Seamless MPLS for Mobile Backhaul
draft-li-mpls-seamless-mpls-mbh-00

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Updates

- Change the draft name from draft-li-mpls-seamless-mpls-mbb-00 to draft-li-mpls-seamless-mpls-mbh-00

- Add one co-author: Luis from Telefonica I+D

- Remove the solutions for seamless MPLS for mobile backhaul network. Please refer to the related solutions drafts.

- Add detailed problem statement and define corresponding requirements.

- Correct text errors.

Seamless MPLS Network Architecture
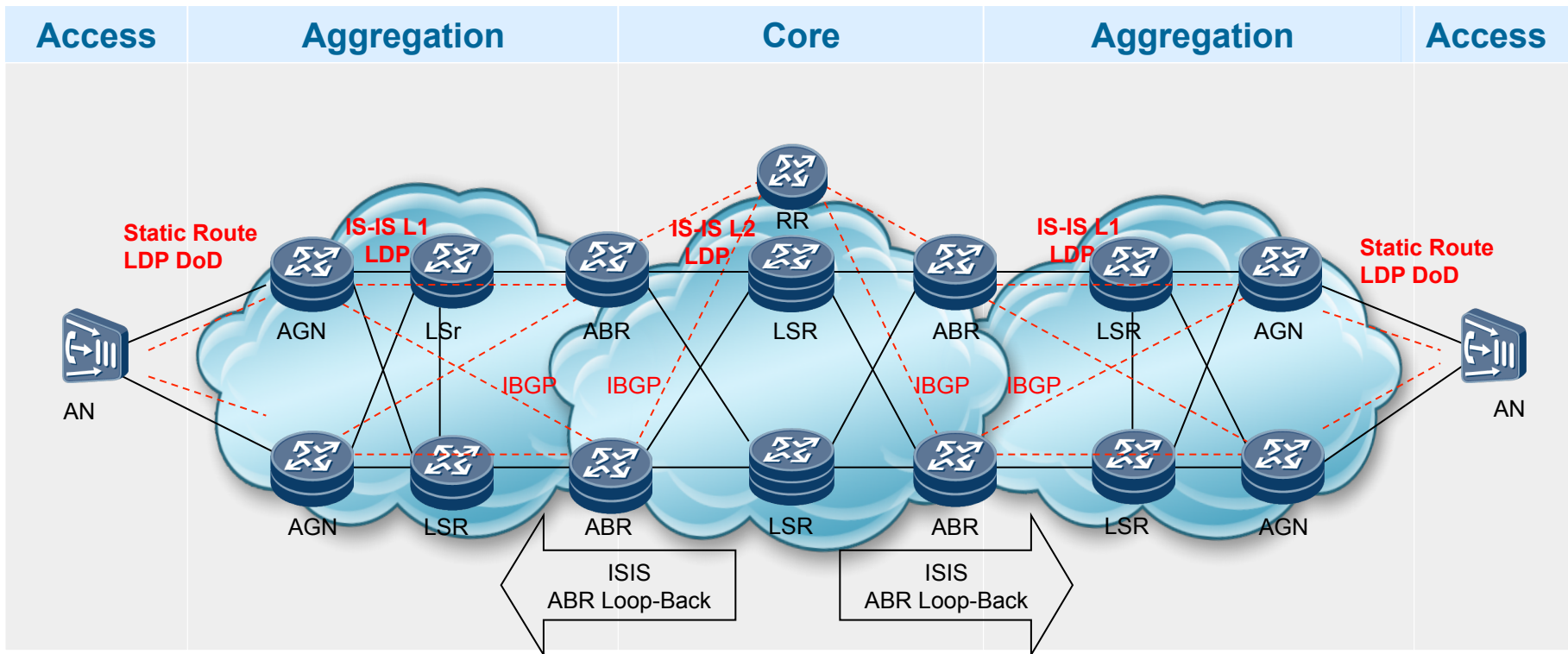
- **The key concepts for Seamless MPLS: Decoupling the transport layer and service layer.**
- **The network will be divided into multiple IGP areas for access, aggregation and core network**
- **IBGP run among the Area Boarder Routers (ABRs) to advertise labeled route.**
- **LDP DoD is introduced to set up LSP on demand between AN and AGN.**

Seamless MPLS for Mobile Backhaul Networks

■ Ring topology is adopted in mobile backhaul networks.

