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Multi-access Edge Computing (MEC); Framework and Reference Architecture

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Reference

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Foreword

This Group Specification (GS) has been produced by ETSI Industry Specification Group (ISG) Multi-access Edge Computing (MEC).

Modal verbs terminology

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1 Scope

The present document provides a framework and reference architecture for Multi-access Edge Computing that describes a MEC system that enables MEC applications to run efficiently and seamlessly in a multi-access network. The present document also describes the functional elements and the reference points between them, and a number of MEC services that comprise the solution. It finally presents a number of key concepts related to the multi-access edge architecture.

2 References

2.1 Normative 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.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

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The following referenced documents are necessary for the application of the present document.

[1] ETSI GS MEC 002: "Multi-access Edge Computing (MEC); Use Cases and Requirements".

[2] ETSI GS NFV 002: "Network Functions Virtualisation (NFV); Architectural Framework".

[3] ETSI GS NFV-IFA 013: "Network Functions Virtualisation (NFV); Management and Orchestration; Os-Ma-Nfvo reference point - Interface and Information Model Specification".

[4] ETSI GS NFV-IFA 008: "Network Functions Virtualisation (NFV); Management and Orchestration; Ve-Vnfm reference point - Interface and Information Model Specification".

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 are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI GS MEC 001: "Multi-access Edge Computing (MEC); Terminology".

[i.2] Void.

[i.3] "OpenStack++ for Cloudlet Deployment".

NOTE: Available at http://reports-archive.adm.cs.cmu.edu/anon/2015/CMU-CS-15-123.pdf.

[i.4] Void.

[i.5] ETSI GR MEC 017: "Mobile Edge Computing (MEC); Deployment of Mobile Edge Computing in an NFV environment".

[i.6] ETSI TS 123 501: "System Architecture for the 5G System, Stage 2 (Release 15)".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GS MEC 001 [i.1] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS MEC 001 [i.1] and the following apply:

CFS	Customer Facing Service
LCM	LifeCycle Management
MEAO	MEC Application Orchestrator
MEPM-V	MEC Platform Manager - NFV
NFV	Network Functions Virtualization
NFVO	NFV Orchestrator
NFVI	Network Functions Virtualization Infrastructure
NS	Network Service
OSS	Operations Support System
VIM	Virtualization Infrastructure Manager
VNF	Virtualized Network Function
VNFM	VNF Manager

4 Overview

The present document presents a framework and a reference architecture to support the requirements defined for Multi-access Edge Computing in ETSI GS MEC 002 [1].

The framework described in clause 5 shows the structure of the Multi-access Edge Computing environment.

The reference architecture described in clause 6 shows the functional elements that compose the multi-access edge system, including the MEC platform and the MEC management, as well as the reference points between them.

The functional elements and reference points listed in clause 7 describe the high-level functionality of the different functional elements and reference points.

Clause 8 describes the high-level functionality of a number of MEC services, comprising the solution for Multi-access Edge Computing.

Annex A describes at a high-level a number of key concepts that underlie the principles used to develop the framework and reference architecture described in the present document.

5 Multi-access Edge Computing framework

Multi-access Edge Computing enables the implementation of MEC applications as software-only entities that run on top of a virtualization infrastructure, which is located in or close to the network edge. The Multi-access Edge Computing framework shows the general entities involved. These can be grouped into system level, host level and network level entities.

