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Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; Network Service Descriptor File Structure 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 of the Network Service Descriptor (NSD) file archive and the naming conventions for the different files it contains, fulfilling the requirements specified in ETSI GS NFV-IFA 014 [1] for an NSD file structure.

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 014: "Network Functions Virtualisation (NFV) Release 2; Management and Orchestration; Network Service Templates Specification".

[2] TOSCA-Simple-Profile-YAML-v1.2-csprd01: "TOSCA Simple Profile in YAML Version 1.2".

NOTE: Available at http://docs.oasis-open.org/tosca/TOSCA-Simple-Profile-YAML/v1.2/csprd01/TOSCA-Simple-Profile-YAML-v1.2-csprd01.pdf.

[3] IETF RFC 3339: "Date and Time on the Internet: Timestamps".

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

[5] IANA register for Hash Function Textual Names.

NOTE: Available at https://www.iana.org/assignments/hash-function-text-names/hash-function-text-names.xhtml.

[6] IETF RFC 7468: "Textual Encodings of PKIX, PKCS, and CMS Structures".

[7] IANA register for Media Types.

NOTE: Available at https://www.iana.org/assignments/media-types/media-types.txt.

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

[9] IETF RFC 3629: "UTF-8, a transformation format of ISO 10646".

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] TOSCA-v1.0-os: "TOSCA Version 1.0".

[i.2] ETSI GS NFV 003: "Network Functions Virtualisation (NFV); Terminology for Main Concepts in NFV".

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

3 Definition of terms and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI GS NFV 003 [i.2] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI GS NFV 003 [i.2] and the following apply:

CA	Certificate Authority
CMS	Cryptographic Message Syntax
CSAR	Cloud Service ARchive
IANA	Internet Assigned Number Association
TOSCA	Topology and Orchestration Specification for Cloud Applications
URI	Universal Resource Identifier
UTF	Unicode Transformation Format
YAML	YAML Ain't Markup Language

4 NSD file structure

4.1 TOSCA YAML Cloud Service Archive (CSAR)

A TOSCA YAML CSAR file is an archive file using the ZIP file format whose structure complies with the TOSCA Simple Profile in YAML version 1.2 specification [2]. The CSAR file may have one of the two following structures:

- CSAR containing a *TOSCA-Metadata* directory, which includes the *TOSCA.meta* metadata file providing an entry information for processing a CSAR file as defined in TOSCA v1.0 Specification [i.1].
- CSAR containing a single yaml (.yml or .yaml) file at the root of the archive. The yaml file is a TOSCA definition template that contains a metadata section with *template_name* and *template_version* metadata. This file is the CSAR Entry-Definitions file.

In addition, the CSAR file may optionally contain other directories with bespoke names and contents.

4.2 NSD file structure and format

The structure and format of an NSD file archive shall conform to the TOSCA Simple Profile in YAML version 1.2 specification of the CSAR format [2].

NOTE: This implies that the NSD file archive can be structured according to any of the two options described in clause 4.1.

4.3 NSD file contents

4.3.1 General

An NSD file archive shall contain the NSD as the main TOSCA definitions YAML file, and additional files, and shall be structured according to one of the CSAR structure options described in clause 4.1.

NOTE: ETSI GS NFV-SOL 001 [i.3] specifies the structure and format of the NSD based on TOSCA specifications.

If the option with a TOSCA-Metadata directory is used and the CSAR-Version parameter indicates version 1.0, all files that are contained in the archive shall be referenced from the TOSCA.meta file. If the CSAR-Version parameter indicates version 1.1, the files that are referenced and pointed to by relative path names through artifact definitions in one of the TOSCA definitions files (e.g. the NSD) contained in the CSAR need not be declared in the TOSCA.meta file.

Examples of NSD file archive options are described in annex A.

4.3.2 NSD file archive manifest file

A CSAR NSD file archive shall contain a manifest file. The manifest file shall have an extension .mf and the same name as the main TOSCA definitions YAML file and be located at the root of the archive (archive without TOSCA-Metadata directory) or in the location specified by the TOSCA.meta file (archive with a TOSCA-Metadata directory). In the latter case, the corresponding entry shall be named "Entry-Manifest".

The manifest file shall start with the NSD file archive metadata in the form of a name-value pairs. Each pair shall appear on a different line. The "name" and the "value" shall be separated by a colon. The name shall be one of those specified in table 4.3.2-1 and the values shall comply with the provisions specified in table 4.3.2-1.

Table 4.3.2-1: List of valid names and values for NSD file archive metadata

Name	Value
nsd_designer	A sequence of UTF-8 [9] characters. See note 1.
nsd_invariant_id	A sequence of UTF-8 [9] characters. See note 1.
nsd_name	A sequence of UTF-8 [9] characters. See note 1.
nsd_release_date_time	String formatted according to IETF RFC 3339 [3].
nsd_file_structure_version	A string. See note 2.
NOTE 1: The value shall be identical to that specified in the NSD. NOTE 2: The value shall be identical to the version attribute specified in the NSD.	

An example of valid manifest file metadata entries follows.

EXAMPLE:

```
metadata:
nsd_designer: Mycompany
nsd_invariant_id: Sunshine
nsd_name: Sunshine
nsd_file_structure_version: 1.0
nsd_release_date_time: 2018-04-08T10:00+08:00
```

END OF EXAMPLE

If the NSD file archive refers to external files, the manifest file shall contain digests of individual files in the file archive, both local files contained in the archive and external files referenced in the archive.

If the NSD file archive does not refer to external files, the manifest files may contain digests of the individual files contained in the archive. If the manifest file does not include digests, the complete CSAR file shall be digitally signed by the NS designer. A consumer of the NSD file archive verifies the digests in the manifest file by computing the actual digests and comparing them with the digests listed in the manifest file.

