Common NFVI Telco Taskforce
Technical F2F Work Shop – January 13-16, 2020

RI Workstream: Key Updates

Facilitator: Mike Fix, Rajesh Rajamani, Sridhar Rao, Cedric Ollivier
Content & MVP Targets
WS Goals

From Document to Code

**Infrastructure Realization:** As the first WS to translate documents into real code, RI is responsible to provide RC, and even further to the telco industry, with real deployable tools for compliance testing/POC/Lab setup

**Snezka RI-Alpha Deliverables:** Initial Content, Establish Lab, Install Software, Draft Cookbook

- A **platform** that can perform compliance verification against
- Verified **test case** for future compliance purpose
- **Automation toolchain** to enable compliance verification in a CI/CD manner
- **Lab** experiences for community compliance verification lab establishment
Provide generic requirement for the reference implementation

Provide practical machine readable code to reveal and enable these generic requirements

Provide deployable integration packet for implementation in accordance to RM and RA

Provide gating test for the implementation to make sure it meets RM & RA

Provide CI/CD capability for the implementation so as to benefit future release evolution and compliance testing

Conclude in a playbook for all the necessary operations of the above capabilities

Establish lab environment to demonstrate the above capabilities & provide further guidance to compliance labs
Progress to Date | Key Accomplishments

**Requirements**

Initial content of requirements for Reference Implementation, including:

- Labs
- Tooling
- Installers, Releases
- Automation Requirements

**Labs**

RI Lab requirements specifies:

- Required support for various NFVI profiles defined by RM
- Capabilities required for Compute, Storage, ToR and Controller nodes
- Lab Topology & Power/cooling requirements

**Cookbook**

Initial operational guide (“Cookbook”):

- Lab Access/Connectivity
- Integration of installers & components
- Deployment validations

RI Dev Chapter 7

- Link to Chapter 7

**Pod Implementation**

Intel POD 10

- Airship 1.0 & OpenStack Ocata
- OPNFV Iruya Release
- Performance benchmarking with Funtest
- 1 jump host, 3 Controllers & 2 compute

POD 15

- Same configuration as POD 10
- Currently facing infrastructure issue and being fixed
RI Requirement Updates
## Progress: Initial Content Creation

### Initial Content: [https://github.com/cntt-n/CNTT/tree/master/doc/ref_impl/cntt-ri](https://github.com/cntt-n/CNTT/tree/master/doc/ref_impl/cntt-ri)

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 01 - Overview</td>
<td>Complete</td>
</tr>
<tr>
<td>Chapter 02 - Reference Implementation Requirements</td>
<td>Complete</td>
</tr>
<tr>
<td>Chapter 03 - NFVI + VNF Target State and Specification</td>
<td>Still Developing Contents</td>
</tr>
<tr>
<td>Chapter 04 - Lab Requirements</td>
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</tr>
<tr>
<td>Chapter 05 - Installer Requirements</td>
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<tr>
<td>Chapter 06 - Lab Operations</td>
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<tr>
<td>Chapter 07 - Integration</td>
<td>Still Developing Contents</td>
</tr>
<tr>
<td>Chapter 08 - Gap analysis &amp; Development</td>
<td>Still Developing Contents</td>
</tr>
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</table>
Progress: Lab Requirements

Lab Requirements

- Must provide capabilities to support the NFVI Profiles specified by CNTT RM
- Must withstand component failures, provide for network path redundancy & Controller HA
- Must provide Jump Host, Compute & Storage hosts, Controllers & ToR with adequate compute, memory, storage, acceleration & network bandwidth capabilities (minimum 6 hosts, recommended 12 hosts in lab)
- Rack space requirement - at least 19U, sufficient for 10-16 servers
- Power requirement - ~ 10KWatts needed for max 16 hosts & 2 ToR

Recommended Lab topology
Progress: Installer Requirements

**Descriptor File Contents (Under Consideration)**

- Hardware Configuration
- Server Template
- Server Instances
- Software Configuration (VM)
- Network Configuration (VLAN settings, IP)
- Storage Configuration
- NTP, Proxy Server, etc.

