same resources.

Shared Mesh Protection
(as specified in the Survivability Framework Section 4.7.6)

```
A----B----C----D----E
     \              /
      \            /
       \          /
        P-----Q-----R
       /          \
      /            \
     /              \
V----W----X----Y----Z

A Shared Mesh Protection Topology
```

The resources on P-Q-R is shared by multiple working LSP's

- Key properties:
  1. Protecting LSP's are pre-established
  2. Upon failure, a working LSP needs to activate the protection
  3. And, it may preempt/notify other connections
  4. If the resources are taken, it needs to try another protecting LSP (1:N)

Key Design Decisions

- Protection activation/preemption need to be fast and meet TP's requirement (i.e. 50 msec)
  - Preferably done via hardware-assistance
- Reliable messaging
  - The operation involves shared resources. Any message loss could cause "orphan" states inside network
- Simple status queries
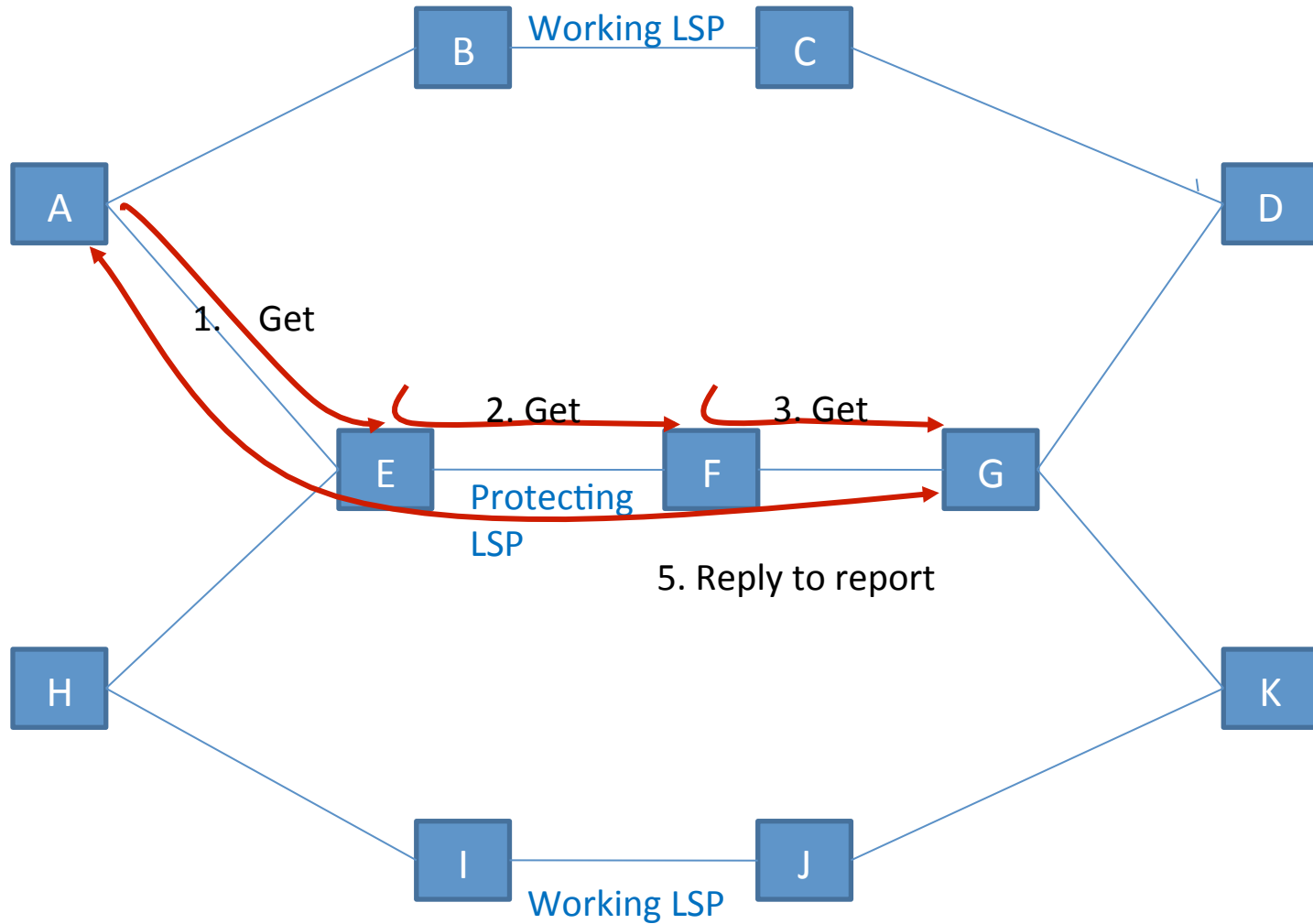 - Optimize the protection from the head-end