■ Variable devices with variable capability are deployed in the access ring and aggregation ring.

■ L3VPN and TE propose new requirements on Seamless MPLS architecture.
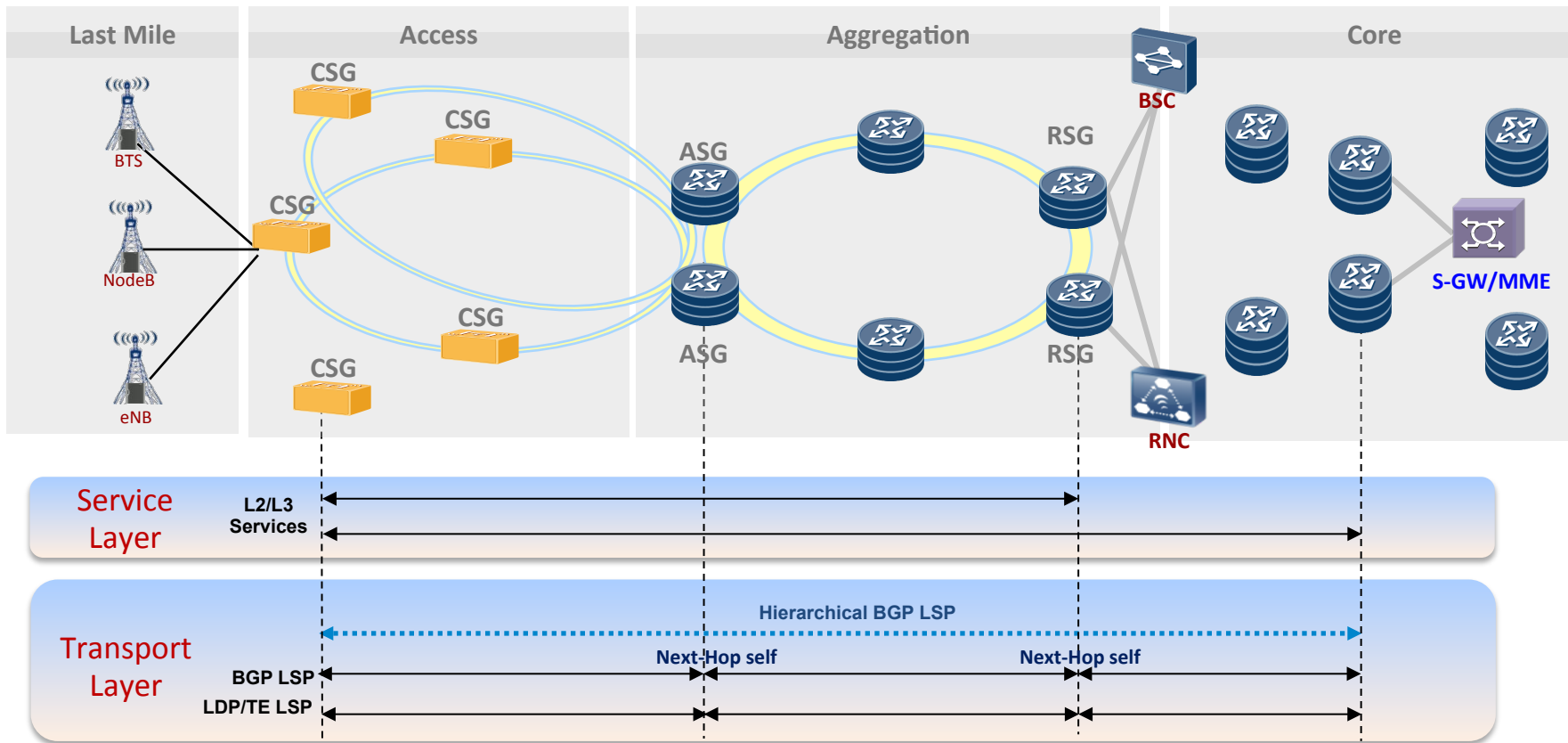
Scenarios for Network Architecture

