APS-based MPLS-TP linear protection

draft-zulr-mpls-tp-linear-protection-switching-07.txt

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Introduction and Draft History

- **Linear protection switching:** for one or more working transport entities, set up one protection transport entity, which is ready for taking over the service transmission when a working transport entity failed.

- **MPLS-TP linear protection mode:**
  - 1+1 unidirectional protection switching mechanism for either point-to-point or point-to-multipoint
  - 1+1/1:1 bidirectional protection switching mechanism for point-to-point
  - Applicable to both LSPs and PWs of MPLS-TP

- **MPLS-TP linear protection protocol:** APS (Automatic Protection Switching) protocol is specified for bidirectional protection switching which needs the coordination of the two endpoints of the transport entity.

- **Inherit mature and proven principles:** APS is based on the same principles and behavior of the APS protocol designed for SONET/SDH networks, and provides commonality with the established operation models utilized in other transport network technologies (e.g., SDH/SONET and OTN).

- **Document History:** submitting individual draft and applying for adopt for more than three years.

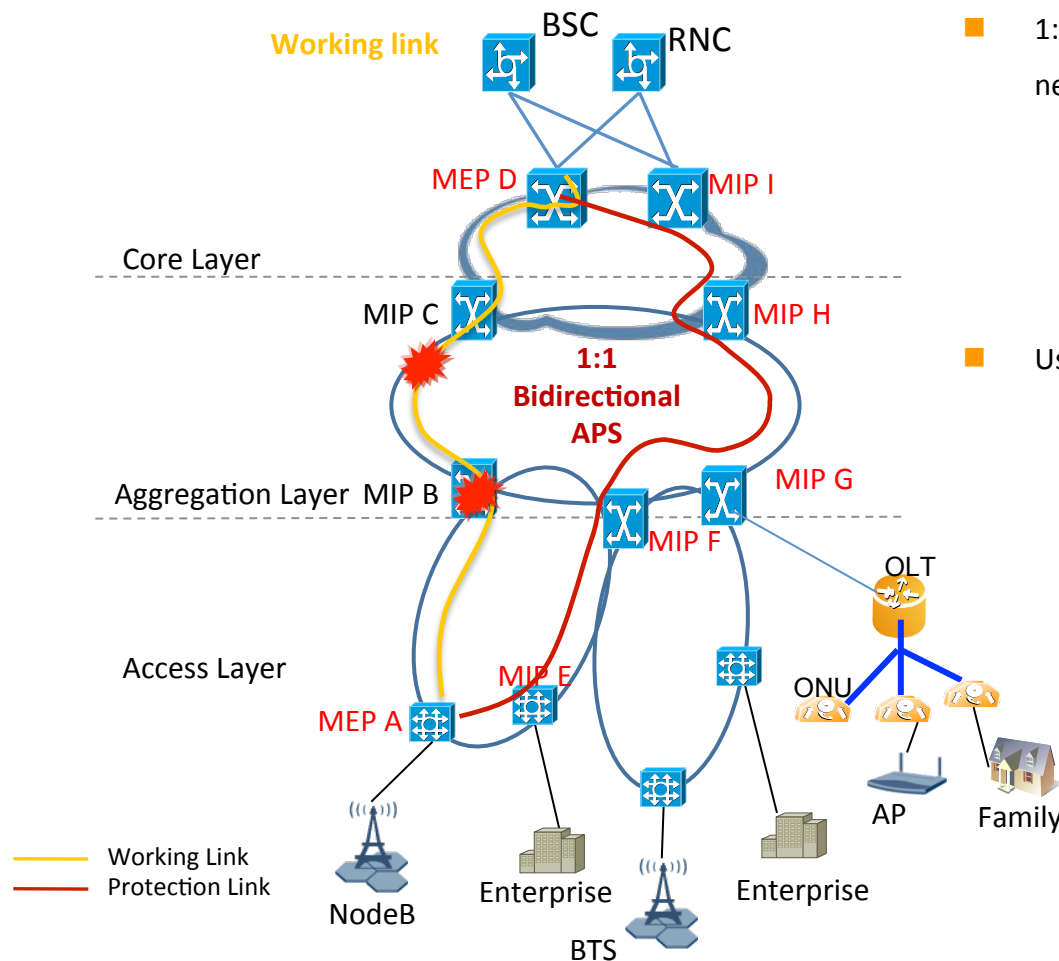| Date	Version	Date	Version
2013-05-06	07	2011-07-13	03
2012-11-05	06	2011-01-11	02
2012-07-31	05	2010-07-12	01
2012-01-09	04	2010-03-23	00

