

# NSD Specification

## V0.1

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# 1.Scope

The scope of the present document is to describe the NSD Specification For ONAP R1.

## 2.Terms, Definitions and Abbreviations

For the purposes of the present document, the following abbreviations apply:

Abbreviation	Definition
CSAR	Cloud Service Archive
TOSCA	Topology and Orchestration Specification for Cloud Applications
NS	Network Service
NSD	Network Service Descriptor
VNF	Virtual Network Function
VNFD	Virtual Network Function Descriptor

Table 2-1 abbreviations

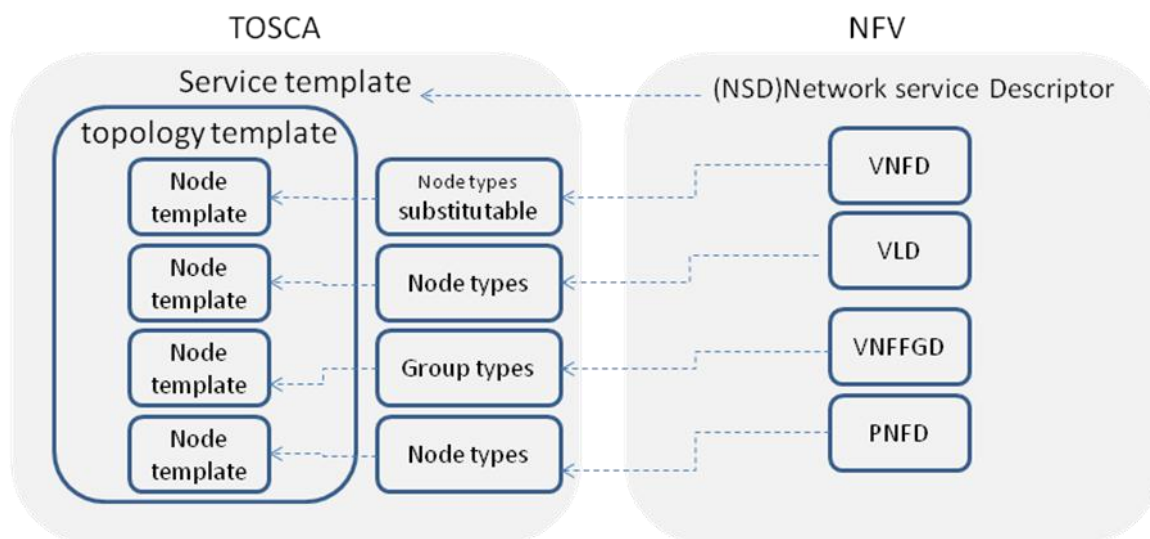
## 3.NSD TOSCA Model

At the top level of TOSCA data model is a service template, within a service template, it includes several node templates with different types. In NFV, NSD is at the top level, under NSD, it includes VNFD, VNFFGD, VLD and PNFD. The mapping between TOSCA and NFV takes the following approach.

1. NSD is described by using a service template,
2. VNFD, VNFFGD, VLD and PNFD is considered as node templates with appropriate node types.

3. VNFD can be further described by using another service template with substitutable node type.

The mapping relationship between TOSCA and NFV is showing in the following Figure.



General mapping between TOSCA and NFV

In R1, the NSD mainly focus on the NS temple, including the VNF, VL nodes.

## 4. NSD TOSCA Definition

**TOSCA Service Template definition:**

Keyname	Required	Type	Description
tosca_definitions_version	yes	<a href="#">string</a>	Defines the version of the TOSCA Simple Profile specification the template (grammar) complies with.
metadata	no	<a href="#">map of string</a>	Defines a section used to declare additional metadata information. Refers to <b>Metadata keynames definition</b> .
description	no	<a href="#">description</a>	Declares a description for this Service Template and its contents.

