Welcome to the World of Standards

ETSI
World Class Standards

ETSI NFV ISG – DIRECTION & PRIORITIES
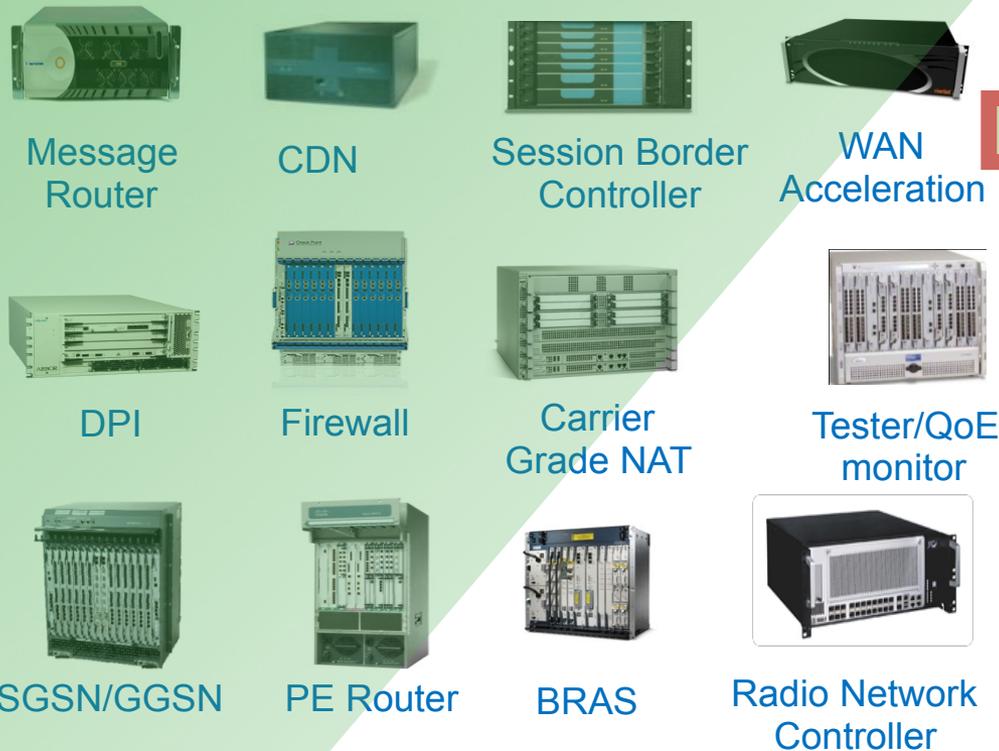
San Jose, May 6th 2015

