

# ETSI GS MEC 037 V3.2.1 (2024-04)



## Multi-access Edge Computing (MEC); Application Package Format and Descriptor Specification

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Reference

RGS/MEC-0037v321PKGFORMAT

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**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - APE 7112B  
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# Foreword

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

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# 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 specifies the structure and format of a MEC application package and data models of the MEC application descriptors, fulfilling the requirements defined in ETSI GS MEC 010-2 [1].

---

## 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.

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

- [1] [ETSI GS MEC 010-2](#): "Multi-access Edge Computing (MEC); MEC Management; Part 2: Application lifecycle, rules and requirements management".

NOTE: The data model in the present document is aligned with the information model specified in V3.2.1 of ETSI GS MEC 010-2 [1].

- [2] [OASIS Standard TOSCA-Simple-Profile-YAML-v1.3-os](#): "TOSCA Simple Profile in YAML Version 1.3".

- [3] [ETSI GS NFV-SOL 001](#): "Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; NFV descriptors based on TOSCA specification".

- [4] [ETSI GS NFV-SOL 004](#): "Network Functions Virtualisation (NFV) Release 4; Protocols and Data Models; VNF Package and PNF Architecture specification".

- [5] [ETSI GS MEC 009](#): "Multi-access Edge Computing (MEC); General principles, patterns and common aspects of MEC Service APIs".

- [6] [IETF RFC 3339](#): "Date and Time on the Internet: Timestamps".

- [7] [Helm™ \(V3.14.0\)](#): "Helm Charts".

- [8] [ETSI TS 129 214](#): "Universal Mobile Telecommunications System (UMTS); LTE; 5G; Policy and charging control over Rx reference point (3GPP TS 29.214)".

### 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 GR MEC 001: "Multi-access Edge Computing (MEC); Terminology".

- [i.2] ETSI GR NFV 003: "Network Functions Virtualisation (NFV); Terminology for main concepts in NFV".
- [i.3] ETSI GS MEC 003: "Multi-access Edge Computing (MEC); Framework and Reference Architecture".
- [i.4] ETSI GS MEC 011: "Multi-access Edge Computing (MEC); Edge Platform Application Enablement".
- [i.5] ETSI GS MEC 012: "Multi-access Edge Computing (MEC); Radio Network Information API".
- [i.6] ETSI GS MEC 013: "Multi-access Edge Computing (MEC); Location API".
- [i.7] ETSI GS MEC 014: "Multi-access Edge Computing (MEC); UE Identity API".
- [i.8] ETSI GS MEC 015: "Multi-Access Edge Computing (MEC); Traffic Management APIs".
- [i.9] ETSI GS MEC 021: "Multi-access Edge Computing (MEC); Application Mobility Service API".
- [i.10] ETSI GS MEC 028: "Multi-access Edge Computing (MEC); WLAN Access Information API".
- [i.11] ETSI GS MEC 029: "Multi-access Edge Computing (MEC); Fixed Access Information API".
- [i.12] ETSI GS MEC 030: "Multi-access Edge Computing (MEC); V2X Information Services API".
- [i.13] ETSI GS MEC 033: "Multi-access Edge Computing (MEC); IoT API".
- [i.14] ETSI GS MEC 040: "Multi-access Edge Computing (MEC); Federation enablement APIs".

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## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the terms given in ETSI GR MEC 001 [i.1] and ETSI GR NFV 003 [i.2] apply.

### 3.2 Symbols

Void.

### 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GR MEC 001 [i.1] and ETSI GR NFV 003 [i.2] apply.

---

## 4 Introduction

A MEC application package is a file containing the necessary information of a MEC application, used by the MEC system for application lifecycle management.

The application package, provided by the application provider, typically contains an application descriptor, software images and manifest file as defined in ETSI GS MEC 010-2 [1].

The MEC application package can be on-boarded by the OSS to the MEO. Or in case of MEC in NFV deployment (see ETSI GS MEC 003 [i.3]), the MEC application package can be either on-boarded to the MEAO or to the NFVO.

To unify the MEC package format in both deployment cases, it is defined in such a way that the package can be used by the MEAO directly, and can be on-boarded as a VNF package to the NFVO without any change.

Therefore the MEC application package format is following these principles:

- The MEC application package format is always a valid VNF package.
- Thus the MEC application package contains a valid AppD that is also a valid VNFD.
- Some of the content of the MEC application package and of the AppD will be ignored by the NFV system in the case of MEC in NFV deployment.
- Some of the mandatory VNFD properties and policies are not needed in the MEC system, therefore the AppD will have some fixed default values for those to comply with the VNFD format.

