Technical Community Coordination: Generic Network Management

2020 April Virtual Technical Event

Magnus Buhrgard, Ericsson

This session

- 3GPP Liaison Statements related to VES

- ETSI NFV outlook

- ETSI – ONAP alignment in the Guilin release

3GPP TSG-SA5 Meeting #127
Sophia Antipolis, France 14-18 October 2019

S5-196792

Title:	LS on 3GPP – ONAP Cooperation & WoW
Source:	3GPP TSG SA WG5
To:	ONAP Community Coordinator for Generic Network Management Activities, Magnus Buhrgard
Cc:	3GPP TSG SA

ACTION:

1. SA5 kindly requests establishment of an individual to act as a liaison coordinator between 3GPP and ONAP
2. SA5 kindly requests ONAP to inform SA5 when a version of VES API specification is available.
3. SA5 kindly requests ONAP to consider establishing a permanent reference to the ONAP VES API specifications.

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- Information from Trevor Lovett:

- A new version of the VES Event Listener specification is being released in the ONAP Frankfurt release. This will be moving VES 7.1 to 7.1.1. The specification, which documents the changes, can be found here.

- The VES Event formats supported by ONAP, will be documented in the VNF Requirements project going forward, and all changes will be managed via contributions to that project.

  - The documentation is versioned with the ONAP release,

  - No changes will be made to the spec after the release unless it is to address a critical bug fix which does not impact compatibility.

  - We have 2 versions of VES supported in ONAP Frankfurt's release: VES 5.4.1 and VES 7.1.1.

- **N.B. this not an agreement between ONAP and 3GPP. Just information exchange.**

3GPP TSG-SA5 Meeting #128   *S5-197831*
18-22 November 2019, Zhuhai, China

Title:	LS to ONAP on 3GPP MnS integration with VES
Response to:	-
Release:	Rel-16
Work Item:	Integration of ONAP and 3GPP 5G management framework
Source:	3GPP SA5
To:	ONAP DCAE Project, ETSI ISG ZSM
Cc:	Magnus.buhrgard@ericsson.com (ONAP SDO coordinator)

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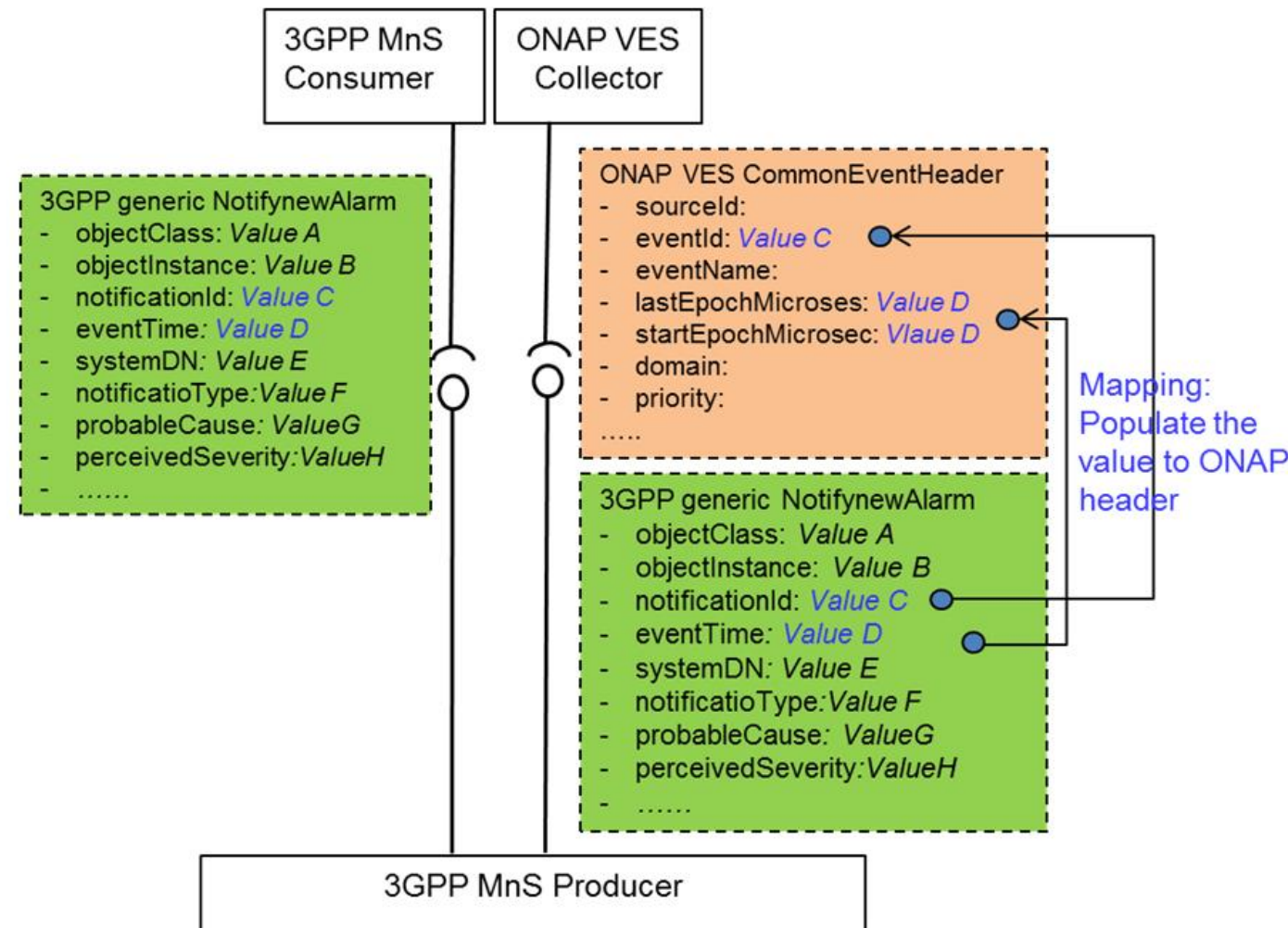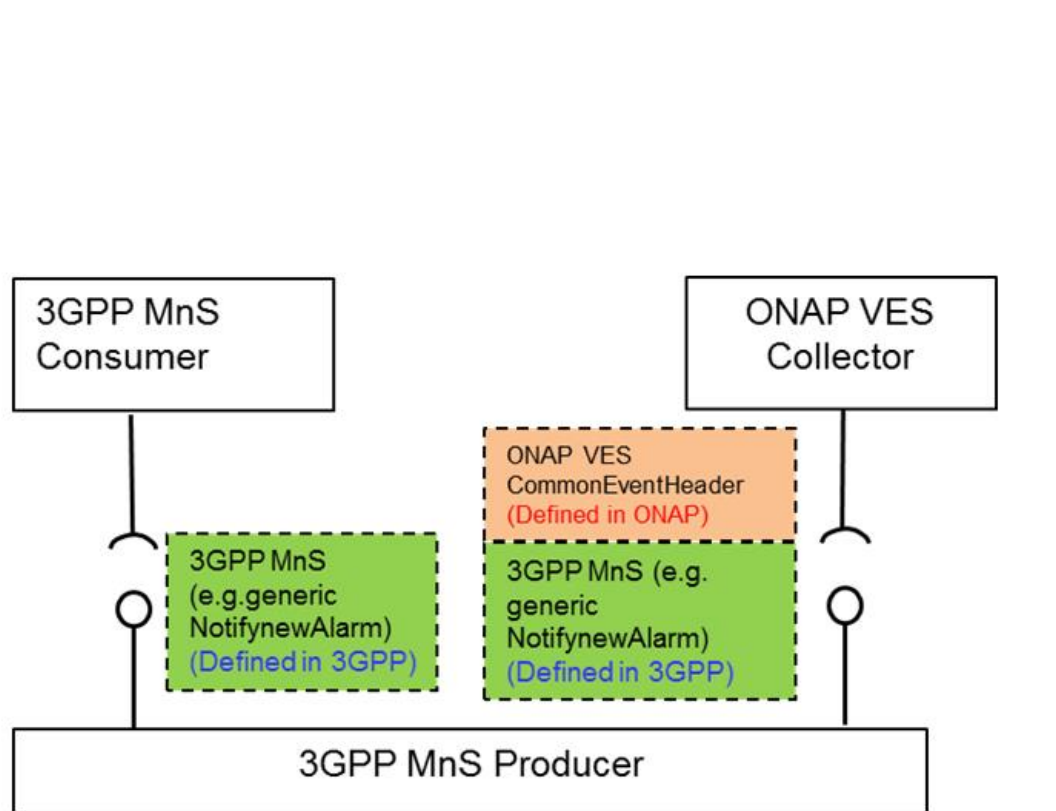
ONAP, 3GPP & O-RAN Alignment (Marge Hillis)

