Proposal for Enabling Live Traffic Performance Monitoring of RoE Traffic using Colored Traffic

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IEEE 1914.3
Radio over Ethernet Encapsulations and Mappings
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Proposal for Enabling Live Traffic Performance Monitoring of RoE Frames using Colored Traffic

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Ethernet Test and Assurance Today
KPIs Needed to Manage Ethernet Networks

Frame Delay (FD)
- Round Trip
- One way

Frame Delay Variation (FDV)
- IETF / MEF – RFC 3393 Inter-Packet Delay Variation
- ITU – Typically considered Jitter

Frame Loss Rate
- Sampled
- Real

Throughput
- RFC-2544 / Y.1564/ETH-TST
- Offered and Delivered

Availability
- Based on Frame Loss Ratio Percentage
- ITU – Sliding Window
- IEEE – Static Window

Test Frames Inserted into Traffic

Measurements Performed on Test Frames
Not measuring actual Packet/Frame Performance

Test Traffic may impair high priority traffic
Test Frames undersample actual traffic.
Current Limitations

Measurements rely on INJECTED PACKETS.... Not measuring performance of the actual traffic.

Operators want...and NEED...to know the performance of the REAL TRAFFIC running across this network.

Operators will NEED accurate, real-time KPI/SLA feeds, on their high-priority traffic (eg RAN fronthaul, ULL Services) into their Cloud Management System to dynamically optimize the network.
Fronthaul Ethernet PM – a Proposed New Methodology

Build off of IETF IP FPM (IP Flow Performance Management) Framework
Motivation

• Why IPFPM?
  ✓ Measurement rely on injected packets has limitations
  ✓ Operators needs to know the performance of the real traffic running in their networks

• What Can IPFPM Do?
  ✓ IP Flow Performance Measurement
  ✓ Measure the real traffic
  ✓ Support MP2MP flow measurement, with data correlation and re-order tolerant mechanism
  ✓ Enable SLA verification, fault localization and fault delimitation

Packet Loss Measurement

- Packet Loss
  - Use one or more unused bits to mark the packets
  - Different markings (“0”, “1”) divide the flows into different consecutive blocks
  - Counting based on each block of marker, two counters, one for “0” block, the other for “1” block

```
Flow A
  A AA A A AA A A
  R1
  Marking Changing
  5 Zeros

Flow B
  B B B B B B B B
  5 Zeros

Tx

Rx

No packet lost
One packet get lost
```
Packet Delay Measurement

- Only marking **ONE** packet in a period,
- Measure the packet delay based on **THE** packet
- Time synchronization is required
Proposal: Suggest IEEE working group assign a minimum of 2 bits for PM coloring from existing fields

**Suggestion #1:** Use the subType field
- subType is 8 bits which allows for 256 subTypes
- Only 6 subTypes are defined today
- Reduce subType to 6 bits which still allows for 64 subTypes

**Suggestion #2:** Use the length field
- length is 16 bits which allows for lengths up to 65,535 Bytes
- A ‘Jumbo’ is 9,000 Bytes of payload and requires only 14 bits to define
- 14 bits allows for lengths up to 16,383 Bytes which exceeds current max jumbo Ethernet payload lengths
- Current RoE payload lengths are 1,500 Bytes

**Suggestion #3:** Optional Reserved Bits in the Sequence Number (seqnum) field
- If the Ordering Info is a timestamp, then Sequence Number field is not available.
Back-up
IPFPM Components

- Period Number
  - Data collected correlation

Data Report (IPFIX)

MCP

Collects the measurement data from the Measurement Agents (MAs) and calculates the performance metrics according to the collected measurement data.

MA1

Measurement Agent (MA)

MA2

MA3

Measurement Agent (MA)

MA4

Executes the measurement actions (e.g., marks the packets, counts the packets, records the timestamps, etc.), and reports the data to the Measurement Control Point (MCP).