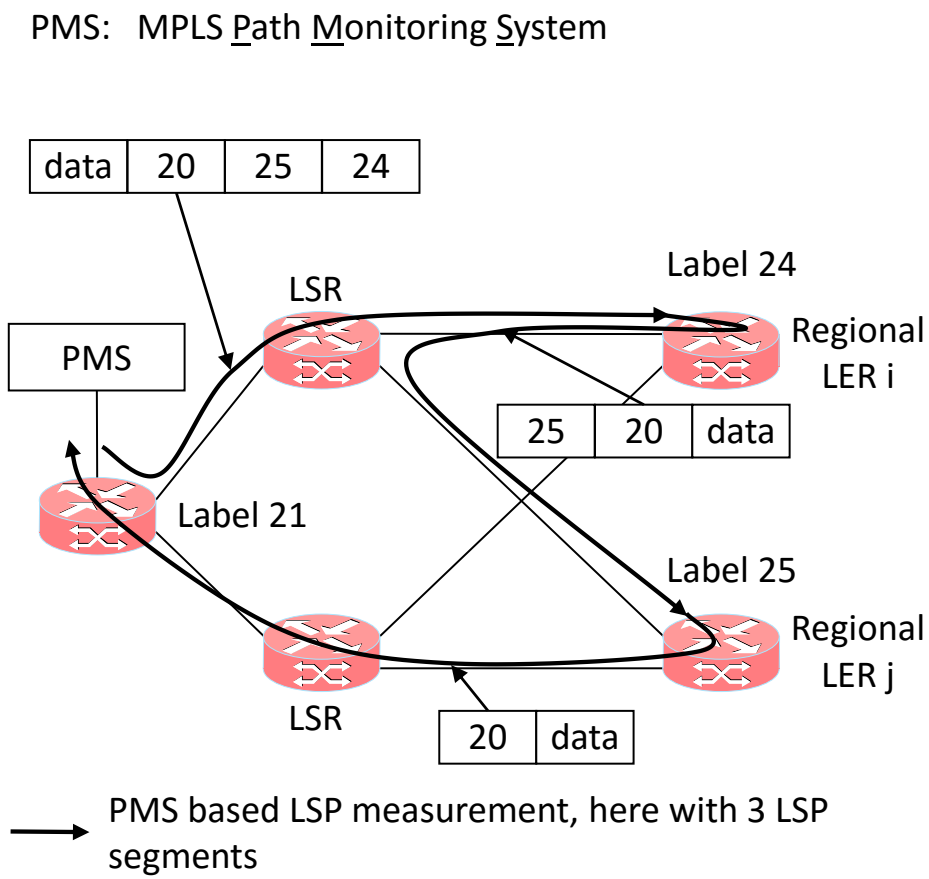
draft-leipnitz-spring-pms-implementation-report

Use case: MPLS path monitoring
Monitoring MPLS paths

- network topology (the implementation detects and stacks LDP signaled Labels)
- the MPLS path monitoring packets remain in data plane
- a single PMS is able to address all LSPs of a domain, a PMS allows allows arbitrary path combinations
- Example task shown here: PMS based data plane failure detection between LER i and LER j.

In general, all MPLS LSPs of a domain can be monitored this way.