■ Network Architecture 1: Network separated by Ases

  ➢ Scenario 1: ASes connected by different ASBRs

  ➢ Scenario 2: ASes connected by integrated ASBRs

■ Different network integrated in one AS but separated by

different IGP areas

```
                                 Service
        |---------------------------------------------------------------|
        |        AS-X                    |           AS-Y               |
        |(Access/Aggregation)           |          (Core)              |
        |---------------------           ----------------------        |
        |                    |           |                             |


                         +----+        +----+
                  ...  |ASBR1|-------|ASBR3|....
   +---+      .......   +----+        +----+   .......    +---+
   | PE |...                                          ...| PE |
   +---+      .....                                   .....  +---+
               .....  +----+        +----+  .....
                  .. |ASBR2|-------|ASBR4|..
                     +----+        +----+
```
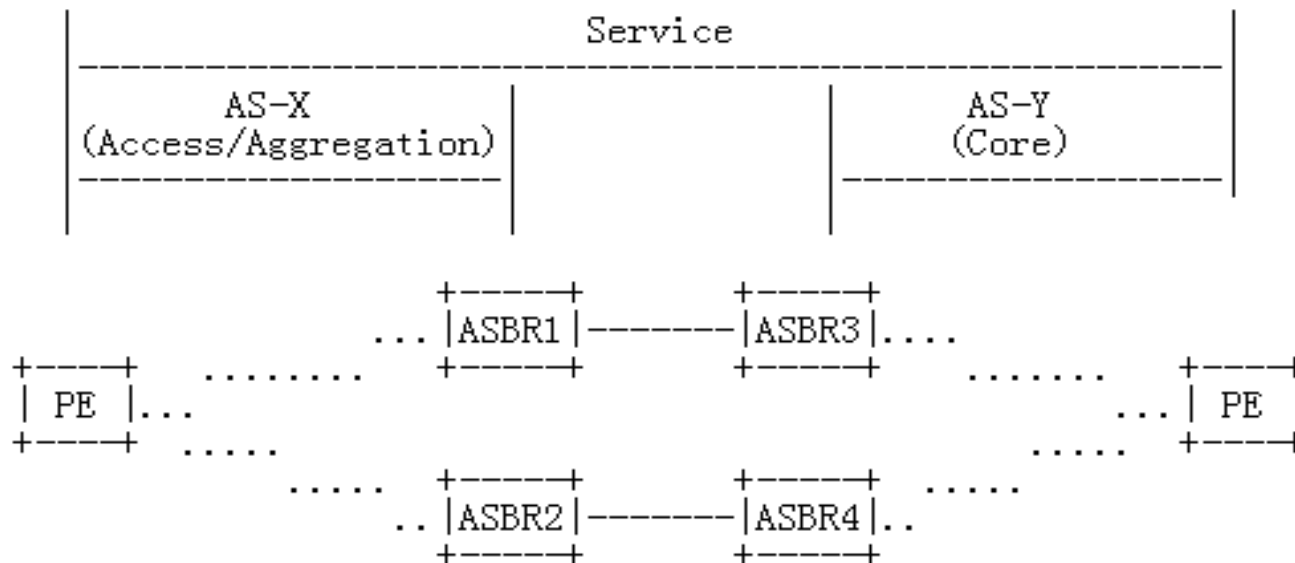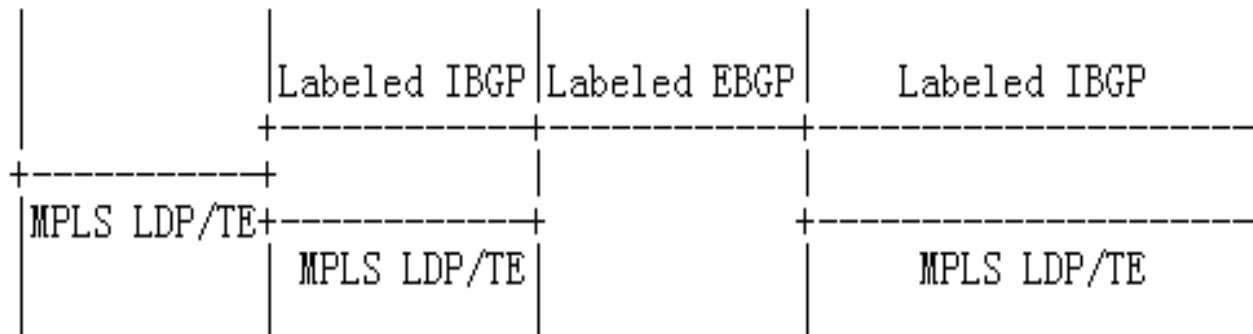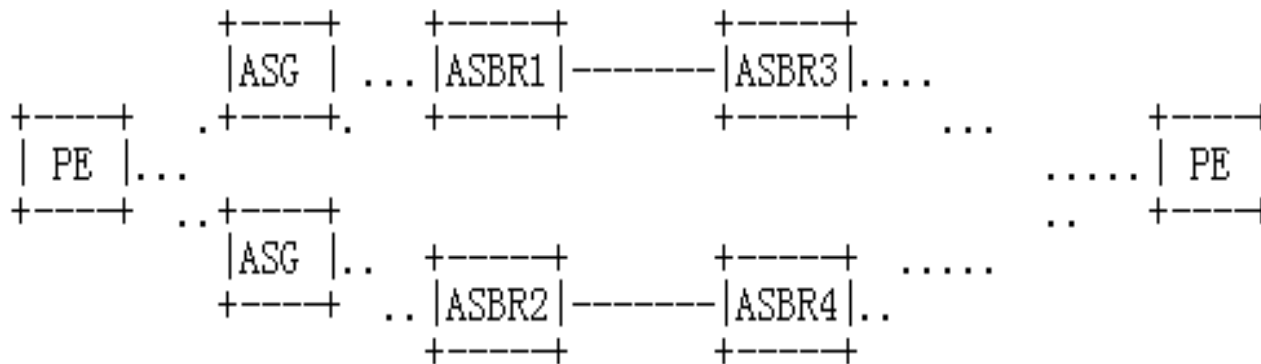
Figure 1 Redundant ASBRs connected Back to Back

