R8 Honolulu Requirements

- Plug and Play, IPv4/IPv6, CMPv2, Standard Defined VES
- ONAP Requirements & Architecture Subcommittees

Benjamin Cheung, PhD / Damian Nowak / Marge Hillis / Pawel Baniewski

October 12, 2020 version 3
# R8 Honolulu Requirements

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<th>REQUIREMENT</th>
<th>DESCRIPTION</th>
<th>Arch Requirement #</th>
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<tr>
<td>PNF Plug and Play</td>
<td>Continuation of PNF Plug and Play from R2 Beijing, adding VID support in R8</td>
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<tr>
<td>CMP v2</td>
<td>Certificate Management Protocol v2 enhancements in R8</td>
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<td>Standard Defined VES</td>
<td>Continuation of Standard Defined VES Development in R8</td>
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R8 PNF PLUG AND PLAY

- R8 Requirements Sub-committee Presentation
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The PNF Plug and Play Use Case allows a PNF to register with ONAP using a pnfRegistration VES Event. This is expected to be used for installation & commissioning a network that is to be managed by ONAP. When this event is received, the PNF Registration Handler (PRH) processes this event to complete the registration by updating the corresponding A&AI entry for the expectant PNF. The PRH was developed specifically for this use case. Once registered, ONAP can interoperate with the PNF and perform LCM or FCAPS (OA&M) operations in addition to other actions. This Use Case was originally started in in R2 Beijing and functionality has been continually improved since then.

**ARCHITECTURE REQUIREMENT IDENTITY – ROW 17**

AR-0016-R7-052020 R7PNFPLUG&PLAYBUILDINGBLOCK/WORK-FLOWMANAGEMENT Benjamin Cheung, Damian Nowak xNF

**EXECUTIVE SUMMARY** - This requirement will introduce VID work to complement the work-flow to building block management work in SO for Plug and Play. The continues the work started in R6 and R7 where the SO work-flow to building block work was finished. The description of the "base" work was done in R6/R7 and can be found in the PnP pages for those releases. In R8, VID software "front end" will be added to allow for a user to more easily use the SO Building Blocks. During PnP AssignPnfBB has SO create an AAI for PNF link to the Place object.

**BUSINESS IMPACT** - The enhancement to Plug and Play operation in ONAP is a critical business function because they enhance installation and commissioning activities.

**BUSINESS MARKETS** - This project applies to any domain (wireless, transport, optical, and wireline) that ONAP may manage.

**FUNDING/FINANCIAL IMPACTS** - The plug and play project has Operating Expense (OPEX) savings for operators because of the ability to saving time and expenses during installation and commissioning and contributes towards ZTM (Zero touch management).

**ORGANIZATION MGMT, SALES STRATEGIES** - There is no additional organizational management or sales strategies for this use case outside of a service providers "normal" ONAP deployment and its attendant organizational resources from a service provider.
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Left (model components) / Right pane (instance components) – service PNF instances  
Today Left pane is blank, need to enable that to setup parameters for PNF instance. Similar to VNF (but with reduce scope).  
Adapt the SO API built in R7.  
Building the PNF instantiation screens within VID.  
The corresponding VNFs already exist, and likely the update will look at these and modify and adapt them to the PNF. |
| (STUDY)                       | STUDY (no code necessarily implemented)  
In R8, we will study how the complex/Place object might be created and used during Plug and play. It is possible that while executing (needs to be investigated) that the AssignPNFBB Building Block in SO, to associate AAI Entry of PNF with Place Object |
VID

Provides Interface of instantiating and managing xNF Lifecycle. Interface for Deployment, instantiation, Change management operations.

SO

Provides work-flow execution with building blocks.

In R8, PNF PnP VID Front end to SO Building Block deployment is developed.

In R7, SO Building Block was completed.
During Plug and Play, the SO Building Block will instantiate a PNF A&AI entry which is associated with a PLACE Object.

