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Mobile Edge Computing (MEC); Mobile Edge Management; Part 2: Application lifecycle, rules and requirements management

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Foreword

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

The present document is part 2 of a multi-part deliverable covering Mobile Edge Management, as identified below:

Part 1: "System, host and platform management";

Part 2: "Application lifecycle, rules and requirements management".

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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1 Scope

The present document provides information flows for lifecycle management of applications running on a mobile edge host, and describes interfaces over the reference points to support application lifecycle management. It also describes application rules and requirements, application-related events and mobility handling. The present document specifies the necessary data model, data format and operation format when applicable.

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 NFV-IFA 011 (V2.1.1): "Network Functions Virtualisation (NFV); Management and Orchestration; VNF Packaging 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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

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: "Mobile Edge Computing (MEC); Terminology".

[i.2] ETSI GS MEC 002: "Mobile Edge Computing (MEC); Technical Requirements".

[i.3] ETSI GS NFV-IFA 007 (V2.1.1): "Network Functions Virtualisation (NFV); Management and Orchestration; Or-Vnfm reference point - Interface and Information Model Specification".

[i.4] ETSI GS MEC 011: "Mobile Edge Computing (MEC); Mobile Edge Platform Application Enablement".

[i.5] ETSI GS NFV 003 (V1.2.1): "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

[i.6] ETSI GS MEC 009: "Mobile Edge Computing (MEC); General principles for Mobile Edge Service APIs".

3 Definitions and abbreviations

3.1 Definitions

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

application descriptor: descriptor provided by the application provider, and describes the application rules and requirements of a mobile edge application

application package: bundle of files provided by application provider, on-boarded into mobile edge system and used by the mobile edge system for application instantiation, including an application descriptor, a VM image or a URL link to a VM image, a manifest file, and other optional files

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS MEC 001 [i.1], ETSI NFV 003 [i.5] and the following apply:

CPD	Connection Point Descriptor
DNS	Domain Name System
FQDN	Fully Qualified Domain Name
FTP	File Transfer Protocol
GRE	Generic Routing Encapsulation
GTP	GPRS Tunnelling Protocol
GTP-U	GPRS Tunnelling Protocol for User plane
IP	Internet Protocol
MAC	Media Access Control
ME	Mobile Edge
MEO	Mobile Edge Orchestrator
MEPM	Mobile Edge Platform Manager
QCI	QoS Class Identifier
RNIS	Radio Network Information Service
URL	Uniform Resource Locator

4 Specification level requirements

4.1 Requirements

4.1.1 Requirements for reference point Mm1

4.1.1.1 General requirements

The Mm1 reference point between the Mobile Edge Orchestrator and the OSS is used for on-boarding application packages, triggering the instantiation and the termination of mobile edge applications in the mobile edge system. Table 4.1.1.1-1 specifies requirements related to application lifecycle management applicable to the Mm1 reference point. Those requirements are derived from table 5.2-1 of ETSI GS NFV-IFA 007 [i.3].

Table 4.1.1.1-1: Mm1 reference point requirements

Numbering	Functional requirement description
Mm1.001	The Mm1reference point shall support the application package management interface produced by the Mobile Edge Orchestrator.
Mm1.002	The Mm1reference point shall support the application lifecycle management interface produced by the Mobile Edge Orchestrator.

4.1.1.2 Interface requirements

4.1.1.2.1 Application package management interface requirements

Table 4.1.1.2.1-1 specifies requirements applicable to the application package management interface produced by the Mobile Edge Orchestrator on the Mm1 reference point. Those requirements are derived from clause 5.2 of ETSI GS MEC 002 [i.2].

Table 4.1.1.2.1-1: Application package management interface requirements

Numbering	Functional requirement description
Mm1.AppPkgm.001	The Application Package Management interface produced by the MEO on the Mm1 reference point shall support on-boarding an Application Package.
Mm1.AppPkgm.002	The Application Package Management interface produced by the MEO on the Mm1 reference point shall support querying Application Package information.
Mm1.AppPkgm.003	The Application Package Management interface produced by the MEO on the Mm1 reference point shall support deleting an Application Package.
Mm1.AppPkgm.004	The Application Package Management interface produced by the MEO on the Mm1 reference point shall support enabling an application package.
Mm1.AppPkgm.005	The Application Package Management interface produced by the MEO on the Mm1 reference point shall support disabling an application package.

4.1.1.2.2 Application lifecycle management interface requirements

Table 4.1.1.2.2-1 specifies requirements applicable to the application lifecycle management interface produced by the Mobile Edge Orchestrator on the Mm1 reference point.

Table 4.1.1.2.2-1: Application lifecycle management interface requirements

Numbering	Functional requirement description
Mm1.AppLcm.001	The Application Lifecycle Management interface produced by the MEO on the Mm1 reference point shall support instantiating an Application instance.
Mm1.AppLcm.002	The Application Lifecycle Management interface produced by the MEO on the Mm1 reference point shall support terminating an Application instance.
Mm1.AppLcm.003	The Application Lifecycle Management interface produced by the MEO on the Mm1 reference point shall support requesting to change the state of an application instance (see note).
NOTE: Changing the state of an application instance refers to starting or stopping an application instance. These operations are complementary to instantiating or terminating an application.	