- 3GPP sent liaison statement (S5-197831) to ONAP/DCAE proposing a solution for VES :
  - notification format/schema remains in 3GPP.
  - ONAP/VES Header defined by ONAP
  - decouple the 3GPP payload from overall event format defined by ONAP/VES and allow more independent evolution.

- Working meetings to prepare a way forward have been ongoing throughout 1Q2020 between 3GPP delegates, O-RAN and ONAP delegates from AT&T, Ericsson, Nokia and Orange.

- Proposed Resolution agreed to by the delegates follows the liaison proposal:
  - two modifications to the VES Common Header (new domain for standards defined notifications and new field that supports the routing of these notifications to the appropriate DMaaP topic).
  - 3GPP will define and publish the valid contents for the new field

- 3GPP published an informative Annex B in 28.532 version 16.3. http://www.3gpp.org/ftp//Specs/archive/28_series/28.532/28532-g30.zip.

- ONAP modifications needed to support the proposed resolution are documented in ONAP 3GPP and O-RAN Alignment Use Case -- Introducing the capability to receive, validate and process standards defined notifications encapsulated in VES events in ONAP.

- Request 3GPP to update to normative the defined notification types that will be populated in the new VES field when the ONAP work is committed.

ETSI NFV REL-3 AND REL-4 FEATURES
- PRESENTATION TO ONAP (SDO COMMUNITY UPDATE)
(APRIL 2020)