This way, the application developer does not need to know whether the package will be on-boarded to MEO, MEAO or NFVO.

Clauses 5 and 6 of the present document specify the structure and format of the AppD and of the application package based on a TOSCA model (see clause 5.2.1) and a TOSCA YAML CSAR file format (see clause 6.1). Other formats are out of scope of the present document.

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## 5 MEC application descriptor

### 5.1 MEC application descriptor content

The MEC application descriptor (AppD), including its attributes, is defined in ETSI GS MEC 010-2 [1]. The AppD is provided to the MEC system during on-boarding as an artifact of the MEC application package. Since the package format is unified between NFV and MEC, this is described in ETSI GS NFV-SOL 001 [3]. The AppD format is also unified with the VNFD format. MEC attributes that can be mapped to attributes defined by NFV are represented by these NFV attributes, while MEC specific attributes are ignored by the NFV system in case of MEC in NFV deployments.

The following clauses further describe how this is achieved.

### 5.2 MEC application descriptor based on TOSCA specification

#### 5.2.1 Overview of TOSCA model

Topology and Orchestration Specification for Cloud Applications (TOSCA) is a modelling language for describing the components of a cloud application and their relationships.

There are several versions of TOSCA specifications, and the present document is based on TOSCA-Simple-Profile-yaml v1.3 [2], which describes a YAML rendering for TOSCA.

In TOSCA, the concept "service template" is used to describe the structure and orchestration behaviour of cloud applications. The service template consists of one or multiple "nodes" which describe the components of the application, and "capabilities" and "requirements" which model the dependency between the components. TOSCA also defines artifact, interface, policy types, etc. to describe additional characteristics and requirements of the application.

The service template for each MEC application describes its AppD and shall include a node type which is derived from the MecApp TOSCA node type defined in the present document.

#### 5.2.2 Introduction of TOSCA based AppD model

The format of the AppD is defined a way so it can be used in both MEC standalone and MEC in NFV deployment, and may be on-boarded into NFV-MANO as a VNFD in MEC in NFV deployment. The TOSCA based AppD model specified in the present document is designed to be reusable as a VNFD unchanged, more specifically:

- AppD attributes are mapped to TOSCA VNFD types as defined in ETSI GS NFV-SOL 001 [3] where applicable.

- MEC specific AppD attributes are defined in a way that they will not affect NFV-MANO.
- VNFD mandatory type definitions and properties which are not applicable to AppD are specified to be filled with default values, see clause 5.2.4.1.7 for the default values in `tosca.nodes.nfv.VNF` and clause 5.2.4.2.2 for default values in other nodes.
- The present document defines an abstract node type (`tosca.nodes.mec.MecApp`) which is derived from the `tosca.nodes.nfv.VNF` node type defined in ETSI GS NFV-SOL 001 [3].

Table 5.2.2-1 shows the mapping of the AppD attributes to TOSCA types and property names. AppD attributes that have no corresponding VNFD TOSCA types are MEC specific attributes which are specified in the following clauses.

