

Verification of NFV Services : Problem Statement and Challenges

draft-irtf-nfvrg-service-verification-03

M-K. Shin, ETRI, K. Nam, Friesty
S. Pack, KU, S. Lee, ETRI
R. Krishnan, Dell
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Overview

- NFV relocates network functions from dedicated hardware appliances to generic servers, so they can run in software. However, incomplete and/or inconsistent configuration of VNF and FGs (aka, service chains) may lead to verification issues.
- This draft discusses properties to be checked on NFV services. Also, we present challenging issues related to verification in NFV environments.

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History

- (-00) Adopted as a RG document (Nov. 2015)
 - New sections added
 - Implementation examples (section 3)
 - NS policy conflict with NFVI policy
 - Gap analysis of relevant works in open source projects (section 6)
- (-01) A new challenging issue added (Mar. 2016)
 - Stateful VNFs with multiple physical views (section 5.6)
- (-02) Some text clean-up (Sep. 2016)
- (-03) Survey ETSI NFV TST docs and be aligned with the aspects of pre-deployment testing (Mar. 2017)

Example - NS policy conflict with NFVI policy

- Example factors of the NS policy are resource constraints (or deployment flavor), affinity/anti-affinity, scaling, fault and performance management, NS topology, etc.
- Example factors of the NFVI policy are NFVI resource access control, reservation and/or allocation policies, placement optimization based on affinity and/or anti-affinity rules, geography and/or regulatory rules, resource usage, etc.

<Example conflict case #1>

- NS policy of NS_A (composed of VNF_A and VNF_B)
 - Resource constraints: 3 CPU core for VNF_A and 2 CPU core for VNF_B
 - Affinity rule between VNF_A and VNF_B
- NFVI policy
 - No more than 4 CPU cores per physical host
- Conflict case
 - The NS policy cannot be met within the NFVI policy

<Example conflict case #2>

- NS policy of NS_B (composed of VNF_A and VNF_B)
 - Affinity rule between VNF_A and VNF_B
- NFVI policy
 - Place VM whose outbound traffic is larger than 100Mbps at POP_A
 - Place VM whose outbound traffic is smaller than 100Mbps at POP_B
- Conflict case
 - If VNF_A and VNF_B generate traffic in 150Mbps and 50Mbps, respectively,
 - VNF_A and VNF_B need to be placed at POP_A and POP_B, respectively according to the NFVI policy
 - But it will violate the affinity rule given in the NS policy

<Example conflict case #3>

- NS policy of NS_C (composed of VNF_A and VNF_B)
 - Resource constraints: VNF_A and VNF_B exist in the same POP
 - Auto-scaling policy: if VNF_A has more than 300K CPS, scale-out
- NFVI policy
 - No more than 10 VMs per physical host in POP_A
- Conflict case
 - If CPS of VNF_A in POP_A gets more than 300K CPS,
 - and if there is no such physical host in the POP_A whose VMs are smaller than 10,
 - VNF_A need to be scaled-out to other POP than POP_A according to the NFVI policy
 - But it will violate the NS policy

This examples are mainly related to other NFVRG docs- draft-irtf-nfvrg-policy-based-resource-management

ETSI NFV TST docs

- The verification framework addressed in this document follows [ETSI-NFV-Testing], which covers
 - 1) assessing the performance of the NFVI and its ability to fulfil the performance and reliability requirements of the VNFs executing on the NFVI,
 - 2) data and control plane testing of VNFs and their interactions with the NFV Infrastructure and the NFV MANO, and
 - 3) validating the performance, reliability and scaling capabilities of network services.

[ETSI-NFV-Testing] ETSI, "Network Function Virtualization (NFV) Pre- deployment Testing; Report on Validation of NFV Environments and Services," 2016.

Next step

- Need inputs on security aspect