Cristina Badulescu (Ericsson), ETSI NFV ISG Vice-chair

ETSI NFV Update: Rel-3 & Rel-4 Features

Feature Overview and Status			
Feature	Stage 1	Stage 2	Stage 3
FEAT01: NFV-MANO Upgrades	ongoing (Rel 4)	not started	not started
FEAT02: VNF software modification	completed (Rel 3)	completed (Rel 3)	ongoing (Rel 3) (see note 1)
FEAT03: NFVI software modification	completed (Rel 3)	completed (Rel 3)	ongoing (Rel 3) (see note 2)
FEAT04: Host Reservation	n/a	completed (Rel 3)	ongoing (Rel 3) (see note 1)
FEAT05 Network Slicing	completed (Rel 3)	completed (Rel 3)	ongoing (Rel 3) (see note 1)
FEAT07: MANO Policy Management (MANO_PLC)	completed (Rel 3)	completed (Rel 3)	ongoing (Rel 3)
FEAT08: Support of composite NS across multi-domain (MANOMD_NS)	completed (Rel 3)	completed (Rel 3)	completed (Rel 3) ETSI GS NFV-SOL011 v3.3.1
FEAT10: Mgmt & Connectivity Multi-Site Services (MCMSS)	completed (Rel 3)	completed (Rel 3)	ongoing (Rel 3) (see note 3)
FEAT11: NFV_M&M (NFV-MANO management)	completed (Rel 3)	completed (Rel 3)	completed (Rel 3) ETSI GS NFV-SOL009 v3.3.1
FEAT12: Enhancement support for MEC in NFV deployments	n/a	ongoing (Rel 3)	n/a
FEAT13: Licencing	ongoing (Rel 4)	not started	not started
FEAT15: VNF Snapshotting	completed (Rel 3)	completed (Rel 3)	ongoing (Rel 3) (see note 3)

NOTE 1: Completion target as part of first drop (Package A) in Q2 2020.
NOTE 2: Related complementary work is also ongoing in OpenStack's Fenix project.
NOTE 3: Completion target on current NFV-MANO API specifications as part of first drop (Package A) in Q2 2020.

ETSI NFV Update: Rel-3 & Rel-4 Features

Feature Overview and Status			
Feature	Stage 1	Stage 2	Stage 3
FEAT16: Service Availability Level	n/a	completed (Rel 3)	ongoing (Rel 3)
FEAT17: Cloud-Native VNFs and Container Infrastructure management	completed (Rel 3)	ongoing (Rel 4)	not started (Rel 4)
FEAT18: Security	completed (Rel 3)	ongoing (Rel 3 & 4) (see note 4)	not started
FEAT19: NFV-Connectivity	ongoing (Rel 4)	not started	not started
FEAT20: Autonomous networks	ongoing (Rel 4)	not started	not started
FEAT21: 5GNFV	ongoing (Rel 4)	not started	not started
FEAT22: Multi-Tenancy	ongoing (Rel 4)	not started	not started
FEAT23: MANO-SBA	ongoing (Rel 4)	not started	not started
FEAT24: VNF-Common OAM	ongoing (Rel 4)	not started	not started
FEAT25: VNF-CI	not started	not started	not started

Description of the features in each release are available in ETSI NFV open area:
https://docbox.etsi.org/ISG/NFV/Open/Other/ReleaseDocumentation

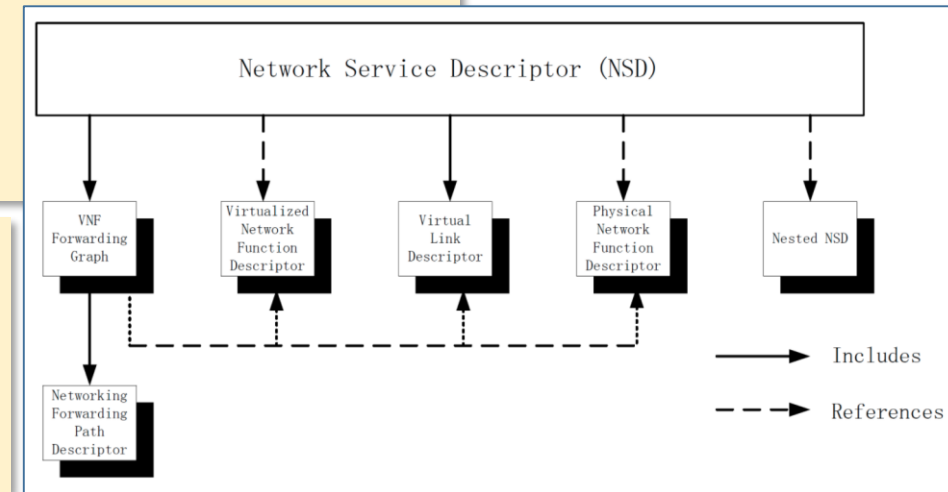NOTE 4: Architecture completed in Rel. 3. Interfaces and modeling ongoing in Rel. 4.

END OF PRESENTATION

ONAP SDC ETSI-Alignment Requirements

- **Onboard ETSI SOL004 compliant VNF packages**
  - Support for onboarding ETSI v2.7.1 SOL004 CSAR Packages (Link to ETSI SOL004 v2.7.1)
  - Support for onboarding ETSI v2.7.1 SOL001 VNF Descriptor (Link to ETSI SOL001 v2.7.1)
  - Support for mapping of ETSI v2.7.1 SOL001 VNF Descriptor into SDC AID Data Model
  - Support for using an ETSI v2.7.1 VNF in an ONAP Service

- **Onboard ETSI SOL007 compliant Network Service Descriptor packages**
  - Support for Cataloging and Preserving the original SOL007 package
  - Support for mapping of ETSI v2.7.1 SOL001 NSD in the SOL007 package into SDC AID Data Model
  - Support for deploying a service that contains an ETSI SOL001 v2.7.1 compliant NS to NFVO (ONAP NFVO, External NFVO)

- **Design ETSI SOL007 compliant Network Service Descriptor packages**
  - Create/Design NSD 1) includes NS Properties and VLDs, and 2) references VNFD, PNFD and Nested NSD
  - Support for deploying a service that contains an ETSI SOL001 v2.7.1 compliant NS to NFVO (ONAP NFVO, External NFVO)
  - Note: VNF-FG Design is optional and a stretch goal