Steven Wright (AT&T), Chair ETSI NFV ISG

NFV WORLD CONGRESS

Classical Network Appliance Approach

Message Router

CDN

Session Border Controller

WAN Acceleration

DPI

Firewall

Carrier Grade NAT

Tester/QoE monitor

SGSN/GGSN

PE Router

BRAS

Radio Network Controller

T$

Network Virtualisation Approach

Virtualized Network Function

Independent Software Vendors

Cloud automation & SDN programmability

Standard High Volume Servers

Standard High Volume Storage

Standard High Volume Whitebox HW (e.g Ethernet Switches)
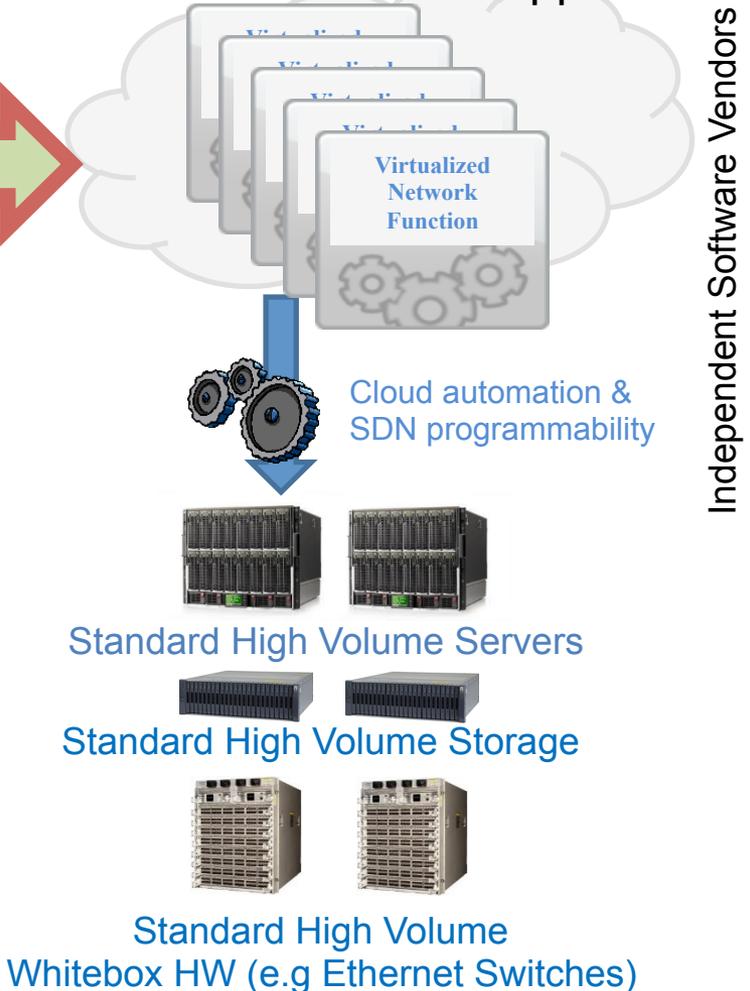
- Fragmented non-commodity hardware.
- Physical install per appliance per site.
- Hardware development large barrier to entry for new vendors, constraining innovation & competition.

NFV WORLD CONGRESS

NFV ISG Phase 1Progress

- Documents finalized and approved for release at our November 2014 meeting

  – **Architecture**: Architectural Framework Revision 2

  – **Infrastructure**: Overview, Use Cases, Compute Domain, Hypervisor Domain, Infrastructure Network Domain, Scalability, Interfaces and Abstractions, Portability and Replicability, Service Quality Metrics

  – **Management**: Management and Orchestration

  – **Performance**: Performance & Portability Best Practices

  – **Reliability**: Resiliency Requirements

  – **Security**: Security Problem Statement, Security and Trust Guidance

  – **Software Architecture**: Virtual Network Function Architecture

  – **Terminology:** Definitions of key terms used within NFV ISG documents.

- Final versions available in the ETSI NFV ISG open area: http://www.etsi.org/nfv

