



The Standards People

# NFV model enhancements for containerized VNF orchestration

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## Outline

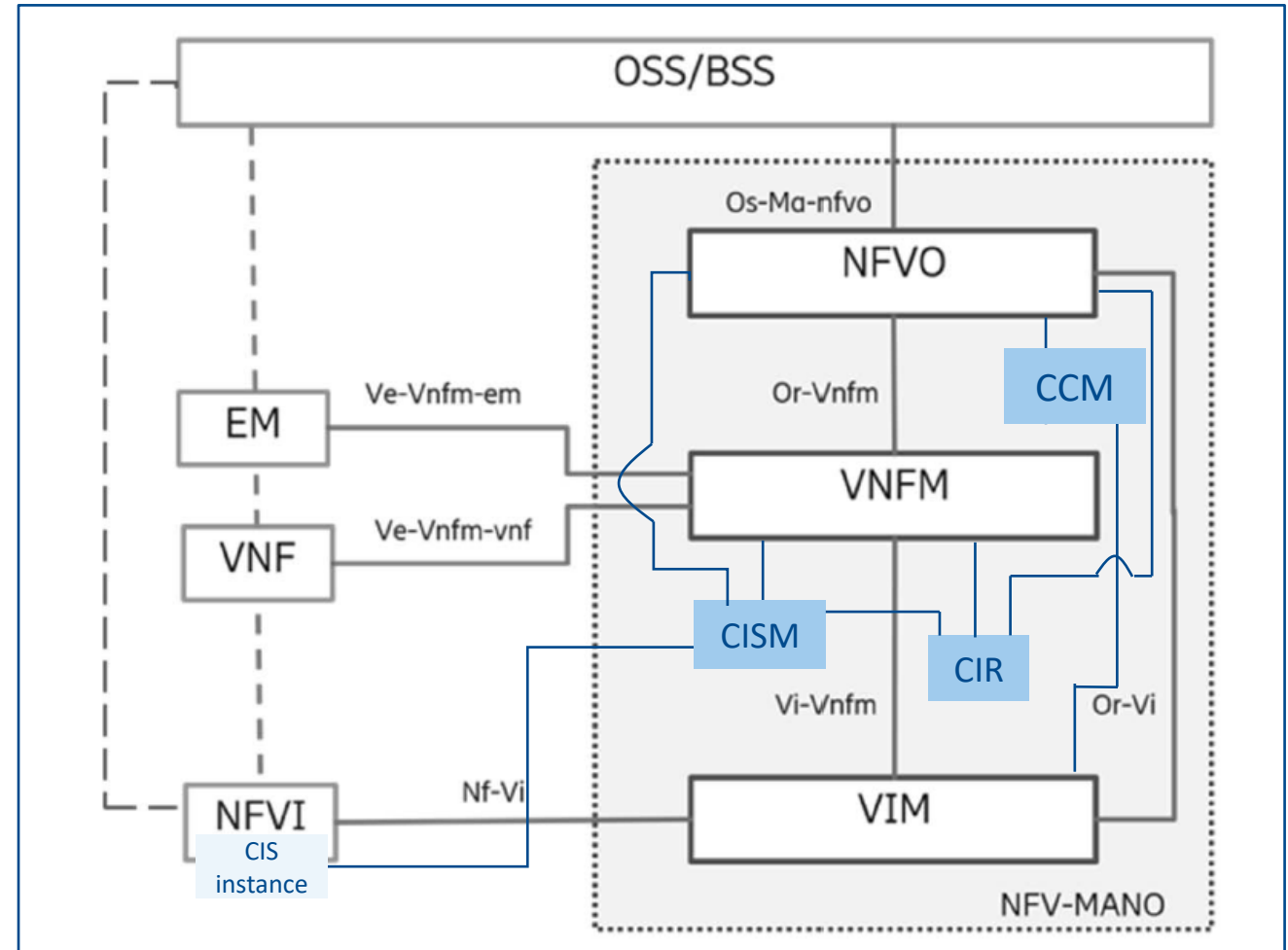
- Architectural enhancements
- NFV model enhancements

# Architectural Enhancements



NFV-MANO architectural framework extended with 3 new functions:

- ❑ Container Infrastructure Service Management (CISM), e.g. Kubernetes Control plane
- ❑ Container Image Repository (CIR), e.g. Docker Registry
- ❑ Container Cluster Management (CCM), e.g. Kubespray, kubernetes, cluster-api



Note 1: The CISM, CIR and CCM can be integrated in existing NFV-MANO functional blocks or be deployed independently.