- **Support for Nested/Hierarchical ETSI SOL001 v2.7.1 NSDs**

- **Design Service templates, leveraging/referencing NSDs**
  - Support Service templates including NSDs

Business Benefits (Industry Compatibility and Deployment Flexibility)

- Enable operators and service providers to use the same ETSI compliant models and packages to boost industry compatibility

- Enable operators and service providers to use standardized onboarding and distribution

- Enable operators and service providers to have flexible deployments, leveraging their own NFVOs and VNFMs

ETSI MANO and ONAP ETSI Alignment Landscape

As part of aligning ONAP to ETSI MANO, ONAP supports ETSI standards (2.7.1) for packaging, LCM operations, security for managing VNF, PNF and NS

- SOL004 standard is used for VNF and PNF packages

- SOL007 standard is used for NS package

- SOL001 standard is used to describe VNF, PNF and NS

- SOL003 standard is used for VNF Package Management, LCM and Monitoring

- SOL005 standard is used for NS/PNF/VNF Package Management, LCM and Monitoring.

- SOL002 standard is used for VNF/VNFC-level EM triggered scenarios (LCM, Fault, Performance, Configuration)

- ETSI Package and communication security are supported / **API** security are supported **(SEC022 GS)**

ONAP components realization of ETSI MANO

- SDC realizes SOL004 and SOL007 package onboarding, design and distribution functionalities.

- ONAP NFVO (SO NFVO & VFC) and External NFVO realize the NFVO functionalities.

- SOL003 Adapter realizes the Or-Vnfm (SOL003) interface

- SOL005 Adapter realizes the Os-Ma (SOL005) interface

- SOL002 Adapter realizes the Ve-Vnfm (SOL002) interface

- ETSI Catalog Manager provides ETSI Catalog/Package management for NS/VNF/PNF

ONAP ETSI Package Structure and Distribution

1. **SOL004 VNF/PNF and SOL007 NS Packages are onboarded to SDC**

2. **SDC creates its Resource CSARs by adding ONAP-specific files and metadata according to SDC procedures, and distributes them**
   - For VNF onboarding, SOL001 VNFD is mapped to SDC Data Model
   - For NS onboarding, SOL001 NSD is mapped to SDC Data Model. Note: the SDC NS Data Model could be SOL001 NSD-based
   - SDC shall have the capability to design SOL007 NSDs and generate SOL007 NS packages
   - For PNF onboarding, SOL001 PNFD is mapped to SDC Data Model
   - The original SOL004 VNF/PNF and SOL007 NS packages will be stored in the ONBOARDED_PACKAGE directory
   - SDC embeds the Resource CSAR into its Service CSAR for distribution
   - SDC validates and distributes the onboarded packages

3. **ETSI Catalog Manager receives the package notification from SDC, and extracts and stores the vendor ETSI packages**
   - Extracts the original vendor ETSI packages from the ONBOARDED_PACKAGE directory
   - Stores the original vendor ETSI package into its Catalog DB
   - Provides APIs (SOL003 and SOL005 conformance) for the SOL003/SOL005 Adapters to distribute the packages to SVNFM/NFVO.
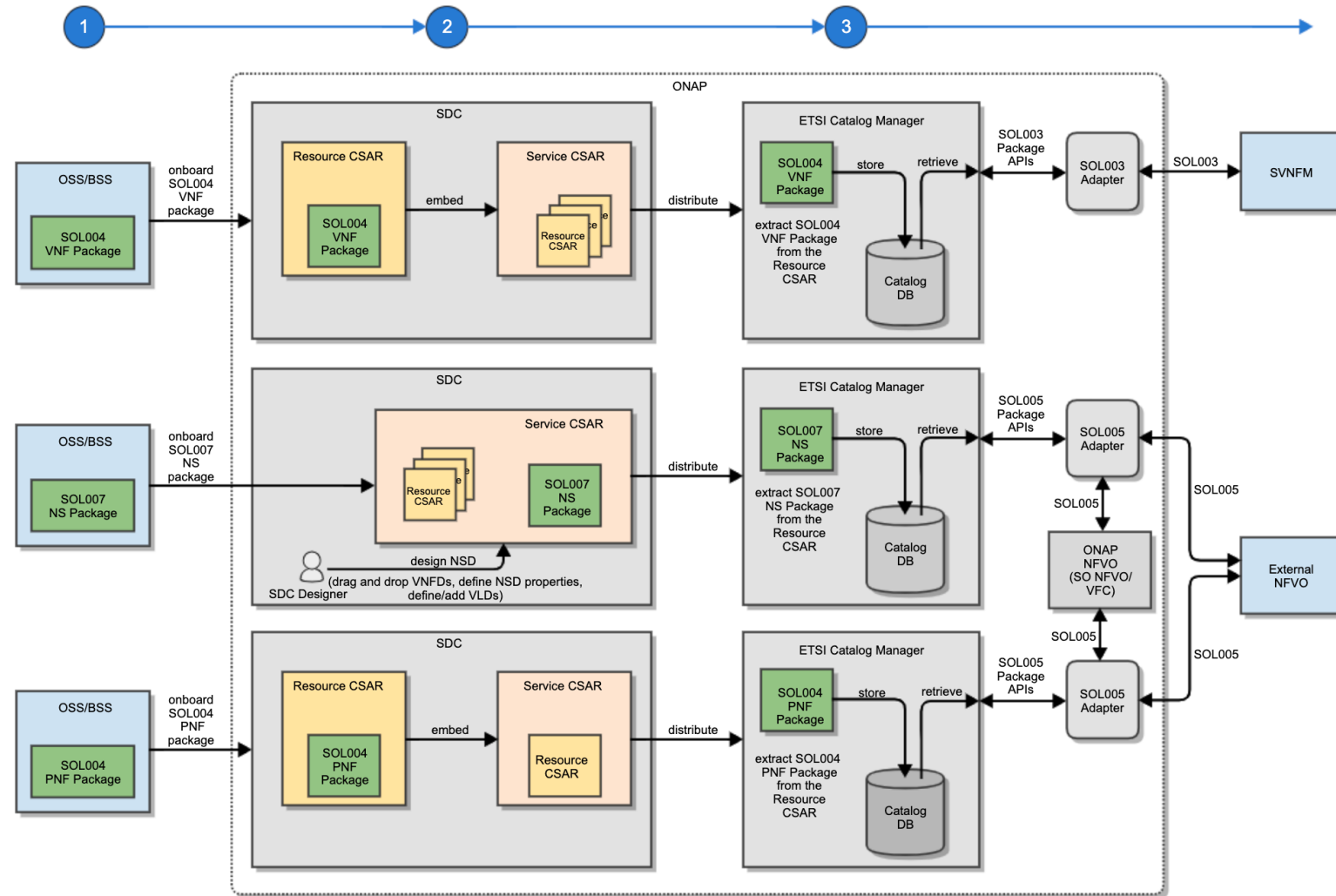
Communication Security between ONAP and SVNFM/NFVO