NFV Architectural Framework

Diagram Changes in R2.0
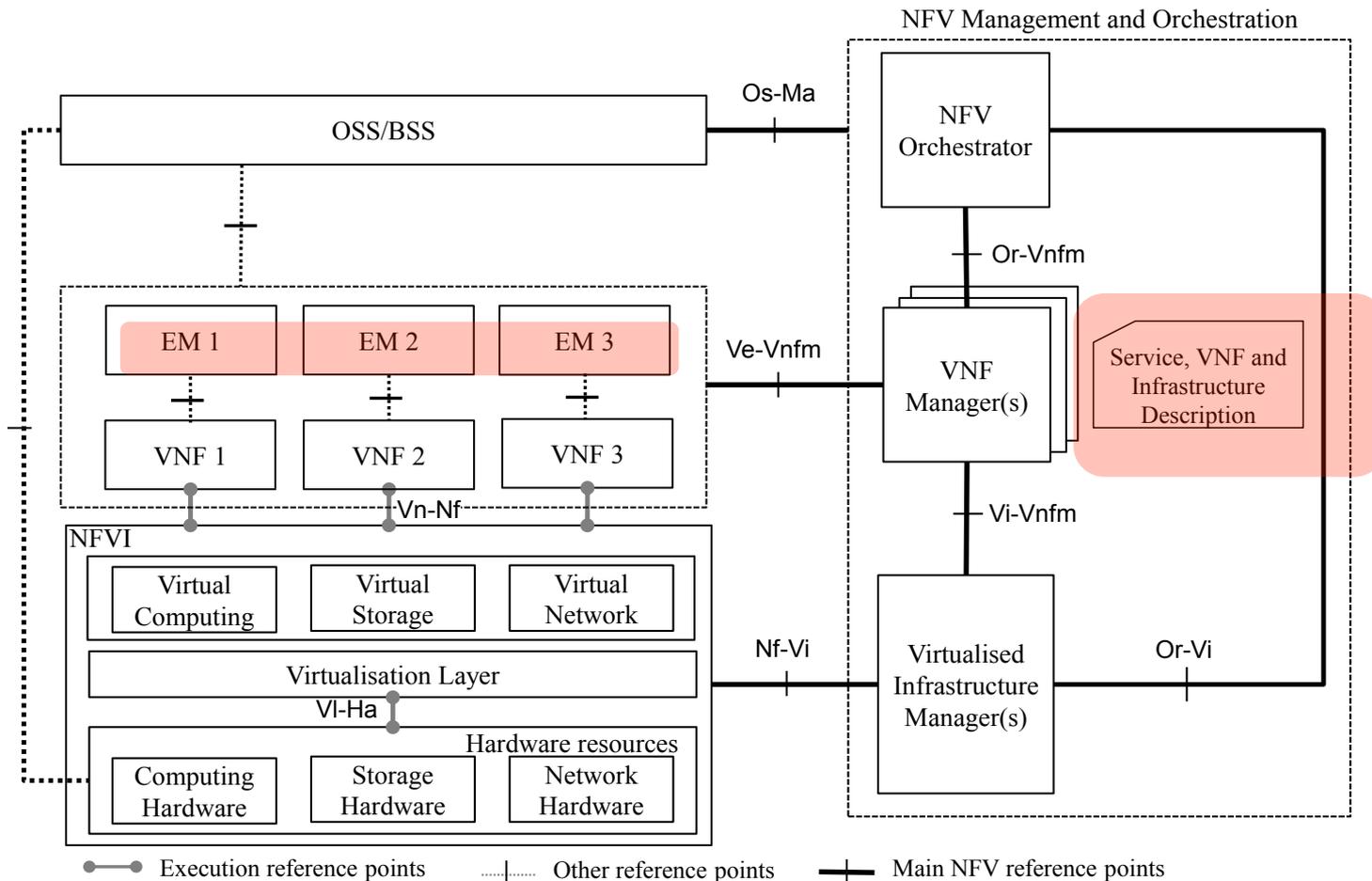
Latest Joint-Operator NFV White Paper

- Published October 14, 2014
  - Supported by 30 network operators

- Detailed description of second release of NFV ISG documents

- Provides latest operator perspectives on industry progress on NFV implementation

- Highlights the importance to evolve network management systems to accommodate dynamic nature of NFV

- Encourages academic research and evolution of teaching courses

Paper available on ETSI NFV Portal:
http://portal.etsi.org/NFV/NFV_White_Paper3.pdf

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Telecom Italia:	
Telenor:	
Telefonica:	
Telstra:	
Turk Telekom Ar	
Verizon:	
Vodafone:	
Windstream:	

Network Functions Virtualisation – White Paper #3   Issue 1

Contents

NFV WORLD CONGRESS

NFV Proof of Concept Activities

- A major objective of the NFV ISG effort is to encourage implementation through Proof of Concepts (PoCs). PoC Framework evolving towards "hot topics"

