Considerations for Benchmarking Network Performance in Containerized Infrastructure

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Scope Re-introduction

- Previous **NFV benchmarking** related RFCs
  - RFC 8172: Considerations for Benchmarking Virtual Network Functions and Their Infrastructure
  - RFC 8204: Benchmarking Virtual Switches in the Open Platform for NFV (OPNFV)

- The primary scope of this document is to fill in **the gaps** of these works

when applying to containerized NFV infrastructure.

- **The consideration gaps are:**
  - Different **Container Networking Models** (including the extended Berkeley Packet Filter model which was not mentioned in previous documents)

  - **Container Resource Configurations**

Updates (1)

Address Libin feedback from mailing list

The configurations of acceleration techniques (or CNIs) should be considered.

- Acceleration CNI configuration parameters were already included in several Resource configuration sections (e.g, DPDK pod hugepage, AF-XDP configuration)
- Add NUMA cores allocation to vSwitch, NIC (which are configurations of User-space acceleration CNIs)
- Add line to clarify this document only introduces new parameters related to containerized infrastructure. Previous VNF and vSwitch parameters in RFC 8204, 8172 are still applicable

5.2. Resources Configuration

The resource configuration considerations listed here apply not only to the CNF but also to other components in a containerized System Under Test (SUT). A containerized SUT comprises NICs, possible cables between hosts, the kernel and/or vSwitch, and CNFs.

Note that this section describes only the new resource configuration parameters introduced by containerized infrastructures. The configuration parameters for vSwitch and VNF environments, as defined in RFC 8172 and RFC 8204, remain applicable.

Updates (2)

Address Libin feedback from mailing list

In Section 5.2.5, for the service function chaining, when a single host runs multiple CNFs belonging to the same chain or different chains, the resource scheduling policy may be another factor which should be considered. Under such scenarios, the resources are not allocated to each CNF fixedly in advance.

Add new lines and configuration parameters in Section 5.2.5 Service Function Chaining to address this

multiple NFV service instances under varying deployment densities on a single host. Another aspect to consider in a service function chaining scenario is that a single CNF or VNF may be part of multiple service chains. In such cases, varying resource scheduling policies during runtime (e.g., CNF activation scheduling, CPU scheduling) may also lead to network function throughput and loss improvement as described in [NFVnice].

For this consideration, the additional configuration parameters should be considered for containerized infrastructure benchmarking are:

- Number of CNFs

- Service chain CNF composition

- Service chain resource scheduling policies (e.g., CNF activation time, CPU allocation time, etc.)

NFVnice: *Dynamic Backpressure and Scheduling for NFV Service Chains*
IEEE/ACM Transactions on Networking (April 2020)

Document Review History

Before Adoption

- **Version 10 – March 2023**
  - **Review from Linux Foundation VinePerf Project (Sridhar and Al Morton)**
  - Agreed on Container Networking Models and Resource Configuration categorization
- **Version 11 – July 2023**
  - **Review from BMWG members (Gábor and Vratko)**
  - Added Benchmarking parameter for each Resource Configuration consideration
- **Version 13 – November 2023**
  - **Comments at IETF 117 meeting**
  - Provided clear Scope section and remove duplicate introduction information

After Adoption

- **Version 0 – March 2024**
  - **Reviews from BMWG members in WG adoption call comments**
  - Added Environment Setup repeatability guidance for each Containter Networking Models
- **Version 6 – October 2024**
  - **Review from Related RFC 8204 document - Maryam**
  - Revise Hybrid networking stack information for Accelerated networking models, added xPU acceleration, added AF_XDP resources consideration, eBPF categorization correction
- **Version 7 – June 2025**
  - **Review from BMWG member - Libin**
  - Added additional Service Function Chaining resource scheduling policy consideration

Summary

- The document is now technical and format Ready
- We would like to request Last Call.