- ONAP ETSI-Alignment API security conforms to ETSI NFV SEC022 Specification (SEC022 GS).

- SOL003/SOL005/SOL002 Adapters will communicate with the SVNFM/NFVO via **secured HTTPS protocol** with authentication and authorization
  - SOL003/005/002 Adapters support OAuth2 and/or HTTP Basic Authentication
  - SOL003/005/002 Adapters will leverage the AAF (or its equivalence) security server (as authorization server)

- SVNFM/NFVO will be allowed to have their own security mechanisms based on their security requirements but are **required to support OAuth2 and/or HTTP Basic Authentication**.
  - Authentication Federation between the Adapters and the SVNFM/NFVO is under discussion.
  - Some vendors prefer SAML-based federation
  - AAF (or its equivalence) Authentication and External Authentication Server will exchange authentication tokens, based on federation configuration.
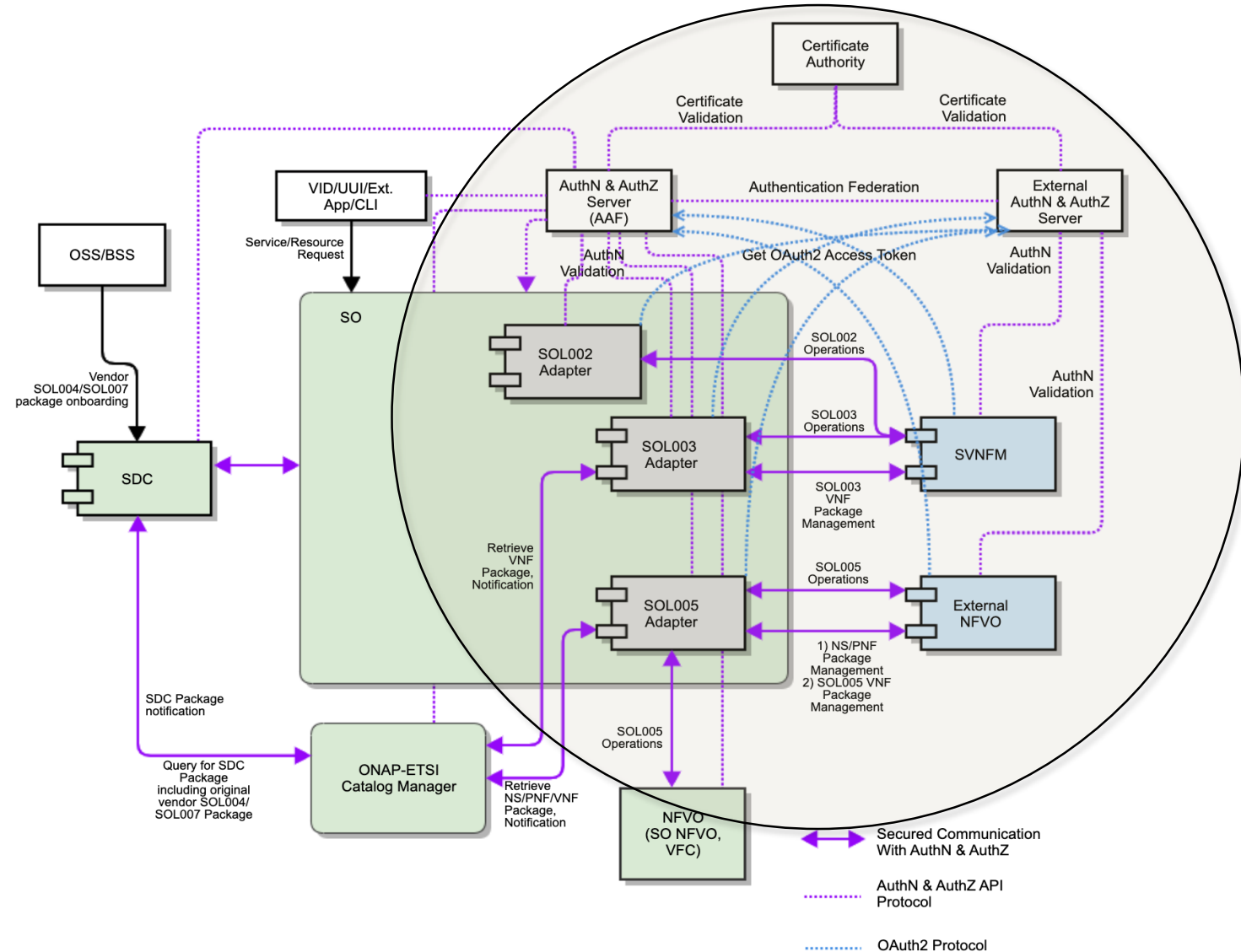
References