**Table 5.2.2-1: TOSCA types for AppD attributes**

AppD attributes	TOSCA types	Property names	Notes
appDId	<code>tosca.nodes.nfv.VNF</code>	<code>descriptor_id</code>	Content same for MEC and NFV, inherit from TOSCA type defined in ETSI GS NFV-SOL 001 [3]
appName	<code>tosca.nodes.nfv.VNF</code>	<code>product_name</code>	
appProvider	<code>tosca.nodes.nfv.VNF</code>	<code>provider</code>	
appSoftVersion	<code>tosca.nodes.nfv.VNF</code>	<code>software_version</code>	
appDVersion	<code>tosca.nodes.nfv.VNF</code>	<code>descriptor_version</code>	Content as in ETSI GS MEC 010-2 [1]
mecVersion	<code>tosca.nodes.mec.MecApp</code>	<code>mec_version</code>	
appInfoName	<code>tosca.nodes.nfv.VNF</code>	<code>product_info_name</code>	Content same for MEC and NFV, inherit from TOSCA type defined in ETSI GS NFV-SOL 001 [3]
appDescription	<code>tosca.nodes.nfv.VNF</code>	<code>product_info_description</code>	
virtualComputeDescriptor	<code>tosca.nodes.nfv.Vdu.Compute</code>	See note 1.	Content same for MEC and NFV, represented by a complete TOSCA type defined in ETSI GS NFV-SOL 001 [3]
osContainerDescriptor	<code>tosca.nodes.nfv.Vdu.OsContainer</code>	See note 1.	
swImageDescriptor	<code>tosca.artifacts.nfv.SwImage</code>	See note 1.	
virtualStorageDescriptor	<code>tosca.nodes.nfv.Vdu.VirtualBlockStorage</code> , <code>tosca.nodes.nfv.Vdu.VirtualObjectStorage</code> , <code>tosca.nodes.nfv.Vdu.VirtualFileStorage</code>	See note 1.	
appExtCpd	<code>tosca.nodes.nfv.Vdu.Cp</code>	See note 1.	
appServiceRequired	<code>tosca.nodes.mec.MecApp</code>	<code>app_service_required</code>	Content as in ETSI GS MEC 010-2 [1]
appServiceOptional	<code>tosca.nodes.mec.MecApp</code>	<code>app_service_optional</code>	
appServiceProduced	<code>tosca.nodes.mec.MecApp</code>	<code>app_service_produced</code>	
appFeatureRequired	<code>tosca.nodes.mec.MecApp</code>	<code>app_feature_required</code>	
appFeatureOptional	<code>tosca.nodes.mec.MecApp</code>	<code>app_feature_optional</code>	
transportDependencies	<code>tosca.nodes.mec.MecApp</code>	<code>transport_dependencies</code>	
appTrafficRule	<code>tosca.nodes.mec.MecApp</code>	<code>app_traffic_rule</code>	
appDNSRule	<code>tosca.nodes.mec.MecApp</code>	<code>app_dns_rule</code>	
appLatency	<code>tosca.nodes.mec.MecApp</code>	<code>app_latency</code>	
terminateAppInstanceOpConfig	<code>tosca.datatypes.nfv.VnfTerminateOperationConfiguration</code>	See notes 1 and 2.	Content same for MEC and NFV, represented by a complete TOSCA type defined in ETSI GS NFV-SOL 001 [3]
changeAppInstanceStateOpConfig	<code>tosca.datatypes.nfv.VnfOperateOperationConfiguration</code>	See notes 1 and 3.	
userContextTransferCapability	<code>tosca.nodes.mec.MecApp</code>	<code>user_context_transfer_capability</code>	Content as in ETSI GS MEC 010-2 [1]
appNetworkPolicy	<code>tosca.nodes.mec.MecApp</code>	<code>app_network_policy</code>	
mciopId	n/a	See note 4	Content same for MEC and NFV, inherit from TOSCA type defined in ETSI GS NFV-SOL 001 [3]
mcioidentificationData	<code>tosca.nodes.nfv.Vdu.OsContainerDeployableUnit</code>	<code>mcioidentification_data</code>	
logicalNode	<code>tosca.nodes.nfv.Vdu.OsContainerDeployableUnit</code>	<code>logical_node</code>	
requestAdditionalCapabilities	<code>tosca.nodes.nfv.Vdu.OsContainerDeployableUnit</code>	<code>requested_additional_capabilities</code>	
mciopConstraintParams	<code>tosca.nodes.nfv.Vdu.OsContainerDeployableUnit</code>	<code>mciop_constraint_params</code>	
n/a	<code>tosca.nodes.nfv.Mciop</code>	<code>tosca.nodes.Root</code>	

AppD attributes	TOSCA types	Property names	Notes
MciopProfile	n/a	n/a	Content same for MEC and NFV, represented by a complete TOSCA type defined in ETSI GS NFV-SOL 001 [3]
<p>NOTE 1: This attribute of the AppD is represented by a complete TOSCA type and all its properties.</p> <p>NOTE 2: This attribute of the AppD is represented by the "terminate" property in the <code>tosca.datatypes.nfv.VnfLcmOperationsConfiguration</code> datatype.</p> <p>NOTE 3: This attribute of the AppD is represented by the "operate" property in the <code>tosca.datatypes.nfv.VnfLcmOperationsConfiguration</code> datatype.</p> <p>NOTE 4: This attribute is not represented by a TOSCA type. The <code>mciopid</code> can be mapped to the node template name of type <code>tosca.nodes.nfv.Mciop</code> in the AppD.</p>			

NOTE: The present document does not cover attributes related to MEC federation.