In R8, during the AssignPnfBB, SO needs to associate the PNF AAI entry with a Place object (???) to be STUDIED.

In R8, a study will be done to figure out how to use this; no code will necessarily be done.

In R6 & R7, the Place Object platform information model was developed & approved (???) to be STUDIED.

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- R8 Requirements Sub-committee Presentation
The Certificate Management Protocol (CMP) is an Internet protocol used for obtaining X.509 digital certificates in a public key infrastructure (PKI). It is described in RFC 4210 and is one of two protocols so far to use the Certificate Request Message Format (CRMF), described in RFC 4211, with the other protocol being Certificate Management over CMS (CMC), described in RFC 5273. An obsolete version of CMP is described in RFC 2510, the respective CRMF version in RFC 2511. CMP messages are encoded in ASN.1, using the DER method and usually transported over HTTP.

**EXECUTIVE SUMMARY** - The CMPv2 work in R8 will develop (1) Integration with Cert-Manager (certificate enrollment solution recommended by OOM) and (2) DCAE further integration (expected to be completed by R7 bug fixes). This requirement improves ONAP Security with CMPv2. CMP is used by multiple operations including Plug and Play, and NetConf operation. In R6 CMPv2 Certificate Service and basic development was implemented. Integration with server & client to the certificate service was completed. There are also two ONAP bordering component that were integrated with the certificate service with interfaces to SDN-C and DCAE. See the REQ-431: [https://jira.onap.org/browse/REQ-431?src=confmacro](https://jira.onap.org/browse/REQ-431?src=confmacro)

**BUSINESS IMPACT** - The enhancement to CMPv2 operation will improve security management within ONAP and affects multiple ONAP functions and use cases, including Plug and Play (PNF registration) and NetConf. As with all security functionality within ONAP, Security is a fundamental aspect of FCAPS, being the "S" for security management.

**BUSINESS MARKETS** - This project applies to any domain (wireless, transport, optical, and wireline) that ONAP may manage.

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## CMP v2 for R8 Honolulu

[R8 Honolulu NEW COMPONENT CAPABILITIES](#)

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<td>Integration with Cert-Manager (certificate enrollment solution recommended by OOM)</td>
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<td>• Implementation of external provider compatible with newest version of Cert-Manager (at the time of writing - 1.0.2)</td>
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<td>• Adjustment of existing ONAP CMPv2 integrations (SDNC and DCAE) to use integration with Cert-Manager</td>
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<td>DCAE further integration:</td>
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<tr>
<td></td>
<td>• Integration with Data File Collector (DFC)</td>
</tr>
<tr>
<td></td>
<td>• Integration with RestConf Collector (RCC)</td>
</tr>
<tr>
<td></td>
<td>- no ability to test such integration as no RestConf simulator available in the community (so far tested only with real equipment) - need to check this with Huawei</td>
</tr>
<tr>
<td></td>
<td>- if Huawei doesn't agree to test CMPv2 changes this part will be dropped</td>
</tr>
<tr>
<td></td>
<td>• Adding native Kafka stream support to BP generator which blocked HV-VES component spec modification in Guilin release</td>
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<td><strong>CMP v2 integration/testing</strong></td>
<td>Testing and Integration with new changes</td>
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[Hyperlink](https://wiki.onap.org/pages/viewpage.action?pageId=84640858)
R8 DUAL STACK IPv4 / IPv6 Support (GR)

- R8 Requirements Sub-committee Presentation
Until we're an IPv6-only world, people need to have connectivity, whether the connection is IPv4-to-IPv4 or IPv6-to-IPv6.
EXECUTIVE SUMMARY - Majority of LTE and 5G RAN networks today are running exclusively on IPv6. IPv4/IPv6 dual stack solution for ONAP is needed to enable integration.

There is also a requirement to register the NetConf network devices in SDN-R controller, using IPv6 networking.