**Descriptor File Benefits**

- Alignment with existing OPNFV Standards
- Easily maintained & edited with Templates | YAML
- OPNFV installers can consume it, enhancements are needed
- CI/CD pipelines built to consume descriptor files
- Provides Test Developers a detailed reference for Test Framework Design

Installer translates content to own configuration

+ Installer Specific Attribute

* Currently under discussion
Progress: Installer Requirements (Continued)

Next Steps: New Content Need to Add

Content to be added as a prerequisite in a new commitment

- Hardware validation requirements (BIOS, RAID, CPU, Memory, IPMI, NIC)
- Network configuration on switch and router (i.e.: vlan design and set for network plane for BMC and/or public access vlan)

Complementary information to add:

- Metadata (Lab Owner, Location, Purpose),
- Components (SDN-C, NFV features),
- Common Network Info (IP range, Subnets), Deployment Tools (installers) and Hardware Prerequisites (SRIOV, DPDK). (network information: in range or static? need to further discussion)

See GitHub for additional details: https://github.com/cntt-n/CNTT/blob/master/doc/ref_impl/cntt-ri/chapters/chapter05.md

Sridhar
NFVI Required State

**Objective**
Provide traceability to RM/RA requirements for RI realization & Manifest Validations, and validated for Compliance.

**Requirements Sources**
- RM Ch 5: [https://github.com/cntt-n/CNTT/blob/master/doc/ref_model/chapters/chapter05.md](https://github.com/cntt-n/CNTT/blob/master/doc/ref_model/chapters/chapter05.md)
- RA Ch 2 Infra: [https://github.com/cntt-n/CNTT/blob/master/doc/ref_arch/openstack/chapters/chapter02.md](https://github.com/cntt-n/CNTT/blob/master/doc/ref_arch/openstack/chapters/chapter02.md)
- RA Ch 5 NFVI API: [https://github.com/cntt-n/CNTT/blob/master/doc/ref_arch/chapters/chapter05.md](https://github.com/cntt-n/CNTT/blob/master/doc/ref_arch/chapters/chapter05.md)

**RI Traceability**
Chp03: NFVI + VNF Target State & Specification documents required state of NFVI, as mapped to RM/RA requirements, yielding the “readiness” of the NFVI:

- **Sec 3.2 VNF profile** – describes what every workload must declare
  - instance type (B/N/C), flavor
  - network options, persistent storage and acceleration extensions
- **Sec 3.3 NFVI SW profile** – list of features defining the NFVI software layer
  - virtual compute (e.g., CPU allocation ratio, huge page etc),
  - storage (e.g., IOPS criteria and replication factor etc)
  - network optimization and acceleration options
- **Sec 3.4 NFVI required status** - architect requirements for VIM, API, tenants, LCM, security, & expected versions
Progress: Reference Implementation Cookbook

Cookbook Outline | Progress

Goal
Utilize Lab, Install, and Validation Experience with RI POC Lab for initial offering to create content

Purpose
Accelerate, NFVI+VNF Certifications through standardized lab setup & validations

Chapters Created
- Requirements Gathering
- Access and Connectivity (Lab)
- Available Installers
- Airship (as RI alpha installer)
  - Descriptor File Preparations
  - Deployment Installer & Install Steps
- Deployment Validations

Progress to Date
- CICD Toolchain in place
- Initial Draft Complete
- Inclusive of Descriptor Files, Install Manifests (AirShip), & Deployment Validations (Functest)

Next Release Plans
- Update Documentation:
  - CICD Toolchain (process & scripts)
  - Jenkins Setup & Job Creation
  - Compliance Validation (steps, process)
- Perform Validation & Optimize Accordingly

Link to Additional Information
Reference Implementation Achievements | Targets for Alpha
# POD10 | POD15: Install State & Availability

<table>
<thead>
<tr>
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<th>Pod-15</th>
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<td>Mike Fix</td>
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<td>NI – SRIOV. Compute Intensive</td>
<td>NI – SRIOV. Compute Intensive</td>
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<tr>
<td><strong>GAPS</strong></td>
<td>Low on Storage</td>
<td>No SSD for data disk.</td>
</tr>
<tr>
<td><strong>Deployed and Maintained By</strong></td>
<td>Sridhar@OPNFV-Airship</td>
<td>Sridhar@OPNFV-Airship</td>
</tr>
</tbody>
</table>
Initial NFVI Installation – The Installer