## 5.2.3 General requirements

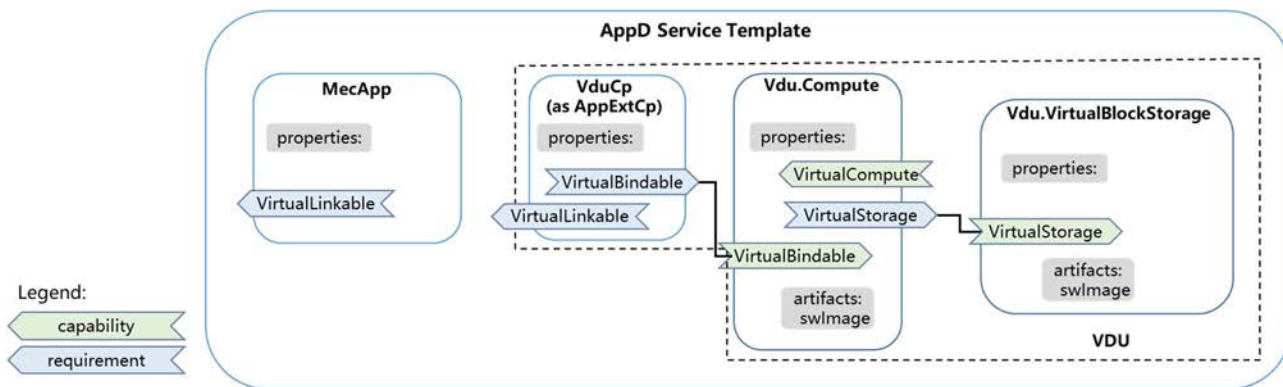
### 5.2.3.1 Service template design

A TOSCA based AppD can be described in the form of service template.

The structure and requirements of such service template shall conform to the provisions defined in ETSI GS NFV-SOL 001 [3], clause 6.11.3, which describe the single deployment flavour design with one service template, with the following clarifications:

- a node type definition defining a specific node type for the particular MEC app that shall be derived from `tosca.nodes.mec.MecApp`; either in the form of an inline definition or as import statement referencing a file that contains such definition;
- an import statement referring to `tosca.nodes.mec.MecApp`. See examples for import statements in clause 5.2.3.2;
- optionally, import statements referencing additional type definitions used by the service template; and
- a topology template describing the topology of the MEC app, with:
  - a node template of the specific node type of the MEC app, see clause 5.2.3.3;
  - further node templates describing the requirements for compute, storage and external network connection, see clause 5.2.3.4;
  - additional definitions and mappings as described in clause 5.2.3.4.

Figure 5.2.3.1-1 provides an overview of TOSCA based AppD service template, including the main node types and relationship between them, for MEC applications intended to be realized by one VM.