UPDATE COMPONENTS TO SUPPORT DUAL STACK - The target for Honolulu is to update all ONAP components which do not install/execute properly in IPv4/IPv6 dual stack environment. As of today (October/2020), the following components are affected:

- SDN-R Elastic Search module
- Portal MariaDB database
- SDC/AAI Cassandra database
- DCAE - CFY Plugin - support exposing services using IPv6
- Et. al. (TBD)

KUBERNETES 1.18 - Additionally, we’d like to make sure, that ONAP CI/Gating environment is running RKE-Kubernetes 1.18.x (at least). deployment and its attendant organizational resources from a service provider.
EXECUTIVE SUMMARY -
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BUSINESS IMPACT - Improves ONAP integration capabilities, mainly in 5G use-cases and E2E Network Slicing. Future-proofs ONAP for years to come. Allows to use AKS/EKS/GKS (* managed Kubernetes Service) to deploy ONAP in public clouds.

BUSINESS MARKETS - All operators, service providers and entities using ONAP.

FUNDING/FINANCIAL IMPACTS – None. RKE is already supporting K8S 1.18 as one of recommended K8S solutions, thus no additional costs here.

ORGANIZATION MGMT, SALES STRATEGIES - This proposal does not affect sales strategies.
### R8 NEW COMPONENT CAPABILITIES

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| SDN-R, Portal Maria DB, SDC/A&AI Cassandra DB, DCAE (CFY Plugin) | **UPDATE COMPONENTS TO SUPPORT DUAL STACK** - The target for Honolulu is to update all ONAP components which do not install/execute properly in IPv4/IPv6 dual stack environment. As of today (October/2020), the following components are affected:  
  - SDN-R Elastic Search module  
  - Portal MariaDB database  
  - SDC/A&AI Cassandra database  
  - DCAE - CFY Plugin - support exposing services using IPv6  
  - Et. al. (TBD) |
| **KUBERNETES 1.18** | **KUBERNETES 1.18** - make sure that ONAP CI/Gating environment is running RKE-Kubernetes 1.18.x (at least). deployment and its attendant organizational resources from a service provider. |
R8 STANDARD DEFINED VES

- R8 Requirements Sub-committee Presentation
ONAP is concerned with O1, O2 and A1 interfaces ONLY.

Logical Architecture of O-RAN—ONAP as O-RAN compliant SMO

- **A1 Adaptor**
  - REST based
  - #1 A1 Policies (cfg actions) (Spec avail) CRUD ops. Coordination f(n).
  - #2 Enrichment info / context from SMO to NRT RIC (TBW)
  - #3 AI & ML model mgmt. between SMO & NRT RIC (TBW)
EXECUTIVE SUMMARY
- This is a continuation of the https://jira.onap.org/browse/REQ-327
- This contribution introduces enhancements (mainly to DCAE platform) to support better the standard-defined openAPI onboarding (at least as a K8S configMap in DCAE)
- This contribution introduces openAPI onboarding capabilities (openAPI as an onboarding package artifact, distribution to relevant ONAP modules, ingesting in interested ONAP modules)

BUSINESS IMPACT
- The ability for service providers to deploy ONAP as the SMO in their O-RAN compliant network depends upon ONAP’s ability to process VES encapsulated events as defined by 3GPP and ORAN in DCAE and route these events to appropriate DMaaP topics. This proposal, in Guilin, provides the necessary capability for ONAP to process and validate events that are defined using 3GPP schema for the data. The proposal is readily extensible for the support of additional events from 3GPP, ORAN or other standards organizations adding a high degree of flexibility to the ONAP platform.

BUSINESS MARKETS
- This contribution applies to any Service Provider that wants to use ONAP as an O-RAN compliant SMO or to support 3GPP compliant interfaces and can be leveraged by Service Providers wishing to support events from network functions which are aligned with other standards organizations.

