PDV-based PTP LSP Setup,Reoptimization and Recovery

draft-zhang-tictoc-pdv-lsp-00

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Background

▶ **Frequency or phase/time over packet network(eth/udp)**

- IEEE 1588v2.

- Synchronization Ethernet

- TDM over MPLS(ACR).

▶ **1588 over IP/MPLS network:**

- IP/MPLS network be looked as a Transparent Clock

- the PDV noise is impact on the performance of clock recovery

Problem Statement

- Does not mandate that all LSRs in path of a PTP LSP be 1588-aware, Non-1588-aware LSRs don't perform any TC processing.

  Therefore, these LSRs may introduce additional PDV noise, although the PTP messages are treated with the highest priority and Green for drop eligibility, because the other flows may use the same queue.

  Just as MPLS-TE setup a TE LSP based on TE metrics(e.g. bandwidth), it is necessary to setup a PTP LSP based-on the PDV metrics, and if the PDV noise between the 1588 Master and the 1588 Slave has deteriorated into a certain degree, then the 1588 Master switchs to the backup PTP LSP and reoptimizes the primary PTP LSP. So, it is useful for clock recovery algorithms to improve the performance of clock recovery.

PTP LSP Setup
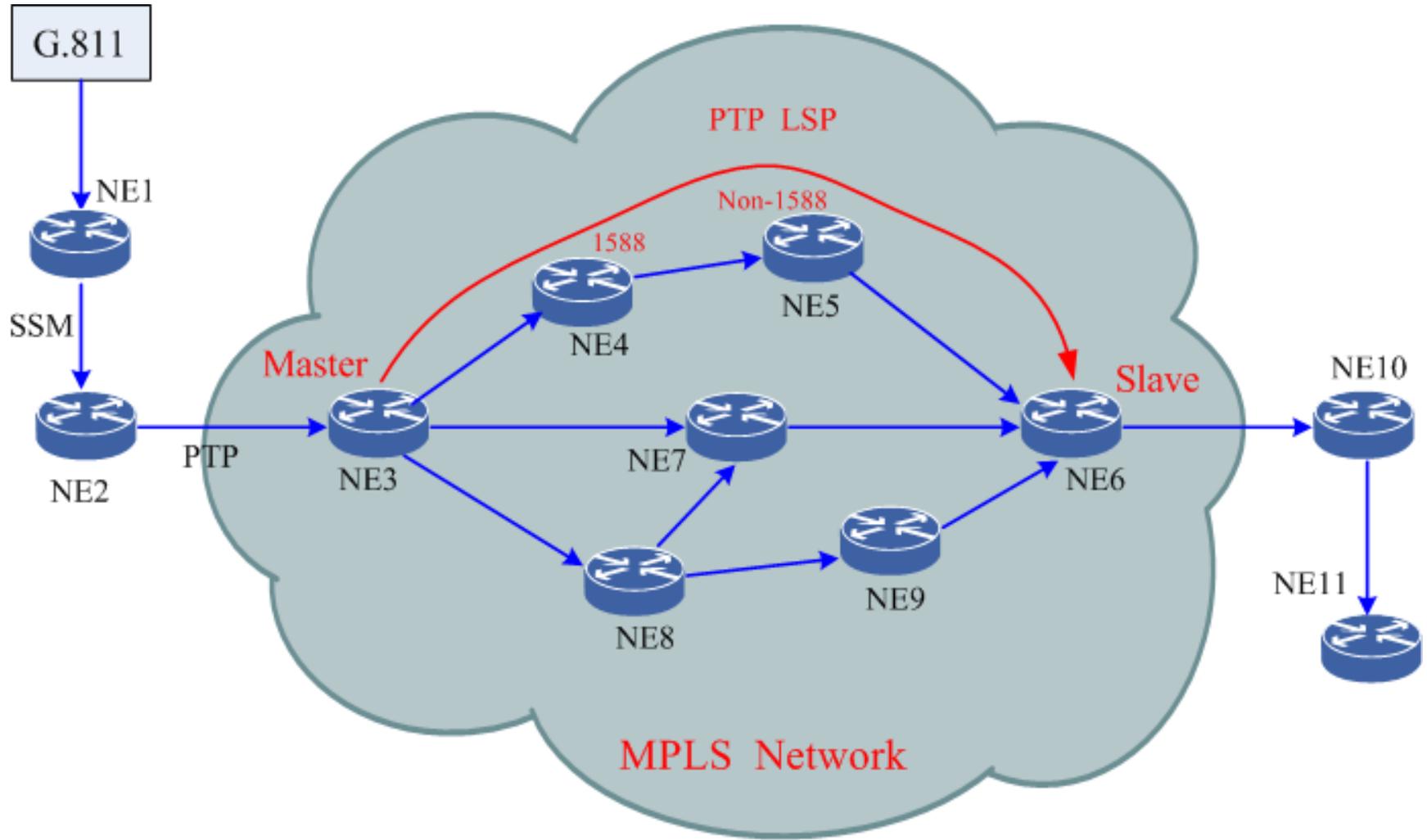
Congestion detection
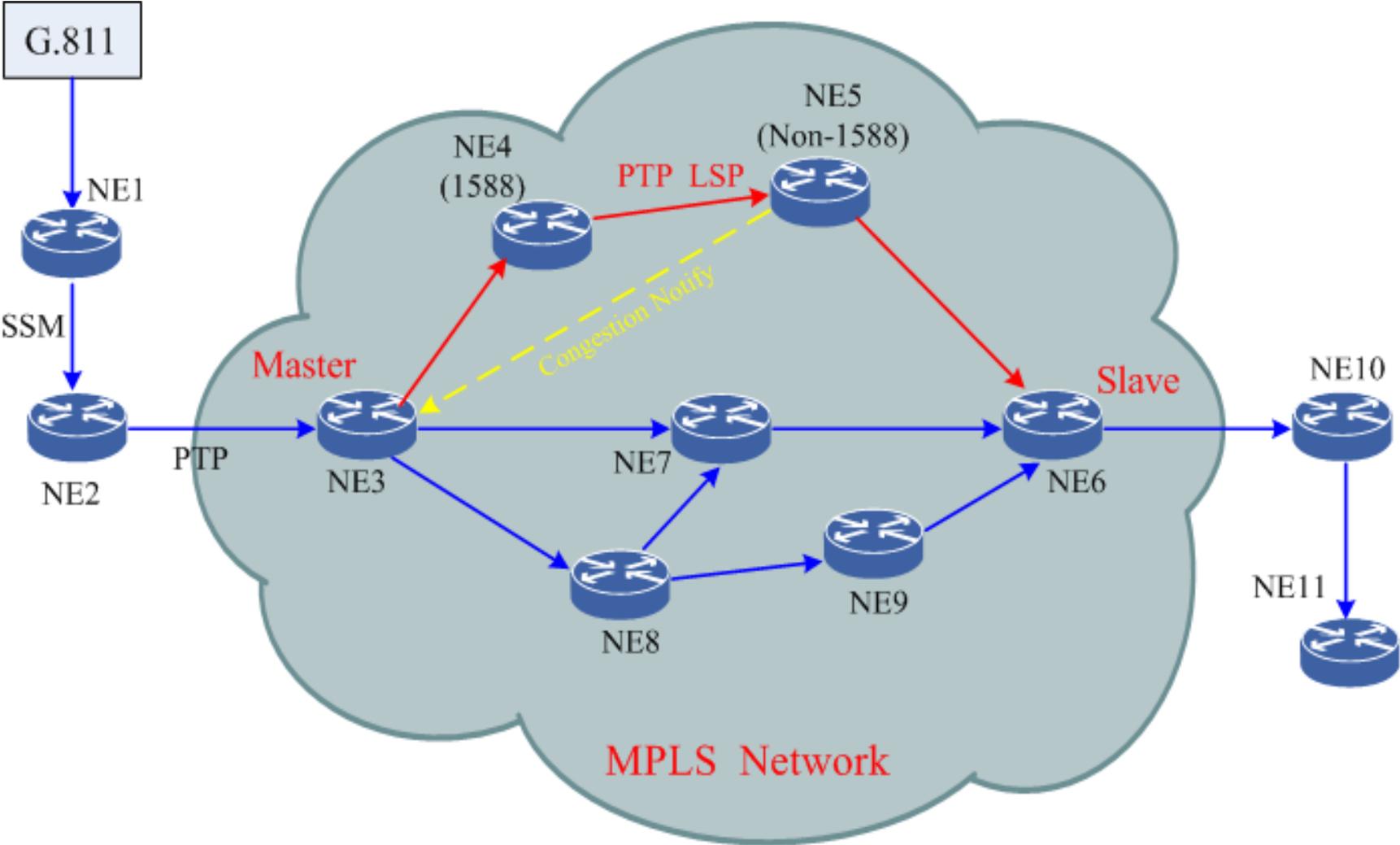
PTP LSP reoptimization
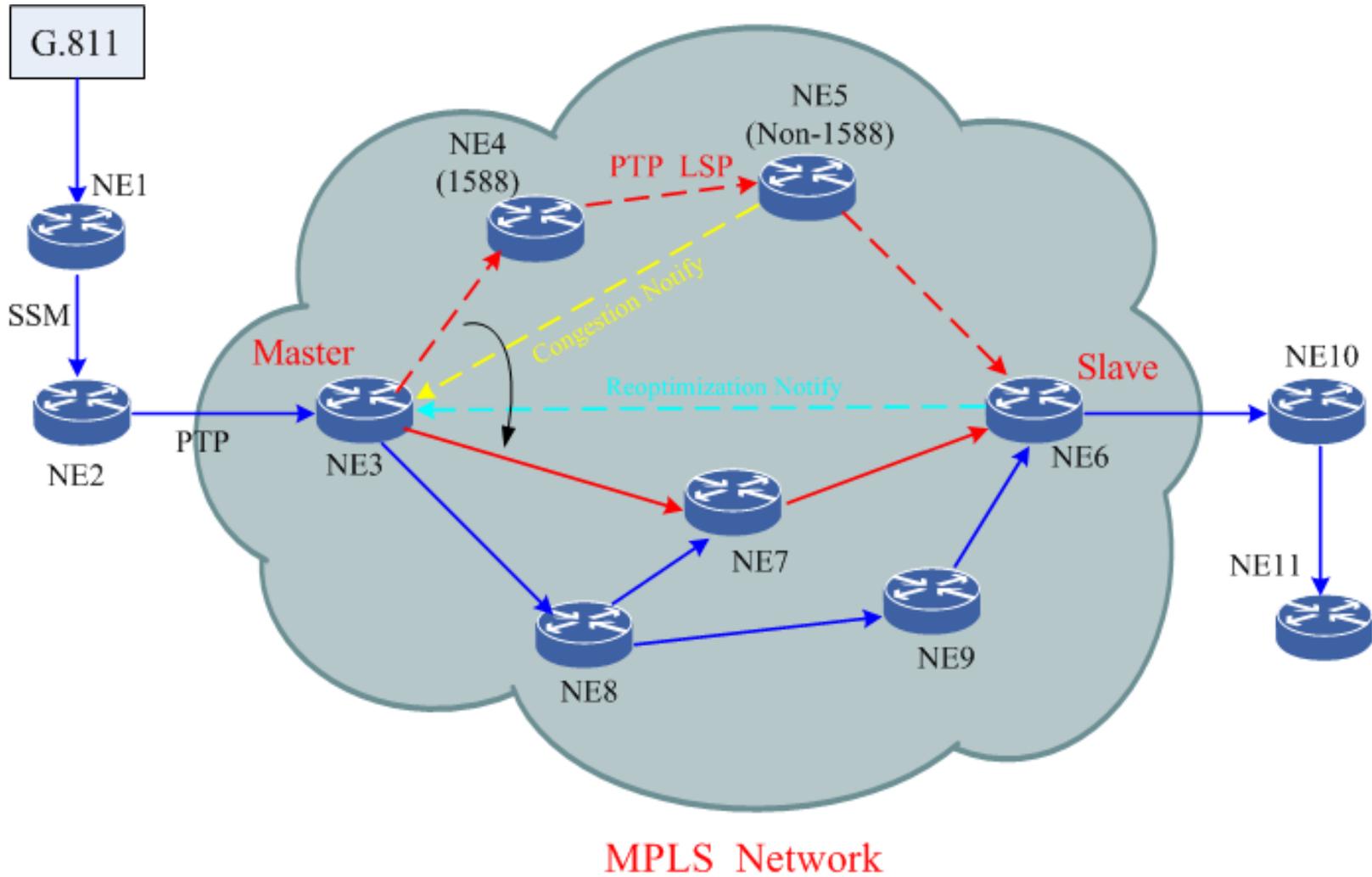
PTP LSP recovery
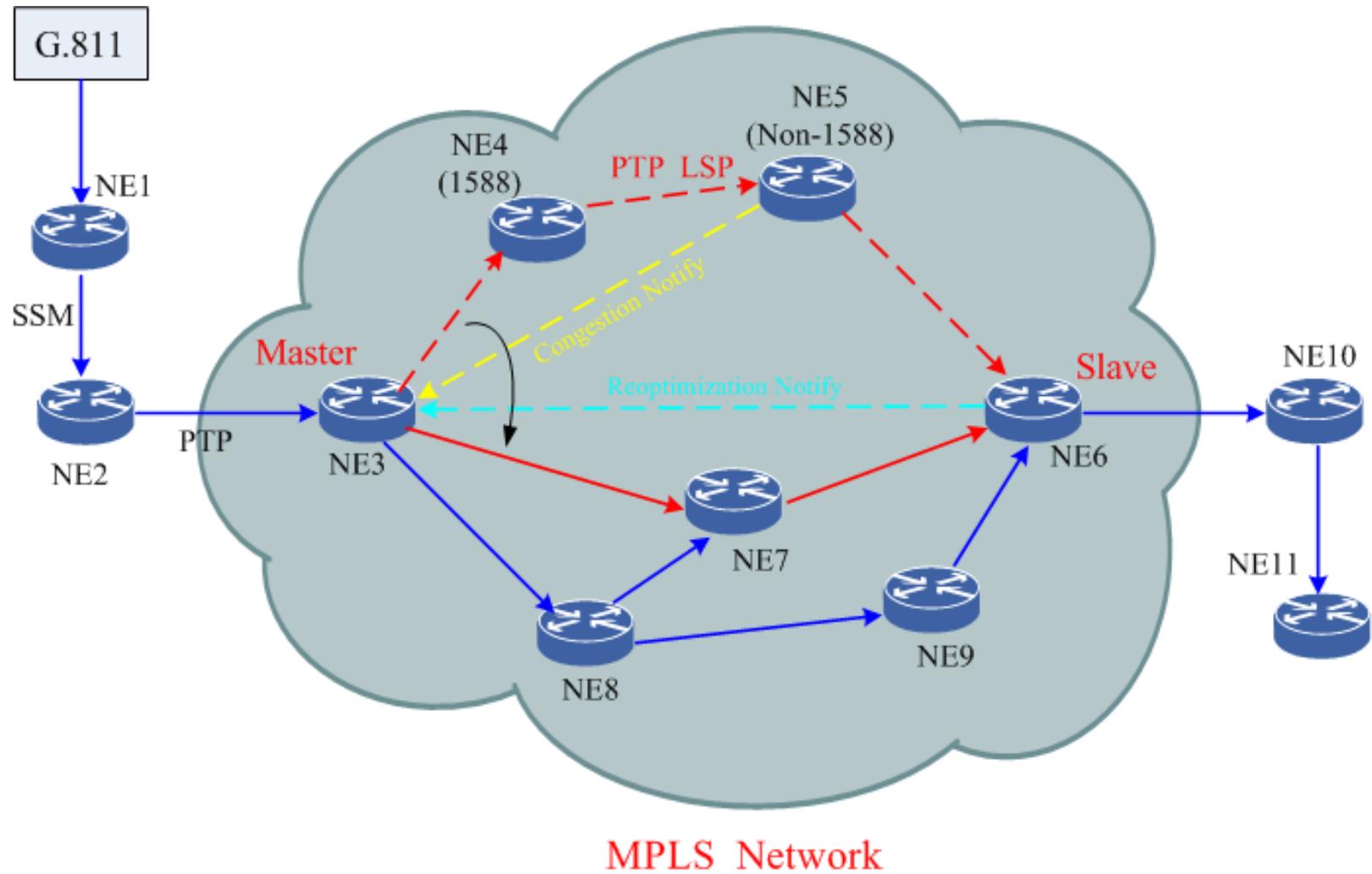
PTP Master recovery
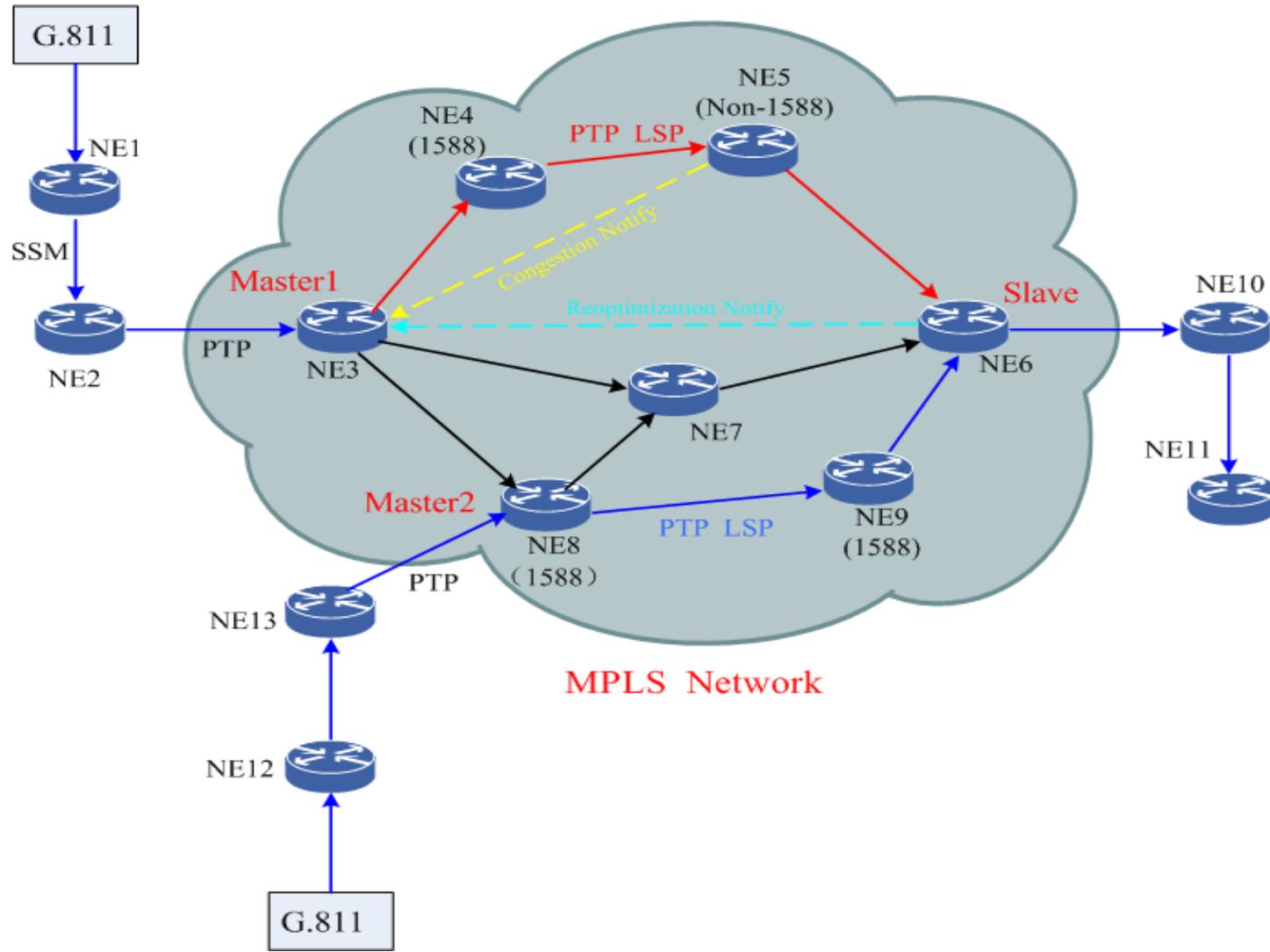
Protocal extensions(OSPF for reserving-bandwidth)
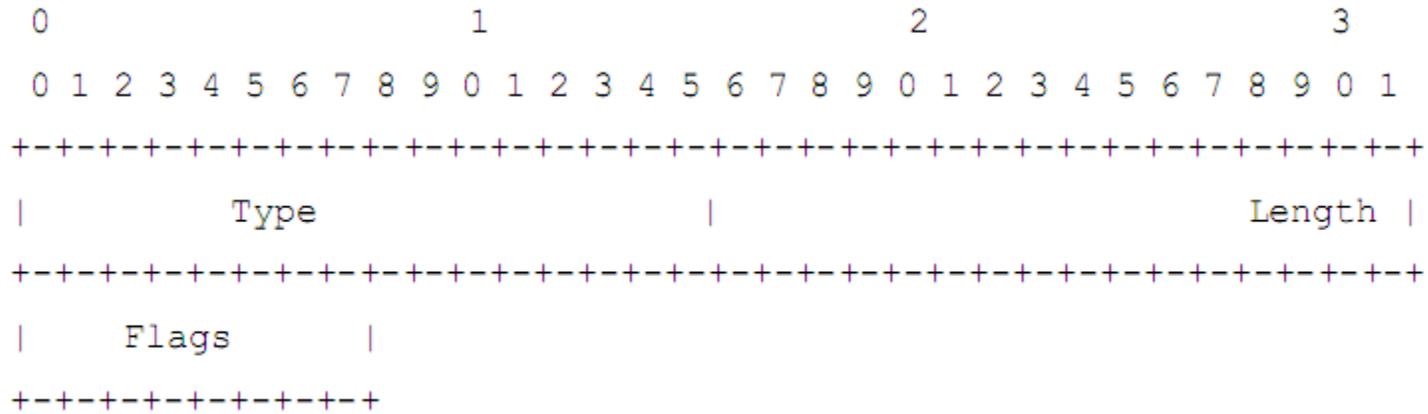
```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|            Type                      |            Length |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    Flags       |
+-+-+-+-+-+-+-+-+
           Figure 4: reserving-bandwidth Capability TLV
```
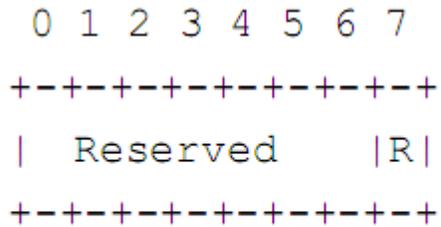
```
  0 1 2 3 4 5 6 7
 +-+-+-+-+-+-+-+-+
 |  Reserved    |R|
 +-+-+-+-+-+-+-+-+
Figure 5: Flags Format
```