Infrastructure defined using Airship Manifests, and deployed using Airship Installer.
- How to create manifests: [https://wiki.opnfv.org/display/AIR/Airship+Manifest+Creation+For+New+Sites](https://wiki.opnfv.org/display/AIR/Airship+Manifest+Creation+For+New+Sites)

Why Airship?
- Opensource, Declarative, Flexible and Consistent
- OPNFV-Airship has simplified manifest creation
- OPNFV-Airship has also simplified IP planning (Internal)
- Airship has captured all aspects of deployment
  - Strategy, definition, networking (networks, NetworkLinks and NIC-Mapping), profiling, security, software, bootactions, baremetal-provisioning, LMA serverside (even RHOSP-13 Director does not support any serverside monitoring)

1.0 Gaps?
- Ubuntu Only, as MaaS is used
- SDN controller deployment is not supported
- MANO (VNFM/NFVO) deployment is not supported
- Airship 2.0 may fix these issues

Contacts with other, related, installer has proved to be unsuccessful
- Kayobe (similar to Airship – OOK)
Initial NFVI Installation – The Process, Summarized

- Prepare Manifests
- Setup Genesis
- Run Deploy

- Single-Node K8S cluster on Genesis
- Provision Control Nodes
- Provision Compute Nodes
- Install and Configure Software Components

Software Components (Namespaces w.r.t K8s):
- Kube-system
- Ceph
- ucp
- osh-infra
- Tenant-Ceph
- OpenStack

Genesis Tenant-Ceph

The Linux Foundation

Sridhar
Initial NFVI Installation - Learnings

Physical-networking (connectivity and configuration), and Internet-Access Issues can cause delays
  • Pings and LLDP tools can help in former
  • At times the access to repos can be slow
    • **Offline repository, possibly in jumphost, would be helpful**

Getting Ceph right is very important
  • It would help to have SSDs for data disks and preferably separate journal disks (NVMe)
  • In Intel-Pods, this is not the case

Open IT tickets early and follow it up – provide as much details as possible
  • **Different time zones (Deployment and IT/Admin) will not help**

Though, with its well-defined process, flow and detailed logs, troubleshooting any deployment failures is relatively easier, **OPNFV-Airship should come-up with Troubleshooting Guide**
  • Some simple ‘inspection’ and ‘validation’ tools would be very helpful

**OPNFV PDF is not used for manifest creation (yet)**
  • Shortcomings = Automation Challenges
  • Enhancement to PDF/IDF/SDF is under consideration. Once done, auto manifest creation can be achieved

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[The Linux Foundation]

Sridhar
Release Notes | Issues

Release Notes, & Issues

Labs
• Intel POD10 and POD15, Pharos Compliance Labs utilized for Alpha release

Installer
• Installation performed manually using AirShip manifests.
• Target next release for consumption of detailed machine readable description files.

Software
• RI based on OpenStack Ocata vs. RA requirements for PIKE
• Installer manifests (i.e. OpenStack Helm (OSH)) supports Pike and Stein (today).
• All core services/capabilities installed, except Live Migration and Resize Services per OSH.

Validations
• Confirmed RA1 Ch 5 (API) feature capability is exposed per OSH Ocata
• Successfully audited installation and recommended next release changes: (1) increase Neutron Workers, (2) automatic removal of :80 reference in API end-points, and (3) use Nova 2.1 vs 2.0
Next Steps

Current Status

Completed:
- RM | RA | RI Requirements
- Lab Requirements
- Initial Lab Secured
- S/W Deployed | Config
- Smoke Test | Sanity
- Continuous Deployment (with errors)

In-Progress
- Manifest > PDF & IDF
- Complete Lab PoC & Deliver Lab
- Create Cookbook & RI Topology artifact
- Implement PoC Key Learnings

Note: All events & dates are pending community alignment
Appendix
## Initial NFVI Installation – Access

<table>
<thead>
<tr>
<th>Dashboards</th>
<th>URL</th>
<th>Credentials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizon</td>
<td>dashboard-airship.intel-pod10.opnfv.org</td>
<td>admin/password123</td>
</tr>
<tr>
<td>Grafana</td>
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<td>grafana/password123</td>
</tr>
<tr>
<td>Kibana</td>
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<td>elasticsearch/password123</td>
</tr>
<tr>
<td>Nagios</td>
<td>nagios-airship.intel-pod10.opnfv.org</td>
<td>nagios/password123</td>
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## Progress: Installer Requirements (1/4)