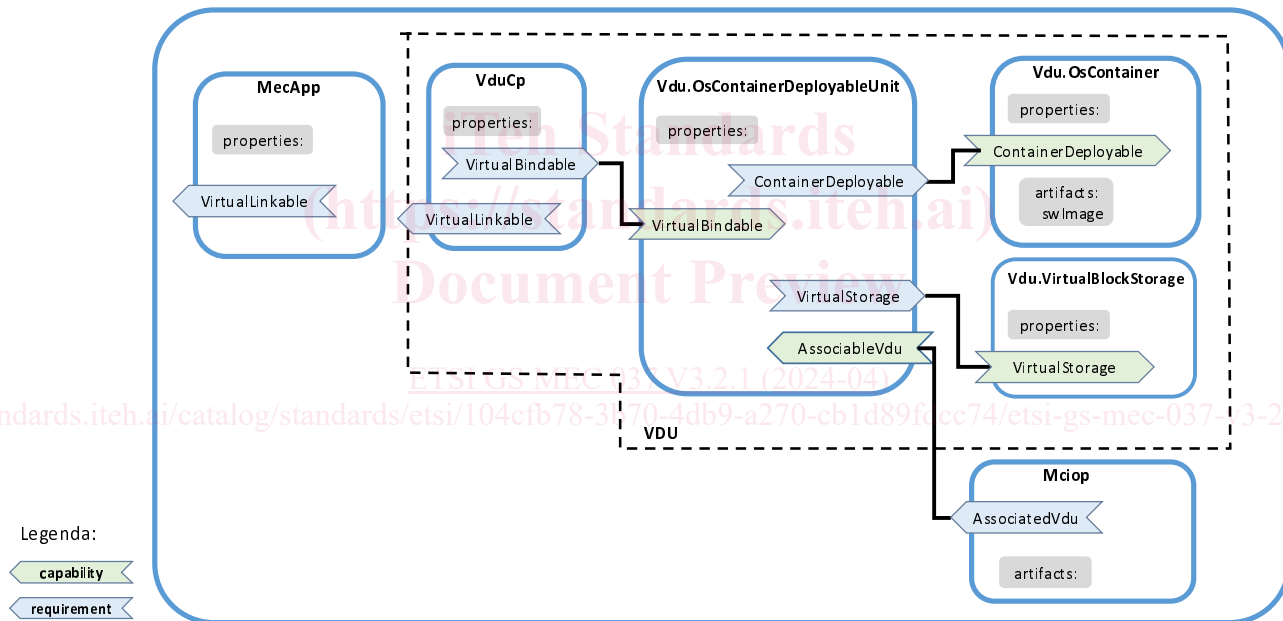


NOTE 1: The external connection points of the MEC app are represented using the VduCp node type according to the mechanism defined in clause A.3.2 of ETSI GS NFV-SOL 001 [3].

NOTE 2: In the present document, a MEC application has no internal virtual links, which means that an external CP always binds to an external virtual link.

**Figure 5.2.3.1-1: AppD service template overview when the MEC application is realized by one VM**

Figure 5.2.3.1-2 provides an overview of TOSCA based AppD service template, including the main node types and relationship between them, for MEC applications intended to be realized by one or a set of OS Containers.



NOTE 1: The external connection points of the MEC app are represented using the VduCp node type according to the mechanism defined in clause A.3.2 of ETSI GS NFV-SOL 001 [3].

NOTE 2: In the present document, a MEC application has no internal virtual links, which means that an external CP always binds to an external virtual link.

**Figure 5.2.3.1-2: AppD service template overview when the MEC application is realized by one or a set of OS Containers**

### 5.2.3.2 Import statement

Import statement is used within a TOSCA service template to reference another file that includes TOSCA type and template definitions. As defined in clause 5.2.3.1, an AppD shall include an import statement that refers to the definition of the specific node type for a particular MEC App or the MEC TOSCA AppD types if the specific node type is defined inline, and additional files which are necessary for processing the AppD. The TOSCA VNF type definitions are imported via the MecAppDTypes.yaml file. See also annex A.

The TOSCA-Simple-Profile-yaml-v1.3 [2] defines two options to describe import statements: the single-line grammar (section 3.6.8.2.1) and the multi-line grammar (section 3.6.8.2.2). The AppD should use the single-line grammar.

The following examples illustrate this:

**EXAMPLE 1:** AppD service template with single-line grammar import statements which defines the MyMecAppType specific node type inline and which further provides the MecApp specific node type definition:

```
tosca_definitions_version: tosca_simple_yaml_1_3

description: example of AppD with specific MEC App node type defined inline

imports:
- https://forge.etsi.org/rep/mec/gs037-pkg-format/raw/v3.2.1/MecAppDTypes.yaml
- other_files.yaml

node_types:
  MyCompany.MyMecAppType.1_0:
    derived_from: tosca.nodes.mec.MecApp
    properties:
      ...

topology template:
  ...

node_templates:
  MyMecApp:
    type: MyCompany.MyMecAppType.1_0:
    ...
```

**EXAMPLE 2:** AppD service template with single-line grammar import statements which defines the MyMecAppType specific node type in a file for import into other service templates:

```
tosca_definitions_version: tosca_simple_yaml_1_3

description: example of definitions file

imports:
- https://forge.etsi.org/rep/mec/gs037-pkg-format/raw/v3.2.1/MecAppDTypes.yaml
- other_files.yaml

node_types:
  MyCompany.MyMecAppType.1_0:
    derived_from: tosca.nodes.mec.MecApp
    properties:
      ...
```

**EXAMPLE 3:** AppD service template for MyMecApp with single-line grammar import statements which imports the type definition from Example 2 as file "MyCompanyMyMecAppType.yaml" and which further provides the MecApp specific node type definition:

```
tosca_definitions_version: tosca_simple_yaml_1_3

description: example of AppD with specific MEC App node type defined in a separate file

imports:
- path1/path2/MyCompanyMyMecAppType.yaml

topology template:
  ...

node_templates:
  MyMecApp:
    type: MyCompany.MyMecAppType.1_0:
    ...
```