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
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
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
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