Scenarios for Different Edge of Labeled BGP

■ Scenario 1: Cell Site/User PE devices as the edge

■ Scenario 2: ASG nodes as the edge

■ Scenario 3: RSG(ASBR) devices as the edge

```
                  +---+      +----+            +----+
                  |ASG |  ... |ASBR1|--------|ASBR3|....
         +---+    .+---+.     +----+            +----+     ...          +---+
         | PE |...                                         .....| PE |
         +---+    ..+---+                                   ..   +---+
                  |ASG |..  +----+            +----+     .....
                  +---+  .. |ASBR2|-------|ASBR4|..
                          +----+            +----+

         |          |                 |                            |
         |          |Labeled IBGP |Labeled EBGP|    Labeled IBGP    |
         |          +-----------+----------+-----------------+
         |          |                 |                            |
         +--------+  |                 |                            |
         |MPLS LDP/TE+-----------+                 +-----------------+
         |          | MPLS LDP/TE|                 |    MPLS LDP/TE   |
```

Scalability problems and requirements

■ **Problem statement**

- Tunnel/LSP Configuration

  ➢ a set of TE attributes configuration at the ingress node

- Path Constraints Configuration

  ➢ Return Path Issue of BFD for MPLS LSPs

  ➢ Completely disjointed primary and backup LSP

  ➢ Avoid passing through different access rings

■ **Requirements**

- REQ 01:Auto tunnel mechanism

- REQ 02: cope with the return path issue of BFD

- REQ 03: completely disjointed primary and backup LSP

- REQ 04: avoid traffic passing through different access rings

End-to-End Transport problems and requirements

■ **Problem statement**

- ● Proxy Egress MPLS TE LSP

  - ➢ Actual destination may be not located in the local MBH network

  - ➢ set up the proxy egress MPLS TE LSP from CSG to stitching point
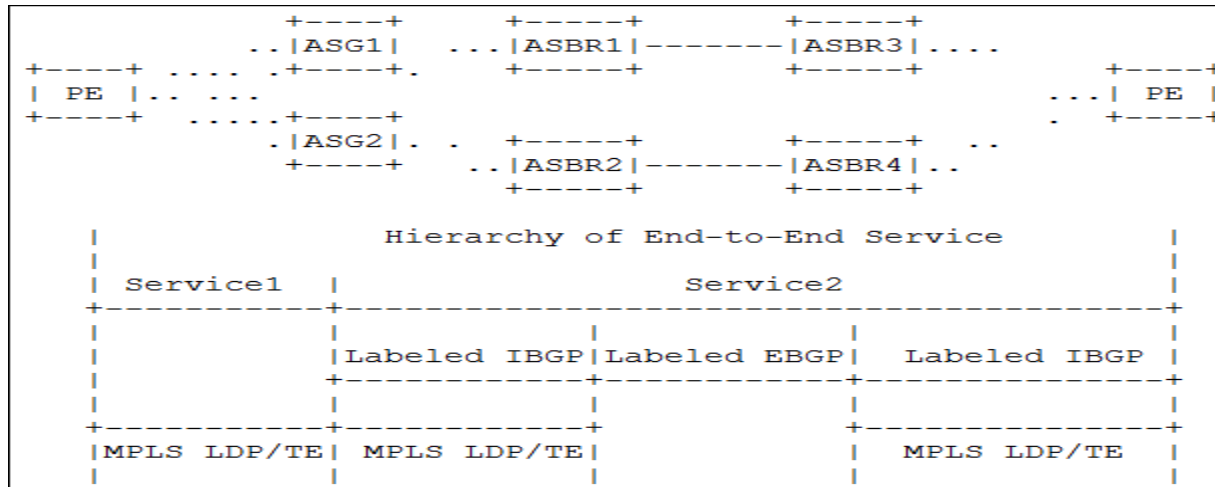
- ● Multi-hop LDP DoD

  - ➢ cannot configure the default route for setup of LDP DoD LSP

  - ➢ troublesome to configure static routes to a specific destination on all node

■ **Requirements**

- ● REQ 11:set up MPLS TE proxy egress LSP to stitch with BGP LSP

- ● REQ 12:simplify route configuration to setup multi-hop LDP DoD LSP

Hierarchical Service Bearing problems and requirements

■ **Problem statement**

```
             +---+        +----+          +----+
          ..|ASG1|   ...|ASBR1|-------|ASBR3|....
+---+ .... .+---+.      +----+         +----+                    +---+
| PE |.. ...                                              ...| PE |
+---+   .....+---+                                         .  +---+
          .|ASG2|.  .   +----+          +----+     ..
           +---+     ..|ASBR2|-------|ASBR4|..
                       +----+          +----+

             |              Hierarchy of End-to-End Service        |
             |
             | Service1     |                 Service2             |
             +----------+-------------------------------------+
             |          |              |             |              |
             |          |Labeled IBGP|Labeled EBGP|  Labeled IBGP  |
             |          +----------+----------+--------------+
             |          |              |             |              |
             +----------+----------+             +--------------+
             |MPLS LDP/TE| MPLS LDP/TE|             |  MPLS LDP/TE  |
             |          |              |             |              |
```

- Owing to the limited capability of access nodes it may be necessary to introduce hierarchical MPLS-based service bearing
- Seamless MPLS is to provide more flexibility for MPLS-based service bearing.

