Considerations for Benchmarking VNFs and their Infrastructure

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draft-ietf-bmwg-virtual-net (01)
Current WG 01 Additions

COMMENTS on the bmwg-list:
• Addressed Ramki Krishnan's comments on section 4.5, power, see that section (7/27 message to the list).
• Addressed Saurabh Chattopadhyay's 7/24 comments on VNF resources and other resource conditions and their effect on benchmarking, see section 3.4.
• Addressed Marius Georgescu's 7/17 comments on the list (sections 4.3 and 4.4).

AND, comments from the extended discussion during IETF-93 BMWG session:
• Section 4.2: VNF footprint and auxiliary metrics (Maryam Tahhan),
• Section 4.3: Verification affect metrics (Ramki Krishnan);
• Section 4.4: Auxiliary metrics in the Matrix (Maryam Tahhan, Scott Bradner, others)
Charter and Next step

- **VNF and Related Infrastructure Benchmarking**: Benchmarking methodologies have reliably characterized many physical devices. This work item extends and enhances the methods to virtual network functions (VNF) and their unique supporting infrastructure.
- **A first deliverable** from this activity will be a document that considers the new benchmarking space to ensure that common issues are recognized from the start, using background materials from industry and SDOs (e.g., IETF, ETSI NFV). … (Milestone in Aug 2015)
- This draft is **Referenced** in ETSI NFV GS, OPNFV specs.
- **WGLC?**
Backup
Current WG 00 Additions

• Using “General Purpose” computing
• Motivated complete desc. of test context: User Story (what’s in the Black Box?)
• Sec3: SUT description = platform and VNFs and...
• Barry Constantine’s comments on the list:
  – “concurrent” VNFs, how many can platform support?
• Sec3.4 Consider interactions/dependencies (placement, HA, VM or Bare Metal)
• Sec 4.1 Scale and capacity benchmarks still needed.
• Sec 4.4 Resolved the question of Scale and the 3x3 Matrix
• new 4.5, Power consumption (need metric(s))
<table>
<thead>
<tr>
<th>Activation/Creation/Setup</th>
<th>Operation</th>
<th>De-Activation/Deletion/Take-Down</th>
</tr>
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<tbody>
<tr>
<td>SPEED</td>
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<td>RELIABILITY</td>
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# Report Results (Capacity = \(N\) units)

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Report Results (Concurrent VNFs)

VNF #1

VNF #2

Core 1

VNF #3

Core 2-5

VNF #4

Core 6

VNF #5
Some Related Work

- **ETSI NFV**:  
  - vSwitch Benchmarking Req (Acceleration-related)  
  - Pre-deployment Testing of VNFs and Infrastructure  
  - Interoperability Testing

- **OPNFV (Open Platform for NFV)**:  
  - Characterize vSwitch Performance for Telco NFV  
  - Many other testing projects

- **OPEN DAYLIGHT**:  
  - Wrapped Cbench – [WCBENCH](#) – [Daniel Farrell](#)
SDN Controller Coverage:

Activation/Creation/Setup

- Forwarding entry and Path: programming rate
- Programming delay
- Node discovery rate

Operation

- Network scalable limit (?
- Max forwarding entries (?

De-Activation/Deletion/Take-Down

- Controller failover time
- Data path re-convergence time
Example: Quality Metric Coverage for Virtual Machines

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<td>Activation/Creation/Setup</td>
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<td>Incorrect Activations per total attempts</td>
<td>Failed/DOA Activations per total attempts</td>
</tr>
<tr>
<td>Operation</td>
<td>I/O Capacity Benchmarks on CPU, Memory, Storage</td>
<td>Incorrect outcomes per Operation attempts</td>
<td>Error/Stall outcomes per Operation attempts</td>
</tr>
<tr>
<td>De-Activation/Deletion/Take-Down</td>
<td><strong>Successful De-Activation Time</strong></td>
<td>Incorrect De-Activations per total att.</td>
<td>Failed/no-resp. De-Activations per total att.</td>
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Version 01, Benchmarking Considerations

• Comparison with Physical Network Functions
  – Re-use of existing benchmarks, with review

• Continued Emphasis on Black-Box Benchmarks
  – Internal Metrics from Open Source are tempting
  – Supply both, may provide useful OPS insight

• New Benchmarks for a Dynamic World
  – Time to deploy VNFs, Time to Migrate,

• Assessment of Benchmark Coverage
Ver 02, HW & Test Considerations

Section 4.4

• How do we reflect Scale/Capacity Benchmarks in the 3x3 Matrix? Alternatives:
  – Add a new column
  – Include Scaleability under Reliability
  – Keep Size, Capacity, and Scale separate from the matrix and present results (using the matrix) with titles that give details of configuration and scale.

• Yes, results could be organized by Matrix, too.
Test Configuration (ver 00)

- number of server blades (shelf occupation)
- CPUs
- caches
- storage system
- I/O

configurations that support the VNF:
  - Hypervisor
  - Virtual Machine
  - Infrastructure Virtual Network

the VNF itself:
  - specific function being implemented in VNF
  - number of VNF components in the service function chain
  - number of physical interfaces and links transited in the service function chain
characterizing perf at capacity limits may change? (ver 00)

• Charac. Infrastructure support of #? VMs:
  - N when all VM at 100% Util
  - 2*N when all VM at 50% Util ??
• #? VNF profile A, VNF profile B
  - Profiles may include I/O, storage, CPU demands
• Partition VNF performance
  - from single VNF in infinite I/O loop
• System errors occur as transients (longer dur.)
• VM and VNF flux: constant change in population while characterizing performance
Figure 1: Vision for Network Functions Virtualisation

http://www.etsi.org/technologies-clusters/technologies/nfv