Considerations for Benchmarking Network Performance in Containerized Infrastructure

draft-dcn-bmwg-containerized-infra-01

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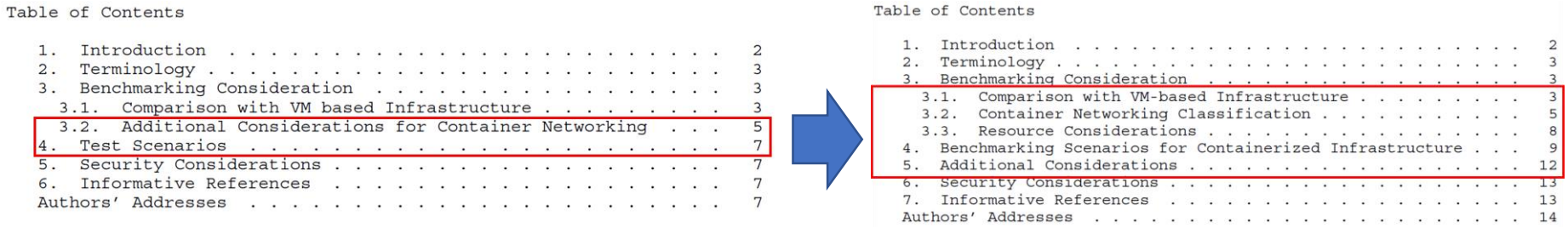
Reviews from -00

- Al Morton
  - Need to mention “repeated instantiation and testing to quantify the performance variation”
  - Performance affected by LCM(Lifecycle Management) to Containerized VNF
- Maciek Konstantynowicz
  - More figures including building blocks and traffic paths when benchmark network performance
  - More specifically listing technologies (driver types, etc) used for interconnecting virtual devices
- Luis Contreras
  - Specific guidance or recommendations about what and how to test and benchmark the containerized case
  - References/links for container solutions (Docker, Kubernetes)
  - Potential cons due to containerization
  - Additions that this draft provides with respect to [ETSI-TST-009]
  - Several editorial comments

Updates Summary

- Remove 2 chapters: “Additional Considerations for Container Networking” and “Test Scenarios”
  - Contents of chapter 3.2 moved to “Resource Consideration”
- Add 3 chapters:
  - Container Networking Classification
  - Resource Considerations
  - Benchmarking Scenarios for Containerized Infrastructure
    - Categorize container networking technologies
    - Try to describe different resource utilization support between VM-based and containerized infrastructure
    - Drawing more figures – Container networking models
    - New benchmarking scenarios



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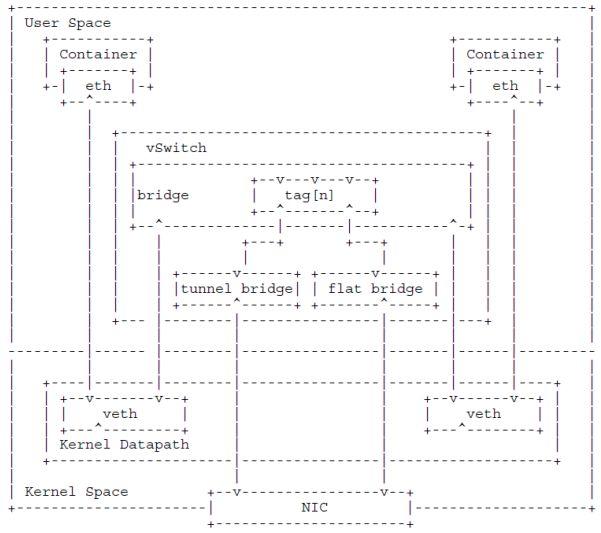
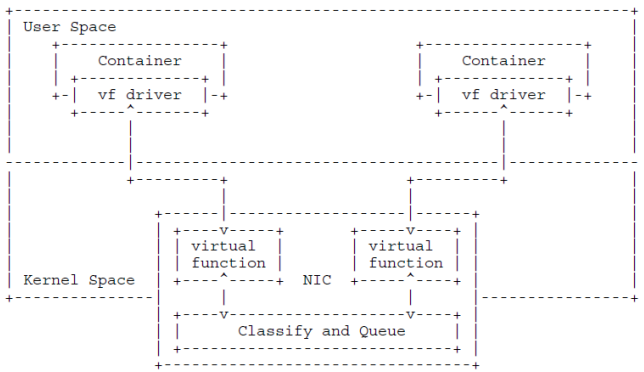
Detail Updates (1)

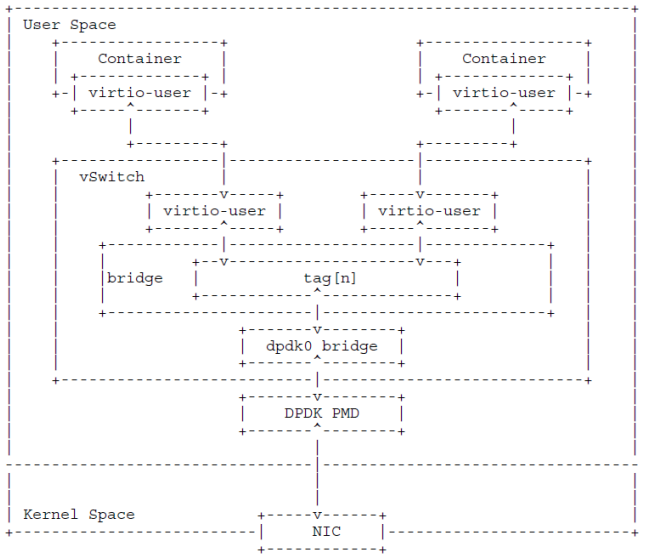
- 3.2. Container Networking Classification
  - 3-networking models depending on location of network service creation
    - Kernel space network model
    - User space network model – Device pass-through
    - User space network model – vSwitch model
  - Mapping current network technologies to this classification
    - Add 10 references/links ex) SR-IOV, eBPF, VPP



