

Network Virtualization Research Challenges

draft-irtf-nfvrg-gaps-network-virtualization-05

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Chicago, NFV RG, March 2017

History

- Individual submission (draft-bernardos-nfvrg-gaps-network-virtualization)
 - -01 presented in Prague (93rd IETF)
 - -03 presented in Yokohama (94th IETF)
 - Multiple feedback and support collected at the mailing list
- Adopted as RG document after Yokohama
 - <https://datatracker.ietf.org/doc/draft-irtf-nfvrg-gaps-network-virtualization/>
 - -00 presented in Buenos Aires (95th IETF)
 - -01 presented in Berlin (96th IETF)
 - -03 presented in Seoul (97th IETF)
 - Received extensive review from Kostas

Objectives

- Title: Network Virtualization Research Challenges
- Identify and describe open research challenges for network virtualization
 - Based on gap analysis
 - Mapping to NFV RG near term work items
 - Propose for new activities in IETF/IRTF that could address some of the challenges

ICNRG published a similar document:

- RFC 7927: Information-Centric Networking (ICN) Research Challenges

I-D structure (I)

1. Introduction
2. Terminology
3. Background
 1. Network Function Virtualization
 2. Software Defined Networking
 3. Mobile Edge Computing
 4. IEEE 802.1CF (OmniRAN)
 5. Distributed Management Task Force
 6. Open Source initiatives
 7. Internet of Things (IoT)



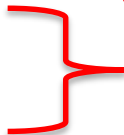
Same structure,
minor updates

I-D structure (II)

4. Network Virtualization Challenges
 - 4.1 Introduction
 - 4.2. Guaranteeing quality-of-service
 - 4.2.1. Virtualization Technologies
 - 4.2.2. Metrics for NFV characterization
 - 4.2.3. Predictive analysis
 - 4.2.4. Portability
 - 4.3. Performance improvement
 - 4.3.1. Energy Efficiency
 - 4.3.2. Improved link usage
 - 4.4. Multiple Domains
 - 4.5. 5G and Network Slicing
 - 4.5.1. Virtual Network Operators
 - 4.5.2. Extending Virtual Networks and Systems to the Internet of Things
 - 4.6. Service Composition
 - 4.7. End-user device virtualization
 - 4.8. Security and Privacy
 - 4.9. Separation of control concerns
 - 4.10. Testing
 - 4.10.1. Changes in methodology
 - 4.10.2. New functionality
 - 4.10.3. Opportunities
5. Technology Gaps and Potential IETF Efforts
6. Mapping to NFVRG Near-Term work items



Structure updates and new content



Interesting outcome for the RG to identify research work items

Content updates since -03 (IETF 97)

- New sections:
 - 4.5.1. Virtual Network Operators
 - 4.5.2. Extending Virtual Networks and Systems to the Internet of Things
 - 4.10. Testing
 - 4.10.1. Changes in methodology
 - 4.10.2. New functionality
 - 4.10.3. Opportunities

Technology Gaps & Potential IETF Efforts

Open network virtualization research areas



Potential IETF groups that could address them

Open Research Area	Potential IETF/IRTF Group
1-Guaranteeing QoS	IPPM WG (Measurements of NFVI)
2-Performance improvement	VNFPOOL BoF (NFV resilience)
3-Multiple Domains	NFVRG
4-Network Slicing	NVO3 WG, NETSLICES bar BoF
5-Service Composition	SFC WG (SFC Mgmt and Config)
6-End-user device virtualization	N/A
7-Security	N/A
8-Separation of control concerns	NFVRG
9-Testing	BMWG

Mapping to NFVRG Near-Term work items

NFVRG near-work items



Open network virtualization research areas

NFVRG Near-Term work item	Open Research Area
1-Policy-based resource management	- Performance improvem.
2-Analytics for visibility & orches.	- Network Slicing
3-Security and service verification	- Guaranteeing QoS
4-Reliability and fault detection	- Testing
5-Service orchestration & lifecycle	- Security
	- Guaranteeing QoS
6-Real-time properties	- Multiple Domains
(other)	- Network Slicing
	- Service Composition
	- Guaranteeing QoS
	- End-user device virt.
	- Separation of control

Content updates since -03 (IETF 97)

- Lots of updates and improvements addressing Kostas's review, e.g.:
 - Section 1 rewritten to make it more focused
 - References added in many places (other SDOs work, papers, examples, etc)
 - Improved text: RFC7426 summary, BMWG regarding methodology and metrics for NFV, etc.
 - Updates due to the closing of SDNRG

Next steps

- Any additional comments/reviews?
- Authors believe the I-D is valuable to the community at large
 - Start RGLC?