Keyname	Required	Type	Description
dsl_definitions	no	N/A	Declares optional DSL-specific definitions and conventions. For example, in YAML, this allows defining reusable YAML macros (i.e., YAML alias anchors) for use throughout the TOSCA Service Template.
repositories	no	list of <a href="#">Repository definitions</a>	Declares the list of external repositories which contain artifacts that are referenced in the service template along with their addresses and necessary credential information used to connect to them in order to retrieve the artifacts.  <b>Reserved</b>
artifact_types	no	list of <a href="#">Artifact Types</a>	This section contains an optional list of artifact type definitions for use in the service template
data_types	no	list of <a href="#">Data Types</a>	Declares a list of optional TOSCA Data Type definitions.
capability_types	no	list of <a href="#">Capability Types</a>	This section contains an optional list of capability type definitions for use in the service template.
interface_types	no	list of <a href="#">Interface Types</a>	This section contains an optional list of interface type definitions for use in the service template.
relationship_types	no	list of <a href="#">Relationship Types</a>	This section contains a set of relationship type definitions for use in the service template.
node_types	no	list of <a href="#">Node Types</a>	This section contains a set of node type definitions for use in the service template.
group_types	no	list of <a href="#">Group Types</a>	This section contains a list of group type definitions for use in the service template.
policy_types	no	list of <a href="#">Policy Types</a>	This section contains a list of policy type definitions for use in the service template.  <b>Reserved</b>
imports	no	list of <a href="#">Import Definitions</a>	Declares import statements external TOSCA Definitions documents. The referenced TOSCA files can be included in CSAR or in other server.  1. If basic TOSCA files are in the CSAR, the import file path can be relative path. 2. If basic TOSCA files are in other server, the import file path must be absolute path.

Keyname	Required	Type	Description
topology_template	no	<a href="#">Topology Template definition</a>	Defines the topology template of an application or service, consisting of node templates that represent the application's or service's components, as well as relationship templates representing relations between the components.
plans	no	plan definition	Defines the workflow plans for service lifecycle management execution.

#### Metadata keynames definition:

Keyname	Required	Type	Description
id	YES	<a href="#">string</a>	Declares ID of the NS Descriptor.
vendor	YES	<a href="#">string</a>	Declares the vendor of the template. Such as ZTE, HW, .....
version	YES	<a href="#">string</a>	Declares the version string for the template.
name	YES	<a href="#">string</a>	Declares the name of the NS Descriptor.

#### [Topology Template definition:](#)

Keyname	Required	Type	Description
description	no	<a href="#">description</a>	The optional description for the Topology Template.
inputs	no	list of <a href="#">parameter definitions</a>	An optional list of input parameters (i.e., as parameter definitions) for the Topology Template.
node_templates	no	list of <a href="#">node templates</a>	An optional list of node template definitions for the Topology Template.
relationship_templates	no	list of <a href="#">relationship templates</a>	An optional list of relationship templates for the Topology Template. Reserved
groups	no	list of <a href="#">group definitions</a>	An optional list of Group definitions whose members are node templates defined within this same Topology Template.
policies	no	list of <a href="#">policy definitions</a>	An optional list of Policy definitions for the Topology Template. Reserved

Keyname	Required	Type	Description
outputs	no	list of <a href="#">parameter definitions</a>	An optional list of output parameters (i.e., as parameter definitions) for the Topology Template.
substitution_mappings	no	N/A	An optional declaration that exports the topology template as an implementation of a Node type. This also includes the mappings between the external Node Types named capabilities and requirements to existing implementations of those capabilities and requirements on Node templates declared within the topology template.

Example:

```

tosca_definitions_version: # Required TOSCA Definitions version string
# Optional metadata keyname: value pairs
metadata:
  id: #NSD unique identifier
  vendor: #VNF vendor
  version: #VNF version
  name: #VNF name
# Optional description of the definitions inside the file.
description: <template type description>
dsl_definitions:
  # list of YAML alias anchors (or macros)
imports:
  # ordered list of import definitions
node_types:
  # list of node type definitions
topology_template:
  # topology template definition of the cloud application or service
description: <template description>
inputs: <input_parameter_list>
outputs: <output_parameter_list>
node_templates: <node_template_list>
groups: <group_definition_list>
# Optional declaration that exports the Topology Template
# as an implementation of a Node Type.
substitution_mappings:
  node_type: <node type name>
capabilities:

```

```
    <map_of_capability_mappings_to_expose>
requirements:
    <map_of_requirement_mapping_to_expose>
plans:
    # plan definition of the cloud application or service
```

## 5. TOSCA Type Definition

The present clauses below describe the extension type definition for NFV VNF according to ETSI NFV IFA011 document, "tosca\_simple\_yaml\_1\_0 protocol" and "tosca-nfv-v1.0-csd03" specifications. The VNF provider also can extend the TOSCA types based on this definition.

