

# **Network Virtualization Research Challenges**

## **draft-irtf-nfvrg-gaps-network-virtualization-03**

Carlos J. Bernardos, Akbar Rahman, Juan C. Zúñiga,  
Luis M. Contreras, Pedro Aranda

Seoul, NFV RG, November 2016

# History

- Individual submission (draft-bernardos-nfvrg-gaps-network-virtualization)
  - -01 presented in Prague (93<sup>rd</sup> IETF)
  - -03 presented in Yokohama (94<sup>th</sup> 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 (95<sup>th</sup> IETF)
  - -01 presented in Berlin (96<sup>th</sup> IETF)
    - Discussion about including additional research challenges
    - Structure the doc around NFV RG near term work items

# Objectives

- Document title updated
  - ~~Gap Analysis on Network Virtualization Activities~~
  - 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

# 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. Network Slicing
  - 4.6. Service Composition
  - 4.7. End-user device virtualization
  - 4.8. Security and Privacy
  - 4.9. Separation of control concerns
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 -01 (IETF 96)

- Significantly updated or new sections:
  - Virtualization technologies
  - Metrics for NFV characterization
  - Improved link usage
  - End-user device virtualization
  - Security and privacy
  - Separation of control concerns
- Thanks to Nicolas Kuhn and Saumya Dikshit for their contributed text to -02 and -03
  - Text from Pierre Lynch on Testing will be added in -04

# 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 (5G Traffic isolation)
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	SDNRG

# 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. - Network Slicing
2-Analytics for visibility & orches.	- Guaranteeing QoS
3-Security and service verification	- Security
4-Reliability and fault detection	- Guaranteeing QoS
5-Service orchestration & lifecycle	- Multiple Domains - Network Slicing
6-Real-time properties	- Service Composition - Guaranteeing QoS
(other)	- End-user device virt. - Separation of control



# Next steps

- An update (-04) will be out soon (this week) including content on testing
- Gather additional comments reviews
- Authors believe the I-D is valuable to the community at large
  - Start RGLC after the document update?