



GROUP REPORT

Network Functions Virtualisation (NFV) Release 6; Evolution and Ecosystem; Report on Model-as-a-Service (MaaS) in NFV

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Foreword

This Group Report (GR) has been produced by ETSI Industry Specification Group (ISG) Network Functions Virtualisation (NFV).

Modal verbs terminology

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1 Scope

The present document investigates Model-as-a-Service (MaaS) for AI-based applications in the context of telco cloud management. It describes and analyses a set of relevant use cases, with a focus on the definition and role of MaaS within the telco cloud management.

The present document also describes key issues, potential solutions, and where applicable, it also provides recommendations for enhancements to the NFV architecture and its functionality. The proposed solutions are aiming to provide further support for how MaaS can be introduced to the NFV framework and how MaaS can assist the management of telco cloud services.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents may be useful in implementing an ETSI deliverable or add to the reader's understanding, but are not required for conformance to the present document.

- [i.1] ETSI GR NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".
- [i.2] ETSI GS NFV-IFA 047: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Management data analytics Service Interface and Information Model Specification".
- [i.3] ETSI GS NFV-IFA 049: "Network Functions Virtualisation (NFV) Release 5; Architectural Framework; VNF generic OAM functions and other PaaS Services specification".
- [i.4] ETSI GS NFV-IFA 050: "Network Functions Virtualisation (NFV) Release 5; Management and Orchestration; Intent Management Service Interface and Information Model Specification".
- [i.5] ETSI GR NFV-IFA 054: "Network Functions Virtualisation (NFV) Release 6; Architecture; Report on architectural support for NFV evolution".
- [i.6] ETSI GR ENI 045 (V4.1.1): "Experiential Networked Intelligence (ENI); Research on Application Scenarios of Network Large Language Models for Operation, Administration, Maintenance, and Performance".
- [i.7] ETSI GS ENI 050 (V4.5.1): "Experiential Networked Intelligence (ENI); Lifecycle management for large model".
- [i.8] 3GPP TR 28.858: "Study on Artificial Intelligence / Machine Learning (AI/ML) management Phase 2 (Release 19)".
- [i.9] ETSI TS 128 105: "5G; Management and orchestration; Artificial Intelligence/ Machine Learning (AI/ML) management (3GPP TS 28.105 Release 19)".
- [i.10] TMForum TMF780: "MaaS API Profile".

[i.11] ETSI GR NFV-IFA 046: "Network Functions Virtualisation (NFV) Release 5; Architectural Framework; Report on NFV support for virtualisation of RAN".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GR NFV 003 [i.1] and the following apply:

NOTE: A term defined in the present document takes precedence over the definition of the same term, if any, in ETSI GR NFV 003 [i.1].

large model application: type of application that invokes large models according to specific requirements to accomplish tasks within a particular application scenario

large-scale model: type of artificial neural network model with complex structure and large number of parameters, enabling it to learn complex patterns and perform tasks with high accuracy

large-scale pre-trained model: type of a large-scale model that is already trained on massive datasets before being adapted to specific tasks

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GR NFV 003 [i.1] and the following apply:

AI	Artificial Intelligence
LLD	Low-Level Design
MaaS	Model-as-a-Service
ML	Machine Learning
RAG	Retrieval-Augmented Generation

4 Introduction and overview

4.1 Background information

4.1.1 Introduction to large model technology

Currently, the integration of Artificial Intelligence (AI) technology to assist in telco cloud management has entered the maturity phase. In the context of NFV AI technology can be utilized to enhance management within various domains, including support for the management data analytics service defined in ETSI GS NFV-IFA 047 [i.2], the generic OAM functions defined in ETSI GS NFV-IFA 049 [i.3], the intent management service defined in ETSI GS NFV-IFA 050 [i.4], among others. With the rapid advancements in AI technology, particularly the ongoing breakthroughs in reinforcement learning, large models, and content generation, the adoption of large models as the foundation for downstream tasks (such as anomaly detection, intelligent maintenance, and intent recognition) has emerged as a new paradigm in AI-based application domains.

The industry often follows a progression from foundational large models to industry-specific large models. Initially, large models are trained to be applicable to multiple domains and tasks, equipping them with robust generalization capabilities that enable extrapolation from one instance to another. Subsequently, industry-related data is used for pre-training or fine-tuning to enhance performance and accuracy within that specific domain.