### 5.1 Nodes

#### 5.1.1 toasca.nodes.onap.NS

```
tosca.nodes.onap.NS:
  derived_from: toasca.nodes.Root
  properties:
    id:
      type: string
      description: ID of the NSD
      required: true
      constraints:
        - min_length: 1
    designer:
      type: string
      description: Designer of the NSD
      required: true
    version:
      type: version
      description: version of the NSD
      required: true
    name:
      type: string
      description: name of the NSD
      required: true
```

#### 5.1.2 toasca.nodes.onap.VNF

```
tosca.nodes.onap.VNF:
```



```
derived_from: tosca.nodes.Root
properties:
  id:
    type: string
    description: ID of the VNFD
  vendor:
    type: string
    description: name of the vendor who generate the VNFD
  version:
    type: version
    description: the version for the VNFD
  name:
    type: string
    required: true
    description: Name of virtual link among VNFs.
  vnfm_info:
    type: string
    required: true
    description: Identifies VNFM(s) compatible with the VNF described in this version of the
VNFD. In ONAP R1, Such as ZTE,HW,JUJU,...
  requirements:
    - virtualLink:
        capability: tosca.capabilities.onap.VirtualLinkable
        node: tosca.nodes.onap.VL
        relationship: tosca.relationships.onap.VirtualLinksTo
```

### 5.1.3 tosca.nodes.onap.VL

```
tosca.nodes.onap.VL:
derived_from: tosca.nodes.network.Network
properties:
  id:
    type: string
    description: ID of the VLD
  name:
    type: string
    required: true
    description: Name of virtual link among VNFs.
```

```
vendor:
  type: string
  required: true
  description: the organization generating the VLD
capabilities:
  virtual_linkable:
    type: tosca.capabilities.onap.VirtualLinkable
```

## 5.2 Capabilities

### 5.2.1 tosca.capabilities.onap.VirtualLinkable

```
tosca.capabilities.onap.VirtualLinkable:
  derived_from: tosca.capabilities.Node
```

## 5.3 relationships

### 5.3.1 tosca.relationships.onap.VirtualLinksTo

```
tosca.relationships.onap.VirtualLinksTo:
  derived_from: tosca.relationships.DependsOn
  valid_target_types: [ tosca.capabilities.onap.VirtualLinkable ]
```

## 5.4 Plans

```
plans:
  instantiate:
    description: Instantiate operation of this service template
    reference: Plans/plan1.zip #WSO plan file path
    inputs:
      inputParam1:
        description: xxx
        type: string
        required: false
        default: xxx
      inputParam2:
        description: xxx
```

```

    type: integer
    required: true
    default: xxx
terminate:
  description: Terminate operation of this service template
  reference: Plans/plan1.zip #WSO plan file path
  inputs:
    inputParam1:
      description: xxx
      type: string
      required: false
      default: xxx
    inputParam2:
      description: xxx
      type: integer
      required: true
      default: xxx

```

## 6. Appendix

### 6.1 scalar-unit.size

Unit	Usage	Description
B	size	byte
kB	size	kilobyte (1000 bytes)
KiB	size	kibibytes (1024 bytes)
MB	size	megabyte (1000000 bytes)
MiB	size	mebibyte (1048576 bytes)
GB	size	gigabyte (1000000000 bytes)
GiB	size	gibibytes (1073741824 bytes)
TB	size	terabyte (1000000000000 bytes)
TiB	size	tebibyte (1099511627776 bytes)

### 6.2 scalar-unit.time

Unit	Usage	Description
d	time	days
h	time	hours
m	time	minutes
s	time	seconds
ms	time	milliseconds
us	time	microseconds
ns	time	nanoseconds

### 6.3 TOSCA version

```
<major_version>.<minor_version>[.<fix_version>[.<qualifier>[-<build_version
] ] ]
```

example:

```
# basic version strings
```

```
6.1
```

```
2.0.1
```

```
# version string with optional qualifier
```

```
3.1.0.beta
```

```
# version string with optional qualifier and build version
```

```
1.0.0.alpha-10
```