Protocal extensions(IS-IS for reserving-bandwidth)
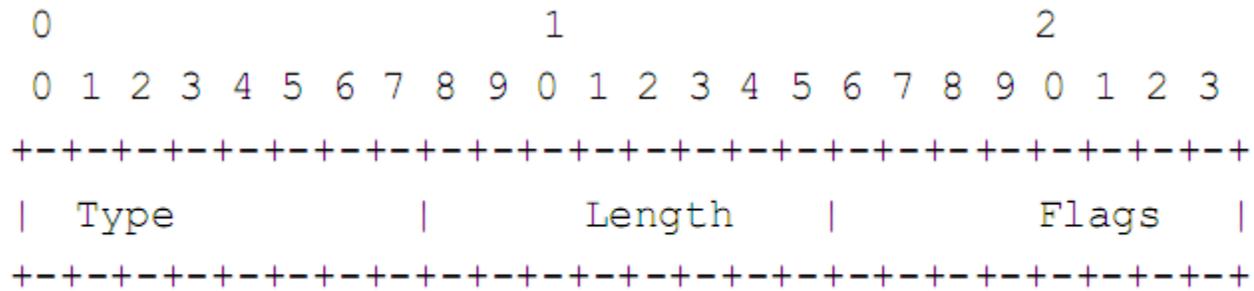
```
 0                   1                   2
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Type          |      Length     |      Flags    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
Figure 6: reserving-bandwidth Capability sub-TLV
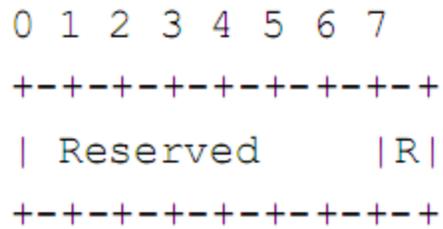
```
 0 1 2 3 4 5 6 7
+-+-+-+-+-+-+-+-+
| Reserved    |R|
+-+-+-+-+-+-+-+-+
```
Figure 7: Flags Format

Protocal extensions(RSVP-TE)

A new flag in the SESSION ATTRIBUTE object and new Error Value sub-codes in the ERROR SPEC object are proposed in this document.
1.PTP LSP Congestion Detection Request
    The following new flag of the SESSION_ATTRIBUTE object (C-Type 1 and 7) is defined:
        Path congestion detection request: 0x40
    This flag indicates that a PTP LSP congestion detection (of the current PTP LSP in use) is requested.

2. New Error Value Sub-Codes
    As defined in [RFC3209], the Error Code 25 in the ERROR SPEC object
    corresponds to a Notify Error. This document adds a new Error Value sub-codes:
        9,PDV degradation.

Other considerations

Network congestion may also led to PTP packets being dropped.

So, in addition to the PDV, the statistics for packet loss rate SHOULD

be collected by the 1588 Slave. When packet loss rate has going up

a certain threshold, the 1588 Slave send a notify message to the

1588 master that decides to reoptimize the PTP LSP or not.

Comments ?