- ETSI Alignment Support, https://wiki.onap.org/display/DW/ETSI-Alignment+Support+for+Guilin

- ETSI Package Management, https://wiki.onap.org/display/DW/ETSI+Package+Management+%28SDC+Enhancements%29-+Guilin

- ETSI Catalog Management, https://wiki.onap.org/display/DW/ETSI+Catalog+Management+%28ETSI+Catalog+Manger%29-+Guilin

- Communication Security, https://wiki.onap.org/display/DW/ETSI+Catalog+Management+%28ETSI+Catalog+Manger%29-+Guilin

- SOL003 Adapter, https://wiki.onap.org/display/DW/SOL003+Adapter+-+Guilin

- SOL005 Adapter, https://wiki.onap.org/display/DW/SOL005+Adapter+-+Guilin

- SOL002 Adapter, https://wiki.onap.org/display/DW/SOL002+Adapter+-+Guilin

- ETSI Catalog Manager, https://wiki.onap.org/display/DW/Etsicatalog+Documentation

- Orchestration Scenarios (a.k.a. ETSI-Alignment) Task Force weekly meeting,
  - Weekly meeting: Mondays at 12PM UTC, 5AM PT, 8AM ET, 2PM CET, 5:30PM India, 8PM China.
  - https://zoom.us/j/722438866
  - One tap mobile: +16699006833,,722438866# US (San Jose)   +16465588656,,722438866# US (New York)

Thank you!

Backup Slides

ETSI-Alignment CNF Support

- Hybrid orchestration templates – TOSCA VNFD and Helm Charts (MCIO)
  - TOSCA VNFD drives the interaction between NFVO and VNFM and NS/VNF LCMs
  - Helm Charts are included as a binary archive in the VNF package, and are consumed by VNFM

- Container images are either included in the VNF package or referenced in the descriptors (URL to CIR)
  - If the VNF package includes Container images, NFVO/ETSI Catalog Manager uploads them to the CIR
  - Otherwise, operators store Container images to the CIR

- Parameter mapping from Or-Vnfm (SOL003) incoming information to Helm input parameters

- Resource Mapping between resources in TOSCA VNFD and K8S resources described in Helm chart (for granting between VNFM and NFVO)

- Mapping the LCM operations to HELM commands (VNFM behavior triggered on Or-Vnfm), etc.

- VNFM-K8S communication prefers Helm APIs to lower level K8S APIs

- K8S-VIM communication uses de facto open source standards (Nova/Cinder/Neutron/Keystone/Octavia)

- CISM-CIS communication uses de facto open source standards

- The above diagram is a draft, based on a CNF PoC and IFA 029. It will be refined by conforming to the coming ETSI CNF standards.
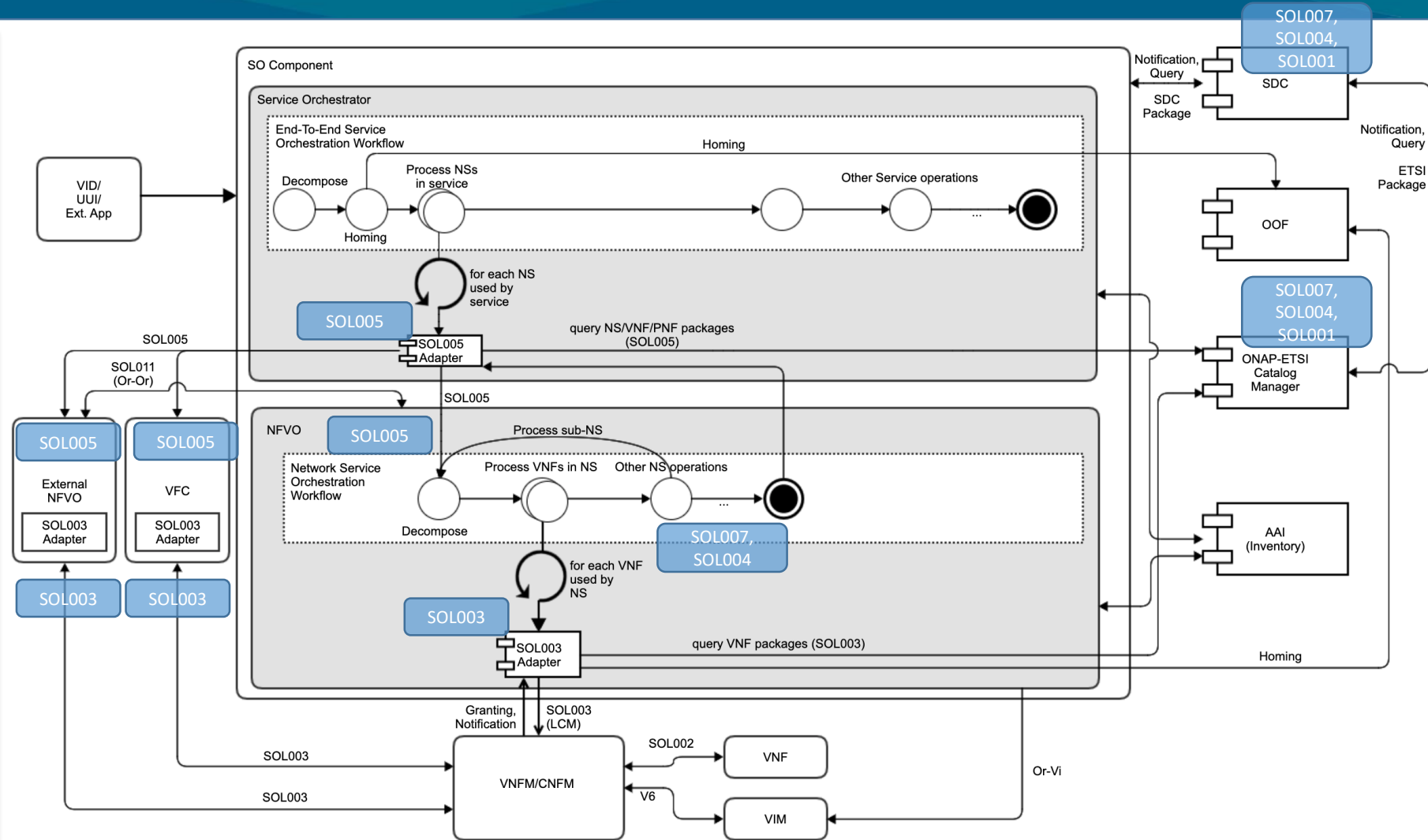- If the vendor VNFM has CNF capabilities, SO will leverage it through the SOL003 Adapter.