- To date 35 PoCs are in progress…

PoC#1: CloudNFV Open NFV Framework
PoC#2: Service Chaining for NW Function Selection in Carrier Networks
PoC#3: Virtual Function State Migration and Interoperability
PoC#4: Multi-vendor Distributed NFV
PoC#5:
E2E vEPC Orchestration in a multi-vendor open NFVI environment
PoC#6: Virtualised Mobile Network with Integrated DPI
PoC#7: C-RAN virtualisation with dedicated hardware accelerator
PoC#8: Automated Network Orchestration
PoC#9: VNF Router Performance with DDoS Functionality
PoC#10: NFV Ecosystem
PoC#11:
Multi-Vendor on-boarding of vIMS on a cloud management framework
PoC#12:
Demonstration of multi-location, scalable, stateful Virtual Network Function
PoC#13: SteerFlow: Multi-Layered Traffic Steering for Gi-LAN
PoC#14: ForCES Applicability for NFV and integrated SDN
PoC#15: Subscriber Aware SGi/Gi-LAN Virtualization
PoC#16: NFVIaaS with Secure, SDN-controlled WAN Gateway
PoC#17:
Operational Efficiency in NFV Capacity Planning, Provisioning and Billing
PoC#18:
VNF Router Performance with Hierarchical Quality of Service Functionality
PoC#19: Service Acceleration of NW Functions in Carrier Networks
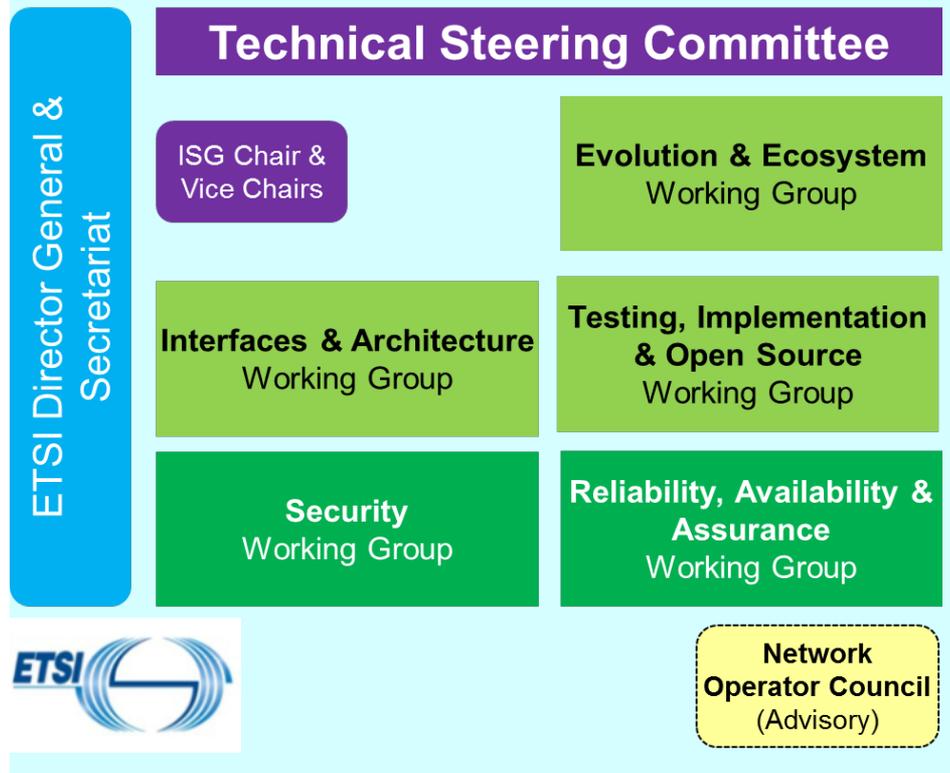**PoC#20: Virality based content caching in NFV framework**

PoC#21:
Network Intensive and Compute Intensive Hardware Acceleration
PoC#22:
Demonstration of High Reliability and Availability aspects in a Multivendor NFV Environment
PoC#23:
Demonstration E2E orchestration of virtualized LTE core-network functions and SDN-based dynamic service chaining of VNFs using VNF FG
PoC#24:
Constraint based Placement and Scheduling for NFV/Cloud Systems
PoC#25:
Demonstration of Virtual EPC (vEPC) Applications and Enhanced Resource Management
PoC#26:
Virtual EPC with SDN Function in Mobile Backhaul Networks
PoC#27: VoLTE Service based on vEPC and vIMS Architecture
PoC#28: SDN Controlled VNF Forwarding Graph
PoC#29:
Service orchestration for virtual CDN service over distributed cloud management platform
PoC#30: LTE Virtualized Radio Access Network (vRAN)
PoC#31: STB Virtualization in Carrier Networks
PoC#32:
Distributed Multi-domain Policy Management and Charging Control in a virtualised environment
PoC#33:
Scalable Service Chaining Technology for Flexible Use of