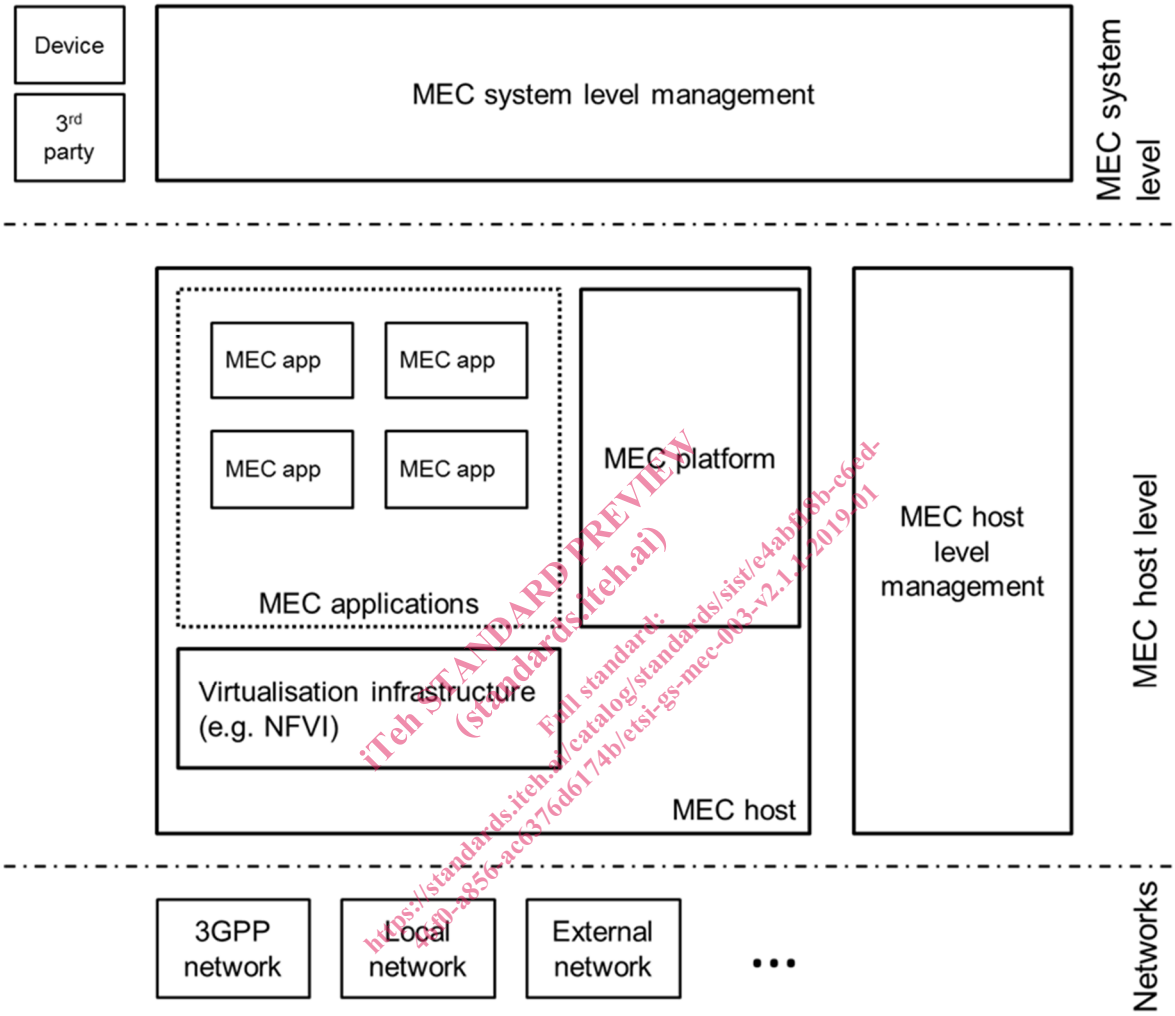

Figure 5-1: Multi-access Edge Computing framework

Figure 5-1 illustrates the framework for Multi-access Edge Computing consisting of the following entities:

- MEC host, including the following:
  - MEC platform;
  - MEC applications;
  - virtualization infrastructure;
- MEC system level management;
- MEC host level management;
- external related entities, i.e. network level entities.

6 Reference architecture

6.1 Generic reference architecture

The reference architecture shows the functional elements that comprise the multi-access edge system and the reference points between them.

Figure 6-1 depicts the generic multi-access edge system reference architecture. There are three groups of reference points defined between the system entities:

- reference points regarding the MEC platform functionality (Mp);
- management reference points (Mm); and
- reference points connecting to external entities (Mx).