ONAP ETSI Package Management Components & Interfaces

- **SDC sends package notifications towards ETSI Catalog Manager via DMaaP**

- **ETSI Catalog Manager queries SDC to download SDC CSAR(s)**

- **ETSI Catalog Manager**
  - Gets an SDC CSAR and extracts the vendor SOL004 package from the ONBOARDED_PACKAGE artifact directory
  - Stores the vendor SOL004 package into the ETSI Catalog Manager DB

- **ETSI Catalog Manager provides package management APIs and package management notification APIs based on the SOL003 specification**
  - etsicatalog.swagger.json, etsicatalog.swagger.notification.json

- **SOL003 Adapter provides notification APIs for ETSI Catalog Manager and invokes the SOL003 package management APIs to ETSI Catalog Manager**

- **SOL003 Adapter and SVNFM use SOL003 package management APIs**
  - SVNFM implements VNF package management notification API
  - SOL003-VnfPackageManagementNotification-API.json
  - SOL003-VnfPackageManagement-API.json

- **SOL005 Adapter provides notification APIs for ETSI Catalog Manager and invokes the package management APIs**

- **SOL005 Adapter and External NFVO/VFC/ONAP SO NFVO uses SOL005 package management APIs**
  - External NFVO/VFC/ONAP SO NFVO implements NS package management notification API
  - SOL005-NSDManagementNotification-API.json
  - SOL005-NSDManagement-API.json
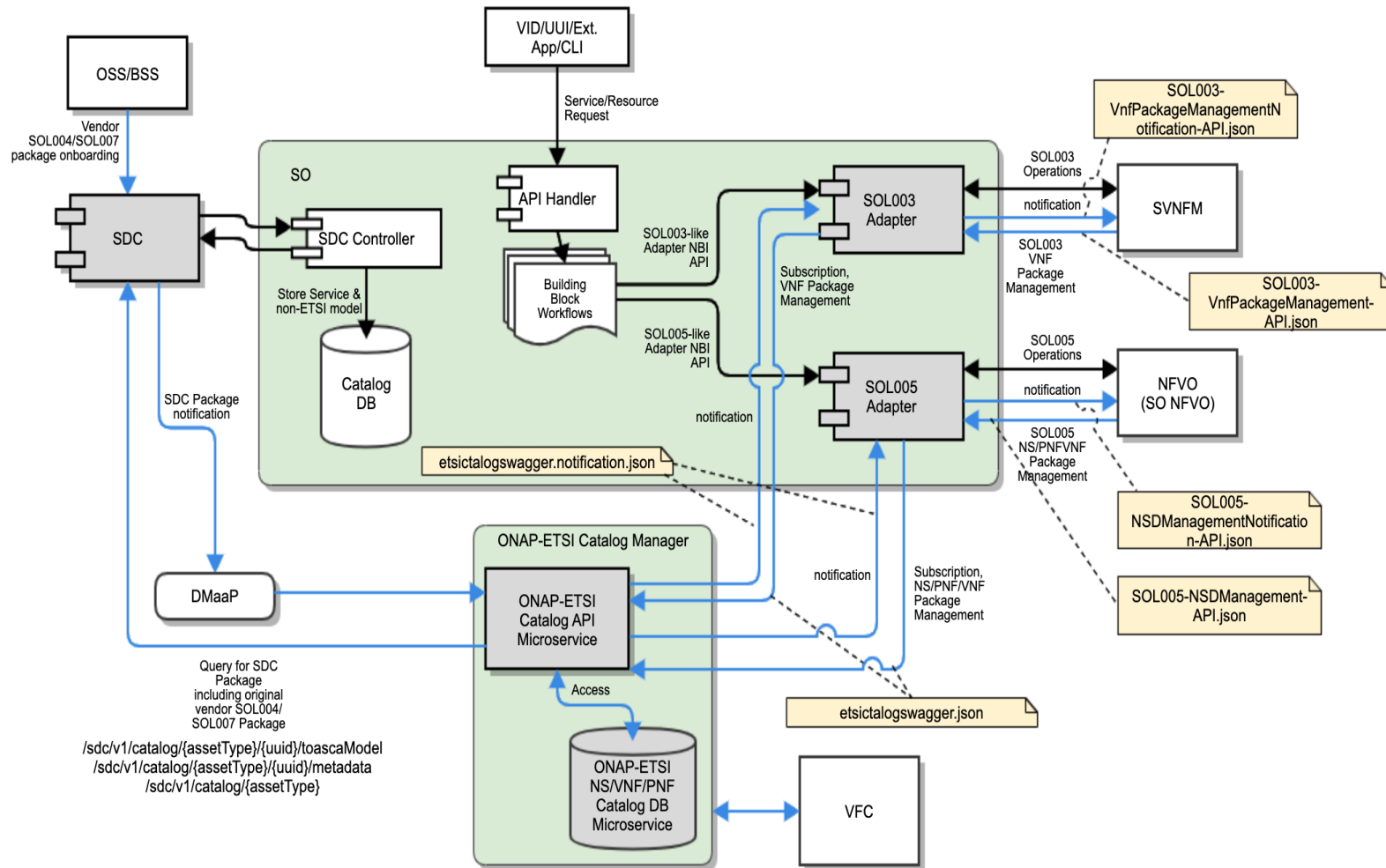
ONAP SO Hierarchical ETSI-based Orchestration

