CSIG Telemetry Project Scope

Simple and Effective In-band Network Signals for Efficient Traffic Management in Datacenter Networks

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Proposed In-band Telemetry Project Scope

- This standard specifies protocols, procedures, and managed objects to support signaling of telemetry within tags on data frames in IEEE 802 networks. This standard supports telemetry for IEEE Std 802.1Q systems, including MAC, C-VLAN and S-VLAN Bridges, and for IEEE 802 end stations. Also supported is the use of telemetry in conjunction with IEEE Std 802.1AE MACSec.

Thank You

Backup

Proposed Project Dependency

- This standard will use content from the Congestion Signaling (CSIG) clauses published within the Ultra Ethernet Consortium (UEC) standard for Ultra Ethernet for tag formats and signal definitions.
- The CSIG sections of the UEC standard for Ultra Ethernet will be published in the next few months.

CSIG Entity Functions

- Insert and Delete CSIG tags to or from frames at the End Stations
  - Operation of these functions depends on the service requests, CSIG entity capabilities, management parameter settings, and LLDP negotiation state.
- Perform Measurements
  - Available Bandwidth (over a specified measurement interval at egress)
  - Residence Time (for this frame, measured from ingress to egress MSAP)
  - Current Queue Depth (for this frame at frame egress time)
- Updating CSIG tags
  - Compare the ingress signal value with the calculated signal value over this hop
  - Update the signal value if the calculated signal value is greater than (or less than) the ingress signal value (depending on signal type), otherwise forward the CSIG tag unchanged from the ingress value.
  - If the signal value was updated, then also update the location metadata.
  - If the packet was trimmed at this hop, then set the “do not modify” bit to prevent further updating.

Backward Compatibility

- To support CSIG the entire path of switches must be CSIG capable.
  - A CSIG-tagged frame is forwarded by Bridges that do not support CSIG because it appears as an ordinary data frame.
  - However, if no measurement is made, the CSIG information becomes invalid, and the end-to-end scheme fails.
- The UEC solution is to use LLDP to negotiation CSIG capabilities over each link and rely upon a central manager to inform the network end points of the end-to-end capabilities.
  - If the link partner does not specifically indicate CSIG support, the sending port strips the CSIG tag before forwarding the frame.

Thoughts on CSIG initiation and termination at L2

- Current use cases initiate CSIG tagging at the transport (L4) layer and use the telemetry to improve the transport function.
- Other use cases such as Debugging and Fault Isolation, Traffic Engineering, and SLA Compliance could make measurements starting and ending at lower network levels (i.e. L2).
  - A management entity could control CSIG initiations at the L2 layer
  - This could be done in a way that didn't interfere with CSIG requests from Higher Layers by giving priority to the Higher Layer's requests.
  - An option to initiating and terminating CSIG at L2 would greatly expands the utility of CSIG, since operation at a L2 doesn't depend on a transport (L4) protocol supporting CSIG capabilities (i.e. it could be run at L2 or L3 under conventional TCP).
  - Insertion and deletion of CSIG could be done at bridge ports as well as end stations.

CSIG Project Deliverables

- End station architecture supporting CSIG tag insertion
  - Define the CSIG tag format
  - Define an Extended MAC Service Interface for client request/indications with telemetry support
  - Define management to support CSIG functions at L2
- Bridge architecture for Q and MAC bridging CSIG tag forwarding
  - Define CSIG signal processing and updating
  - Define CSIG Tag strip and forward function along with LLDP configuration
  - Define a method for providing CSIG telemetry to higher layer entities
  - Define a method to inject and remove CSIG tags from Bridge ports
  - Define management to support CSIG functions at L2