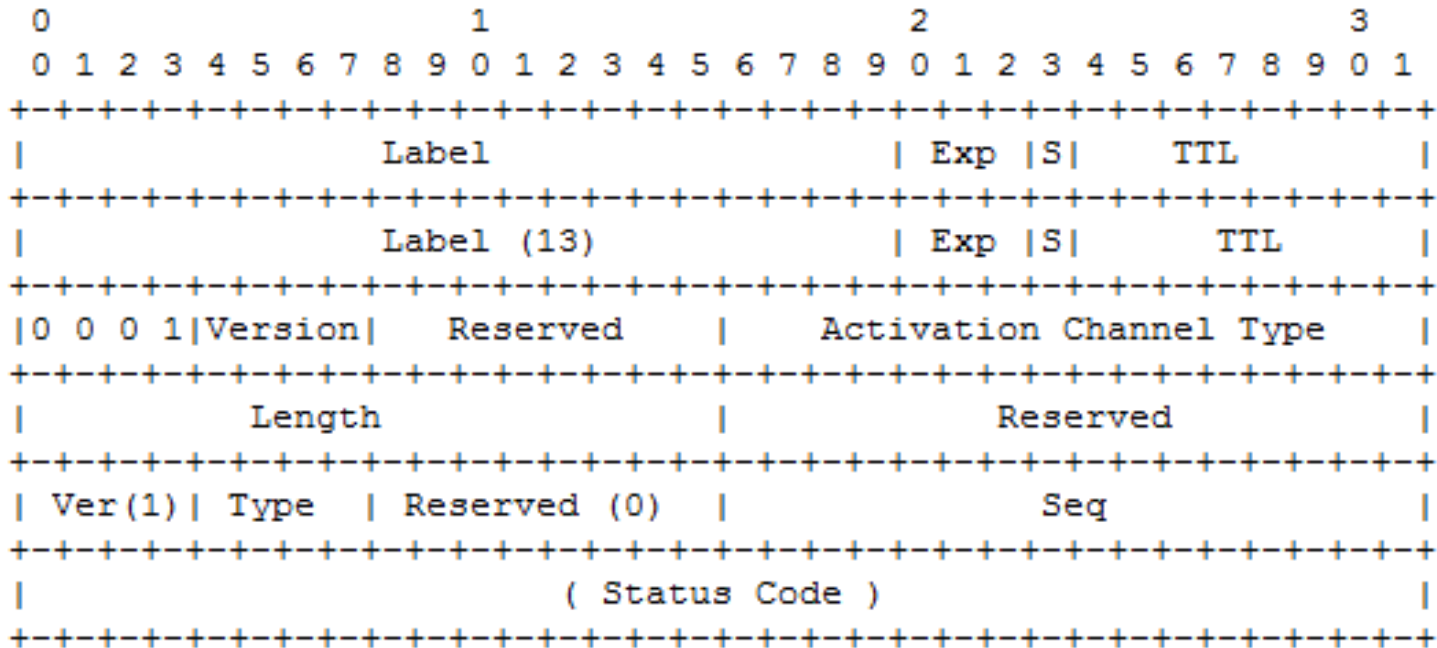# Operation Example: End-to-end Activation
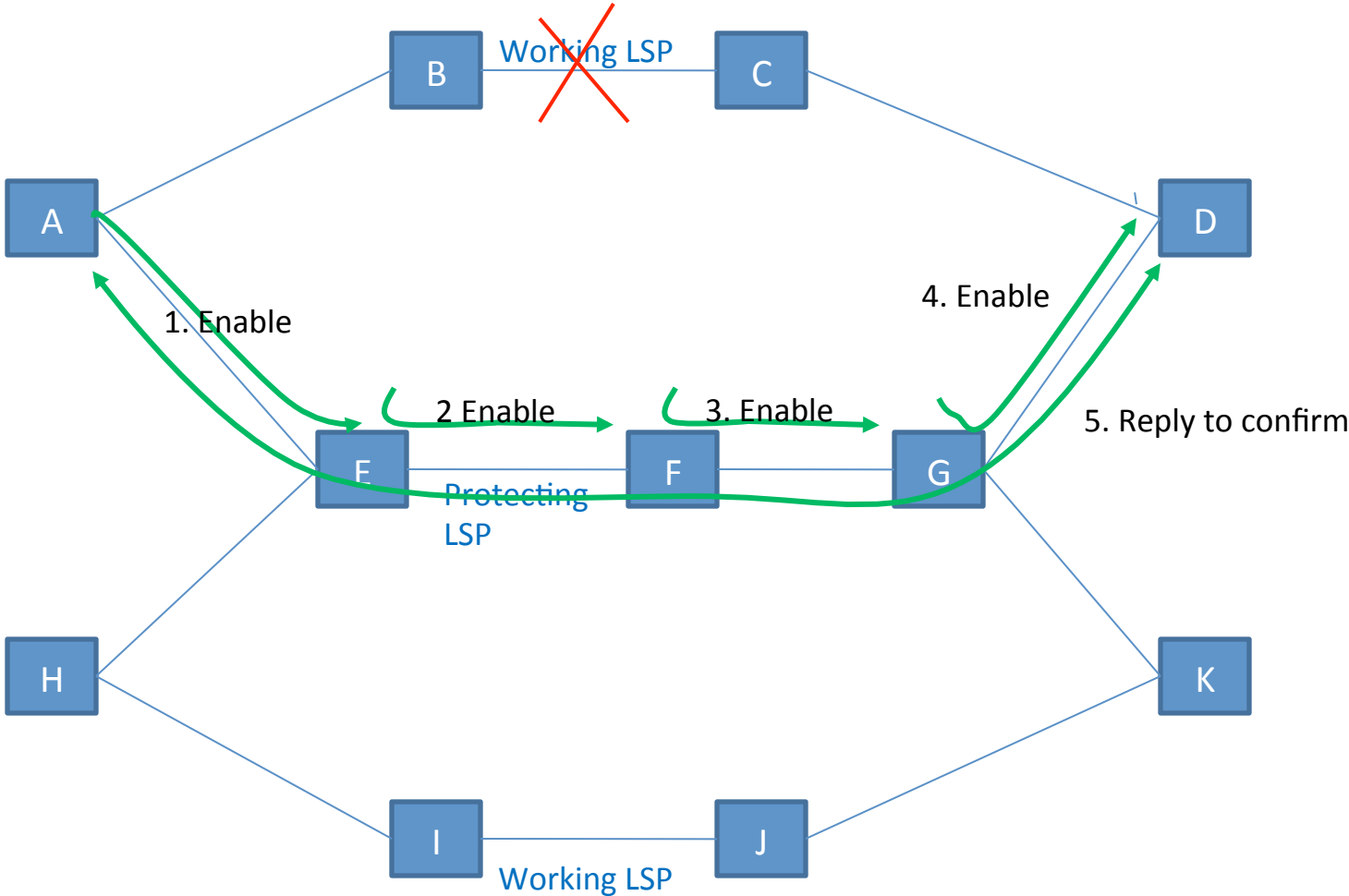
Operation Example: Preemption
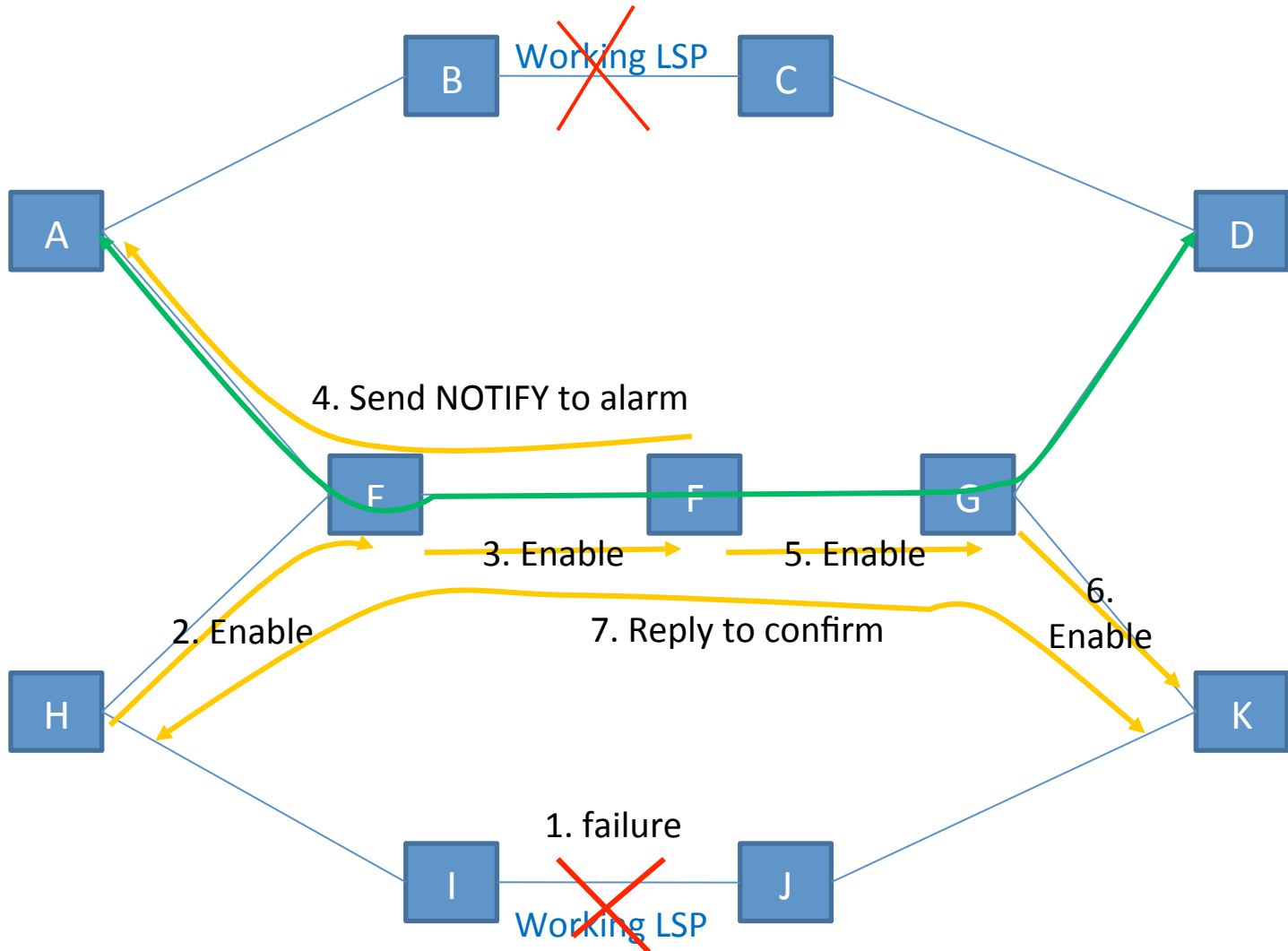
Operation Example: Optimize Protection through Queries

Protocol Extension

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   Label                   | Exp |S|     TTL     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 Label (13)                | Exp |S|     TTL     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0 0 0 1|Version|    Reserved    |    Activation Channel Type    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|            Length              |           Reserved            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Ver(1)| Type  | Reserved (0)  |             Seq               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       ( Status Code )                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- Encapsulated in MPLS-TP GAL/GACH Header
- A special channel type for activation purposes
- Type: ENABLE, DISABLE, GET etc.

Other Approach

- "MPLS-TP Shared Mesh Protection" (draft-cheung-mpls-tp-mesh-protection-02.txt)
  - Developed on top of the linear protection proposal
  - No reliable messaging
  - Complex message processing (both headend and intermediate nodes can generate messages at will)

Summary

- Shared Protection is required to support fast recovery in MPLS-TP

- This proposal satisfies all the MPLS-TP protection requirements
  - Simple to implement
  - Cover all important aspects
  - Enable hardware-based implementation
  - Operate independent of control-plane

Next Steps

- Get more feedback from vendors and providers
- Make it to WG document