The manifest file, or alternatively, the signature of the CSAR file, is the key for decision regarding an NSD file archive integrity and validity in terms of its contained artifacts. The specification of the manifest file and specific algorithms used in digest creation and validation is described in the security related clause.

4.3.3 NSD file archive change history file

A CSAR NSD file archive shall contain a humanly readable text file describing any change in the constituency of the NSD file archive. All the changes in the NSD file archive shall be versioned, tracked and inventoried in the change history file.

The NSD file archive change history file shall be named "ChangeLog.txt" and be located at the root of the archive (archive without TOSCA-Metadata directory) or in the location specified by the TOSCA.meta file (archive with a TOSCA-Metadata directory). In the latter case, the corresponding entry shall be named "Entry-Change-Log".

4.3.4 Testing files in the NSD file archive

To enable NS validation, an NS designer should include in an NSD file archive, files containing necessary information (e.g. test description) in order to perform NS testing. The contents of NS testing information included in the NSD file archive is outside the scope of the present document.

The NS testing information in the NSD file archive shall be located in a directory named "Tests" located at the root of the archive (archive without TOSCA-Metadata directory) or in the location specified by the TOSCA.meta file (archive with a TOSCA-Metadata directory). In the latter case, the corresponding entry shall be named "Entry-Tests".

4.3.5 Certificate file

If the manifest file is signed by the NS designer (see option 1 in clause 5.1), the CSAR NSD file archive shall contain a certificate file if the certificate is not included in the signature container (see note) within the manifest file. In this case or if a single certificate is provided for the signature of multiple artifacts (see clause 5.4), the certificate file shall have an extension .cert and the same name as the main TOSCA definitions YAML file and be located at the root of the archive (archive without TOSCA-Metadata directory) or in the location specified by the TOSCA.meta file (archive with a TOSCA-Metadata directory). In the latter case, the corresponding entry shall be named "Entry-Certificate".

NOTE: Signature container refers to a structure in a standard format (e.g. CMS) which contains signature and additional data needed to process the signature (e.g. certificates, algorithms, etc.).

If the complete CSAR file is signed by the NS designer (see option 2 in clause 5.1), the certificate file shall be contained in a zip file together with the CSAR file and the signature file if the certificate is not included in the signature file. The certificate file shall have an extension .cert and the same name as the CSAR file.

5 Adding security to TOSCA CSAR

5.1 NSD file archive authenticity and integrity

An NSD file archive shall support a method for authenticity and integrity assurance.

In order to provide the public key based authenticity and integrity for the whole NSD file archive one of the two following options shall be followed:

Option 1: The NSD file archive shall contain a Digest (a.k.a. hash) for each of files it contains. The table of hashes shall be included in the manifest file, which is signed with the NS designer private key. In addition, the NS designer shall include a signing certificate that includes the NS designer public key, following a predefined naming convention and located either at the root of the archive or in a predefined location (e.g. directory).

The certificate may also be included in the signature container, if the signature format allows that. For example, the CMS format allows to include the certificate in the same container as the signature.

Option 2: The complete CSAR file shall be digitally signed with the NS designer private key. The NS designer delivers one zip file consisting of the CSAR file, a signature file and a certificate file that includes the NS designer public key. The certificate may also be included in the signature container, if the signature format allows that.

In option 2, the NSD file archive delivered would therefore be structured according to figure 5.1-1.

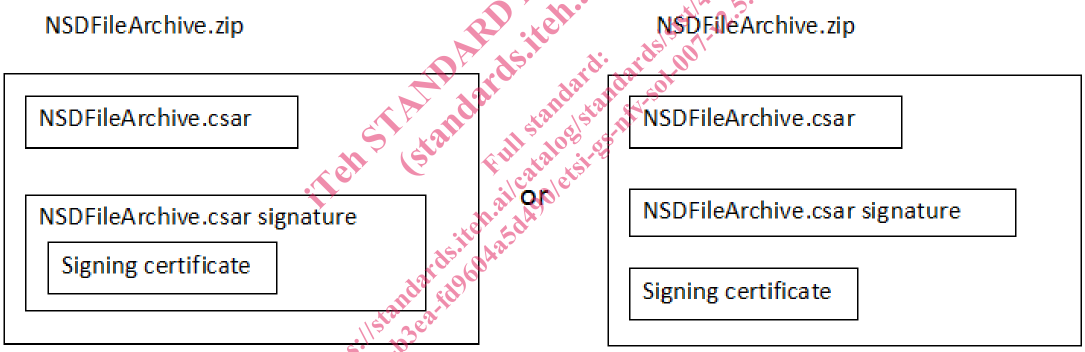

Figure 5.1-1: Composition of the NSD File Archive zip file in option 2

Option 2 is only valid if all artifacts are included in the NSD file archive, i.e. no external artifacts are referenced from the files contained in the NSD file archive.

This solution, either option 1 or option 2, relies on the existence in the NFVO of a root certificate of a trusted CA that shall have been delivered via a trusted channel that preserves its integrity (separate from the NSD file structure) to the NFVO and be preinstalled in the NFVO before the on-boarding of the NSD file structure.

NOTE: The present document makes no assumption on who this trusted CA is. Furthermore, it does not exclude that the root certificate be issued by the NS designer or by the NFVI provider.

5.2 Manifest and certificate files in the NSD file archive

In option 1 (see clause 5.1) the manifest file provides integrity assurance of the NSD file archive. In this option the manifest contains the digests (hashes) for each individual file locally stored within the NSD file archive or referenced from it. Each file related entry of the manifest file includes the path or URI of the individual file, the hash algorithm and the generated digest. A consumer of the NSD file archive shall verify the digests in the manifest file by computing the actual digests and comparing them with the digests listed in the manifest file.