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

Objectives for NFV ISG

- *NFV Vision:* An open ecosystem for NFV enables rapid service innovation for Network Operators and Service Providers. Innovation in end-to-end services is enabled by software-based deployment and operationalization of *virtualized network functions* (and network services) on independently deployed and operated NFV infrastructure platforms.

- New WG structure to facilitate better coordination across ISG work program

- Pro-active coordination with other industry bodies (SDOs and Open Source) to map their domain specific technologies into NFV Framework (e.g. as VNFs)

Phase 2 ISG Organization Structure

ETSI Director General & Secretariat

Technical Steering Committee

ISG Chair & Vice Chairs

Evolution & Ecosystem Working Group

Interfaces & Architecture Working Group

Testing, Implementation & Open Source Working Group

Security Working Group

Reliability, Availability & Assurance Working Group

Network Operator Council (Advisory)

NFV ISG Future Plenary Meetings

- NFV#10 (Huawei)
  - 18-22 May, 2015
  - Sanya, China

- NFV#11 (Dell)
  - 27-31 July, 2015
  - San Jose, USA

- NFV#12 (TBD)
  - 27-30 Oct., 2015
  - USA (tbc)

- NFV#13
  - 18-22 May, 2016
  - Dublin (tbc)

- NFV#14
  - 18-22 April, 2016
  - TBD

- NFV#15
  - 25-19 July, 2016
  - TBD

- NFV#16
  - 16-21 or 24-29 Oct., 2016
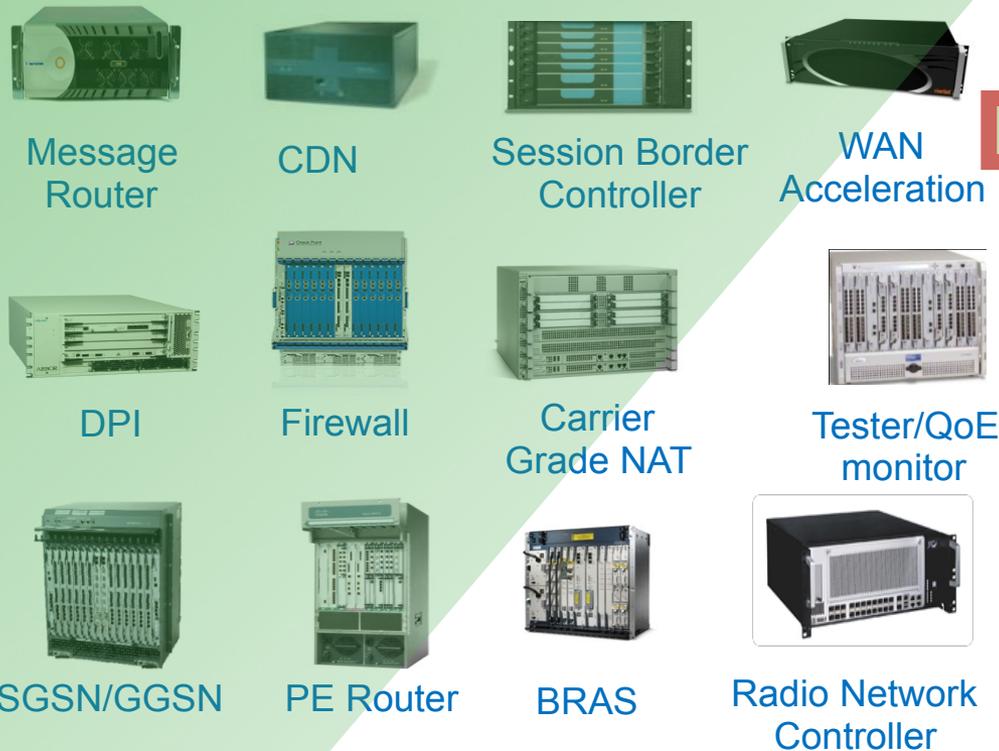 - TBD