<table>
<thead>
<tr>
<th>Ref</th>
<th>sub-category</th>
<th>Description</th>
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<tbody>
<tr>
<td>req.gen.ins.01</td>
<td>Installer</td>
<td>Installer <strong>must</strong> accept a descriptor file to finish deployment.</td>
</tr>
<tr>
<td>req.gen.ins.02</td>
<td>Installer</td>
<td>Installer implementation <strong>must</strong> validate the descriptor file with schema.</td>
</tr>
<tr>
<td>req.gen.ins.03</td>
<td>Installer</td>
<td>Any existing installer implementation <strong>may</strong> need adaptation for the descriptor file.</td>
</tr>
<tr>
<td>req.gen.ins.04</td>
<td>Installer</td>
<td>Installer <strong>may</strong> support reporting the deployment progress status.</td>
</tr>
<tr>
<td>req.gen.des.01</td>
<td>Descriptor</td>
<td>Descriptor file <strong>must</strong> include hardware resource configuration, software configuration.</td>
</tr>
<tr>
<td>req.gen.des.02</td>
<td>Descriptor</td>
<td>Descriptor file <strong>may</strong> include additional extending configuration.</td>
</tr>
</tbody>
</table>
Reference Implementation

**Objective**
Implement & deploy based on the design & configurations of each Reference Architecture

**Goals**
- Provide CNTT verification labs with standard hardware/software for cloud platform & VNF certification
- Providing Reference Implementation leveraging Reference VNFs (“Golden VNFs”) for interoperability testing
- Collaborate with OPNFV on approach & tools, aligning with CNTT community requirements
- Establish hardware | software manifests

**Target Delivery**
January 2020 (v 1.0- Alpha)
Aligns with Reference Architecture # 1 (OpenStack)
## Reference Implementation Approach | Outcome

<table>
<thead>
<tr>
<th>Actions Underway</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Generate eco-system requirements for Reference Implementation, including:</td>
<td>Efficient and effective quality approach while aligning with CNTT objectives.</td>
</tr>
<tr>
<td>• Labs</td>
<td></td>
</tr>
<tr>
<td>• Tooling</td>
<td></td>
</tr>
<tr>
<td>• Installers, Releases</td>
<td></td>
</tr>
<tr>
<td>• Automation Requirements</td>
<td></td>
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<tr>
<td>Create detailed description file definitions for installers, VNF features, etc..</td>
<td>User follows the steps or procedures to achieve an RI identical to the lab utilized by CNTT</td>
</tr>
<tr>
<td>Create detailed Lab criteria &amp; operations</td>
<td>Optimized approach and aligned with CVC lab setup, operations, &amp; support</td>
</tr>
<tr>
<td>Create a cookbook for the first RI, which includes detailed steps for the deployment and configuration</td>
<td>User follows the steps or procedures to achieve an RI identical to the lab utilized by CNTT</td>
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<tr>
<td>Create a detailed design for automation for deployment &amp; testing</td>
<td>Reference Implementation is integrated with CVC ecosystem, including test cases &amp; framework</td>
</tr>
<tr>
<td>Create continuous integration &amp; delivery pipeline for Reference Implementation</td>
<td>Alignment with OPNFV CI to generate CNTT Reference Implementation in a continuous manner</td>
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<tr>
<td>Perform gap analysis to determine required actions for existing eco-system within LFN/OPNFV community projects</td>
<td>Required test cases &amp; test frameworks are identified &amp; created in collaboration with upstream communities</td>
</tr>
</tbody>
</table>
Reference Implementation: Lab Strategy & Plan

Goal

Select a secure, stable, and configurable lab, enabling automated reference implementation (RI) validations

Vision & Recommendation

✓ Establish at least 2 community labs (leverage testing & HW expertise)
  ✓ Supports multiple RI validations in parallel
  ✓ Readily available supplier test apparatus & expertise
  ✓ Leverage geo diversity
✓ Leverage Lab as a Service (UNH-IOL) labs
✓ Promote 3rd Party Vendor Labs for Scalability

Qualifications – Must be Satisfied for Lab Selection

• Available with Outage Contingency (4-nine uptime)
• Current & Stable (current patch sets)
• Demonstrated Integration with the OVP Ecosystem
• Secure (physical, and logical)
• Configurable with minimal downtime
• Effortless onboarding process