- The diagram depicts the orchestration functional blocks

- It is an ETSI-based hierarchical orchestration concept, to facilitate ONAP orchestration adoption by operators who have their own NFVOs and/or VNFMs
  - E2E, NS, VNF, CNF orchestration by leveraging ETSI standards

- Working with the existing VFC and external NFVOs

- Leveraging the common ETSI Catalog Manager

- Leveraging the common OOF for homing

- Possible ONAP SO embedded NFVO block
  - Handle NS LCM Orchestration
  - Take over Granting and Package Management from the SOL003 Adapter
  - Support SOL005 Northbound Interface
  - Support Or-Vi Indirect Resource control for VIM
  - Possibly, interface with other peer NFVOs (Or-Or)

- SOL002 Adapter deployment location will be decided.

ETSI-Alignment Requirements & Roadmaps

Dublin ✔	El Alto ✔	Frankfurt Support ✔	Guilin Proposals	Future Topics

• ETSI SOL 2.5.1 support
• SOL003 Adapter
  • Create VNF
  • Instantiate VNF
  • Terminate VNF
  • Delete VNF
  • Subscription
  • Notification
  • Granting
• SO ETSI VNF BB Workflows
• VNFM Simulator in the SO project
• SDC SOL004 PNF onboarding
	• ETSI SOL 2.5.1 support
	• CSIT (test automation) for SOL003 Adapter
	• SOL003 Adapter Bug fixes
	• Communication security between SOL003 Adapter and SVNFM
	  • HTTPS support
	  • SpringBoot-based authentication
	• VNFM Simulator migration to the Integration Test project
	• SDC SOL004 VNF and PNF onboarding
		• ETSI SOL 2.5.1 support
		• SO & SOL003 Adapter enhancements
		  • SO SOL004 and SOL001 package storage/retrieval support leveraging ETSI Catalog Manager
		  • SOL003-based package management API support
		  • SOL003 VNF LCM Operations
		• ETSI Catalog Manager
		  • Storing vendor ETSI packages
		  • Providing ETSI package APIs to the SOL003/SOL005 Adapters
		  • Software Image delivery
		• SOL005 Adapter for
		  • Create NS
		  • Instantiate NS
		  • Terminate NS
		  • Delete NS
		• SOL002 Adapter
		  • VNF LCM notification
		• AAF-based HTTPS and Authentication – partial OAuth2 support
			• ETSI SOL 2.7.1 support
			• SDC enhancements
			  • SOL007 NS package onboarding and design
			  • SOL001 NSD and VNFD mapping to SDC AID DM
			• SOL003 Adapter enhancements and additional SOL003 operations support
			  • SOL003 NBI enhancements for GNFC-ready
			  • VNF Query
			  • VNF Modify (ModifyVnfInfo)
			  • VNF Heal
			  • Granting with HPA via OOF
			• OOF VNF-level Homing Request Support
			• CNF support (Stretch Goal)
			• Model-Driven Orchestration leveraging,
			  • Puccini? CDS integration?
			• SOL005 Northbound Interface support
			• SOL005 Adapter enhancements
			  • ETSI Package Management
			  • Security
			  • Additional NS LCM
			  • FM/PM
			  • Configuration
			• OAuth2-based authentication support between SOL002/SOL003/SOL005 Adapters and SVNFM/NFVO
			• SDC SOL007 Design and generation of SOL004/SOL007 packages
			• ONAP SO embedded NFVO for hierarchical orchestration, as one of the NFVO options – see the hierarchical orchestration section
			  • Move package management, Granting, Software-Image handling from SOL003 Adapter to NFVO
			  • NS LCM orchestration support
				• ETSI-based VNF software upgrade
				• SOL011 Or-Or interface to support multi-domain orchestration.
				• Policy-based Scaling (VNF-level and/or VF-Module-level)
				• SOL003 LCN and translation into DCAE events (FM/PM
				• High Availability and Fault-Tolerant