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Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; VNF Snapshot Package specification

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Reference

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Foreword

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

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 VNF Snapshot Package file and of the artifacts it contains, fulfilling the requirements specified in ETSI GS NFV IFA 011 [1] for a VNF Snapshot Package, to be used within a NFV-MANO administrative domain or where all artifacts are managed by the same security domain within the network. The present document does not support using a VNF Snapshot Package across different NFV-MANO administrative domains or where artifacts are managed by different security domains within the network.

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 NFV-IFA 011: "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification".

[2] IETF RFC 3339 (July 2002): "Date and Time on the Internet: Timestamps".

[3] ETSI GS NFV-SOL 005: "Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Os-Ma-nfvo Reference Point".

[4] ISO/IEC 21320-1 (2015): "Information Technology -- Document Container File -- Part 1: Core".

[5] ETSI GS NFV-SOL 004: "Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; VNF Package and PNFD Archive specification".

[6] Recommendation ITU-T X.509: "Information technology - Open Systems Interconnection - The Directory: Public-key and attribute certificate frameworks".

[7] IETF RFC 5652 (September 2009): "Cryptographic Message Syntax (CMS)".

[8] IETF RFC 2315 (March 1998): "PKCS #7: Cryptographic Message Syntax Version 1.5".

[9] ETSI GS NFV-SOL 003: "Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; RESTful protocols specification for the Or-Vnfm Reference Point".

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 NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

[i.2] ETSI GS NFV-SOL 001: "Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; NFV descriptors based on TOSCA specification".

[i.3] ETSI GS NFV-SOL 006: "Network Functions Virtualisation (NFV) Release 3; Protocols and Data Models; NFV descriptors based on YANG specification".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GS 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 GS NFV 003 [i.1].

VNF Snapshot Package provider: creator of the VNF Snapshot Package

NOTE: The NFVO is a VNF Snapshot Package provider as producer of the VNF Snapshot Package management interface specified in ETSI GS NFV-SOL 005 [3].

VNF Snapshot Record: file that contains runtime information representing a VNF instance at the time when the snapshot is taken

3.2 Symbols

Void.

3.3 Abbreviations

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

TOSCA	Topology and Orchestration Specification for Cloud Applications
VNFSR	VNF Snapshot Record
YAML	YAML Ain't Markup Language

4 VNF Snapshot Package

4.1 VNF Snapshot Package format

The VNF Snapshot Package shall be a ZIP archive file whose format shall conform to ISO/IEC 21320-1 [4]. In the rest of the present document, this file is referred to as the "VNF Snapshot Package file".

4.2 VNF Snapshot Package file contents and structure

4.2.1 General

A VNF Snapshot Package shall contain:

- a VNF Snapshot Record (VNFSR) file;
- and additional files.

A VNF Snapshot Package may contain:

- The VNFD corresponding to the snapshotted VNF.

If a VNFD is present in the VNF Snapshot Package, the VNFD file shall be a ZIP archive file as specified in clause 10.4.4 of ETSI GS NFV-SOL 003 [9]. It shall be an exact copy of the VNFD in the VNF Package from which the snapshotted VNF was instantiated and be located at the root of the VNF Snapshot Package file. That copy can be used for troubleshooting by entities external to NFV-MANO. The VNFD in the VNF Snapshot Package is not intended to be used by NFV-MANO entities, e.g. for VNF snapshot reversal.

NOTE 1: ETSI GS NFV-SOL 001 [i.2] specifies the structure and format of the VNFD based on TOSCA specifications.

NOTE 2: ETSI GS NFV-SOL 006 [i.3] specifies the structure and format of the VNFD based on YANG specifications.

Examples of a VNF Snapshot Package file are described in annex A.

4.2.2 VNF Snapshot Package manifest file

A VNF Snapshot Package shall contain a manifest file located at the root of the VNF Snapshot Package file. The name and extension of the manifest file shall be "manifest.mf". The name and extension are case-insensitive.

The manifest file shall start with the VNF Snapshot Package metadata in the form of name-value pairs. Each pair shall appear on a different line. The "name" and the "value" shall be separated by a colon and, optionally, one or more blanks. The order of the name-value pairs is not significant.

The name shall be one of those specified in table 4.2.2-1 and the values shall comply with the provisions specified in table 4.2.2-1. All of these pairs in table 4.2.2-1 shall be in the manifest file.

Table 4.2.2-1: List of valid names and values for VNF Snapshot Package metadata

Name	Value
vnfd_id	A sequence of UTF-8 characters. See note 1.
vnf_snapshot_pkg_name	A sequence of UTF-8 characters. See note 2.
vnf_snapshot_pkg_id	A sequence of UTF-8 characters. See note 3.
vnf_snapshot_id	A sequence of UTF-8 characters. See note 4.
vnf_snapshot_scope	A sequence of UTF-8 characters. See note 5.
vnf_snapshot_pkg_create_date_time	String formatted according to IETF RFC 3339 [2]. See note 6.

