



Network Functions Virtualisation (NFV) Release 2; Protocols and Data Models; Network Service Descriptor File Structure Specification

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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".
- [i.4] ETSI GS NFV-SOL 006: "Network Functions Virtualisation (NFV) Release 2; 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.2] apply.

3.2 Symbols

Void.

3.3 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)

4.1.1 CSAR structure

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 [1.1].
- CSAR containing a single yam1 (.yml or .yaml) file at the root of the archive. The yam1 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.

4.1.2 TOSCA Entry definition file metadata extension

4.1.2.1 Metadata keynames

Table 4.1.2.1-1 specifies an extension of the list of recognized metadata keynames as specified in TOSCA-Simple-Profile-YAML-v1.2 [2] for the main TOSCA Service Template.

Table 4.1.2.1-1: List of metadata keynames extensions

Keyname	Required	Type	Description
yang_definitions	No	string	Reference to a YANG file representing the NSD within an NSD file archive.

4.1.2.2 Additional requirement

If a YANG-based NSD is included in the NSD file archive, the main TOSCA definitions YAML file shall include a metadata section with a metadata entry, where the keyname is "yang_definitions" and the value is the path to the YANG file representing the NSD within the NSD file archive. No additional contents shall be included in the main TOSCA definitions YAML file.

EXAMPLE:

```
tosca_definitions_version: tosca_simple_yaml_1_2

metadata:

  template_name: MainServiceTemplate

  template_author: Onboarding portal

  template_version: 1.0

  yang_definitions: Definitions/myNSD.xml
```

END OF EXAMPLE.

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 a main TOSCA definitions YAML file, representing all or part of the NSD, and additional files. It shall be structured according to one of the CSAR structure options described in clause 4.1.

NOTE 1: ETSI GS NFV-SOL 001 [i.3] specifies the structure and format of the NSD based on TOSCA specifications.

NOTE 2: ETSI GS NFV-SOL 006 [i.4] specifies the structure and format of the NSD based on YANG 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.

If a YANG-based NSD is included in the NSD file archive only the option without a TOSCA-Metadata directory is applicable.

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 and, optionally, one or more blanks. 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 1:

```
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 1.

The manifest file shall include a list of all files contained in or referenced from the NSD file archive with their location, expressed using a Source: location/name key-value pair. The manifest file itself may be included in the list.

Below is an example of valid manifest file entries for files contained in or referenced from the NSD file archive.

EXAMPLE 2:

```
Source: SunShine.yaml
Source: scripts/install.sh
Source: https://www.designer_org.com/SunShine/v4.1/scripts/scale/scale.sh
```

END OF EXAMPLE 2.

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.

The details of specifying the local or externally located files and their security protection are described in clause 5.

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.