FUNDING/FINANCIAL IMPACTS
- This contribution helps enable ONAP to be O-RAN and 3GPP compliant which should stimulate contributions from companies that are aligned with O-RAN and 3GPP. There is no new hardware to be procured and no new licenses.

ORGANIZATION MGMT, SALES STRATEGIES
- This proposal does not affect sales strategies.
1) Standards organization is intended to be interpreted in a broader sense than SDO as defined by ITU, to cover also e.g. joint ventures like 3GPP and open industry fora like the O-RAN Alliance.
This use case uses a new domain in VES, stndDefined, which indicates that the event contains data that conforms to format/schema defined by a separate standards organization, such as 3GPP. There is a new field in the VES Common Header to enable further classification of such events, e.g., to support routing of these events to appropriate DMaaP topics. An optional second stage validation is proposed in DCAE prior to acknowledging the event to enhance troubleshooting. The first application of this generic capability supports VES encapsulated 3GPP defined notifications as described in 28.532 version 16.3.0 Annex B (informative). The ORAN O1 specification also refers to VES-based 3GPP notifications for several management services, and in those cases is expected to further align with the approach and solution published in 3GPP in a future release.

### R8 CANDIDATE ENHANCEMENTS

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<tr>
<td><strong>SDC</strong></td>
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QUESTIONS
ARCHITECTURE SUB-COMMITTEE PRESENTATIONS
R8 PNF PLUG AND PLAY

• R8 Architecture Sub-committee Presentation
PNF PLUG AND PLAY U/C Overview R2-R5

1. **Design Time**
   - **PNF Modeling**
   - Resources Definition/Services Definition
   - SDC: PNF (physical element) Modeling
   - Distribution of types

2. **Run-Time (Instances)**
   - **PNF Instance Declaration**
   - PNF Infrastructure Service Declaration
   - First part of PNF instantiation
   - PNF A&AI Entry created

3. **PNF Boot-strapping**
   - PNF Powers up and Boot-straps
   - PNF performs a “Plug and Play” procedure
   - Equipment vendor proprietary steps

4. **PNF Contacts ONAP**
   - PNF connects to ONAP via a Registration Event
   - PNF Registration Handler (PRH) processes the event

5. **PNF Activation**
   - Connection points configured
   - Second part of PNF service instantiation
   - PNF configured and ready to provide service
The PNF Plug and Play Use Case allows a PNF to register with ONAP using a pnfRegistration VES Event. This is expected to be used for installation & commissioning a network that is to be managed by ONAP. When this event is received, the PNF Registration Handler (PRH) processes this event to complete the registration by updating the corresponding A&A/I entry for the expectant PNF. The PRH was developed specifically for this use case. Once registered, ONAP can interoperate with the PNF and perform LCM or FCAPS (OA&M) operations in addition to other actions. This Use Case was originally started in R2 Beijing and functionality has been continually improved since then.

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Provides Interface of instantiating and managing VNF Lifecycle. Interface for Deployment, instantiation, Change management operations.

In R8, PNF PnP VID Front end to SO Building Block deployment is developed.

Provides work-flow execution with building blocks.

In R7, SO Building Block was completed.
PNF PLUG AND PLAY – Support for Place Model in R8

ONAP INFO-MODEL: PLACE OBJECT

During Plug and Play, the SO Building Block will instantiate a PNF A&AI entry which associated with a PLACE Object.

In R8 & R7, the Place Object platform information model was developed & approved (???) to be STUDIED

In R8, during the AssignPnfBB, SO needs to associate the PNF AAI entry with a Place object (???) to be STUDIED

In R8, a study will be done to figure out how to use this; no code will necessarily be done.
Stage x: PNF PnP & Vendor Specific License Service

- Request Licenses (optional)
- Response with Licenses (optional)
## R8 NEW COMPONENT CAPABILITIES

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CMP (Certificate Management Protocol) Server & Client (completed in R6)

