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Network Service Header KPI Stamping

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Overview



- KPI Stamping provides a generic method for examining KPIs at each SF in an NSH service chain
 - We use MD2 to define KPI header structure
- We currently define 2 KPI types, latency and QoS. The method is extensible to other KPI types
- We use detection mode and extensive mode.
 - Detection mode allows the SFC classifier to ingress stamp the KPI and optionally to insert a threshold, that when exceeded constitutes a service violation
 - Extensive mode allows us to aggressively examine the service chain for root cause analysis of KPI violation
- KPIs can be examined, end-to-end, on a specific SF, or hop-by-hop
- Associated control plane is not defined in this draft

Detection Mode

1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 9 0 Ver|O|C|R|R|R|R|R|R|R| Length | MD type=0x2 | Next Protocol Service Path Identifier | Service Index MD Class=KPI Monitoring |C| Type=TSD IRI Len Flow ID I C I KPIType | SI Threshold KPI Value Ingress KPIStamp Figure 6: Generic NSH KPI Encapsulation (Detection Mode)

- Low Overhead, no packet growth
- Ingress stamp performed by SFC Classifier (FSN)
- Threshold defines maximum chain latency (for example)

Extended Mode

2 2 222 6 1 2 3 4 5 - 8 9 0 8 9 0 2 Length MD type=0x2 |Ver|O|C|R|R|R|R|R|R| NextProto Service Path ID Service Index | Class=KPI Monitoring |C| Type=KPI IRI Len |I|E|T|R|R|R|SSI| Service Index | Flow ID Reference Time |I|E|K|K|K|K|K|K| Reserved KPI Value (LSN) |I|E|K|K|K|K|K|K| Reserved KPI Value (FSN) Figure 7: Generic KPI Encapsulation (Extended Mode)

- Reference time and Flow ID are used for offline analysis and correlation
- SSI defines required operation
- E2E stamps at chain ingress and egress
- Specific stamps at 1 SF ingress and egress
- Hop by hop stamps at each SF ingress, egress or both

Extended Mode (Latency)

8 9 0 1 2 3 2 3 4Length MD-type=0x2 Ver O C R R R R R R Class=KPI Monitoring IC| Type=TS R Len Flow ID I E T R R SSI Service Index Reference Time (T bit is set) R R R Syn | Service Index Ingress Timestamp (I bit is set) (LSN) Egress Timestamp (E bit is set) (LSN) |I|E|R|R|R| Syn | Service Index Reserved Ingress Timestamp (I bit is set) (FSN) Egress Timestamp (E bit is set) (FSN) Figure 8: NSH Timestamp Encapsulation (Extended Mode)

- SFs must be in synch
- I, E are ingress, egress flags
- T is reference time flag
- Syn indicates synchronization status
- Fragmentation is out of scope.
- PTP timestamps are used

Extended Mode (QoS)

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 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1	Q Type(QT)	Value	Length	Comment
<pre>++++++++++++++++++++++++++++++++++++</pre>	IVLAN	0x01	4 Bits	Ingress VLAN (PCP + DEI)
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-	EVLAN	0x02	4 Bits	Egress VLAN
MD Class= KPI C Type= QoS R Len	IQINQ	0x03	8 Bits	Ingress QinQ (2x PCP+DEI)
R R T R R SSI Service Index Flow ID +-+++++++++++++++++++++++++++++++++++	EQINQ	0x04	8 Bits	Egress QinQ
Reference Time (T bit is set)	IMPLS	0x05	3 Bits	Ingress Label
R R R R R R Service Index Reserved ++++++++++++++++++++++++++++++++++++	EMPLS	0x06	3 Bits	Egress Label
QT QoS Value R R R E QT QoS Value R R R E +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-	IMPLS	0x07	6 Bits	2 Ingress Labels (2x EXP)
· · ·	EMPLS	0x08	6 Bits	2 Egress Labels
R R R R R R R R Service Index Reserved +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-	IDSCP	0x09	8 Bits	Ingress DSCP
QT QoS Value R R R E QT QoS Value R R R E +-++++++++++++++++++++++++++++++++++	EDSCP	0x0A	8 Bits	Egress DSCP

• QoS stamping is performed infrequently on a tiny percentage of traffic

Result Examples



- Detect and diagnose latency issues in SFs and Vlinks
- Detect QoS configuration issues per SF and Vlink

Summary

- KPI Stamping provides a generic method for examining KPIs at each SF in an NSH service chain in order to
 - Check SF processing times
 - Check Vlink transit times
 - Check QoS configuration consistency in a chain
- KPI stamping is not an OAM protocol it operates on subscriber traffic
- KPI stamping is performed on a very small subset of traffic
- KPI Stamping is an operational tool that reduces the need for expensive and manual techniques in order to monitor and debug NSH service chains

Thanks!