RI-1 Lab Chosen (Alpha)

• Intel POD10 PoC & POD15 Target State
• 3 x Controller Nodes
• 10 x Compute Nodes (4 general + 2 per B/N/C)
• 1 x Jump Host
• 1 x Spine Switch and 2 x Leaf Switch in 1 x 48u Rack
Reference Implementation Challenges

• Community resources (engagement & contributions)
• **OPNFV capabilities & alignment with CNTT objectives**
  • Ability to scale to demand
• Alignment with other communities
• Limited support structure for defects | issues (best-effort community Triage)
• Agreement & Support to build a normalized POD/Infrastructure Descriptor File for installers
• Closure on target location and quantity of code repos needed
• Consensus to create a long-term delivery Work Group (WG) for LCM
• Need automated BareMetal validations

**CNTT will maintain ownership of the Reference Implementation until a satisfactory level of support, stability, & maturity is attained**
# POD10 | POD15: Install State & Availability

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<td><a href="https://github.com/opnfv/airship/tree/master/site/intel-pod15">https://github.com/opnfv/airship/tree/master/site/intel-pod15</a> [Coming Soon]</td>
</tr>
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<td><strong>Openstack Installation Type</strong></td>
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<td>In-Progress</td>
<td>Yet to be performed</td>
</tr>
<tr>
<td><strong>CNTT RA/RM Compatibility</strong></td>
<td>Yet to Assess. Lack to requirement specification</td>
<td>NA</td>
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<tr>
<td><strong>GAPS</strong></td>
<td>Low on Storage. Yet to assess CNTT RM/RA compatibility due to lack of manifest validation specification</td>
<td>No SSD for datadisk.</td>
</tr>
<tr>
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# POD 10 Configuration Details

**Installer:**
- Airship version v1.0
- Airship TreasureMap version v1.6

**Openstack:**
- Openstack version: Ocata
- Installation type: Openstack on Kubernetes

**Other software versions & locations:**
- [https://github.com/airshipit/treasuremap/blob/v1.6/global/software/config/versions.yaml](https://github.com/airshipit/treasuremap/blob/v1.6/global/software/config/versions.yaml)

**Infrastructure definition / descriptor files:**
- [https://github.com/opnfv/airship/tree/master/site/intel-pod10](https://github.com/opnfv/airship/tree/master/site/intel-pod10)

**Hardware details:**

<table>
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<th>Node description</th>
<th>Compute</th>
<th>Memory</th>
<th>Storage</th>
</tr>
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<tbody>
<tr>
<td>pod10-jump</td>
<td>2x E5-2699</td>
<td>64GB</td>
<td>3TB (Sata) 180 (SSD)</td>
</tr>
<tr>
<td>pod10-node1</td>
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<td>64GB</td>
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<tr>
<td>pod10-node5</td>
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**Test Tooling:**
- OPNFV Iruya Release
  - [https://wiki.opnfv.org/display/SWREL/Iruya](https://wiki.opnfv.org/display/SWREL/Iruya)
- OPNFV projects used for testing
  - Yardstick
  - Functest
    - Rally
    - Tempest
  - Dovetail

[THE LINUX FOUNDATION](https://www.linuxfoundation.org)

[GSMA](https://www.gsma.com)
POD 10 Topology
POD 15 Configuration Details

Installer:
- Airship version v1.0
- Airship TreasureMap version v1.6

Openstack:
- Openstack version: Ocata
- Installation type: Openstack on Kubernetes

Other software versions & locations:
- https://github.com/airshipit/treasuremap/blob/v1.6/global/software/config/versions.yaml

Infrastructure definition / descriptor files:
- https://github.com/opnfv/airship/tree/master/site/intel-pod15
  [Coming Soon]

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<td>pod15-node3</td>
<td>2xE5-2699</td>
<td>64GB</td>
<td>3TB (Sata) 180 (SSD)</td>
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<td>3TB (Sata) 180 (SSD)</td>
</tr>
</tbody>
</table>

Test Tooling:
- OPNFV Iruya Release
  - https://wiki.opnfv.org/display/SWREL/Iruya
- OPNFV projects used for testing
  - Yardstick
  - Functest
    - Rally
    - Tempest
  - Dovetail
POD 15 Topology