**EXECUTIVE SUMMARY** - The CMPv2 work in R8 will develop (1) Integration with Cert-Manager (certificate enrollment solution recommended by OOM) and (2) DCAE further integration (expected to be completed by R7 bug fixes). This requirement improves ONAP Security with CMPv2. CMP is used by multiple operations including Plug and Play, and NetConf operation. In R6 CMPv2 Certificate Service and basic development was implemented. Integration with server & client to the certificate service was completed. There are also two ONAP bordering component that were integrated with the certificate service with interfaces to SDN-C and DCAE. See the REQ-431: https://jira.onap.org/browse/REQ-431?src=confmacro

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## INTERFACES & APIs

### R8 Interfaces

| CMP v2 | DCAE will have I/F from CertMan (internal tool) instead of AAF. |

### R8 API

| CMP v2 | New endpoint for Certificate Update. |
### Modeling Impacts

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• SDN-R Elastic Search module
• Portal MariaDB database
• SDC-AAI Cassandra database
• DCAE - CFY Plugin - support exposing services using IPv6
• Et. al. (TBD)

KUBERNETES 1.18 - Additionally, we`d like to make sure, that ONAP CI/Gating environment is running RKE-Kubernetes 1.18.x (at least). deployment and its attendant organizational resources from a service provider.

BUSINESS IMPACT- Improves ONAP integration capabilities, mainly in 5G use-cases and E2E Network Slicing. Future-proofs ONAP for years to come. Allows to use AKS/EKS/GKS (* managed Kubernetes Service) to deploy ONAP in public clouds.
BUSINESS MARKETS - All operators, service providers and entities using ONAP.
FUNDING/FINANCIAL IMPACTS – None. RKE is already supporting K8S 1.18 as one of recommended K8S solutions, thus no additional costs here.
ORGANIZATION MGMT, SALES STRATEGIES - This proposal does not affect sales strategies.
<table>
<thead>
<tr>
<th>R8 NEW COMPONENT CAPABILITIES</th>
<th>DESCRIPTION</th>
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</table>
| SDN-R, Portal Maria DB, SDC/A&AI Cassandra DB, DCAE (CFY Plugin) | **UPDATE COMPONENTS TO SUPPORT DUAL STACK** - The target for Honolulu is to update all ONAP components which do not install/execute properly in IPv4/IPv6 dual stack environment. As of today (October/2020), the following components are affected:  
  - SDN-R Elastic Search module  
  - Portal MariaDB database  
  - SDC/A&AI Cassandra database  
  - DCAE - CFY Plugin - support exposing services using IPv6  
  - Et. al. (TBD) |

<p>| KUBERNETES 1.18 | <strong>KUBERNETES 1.18</strong> - make sure that ONAP CI/Gating environment is running RKE-Kubernetes 1.18.x (at least). deployment and its attendant organizational resources from a service provider. |</p>
<table>
<thead>
<tr>
<th>R8 Interfaces</th>
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<th>R8 API</th>
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<td>R8 Model</td>
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R8 STANDARD DEFINED VES

• R8 Architecture Sub-committee Presentation
ONAP/3GPP & ORAN Alignment in R8 Guilin

Logical Architecture of O-RAN—ONAP as O-RAN compliant SMO

ONAP is concerned with O1, O2 and A1 interfaces ONLY.

REST based
- #1 A1 Policies (cfg actions) (Spec avail) CRUD ops. Coordination f(n).
- #2 Enrichment info / context from SMO to NRT RIC (TBW)
- #3 AI & ML model mgmt. between SMO & NRT RIC (TBW)
ONAP/3GPP & ORAN Alignment in R8 Guilin

EXECUTIVE SUMMARY -
This is a continuation of the https://jira.onap.org/browse/REQ-327
- This contribution introduces enhancements (mainly to DCAE platform) to support better the standard-defined openAPI onboarding (at least as a K8S configMap in DCAE)
- This contribution introduces openAPI onboarding capabilities (openAPI as an onboarding package artifact, distribution to relevant ONAP modules, ingesting in interested ONAP modules)

BUSINESS IMPACT - The ability for service providers to deploy ONAP as the SMO in their O-RAN compliant network depends upon ONAP’s ability to process VES encapsulated events as defined by 3GPP and ORAN in DCAE and route these events to appropriate DMaaP topics. This proposal, in Guilin, provides the necessary capability for ONAP to process and validate events that are defined using 3GPP schema for the data. The proposal is readily extensible for the support of additional events from 3GPP, ORAN or other standards organizations adding a high degree of flexibility to the ONAP platform.