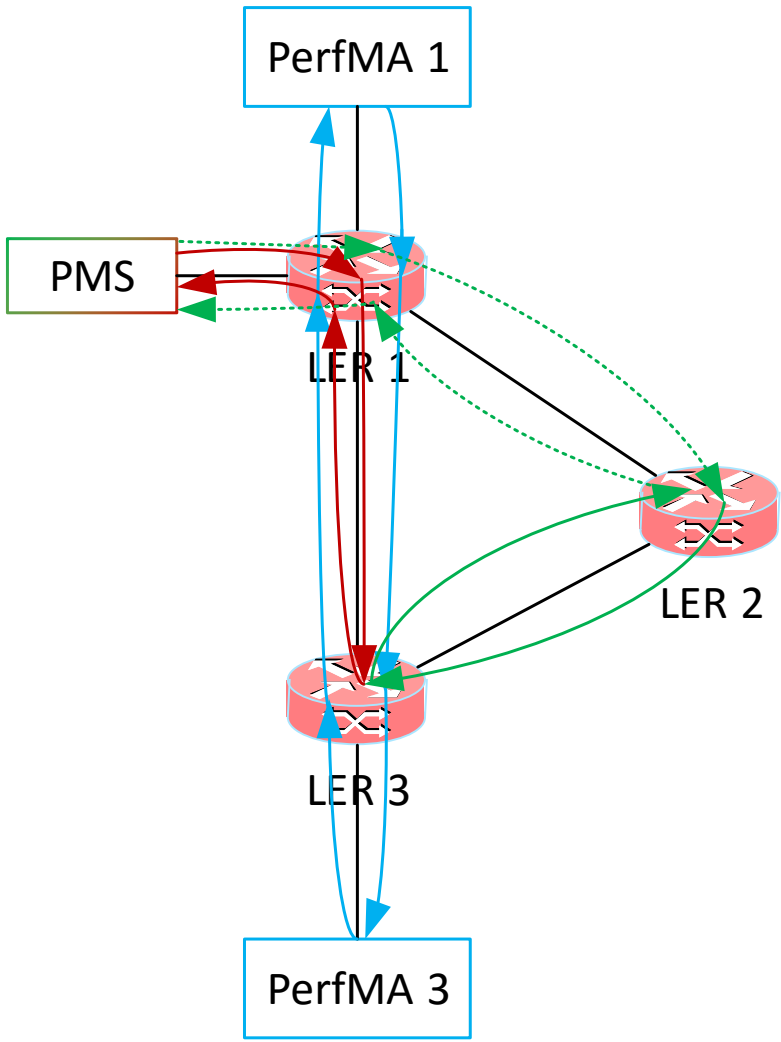
Measurement Topology (extract)

case one: IPPM and PMS comparison of RT Delay measurement:

- PerfMA 1 $\leftrightarrow$ PerfMA 3 (reference)
- PMS $\leftrightarrow$ LER 3

case two: LER 2 $\leftrightarrow$ LER 3 measurements:

- LER 2 $\leftrightarrow$ LER 3 = PMS $\rightarrow$ LER 1 $\rightarrow$ LER 2 $\rightarrow$ LER 3 $\rightarrow$ LER 2 $\rightarrow$ LER 1 $\rightarrow$ PMS
  – PMS $\leftrightarrow$ LER 2
- LER 3 $\leftrightarrow$ LER 2 in analogy by subtracting PMS $\leftrightarrow$ LER 3



Measurement Results and Evaluation

- measurement: 288 mean RT Dealy values each calculated of 10 singleton samples (8 hours measurement)
- Anderson-Darling-K-Sample (ADK) is successful (≤ 1.993, RFC 6576) after adjustment of the mean / median
- high precision of the values
- no network emulator inserted
- LER 2 $\leftrightarrow$ LER 3 two calculation methods result in mean / median values differing by 10 μs

Test metric	**PERFAS+**	**PMS**
minimum [μs]	691.5	695.5
maximum [μs]	701	704.5
mean [μs]	695.4	699.6
median [μs]	695.5	699.5
standard deviation [μs]	1.4	1.7
ADK-value	278.445	
ADK-value (adj. of mean)	1.701	
ADK-value (adj. of median)	1.982	

Table: PERFAS+ and PMS OWD measurement results for path LER 1 to LER 2 and ADK test results

IP-address variation

- identical routing paths for all measurements, no Equal-cost multi-path routing
- 11 mean round-trip delay values of 10 singletons per measurement, collected at different times of a day
- only IP-addresses varied, MPLS-stack kept the same
- PMS connected to two different LER “one” and “two”
- difference in mean values of 19.5 μs and 14.4 μs, RTD a.b.c.0 is always smaller than that of a.b.c.32

Interface IP-address	**mean [μs]**	**median [μs]**
one / a.b.c.0	1413.2	1412
one / a.b.c.32	1432.7	1433
two / a.b.c.0	1446.4	1446
two / a.b.c.32	1460.8	1460.5

Table: Destination-IP-address variation

Progress on SPRING based OAM within IETF

- SPRING allows for new OAM features
- a single PMS may send packets to any router and collect responses or it may send and receive circular routed measurement packets
- no need to standardize protocols
- SPRING WG is chartered to produce also OAM related use cases, draft-ietf-spring-oam-usecase is stable for a while
- draft-leipnitz-spring-pms-implementation-report documents first experiences with SPRING enabled OAM features
- How to make progress on SPRING enabled new OAM features within IETF?