4.1.2 Requirements for reference point Mm3

4.1.2.1 General requirements

The Mm3 reference point between the Mobile Edge Orchestrator and the Mobile Edge Platform Manager is used for the management of the application lifecycle, application rules and requirements and keeping track of available mobile edge services, etc. Table 4.1.2.1-1 specifies requirements related to application lifecycle management applicable to the Mm3 reference point.

Table 4.1.2.1-1: Mm3 reference point requirements

Number	Functional requirement description
Mm3.001	The Mm3 reference point shall support the application package management interface produced by the Mobile Edge Orchestrator.
Mm3.002	The Mm3 reference point shall support the application Lifecycle Management interface produced by the Mobile Edge Platform Manager.
Mm3.003	The Mm3 reference point shall support the application Lifecycle Change Notification interface produced by the Mobile Edge Platform Manager.

4.1.2.2 Interface requirements

4.1.2.2.1 Application package management interface requirements

Table 4.1.2.2.1-1 specifies requirements applicable to the Application Package Management interface produced by the MEO on the Mm3 reference point.

Table 4.1.2.2.1-1: Application Package Management interface requirements

Numbering	Functional requirement
Mm3.AppPkgm.001	The Application Package Management interface produced by the MEO on the Mm3 reference point shall support querying application package information (see note).
Mm3.AppPkgm.002	The Application Package Management interface produced by the MEO on the Mm3 reference point shall support providing notifications as a result of changes on application package states.
Mm3.AppPkgm.003	The Application Package Management interface produced by the MEO on the Mm3 reference point shall support providing notifications about the on-boarding of application packages.
Mm3.AppPkgm.004	The Application Package Management interface produced by the MEO on the Mm3 reference point shall support fetching an application package, or selected files contained in a package.
NOTE: Application package information may include information such as release date, vendor info, manifest, application descriptor, and other files contained in the application package, etc.	

4.1.2.2.2 Application lifecycle management interface requirements

Table 4.1.2.2.2-1 specifies requirements applicable to the Application Lifecycle Management interface produced by the Mobile Edge Platform Manager on the Mm3 reference point.

Table 4.1.2.2.2-1: Application Lifecycle Management interface requirements

Numbering	Functional requirement
Mm3.AppLcm.001	The Application Lifecycle Management interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support instantiating an Application.
Mm3.AppLcm.002	The Application Lifecycle Management interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support terminating an application instance.
Mm3.AppLcm.003	The Application Lifecycle Management interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support querying information about an application instance.
Mm3.AppLcm.004	The Application Lifecycle Management interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support requesting to change the state of an application instance (see note).
Mm3.AppLcm.005	The Application Lifecycle Management interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support querying the status of an ongoing application lifecycle management operation.
NOTE: Changing the state of an application instance refers to starting or stopping an application instance. These operations are complementary to instantiating or terminating an application.	

4.1.2.2.3 Application lifecycle change notification interface requirements

Table 4.1.2.2.3-1 specifies requirements applicable to the Application Lifecycle Change Notification interface produced by the Mobile Edge Platform manager on the Mm3 reference point.

Table 4.1.2.2.3-1: Application Lifecycle Change Notification interface requirements

Numbering	Functional requirement
Mm3.AppLccn.001	The Application Lifecycle Change Notification interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support providing to the MEO notifications about changes of an application instance that are related to application lifecycle management operations.
Mm3.AppLccn.002	Notifications provided on the Application Lifecycle Change Notification interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall contain information about the type of application lifecycle operation, the identification of the application instance.
Mm3.AppLccn.003	Notifications provided on the Application Lifecycle Change Notification interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support indicating the start of the lifecycle procedure, the end and the results of the lifecycle procedure including any error produced from the lifecycle procedure.
Mm3.AppLccn.004	The Application Lifecycle Change Notification interface produced by the Mobile Edge Platform Manager on the Mm3 reference point shall support notifying the result (successful or failed) of application instantiation with indicating the application instance identifier, and the consumed, modified or released resources.

4.1.3 Requirements for application package

4.1.3.1 General requirements

Table 4.1.3.1-1 specifies requirements related to application lifecycle management applicable to the application package.

Table 4.1.3.1-1: Application package requirements

Numbering	Functional requirement description
AppPkt.001	The application package shall contain software image(s) or link(s) to software image(s). See notes 1 and 2.
AppPkt.002	The application package shall contain an application descriptor that describes the application requirements and rules which are required or preferred by the mobile edge application. See note 1.
AppPkt.003	The application package shall be signed by the application provider. The digest and the public key of the entity signing shall be included in the package along with the corresponding certificate.
AppPkt.004	Files in the package may be individually signed. For each signed file, the corresponding public key, algorithm and certificate used shall be stored in a well-known location within the application package.
AppPkt.005	The application package shall contain a manifest file which lists files that the package contains and a hash of their content. See note 1.
NOTE 1: The application package, the software image(s), the manifest file and the application descriptor are provided by the application provider. NOTE 2: In the present document it is assumed that the software image is a VM image.	