BUSINESS MARKETS - This contribution applies to any Service Provider that wants to use ONAP as an O-RAN compliant SMO or to support 3GPP compliant interfaces and can be leveraged by Service Providers wishing to support events from network functions which are aligned with other standards organizations.

FUNDING/FINANCIAL IMPACTS -This contribution helps enable ONAP to be O-RAN and 3GPP compliant which should stimulate contributions from companies that are aligned with O-RAN and 3GPP. There is no new hardware to be procured and no new licenses.

ORGANIZATION MGMT, SALES STRATEGIES - This proposal does not affect sales strategies.
1) Standards organization is intended to be interpreted in a broader sense than SDO as defined by ITU, to cover also e.g. joint ventures like 3GPP and open industry fora like the O-RAN Alliance.
This use case uses a new domain in VES, `stdDefined`, which indicates that the event contains data that conforms to format/schema defined by a separate standards organization, such as 3GPP. There is a new field in the VES Common Header to enable further classification of such events, e.g., to support routing of these events to appropriate DMaaP topics. An optional second stage validation is proposed in DCAE prior to acknowledging the event to enhance trouble shooting. The first application of this generic capability supports VES encapsulated 3GPP defined notifications as described in 28.532 version 16.3.0 Annex B (informative). The ORAN O1 specification also refers to VES-based 3GPP notifications for several management services, and in those cases is expected to further align with the approach and solution published in 3GPP in a future release.

### R8 CANDIDATE ENHANCEMENTS

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<th><strong>DCAE</strong></th>
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<td>This contribution introduces enhancements (mainly to DCAE platform) to support better the standard-defined openAPI onboarding (at least as a K8S configMap in DCAE). Scripts to generated to generate a K8S configMap attached to DCAE modules (localized to DCAE)</td>
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<tr>
<th><strong>openAPI onboarding (package onboarding, distribution)</strong></th>
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<td>This contribution introduces openAPI onboarding capabilities (openAPI as an onboarding package artifact, distribution to relevant ONAP modules, ingesting in interested ONAP modules) Broader – repo of openAPI descriptors; onboard it as an artifact.</td>
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## INTERFACES & APIs

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| (None)   | Existing StndDef VES is defined in the Modeling wiki: [https://wiki.onap.org/display/DW/VES+7.2](https://wiki.onap.org/display/DW/VES+7.2)  
No new modeling work is planned for this Use Case in R8 |
Brief Project Overview (brief as it should be known)
(Referenced to existing documentations is highly encouraged for the purpose of keeping this document up to date)

New component capabilities for Guilin, i.e. the functional enhancements, if applicable

New or modified interfaces

If they are modified, are they backwards compatible?

Interface naming (point to an example)

Consumed API from other platform projects (A&AI, DCAE, SO)

Published API

Reference to the interfaces.
(Reference to the the swagger.json file(s) whenever possible)

What are the system limits?

Involved use cases, architectural capabilities or functional requirements.

Listing of new or impacted models used by the project (for information only).
• Identify any High Level Information Model Requirements. See: ONAP R7 Modeling High Level Requirements
  • Models based on information exchanges from Use Cases
  • Models documenting existing implementations
  • Forward looking models that may be implemented in future releases
• Describe how exposed APIs are mapped to information models
  (list all the relevant Jira tickets)

Any other details that are specific to this functional enhancement or UseCase.

Testing/Integration