None

Release draft (32a7428)

OPNFV

August 14, 2016

CONTENTS

The goal of Software Fastpath service Quality Metrics (SFQM) is to develop the utilities and libraries in DPDK to support:

- Measuring Telco Traffic and Performance KPIs. Including:
  - Packet Delay Variation (by enabling TX and RX time stamping).
  - Packet loss (by exposing extended NIC stats).
- Performance Monitoring of the DPDK interfaces (by exposing extended NIC stats + collectd Plugin).
- Detecting and reporting violations that can be consumed by VNFs and higher level management systems (through DPDK Keep Alive).

After all **the ability to measure and enforce Telco KPIs (Service assurance) in the data-plane will be mandatory for any Telco grade NFVI implementation**.

All developed features will be upstreamed to DPDK or other Open Source projects relevant to telemetry such as collectd and Ceilometer.

The OPNFV project wiki can be found @ SFQM

CHAPTER

ONE

PROBLEM STATEMENT

Providing carrier grade Service Assurance is critical in the network transformation to a software defined and virtualized network (NFV). Medium-/large-scale cloud environments account for between hundreds and hundreds of thousands of infrastructure systems. It is vital to monitor systems for malfunctions that could lead to users application service disruption and promptly react to these fault events to facilitate improving overall system performance. As the size of infrastructure and virtual resources grow, so does the effort of monitoring back-ends. SFQM aims to expose as much useful information as possible off the platform so that faults and errors in the NFVI can be detected promptly and reported to the appropriate fault management entity.

The OPNFV platform (NFVI) requires functionality to:

- Create a low latency, high performance packet processing path (fast path) through the NFVI that VNFs can take advantage of;
- Measure Telco Traffic and Performance KPIs through that fast path;
- Detect and report violations that can be consumed by VNFs and higher level EMS/OSS systems

Examples of local measurable QoS factors for Traffic Monitoring which impact both Quality of Experience and five 9's availability would be (using Metro Ethernet Forum Guidelines as reference):

- Packet loss
- Packet Delay Variation
- Uni-directional frame delay

Other KPIs such as Call drops, Call Setup Success Rate, Call Setup time etc. are measured by the VNF.

In addition to Traffic Monitoring, the NFVI must also support Performance Monitoring of the physical interfaces themselves (e.g. NICs), i.e. an ability to monitor and trace errors on the physical interfaces and report them.

All these traffic statistics for Traffic and Performance Monitoring must be measured in-service and must be capable of being reported by standard Telco mechanisms (e.g. SNMP traps), for potential enforcement actions.

CHAPTER

TWO

SCOPE

The output of the project will provide interfaces and functions to support monitoring of Packet Latency and Network Interfaces while the VNF is in service.

The DPDK interface/API will be updated to support:

- Exposure of NIC MAC/PHY Level Counters
- Interface for Time stamp on RX
- Interface for Time stamp on TX
- Exposure of DPDK events

collectd will be updated to support the exposure of DPDK metrics and events.

Specific testing and integration will be carried out to cover:

- Unit/Integration Test plans: A sample application provided to demonstrate packet latency monitoring and interface monitoring

The following list of features and functionality will be developed:

- DPDK APIs and functions for latency and interface monitoring
- A sample application to demonstrate usage
- collectd plugins

The scope of the project involves developing the relavant DPDK APIs, OVS APIs, sample applications, as well as the utilities in collectd to export all the relavent information to a telemetry and events consumer.

VNF specific processing, Traffic Monitoring, Performance Monitoring and Management Agent are out of scope.

The Proposed Interface counters include:

- Packet RX
- Packet TX
- Packet loss
- Interface errors + other stats

The Proposed Packet Latency Monitor include:

- Cycle accurate stamping on ingress
- Supports latency measurements on egress

Support for failover of DPDK enabled cores is also out of scope of the current proposal. However, this is an important requirement and must-have functionality for any DPDK enabled framework in the NFVI. To that end, a second phase of this project will be to implement DPDK Keep Alive functionality that would address this and would report to a

VNF-level Failover and High Availability mechanism that would then determine what actions, including failover, may be triggered.

CHAPTER

THREE

CONSUMPTION MODELS

In reality many VNFs will have an existing performance or traffic monitoring utility used to monitor VNF behavior and report statistics, counters, etc.

The consumption of performance and traffic related information/events provided by this project should be a logical extension of any existing VNF monitoring utility. It should not require a new utility to be developed. We do not see the Software Fastpath Service Quality Metrics data as major additional effort for VNFs to consume; this project would be sympathetic to existing VNF architecture constructs. The intention is that this project represents a lower level interface for network interface monitoring to be used by higher level fault management entities (see below).

Allowing the Software Fastpath Service Quality Metrics data to be handled within existing VNF performance or traffic monitoring utilities also makes it simpler for overall interfacing with higher level management components in the VIM, MANO and OSS/BSS. The Software Fastpath Service Quality Metrics proposal would be complementary to the Fault Management and Maintenance project proposal (Doctor), which addresses NFVI Fault Management support in the VIM. To that end, the project committers and contributors for the Software Fastpath Service Quality Metrics project wish to collaborate with the Doctor project to facilitate this.