Backgrounds

Backgrounds of APS
- ✓ APS based linear protection for SDH , OTN and Ethernet had been standardized in ITU-T G. 808.1, G.841, G.873.1 and G.8031, and been supported by many top tier operators and vendors for years;
- ✓ APS based linear protection for MPLS-TP has been required by many operators and has been widely deployed in PTN networks since 2009;
- ✓ Using APS based linear protection for WDM, SDH , OTN, Ethernet and MPLS-TP in multilayer networks could benefit the equipment developing and network maintenance operating.
- ✓ The ecosystem of APS based linear protection is mature and verified by the whole industry.

Backgrounds of this proposal
- ✓ ITU-T G.8113.1 PTN OAM recommendation was approved by WTSA-12 and code point assigned by IANA in Nov. 2012.
- ✓ An agreement was reached in Hiroshima SG15 MPLS-TP interim meeting: continue to work in cooperation with the IETF to enhance PSC as defined in RFC6378 so that it will meet the APS requirements. The objective is to develop, as soon as possible, a single solution for linear protection that fully meets the ITU APS requirements.
- ✓ The consent time target for G.8131 was April 2014, expected and expressed by many members in ITU-T SG15.
- ✓ Both Amendments for G.8113.1 &G.8113.2 were determined, and approved to change from TAP to AAP in last SG15 Plenary meeting in 12 July 2013.

APS application scenarios in CMCC

✓ APS based linear protection has been deployed in CMCC's PTN network with more than 500,000 nodes until Jun. 2013, which is mature and proven.

Working link

BSC   RNC

MEP D   MIP I

Core Layer

MIP C   MIP H

1:1
Bidirectional
APS

Aggregation Layer MIP B   MIP G

MIP F

OLT

Access Layer

MIP E   ONU

MEP A   AP   Family

Working Link
Protection Link

NodeB   Enterprise   Enterprise   BTS

- 1:1 LSP linear protection is deployed all over the PTN networks of CMCC to provide high quality service for:

  - Wireless Backhaul(2G/3G/LTE)
  - Enterprise customers
  - OLT uplinking for family broadband

- Use case:

  - **Normal state**: LSP A-B-C-D is set up as working path and LSP A-E-F-G-H-I-D as the protection path. APS is bidirectional and running through A-E-F-G-H-I-D and D-I-H-G-F-E-A.

  - **Failure state:** When a link failure or node failure in working path occurs, both Node A and Node D can detect the failure by MPLS-TP OAM mechanism and then the services is switched to the protection Link with APS protocol.

Summary of APS based MPLS-TP deployments

- **PTN Equipment's number**: more than 500,000 in China, and more than 200,000 Overseas.

- **Operators number**: more than 30 globally, especially in Asia and Europe.
  - Asia: NTT , KDDI, SKT, SingTel, etc.
  - Europe: Vodafone, Telecom Italia, Telefónica, etc.

- **PTN Equipment Vendors:** more than 10, such as Huawei, ZTE, Alcatel-lucent, WRI, NEC, etc.

- **Chip Vendors:** more than 10, such as Broadcom, PMC, Cortina, Altera, etc.

- **Test instruments Vendors:** more than 10, such as Spirent, IXIA, EXFO, etc.

Proposal

- Request MPLS WG to accept the draft "draft-zulr-mpls-tp-linear-protection-switching-07.txt" as an Informational RFC in 2013.