Note 2: The Container Infrastructure Service (CIS) instances provide, as part of the NFVI, runtime environments for one or more container virtualization technologies.

Note 3: This figure is not extracted from a published GS. It is based on GS NFV-IFA 010 and current working assumptions w.r.t. the CCM. It is for illustrative purposes only.

# VNFD information model changes

## New requirements for the description of VNF Package content

- ✔ The VNF Package shall contain one or more MCIOPs for containerized VNFs
- ✔ The VNFD shall support the possibility to reference one or more MCIOP(s)
- ✔ The VNFD shall support the possibility to reference OS container images

## Enhanced VNFD information model

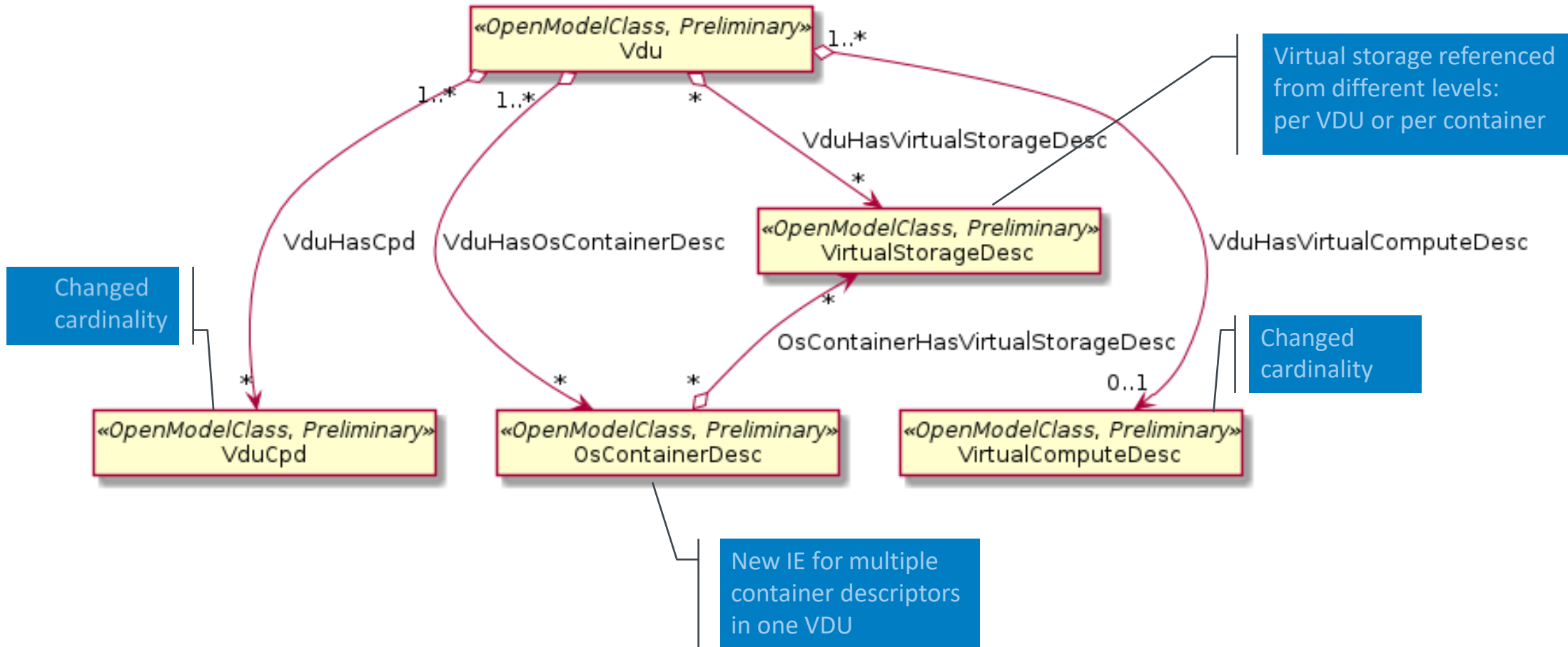
- ✔ Introduce new IE for OsContainerDesc
- ✔ Enhance the VDU IE to model a MCIO as VDU (model a K8s Pod as VDU)
  - ✔ Add attribute for OsContainerDesc
- ✔ Enhance the VNFD IE with an attribute, referencing included MCIOPs
- ✔ From a descriptor point of view, it allows hybrid VNFs, i.e. VM-based and OS container based VNFCs
- ✔ Forbid hybrid VNFCs, they have to be either VM- or OS container based
- ✔ Enhanced IE for SwImageDesc to reflect capabilities for OS container images