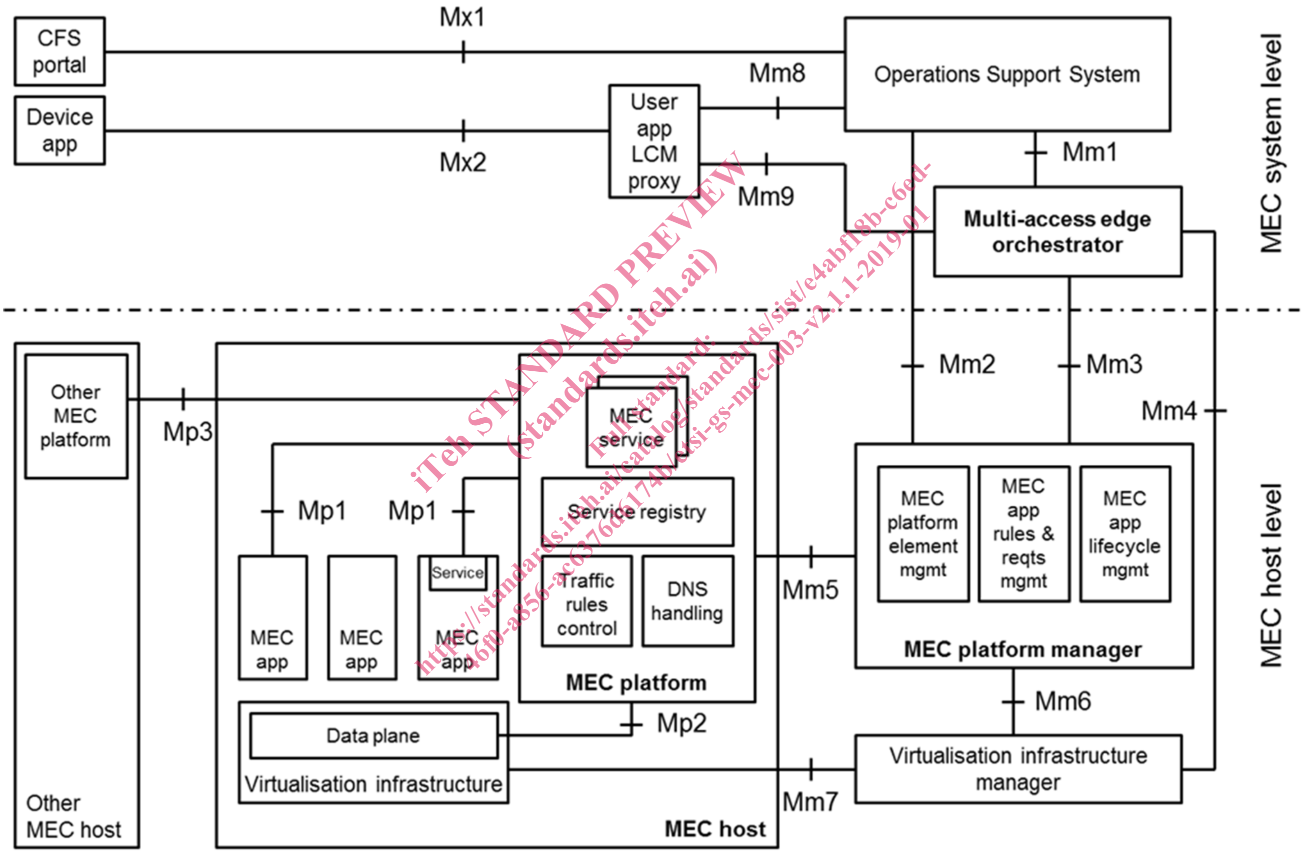

Figure 6-1: Multi-access edge system reference architecture

The multi-access edge system consists of the MEC hosts and the MEC management necessary to run MEC applications within an operator network or a subset of an operator network.

The **MEC host** is an entity that contains a MEC platform and a virtualization infrastructure which provides compute, storage, and network resources, for the purpose of running MEC applications. The MEC host is further described in clause 7.1.1.

The **MEC platform** is the collection of essential functionality required to run MEC applications on a particular virtualization infrastructure and enable them to provide and consume MEC services. The MEC platform can also provide services. The MEC platform is further described in clause 7.1.2.

MEC applications are instantiated on the virtualization infrastructure of the MEC host based on configuration or requests validated by the MEC management. MEC applications are further described in clause 7.1.3.

The MEC management comprises the MEC system level management and the MEC host level management.

The MEC system level management includes the **Multi-access edge orchestrator** as its core component, which has an overview of the complete MEC system. The MEC system level management is further described in clause 7.1.4.

The MEC host level management comprises the **MEC platform manager** and the **virtualization infrastructure manager**, and handles the management of the MEC specific functionality of a particular MEC host and the applications running on it. The MEC host level management is further described in clause 7.1.5.

6.2 Reference architecture variant for MEC in NFV

6.2.1 Description

Multi-access Edge Computing (MEC) and Network Functions Virtualization (NFV) are complementary concepts. The MEC architecture has been designed in such a way that a number of different deployment options of MEC systems are possible. A dedicated Group Report, ETSI GR MEC 017 [i.5], provides an analysis of solution details of the deployment of MEC in an NFV environment.

In clauses 6.2.2, 7.1.8 and 7.2.4 of the present document, a MEC architecture variant is specified that allows to instantiate MEC applications and NFV virtualized network functions on the same virtualization infrastructure, and to re-use ETSI NFV MANO components to fulfil a part of the MEC management and orchestration tasks.

6.2.2 Architecture diagram

Figure 6-2 depicts a variant of the multi-access edge system reference architecture for the deployment in a Network Functions Virtualization (NFV) environment [2].

In addition to the definitions for the generic reference architecture in clause 6.1, the following new architectural assumptions apply:

- The MEC platform is deployed as a VNF.
- The MEC applications appear as VNFs towards the ETSI NFV MANO components.
- The virtualization infrastructure is deployed as an NFVI and is managed by a VIM as defined by ETSI GS NFV 002 [2].
- The MEC platform manager (MEPM) is replaced by a MEC platform manager - NFV (MEPM-V) that delegates the VNF lifecycle management to one or more VNF managers (VNFM).
- The MEC orchestrator (MEO) is replaced by a MEC application orchestrator (MEAO) that relies on the NFV orchestrator (NFVO) for resource orchestration and for orchestration of the set of MEC application VNFs as one or more NFV network services (NSs).

The new reference points shown in figure 6-2 are further described in clause 7.2.4.