Kernel space model



User space model
(Device pass-through)



User space model
(vSwitch)

Detail Updates (2)

- 3.3. Resource Considerations
  - Huge-page
    - In the containerized infrastructure, container is isolated in the application level so that administrators can set Hugepage more granular level(e.g 2M, 4M, ...)
  - NUMA (Non-Uniform Memory Access)
    - Instantiation of C-VNFs is somewhat non-deterministic and apparently NUMA-Node agnostic, which is one way of saying that performance will likely vary whenever this instantiation is performed. So, repeated instantiation and testing to quantify the performance variation is required
  - RX/TX Multiple-Queue
    - Technology that enables packet sending/receiving processing to scale with number of available vCPUs of guest VM
    - RX/TX Multiple- Queue technology is not supported in the containerized infrastructure

Detail Updates (3)

- 4. Benchmarking Scenarios for the Containerized Infrastructure
  - In the [ETSI-TST-009], there are two scenarios
    - Container2Container
    - Pod2Pod (as mapped with BMP2BMP)
  - In this draft, we consider deployment scenario where Pod is running on VM
    - BMP (Baremetal Pod)
    - VMP (Virtual Machine Pod)
  - 2 additional test scenarios – BMP2VMP, VMP2VMP

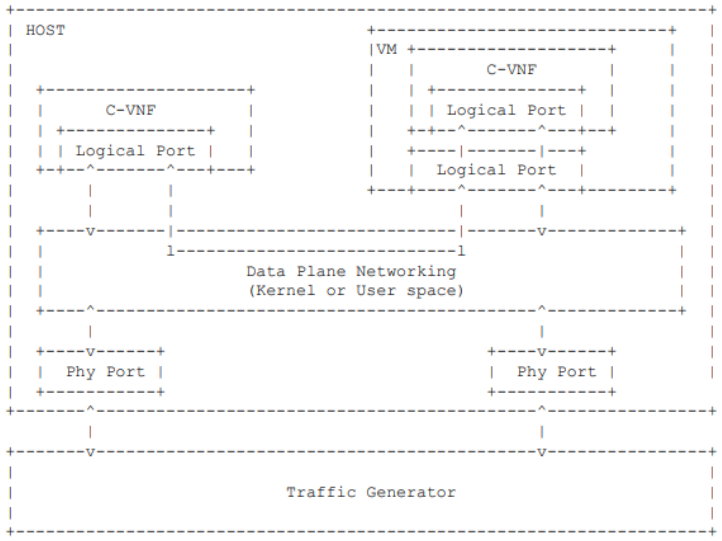


Figure 6: Single Host Test Scenario - BMP2VMP

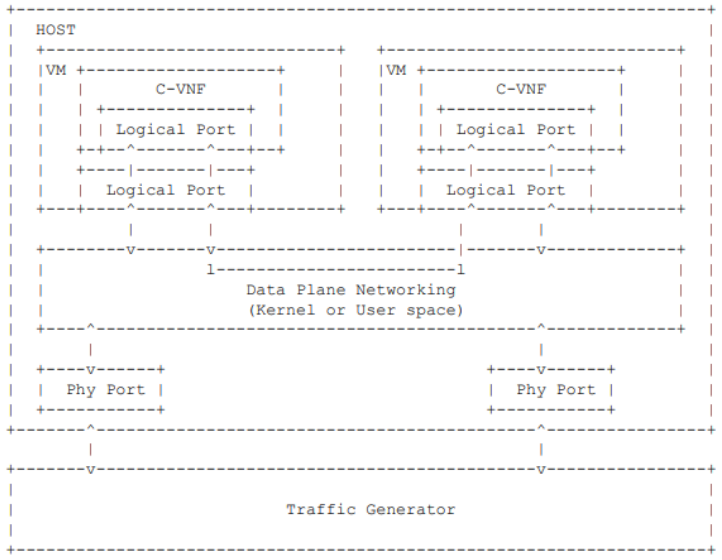


Figure 7: Single Host Test Scenario - VMP2VMP

Detail Updates (4)

- Additional Considerations
  - In the NFV environment, the physical network port commonly will be connected to multiple VNFs rather than dedicated to a single VNF
    - Multiple PVP test setup architecture in [ETSI-TST-009]
  - Therefore, benchmarking scenarios should reflect operational considerations such as number of VNFs or network services defined by a set of VNFs in a single host
    - [draft-mkonstan-nf-service-density] is a good example from this perspective
  - It is not only limited in the containerized infrastructure, but also VM-based infrastructure

Next Step

- We tried to solve all comments from -00 review
  - Are there any missing points?
- Any comments or feedbacks are welcome
- Keep trying to update new technologies, resource considerations

- IETF BMWG Hackathon
  - Proof our draft scenarios and feature
  - Consideration automation benchmark