# Further VNFD information model enhancements

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- ✔ Enhance the VirtualStorageDesc IE with the additional attribute perVnfcInstance which indicates if the Storage shall be used as template for all VNFC instances (current semantic), or if it is created once and potentially (depending on the storage backend capability) can be shared between VNFC instances.
- ✔ Add a descriptor information element for a MCIOP profile to the VnfDf.
- ✔ Enhance the scope attribute of the AffinityOrAntiAffinityGroup information element with a new scope type “container-namespace”.
- ✔ Change the cardinality of the intCp attribute of the VDU information element from “1..N” into “0..N” to also allow an absence of VduCps in case the implementing containers only connect to the container cluster internal network.
- ✔ New CP descriptor type VirtualCPD, specifying the primary container cluster external network connection properties (modelling K8s Service and Ingress objects).
- ✔ Enhance the VDU information element with a new attribute mcioConstraintParams which specifies the standardized semantical context of the MCIO constraints.

# Enhanced VNFD information model for virtual deployment unit (VDU)





## Enhance the information models of the Or-Vnfm interfaces for OS container management and orchestration

- ✔ Convey the namespace value for VNF LCM operations and the constraint values to be assigned to MCIOs via the grant response message
- ✔ Enhance the ResourceDefinition information element attributes with references to OS container resource definition types and resource templates.
- ✔ Align the description of access information for SW image and artifact information elements for external access.
- ✔ Align the runtime information elements like VnflInfo and its sub-elements to the extended VNFD and VDU information model for OS containers, including a new information element mciInfo which provides information on the type of MCIO, the desired, and available number of instances and additional information obtained from the CISM
- ✔ Enhance the VimConnectionInfo to cover CISM, MCIOP repository and CIR connections as well.
- ✔ Enhance the Grant VNF LCM output parameters and VnflInfo information element with attributes for access information to OS container image registries and MCIOP repositories.

## Enhance the information models of the Ve-Vnfm and Os-Ma-nfvo interfaces for OS container management and orchestration

- ✓ Align the runtime information elements like VnflInfo and its sub-elements to the extended VNFD and VDU information model for OS containers, including a new information element mciolInfo which provides information on the type of MCIO, the desired, and available number of instances and additional information obtained from the CISM

## Enhance the information model of the NSD

- ✓ Enhance the scope attribute of the AffinityOrAntiAffinityGroup information element with a new scope type “container-namespace”.

Published versions available at:

[ETSI GS NFV-IFA 008 V4.2.1 \(2021-05\)](#)

[ETSI GS NFV-IFA 013 V4.2.1 \(2021-05\)](#)

[ETSI GS NFV-IFA 014 V4.2.1 \(2021-05\)](#)



# New types in TOSCA VNFD data model

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## New TOSCA NFV node types:

- ✓ Vdu.OsContainer
- ✓ Vdu.OsContainerDeployableUnit
- ✓ Mciop
- ✓ VirtualCp

## New TOSCA NFV artifact type:

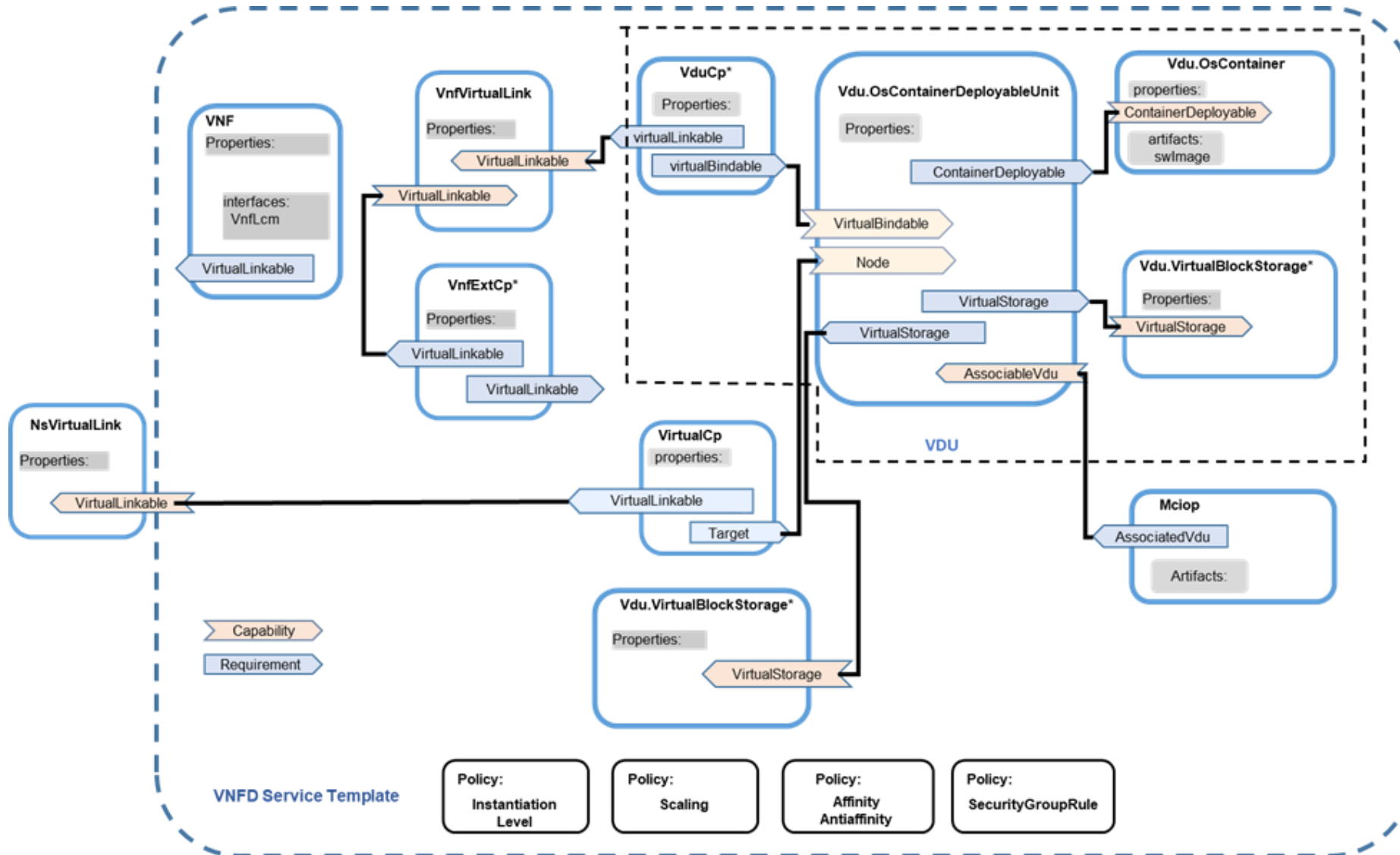
- ✓ HelmChart

## New TOSCA NFV data types:

- ✓ ExtendedResourceData
- ✓ Hugepages

**NOTE:** Only the most relevant new types of the TOSCA VNFD data model are listed here. For complete type specifications refer to the SOL001ed421 specification.

# VNFD service template model for containerized VNF – Current draft in SOL001ed421



<p>Release 4 versions of IFA specifications (information models)</p>	<p>First drop for NFV Release 4 stage 2 specifications (IFA010ed411, IFA011ed411, IFA040) published Q4 2020.</p> <p>Second drop for NFV Release 4 stage 2 specifications (IFA010ed421, IFA011ed421, IFA007ed421, IFA008ed421, IFA013ed421, IFA014ed421, IFA040ed421) published May 2021.</p> <p>Third drop for NFV Release 4 stage 2 specifications (maintenance versions ed431) are planned for publication Q1 2022</p>
<p>Release 4 versions of SOL specifications (data models)</p>	<p>First drop of NFV Release 4 stage 3 specifications (SOL001ed421) is planned for publication January 2022.</p> <p>Second drop of NFV Release 4 stage 3 specifications (SOL002ed431, SOL003ed431, SOL005ed431, SOL006ed431) are planned for publication Q1 2022</p>

# Where to find further information

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NFV Bits on YouTube:

<https://www.youtube.com/user/ETSIstandards>

ETSI NFV drafts:

<https://docbox.etsi.org/ISG/NFV/Open/Drafts/>

ETSI NFV published standards:

<https://www.etsi.org/committee/1427-nfv>

ETSI NFV blog:

<https://www.etsi.org/newsroom/blogs/blog-nfv>

ETSI NFV webpage:

<https://www.etsi.org/technologies/nfv>

The contents of this presentation is of tutorial nature. To make this presentation easy to understand to non-experts, not all technical details are shown.

In case of discrepancies between the contents of this tutorial and the ETSI NFV Group Specifications, the latter source of information takes precedence.