NFV Progress Summary

- NFV is a paradigm shift that is transforming the design and operations of telecommunications networks to an ecosystem based on VNFs

- The NFV ISG has driven global industry awareness and convergence on end-user requirements and delivered an NFV Architectural Framework that has become the global industry reference enabling development of VNFs and network services based on VNFs.

- Major release published January 2015 (available on open area)

- The ISG is engaging more proactively with other industry bodies to scale up/ speed up VNF related specifications and avoid duplication
  - NFV#9 Workshop with OPNFV, 3GPP SA5 TMF to identify and avoid duplication
  - EVE 002 on MEF services in context of NFV
  - Joint meeting NFV/IFA and 3GPP SA5 (April '15)
  - Joint PoCs and Catalysts with TMF
  - Joint PoC (#28) with ONF
  - EVE 006 NFV Industry Roadmap
  - Letter of Intent established with OPNFV for coordination of efforts
  - Encouraging PoCs based on OPNFV reference platform.
  - Collaboration projects with OPNFV on Resource Reservation and Capacity Management

NFV: The Equipment Market Transformation

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NFV WORLD CONGRESS

Evolution & Ecosystem WG
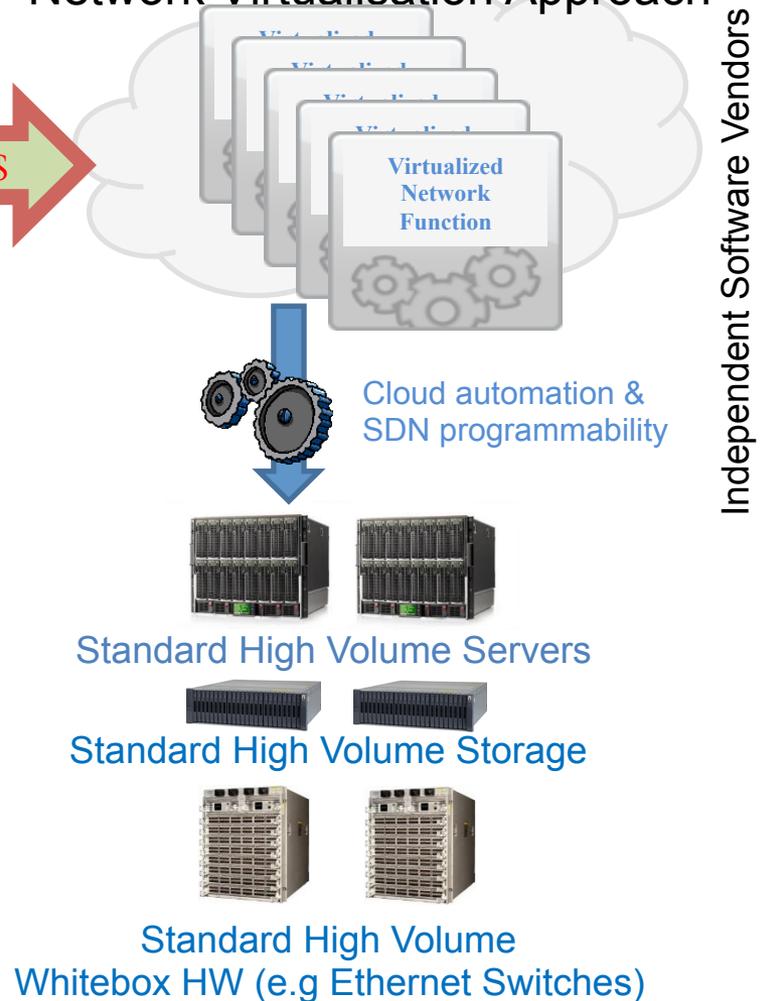
- New NFV use cases and associated technical features, new NFV technologies and NFV relationship with other technologies (e.g. SDN)

- Keep track of NFV related activities that occur in other bodies

- Facilitate engagement with research institutes and academia to encourage research and teaching curricula on the topic of NFV

Current Work Items…

- EVE001: Infrastructure Hypervisor Domain Specification. NORMATIVE.

