**Terms of Reference (ToR) for
ETSI ISG Network Functions Virtualization, (NFV)**

Approved by the Director-General on **8 December 2022**, following ETSI Board consultation

Scope

The purpose of ISG NFV is to facilitate the industry transformation and the development of an open, interoperable, ecosystem enabling managing the lifecycle of virtualised network functions hosted on independently deployed and operated NFV infrastructure platforms, which can be distributed across various locations (e.g., centralised data centres, edge clouds, end-user premises, etc.).

The original target of ISG NFV consisted in providing a pre-standardisation study before considering later a broader standards proposal in a new or existing standardisation group. It was important at that stage to first clearly define, agree, and share the goals of virtualising network functions with the whole industry. This was addressed in the 2013-2014 timeframe and resulted in the publication of the first ISG NFV specifications release.

From 2015 to 2018, ISG NFV focused on producing the technical specifications for the NFV foundation technology and enhancing these technical specifications by defining a consistent operational integration with current network services. During the 2019-2022 period, the ISG focused on consolidating these technical specifications to enable more cloudification and automation related features, and addressing the additional requirements for NFV technologies brought by the evolution of telecommunications networks (e.g., 5G and beyond 5G),, in close cooperation with global and regional initiatives.

From 2023 onwards, ISG NFV will continue to further consolidate technical specifications and address new functional and operational requirements brought by advances in cloud-native technology, network resources management and orchestration, network connectivity technologies, hardware and other infrastructure resources management, virtualisation and cloud technologies, as well as new use cases (e.g. for industry verticals, and for vRAN) and operational models. The ISG develops and maintains a perennial management and orchestration framework for NFV that can cope with multiple virtualisation technologies and cloud management/service solutions and adapt to their evolutions.

This will be achieved by delivering both informative documents (in the form of Group Reports, GR, and including assessments, use-case descriptions, feasibility studies, reports, etc.) and normative documents (in the form of Group Specifications, GS, and including requirements, architecture and interface specifications, information and data models, metrics and methods of measurement, interoperability test procedures, etc.) aiming at helping the industry in its quest for interoperability and operation automation.

Through these documents, ISG NFV will address technical challenges that include:

- Ensuring that virtualised network platforms will be able to support automated (and even autonomous) management of all application-independent aspects of virtualised services, ranging from the management of the infrastructure for virtualisation and the management of the virtualised resources they use to the management of the network functions they combine.
- Achieving high-performance virtualised network functions which are portable between different supporting platforms, which includes hardware, infrastructure software, and orchestration stacks.
- Achieving co-existence with legacy hardware-based network platforms whilst enabling an efficient migration path to fully virtualised network platforms.
- Catalysing the evolution of network management support systems to take full advantage of virtualisation and software-based operation techniques.
- Exploring the cloud native technologies to identify requirements and capabilities for orchestration and management framework to support scalable virtualised network functions in dynamic cloud environments to be more resilient, manageable, and observable.
- Ensuring the security of virtualised network platform from attack and misconfiguration, and their compliance with national and international regulations on privacy and security matters.
- Maintaining network stability and service levels without degradation during any event in the function's lifecycle.
- Ensuring the appropriate level of resilience to hardware and software failures, operational errors, and other anomalous events.
- Exploring the necessary enabling technologies to support the new business models made possible by network virtualisation.

- Exploring technologies enabling cross-organizational continuous integration and delivery practices in software-based virtualised environments.

Within these objectives, the ISG NFV will continue to cooperate with other standards-oriented organisations, fora, and open-source communities, to ensure the suitability of its specifications to all possible application domains and guarantee their evolution according to practical development and operation experience.

Areas of activity

The activities of ISG NFV include the following broad areas:

- Resource virtualization (storage, compute, network),
- Network Slicing,
- Hardware and software acceleration,
- Management and orchestration (of Virtualised Network Functions, of infrastructure resources, of platform as a service, etc.),
- Performance, Reliability, Resiliency,
- Architecture (component and interface definition),
- Information and data modelling,
- Protocols, Application Programming Interface,
- Open APIs, information registry and data modelling registry,
- Security, trust, attestation, regulation,
- Testing, benchmarking, continuous integration and development processes

Annex (informative): collaboration with other bodies

ISG NFV will set up and maintain appropriate communication channels to the following groups both within and outside of ETSI.

ETSI groups

- ISG MEC   Multi-access Edge Computing
- OSG OSM   Open-Source MANO
- ISG ZSM   Zero touch network and Service Management
- ISG ENI   Experiential Networked Intelligence
- OSG TFS   Open-Source Group TeraFlowSDN

and others as identified during the progression of the work.

External groups

- 3GPP   3rd Generation Partnership Project
- ATIS   Alliance for Telecommunications Industry Solutions
- BBF   Broadband Forum
- CNCF   Cloud Native Computing Foundation
- DMTF   Distributed Management Task Force
- GlobalPlatform
- GSMA   GSM Association
- IEEE   Institute of Electrical and Electronics Engineers
- IETF   Internet Engineering Task Force
- ITU-T   ITU Telecommunication Standardization Sector
- Anuket   Anuket project (Linux Foundation Networking)
- ONAP   Open Network Automation Platform (Linux Foundation Project)
- MEF   Metro Ethernet Forum
- NGMN   Next Generation Mobile Networks
- OASIS   Organization for the Advancement of Structured Information Standards
- OIF   Optical Internetworking Forum
- ONF   Open Networking Foundation
- OpenDaylight
- OpenStack   OpenStack project of Open Infrastructure Foundation
- ORAN   O-RAN ALLIANCE
- QuestForum
- SCF   Small Cell Forum
- TCG   Trusted Computing Group
- TM Forum   TeleManagement Forum

and others as identified during the progression of the work.

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