NOTE 1: The value shall be identical to the value specified in the VNFD.
NOTE 2: The value shall be identical to the "name" attribute of the "VnfSnapshotPkgInfo" structure specified in ETSI GS NFV-SOL 005 [3], which is signalled to the NFVO (as VNF Snapshot Package provider) during the VNF Snapshot Package creation request.
NOTE 3: The value shall be identical to the "vnfSnapshotPkgUniqueId" attribute of the "VnfSnapshotPkgInfo" structure specified in ETSI GS NFV-SOL 005 [3], which is assigned by the NFVO (as VNF Snapshot Package provider) during the VNF Snapshot Package building.
NOTE 4: The value shall be identical to the value specified in the VNFSR file.
NOTE 5: Indicates whether it is a partial or full VNF Snapshot Package. The value is set from the value of the isFullSnapshot attribute specified in in ETSI GS NFV-SOL 005 [3]. Permitted values: PARTIAL, FULL.
NOTE 6: The value shall be identical to the "createdAt" attribute of the "VnfSnapshotPkgInfo" structure specified in ETSI GS NFV-SOL 005 [3], which is assigned by the NFVO during the VNF Snapshot Package building.

An example of valid manifest file metadata entries follows.

EXAMPLE 1:

```
metadata:
vnfd_id: 2116fd24-83f2-416b-bf3c-ca1964793aca
vnf_snapshot_pkg_id: 3225d37-64f4-518b-af3d-da2064793adb
vnf_snapshot_pkg_name: Sunshine
vnf_snapshot_scope: PARTIAL
vnf_snapshot_id: 43253d7-84f5-619d-bf4e-cf2054783aef
vnf_snapshot_pkg_create_date_time: 2020-04-01T10:00+08:00
```

END OF EXAMPLE 1.

The manifest file shall include a list of all files contained in or referenced from the VNF Snapshot Package with their location, expressed using a Source: location/name key-value pair. The manifest file itself shall not be included in the list.

The manifest file shall also contain a list of entries corresponding to the snapshot images that are part of the VNF Snapshot Package. For each of the comprising snapshot images, a reference to the snapshot image information contained in the VNFSR shall be provided after the corresponding "Source" entry as follow:

- For an image artifact corresponding to a compute snapshot resource, the tag "ComputeImageId" shall be used whose value is the same as the "id" attribute of the specific "VnfcSnapshotInfo" in the VNFSR of the compiled VNFC snapshot.

- For an image artifact corresponding to a storage snapshot resource, the tag "StorageImageId" shall be used whose value is the same as the "storageResourceId" attribute of the specific "VnfcSnapshotInfo" in the VNFSR of the compiled VNFC snapshot.

Below is an example of valid manifest file entries for image artifacts contained in or referenced from the VNF Snapshot Package.

EXAMPLE 2:

```
Source: images/image1
ComputeImageId: 1234d1-5678-910a-bf01-cf1234567abc
Source: images/image2
StorageImageId: 5678e1-1234-109b-bf02-cf7654321def
```

END OF EXAMPLE 2.

In addition, the manifest file shall contain an entry with the tag "Vnfsr" to identify the VNFSR file and, if the VNFD file is contained in the VNF Snapshot Package, another entry with the tag "Vnfd" to identify the VNFD file.

The "Vnfsr" and "Vnfd" tags and the generic "Source" tag are case-insensitive.

The "Vnfsr" entry and, if present, the "Vnfd" entry, shall be listed before the "Source" entries.

Below is an example of valid manifest file entries for files contained in or referenced from the VNF Snapshot Package.

EXAMPLE 3:

```
Vnfsr: MyVnfSnapshot.json
Vnfd: MyVnfd.zip
Source: MyVnfSnapshot.json
Source: MyVnfd.zip
Source: images/image1
```

END OF EXAMPLE 3.

4.2.3 VNF Snapshot Record in the VNF Snapshot Package

The VNF Snapshot Package shall contain a VNFSR of the snapshotted VNF instance. The specification of the contents and format of a VNFSR file is outside the scope of the present document.

The VNFSR file shall be located at the root of the VNF Snapshot Package file. In addition, the VNFSR file shall have an extension .json and the same name as the VNF Snapshot Package file.

5 Adding security to VNF Snapshot Package

5.1 VNF Snapshot Package authenticity and integrity

A VNF Snapshot Package shall support a method for authenticity and integrity assurance.

In order to provide the public key based authenticity and integrity for the whole VNF Snapshot Package, the complete VNF Snapshot Package file shall be digitally signed with the private key of the VNF Snapshot Package provider. The NFVO, as VNF snapshot package provider, shall sign the file when the VNF Snapshot Package is created with the "Build VNF snapshot package" operation specified in ETSI GS NFV-SOL 005 [3]. The VNF Snapshot Package provider shall deliver one ZIP archive file consisting of the VNF Snapshot Package file, a signature file and a certificate file that includes the public key of the VNF Snapshot Package provider. The signature file shall have an extension '.cms' and the same name as the VNF Snapshot Package file. The certificate may also be included in the signature container, if the signature format allows that.

The format of the ZIP archive file embedding the VNF Snapshot Package file shall conform to ISO/IEC 21320-1 [4].

The ZIP archive file embedding the VNF Snapshot Package file delivered by the VNF Snapshot Package provider is therefore structured according to one of the options described in figure 5.1-1.