- EVE002: Use cases for MEF Carrier Ethernet Services.

- EVE003: NFVI Node Physical Architecture Guidelines for Multi-Vendor Environment.

- EVE004: Virtualisation technologies Report.

- EVE005: SDN usage in NFV architectural framework Report.

- EVE006: NFV Industry Roadmap

Testing, Implementation & Open Source WG

- Maintaining and evolving the PoC Framework and extending the testing activities to cover interoperability based on NFV ISG specifications
- Developing specifications on NFV testing and test methodologies
- Coordinating experimentation and showcasing of NFV solutions
- Producing PoC case studies and documenting/reporting the results in various forms (e.g., white papers, etc.)
- Feeding feature requests to open source projects and implementation experience results to open source communities
- Transferring results to other ISG NFV working groups to ensure consistent delivery of specifications through real implementation and testing

Current work items…

- TST001: Guidelines for Pre-deployment validation of NFV environments and services.

- TST002: Report on NFV interoperability test methodology.

- TST003: Open Source Components for NFV

Reliability, Availability & Assurance WG

- Driving the necessary contributions and/or change requests in other ISG documents and working drafts in order to reflect specific aspects on reliability, availability and assurance.

- Analysing reliability and availability techniques for existing and new features in a NFV environment

- Provide guidance on mechanisms for validation, assurance and SLAs

- Provide guidance on interworking with physical network functions in the area of reliability, availability and assurance

Current work items…

- REL002: Scalable Architecture for Reliability Report.

- REL003: E2E Reliability Models Report.

- REL004: Active monitoring and failure detection Report.

Interfaces and Architecture WG

- Delivering a consistent consolidated set of information / data models and information flows and protocols for interoperability at reference points

- Refinement of the architecture and maintenance of specifications

- Cooperate with other external bodies relevant to the development of the reference points or interfaces (including open source communities)

Current work items…

- IFA001 – IFA004: Acceleration (4 parts)

- IFA005: Or-Vi Interface Requirements Specification. NORMATIVE.

- IFA006: Vi-Vnfm Interface Requirements Specification. NORMATIVE

- IFA007: Or-Vnfm Interface Requirements Specification. NORMATIVE

- IFA008: Ve-Vnfm Interface requirements Specification. NORMATIVE

- IFA009: Refinement of VNF Manager and NFVO functionality and architecture options.

- IFA010: MANO Functional Requirements Specification. NORMATIVE

- IFA011: VNF Packaging Specification.NORMATIVE

- IFA012: OSS - Orchestrator Requirements Specification. NORMATIVE.

- IFA013: Os-Ma-Nfvo Interface Requirements Specification. NORMATIVE.

- IFA014: Network Service Templates Specification. NORMATIVE

Security WG

- Reviewing new NFV ISG work items for likely security impacts

- Analysing threats to security in virtualized environments and deriving service and security requirements

- Identifying and specifying best practice in areas of security for NFV environments

- Investigating security enhancements for NFV & Impact of trends such as opportunistic encryption

- Contributing to the security aspects of NFV PoCs

- Work with external security experts and accreditation institutions to highlight the importance of NFV and encourage involvement

- Current work items…

  - SEC002: Security Features in Mgmt Software Report

  - SEC004: Lawful Interception Report

  - SEC005: Certificate Management Report

  - SEC006: Security Aspects and Regulatory Report

  - SEC007: NFV Attestation Methods Report

  - SEC008: Security Monitoring for NFV Deployments

  - SEC009: Use Cases for Multi-layer Host Administration Report