■ **Requirements**

- REQ 31: hierarchical L3VPN solutions MAY be introduced
- REQ 32: hierarchical L2VPN solutions MAY be introduced

Reliability Transport problems and requirements

■ Problem statement

- The route loop is common in the ring

- LFA can not avoid the route loop completely

- Remote-LFA has to set up LDP remote session and still faces the route loop challenges

■ Requirements

- REQ41:Scalable IP/LDP FRR solutions SHOULD be provided for the purpose of 100% network coverage

Policy Control problems and requirements

■ Problem statement

- Simple and dynamic BGP policy design and configuration

- BGP is asked to carry more information to help select routing more intelligently
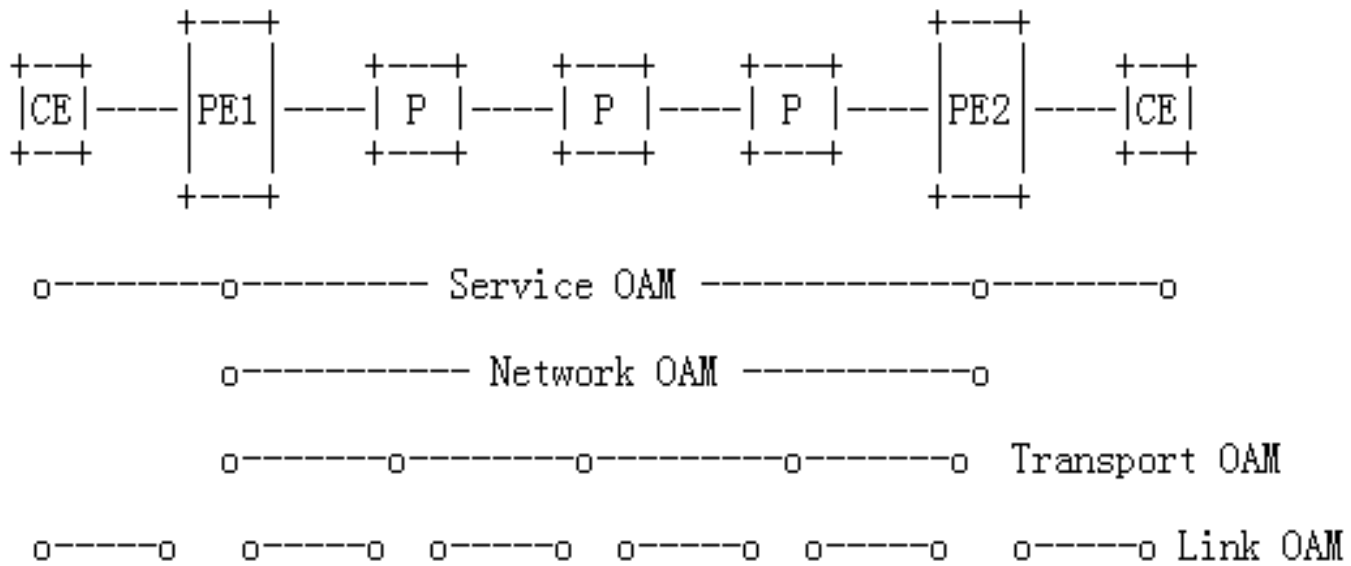
■ Requirements

- REQ51: BGP SHOULD be able to carry more information to facilitate the route policy control

OAM problems and requirements (1)

- ■ **Problem statement**
  - ● Layering OAM Framework for L3VPN Service
    - ➤ The existing OAM mechanisms for IP and L3VPN is not sufficient to satisfy the OAM requirement of the mobile service, especially for performance monitoring

```
                +--+                              +--+
     +-+        |  |   +--+   +--+   +--+         |  |    +-+
    |CE|--------|PE1|--| P |--| P |--| P |--------|PE2|----|CE|
     +-+        |  |   +--+   +--+   +--+         |  |    +-+
                +--+                              +--+

   o----------o------------ Service OAM -------------o----------o

            o------------ Network OAM -----------o

          o---------o------------o----------o-------o  Transport OAM

   o-----o    o------o   o------o   o------o   o-----o    o-----o Link OAM
```

OAM problems and requirements (2)

- **Problem statement**
  - ● Flat End-to-End OAM Mechanism
    - ➢ Can not get the end-to-end path directly.
    - ➢ Path of OAM packets and real traffic packets may be different
- **Requirements**
  - ● REQ61: Performance monitoring mechanism for IP flow
  - ● REQ62: Performance monitoring mechanism for the VPN flow
  - ● REQ63: The end-to-end path trace mechanism for the IP flow

Next Steps

- Solicit more comments and feedback

- Incorporate more requirements and solutions

- Revise the draft