Integration & Testing for Amsterdam
Status and Needs

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Eric Debeau, Global Orange ONAP Coordinator @Orange
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* Marco Platania, Chengli Wang, Yang Xu, Kang Xi, Stephen Gooch
Agenda

• Integration Testing and Status
  - Unit Testing (UT)
  - Continuous System Integration Testing (CSIT)
  - Integration Lab Testing
    • How do we track the test issues
    • The Latest Status
    • How to Use Integration Lab for Pair / Integration Testing Proposal
  - End to End lab deployment status overview
    • vCPE
    • VoLTE

• Integration Testing Practice and Results from Orange Open Lab

• Integration Deployment with Heat Template
  - Assets Requirement and Deployment topology,
  - A Quick Overview of How to Use Heat Template to Deploy ONAP in Integration Lab

• Needs
Our goal is to automate all the testing to achieve continuous release.
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The following data is reported by Sonar:

- **Unit Tests**: 8,043,
- **Average code coverage**: 35.12%
  - Our actually unit tests and coverage is higher than this:
    - It only includes Java code, Python uses different
    - We hasn’t require UT for Javascript

SDN-C Core, DMaaS/datarouter no report in Sonar

- For details: https://sonar.onap.org/
Unit Test Tool

https://sonar.onap.org/

Suggest to clear out at least those blocker issues at Beijing Release
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CSIT Env Setup in ONAP Amsterdam Release

• CSIT: testing a specific feature or functionality comprehensively to capture integration issues inside your project

• Test Suites written using Robot Framework

• Microservices run via docker

• Mock southbound services
  - e.g. mock VIMs or SDN controllers

• Robot test suites executed via Jenkins
  - Can also be run manually in developer’s environment

• ONAP CSIT is tracked at: https://jenkins.onap.org/view/CSIT/
ONAP CSIT Inside Projects (as of 7:10 AM, 9/24/2017, PDT)

Details: https://jenkins.onap.org/view/CSIT/
ONAP CSIT Inside Projects Status Summary
(as of 7:10 AM, 9/24/2017, PDT)

• Our goal is: M2: env setup; M3: 50%; M4: 100%
• Status:
  • Implemented CSIT infrastructure with Robot and Docker
    - How to create CSIT Tutorial
      • Wiki page: https://wiki.onap.org/display/DW/Creating+a+CSIT+Test
      • Video: https://wiki.onap.org/display/DW/Creating+a+CSIT+Test?preview=/8232252/11928547/How%20to%20creating%20CSIT.mp4
    - We currently have **65 CSIT test suites**, including **308 CSIT test cases**

<table>
<thead>
<tr>
<th>1. A&amp;AI</th>
<th>9. Multicloud</th>
<th>CCSDK (Dan Timoney)</th>
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<tbody>
<tr>
<td>2. APPC</td>
<td>10. Policy</td>
<td>DCAE (Lusheng Ji)</td>
</tr>
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<td>3. CLAMP</td>
<td>11. Portal</td>
<td>Modeling (Hui Deng)</td>
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<td>4. CLI</td>
<td>12. SDNC</td>
<td>UUI (Tao Shen)</td>
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<td>5. DMaaP</td>
<td>13. SO</td>
<td>SDC (Michael Lando)</td>
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<td>6. Holmes</td>
<td>14. VFC</td>
<td>VID (Amichai Hemli)</td>
</tr>
<tr>
<td>7. Integration</td>
<td>15. VNFSDK</td>
<td></td>
</tr>
<tr>
<td>8. MSB</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Not all projects have CSIT env setup yet!
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• Needs
Integration Test Tracking

https://wiki.onap.org/display/DW/Integration+Project

- Integration Test
  - ONAP Platform Test
    - Integration Test Blocking Issues
    - ONAP master branch Stabilization
    - vCPE Design and Test Cases
    - vCPE Integration Test Case
    - VoLTE Integration Test Cases (draft version)
    - VoLTE Use Case Development Tasks

Pages Edit Save for later Watching

/ ... / Integration Test

ONAP Platform Test

Created by Helen Chen, last modified just a moment ago

Integration Test Blocking Issues

ONAP master branch Stabilization

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How to report integration blocking issues: Open a jira ticket?
At the moment, ONAP code is not stable: we are unable to run ANY End to End use cases, such as vFW / vDNS.

What we have tested with master branch so far?

- Both vFW and vLB installed and executed correctly by themselves without ONAP.
- Installed ONAP1.1 in developer lab (Windriver Lab), 4 VMs (DCAE, APPC, SDNC, and SO) right now fail Robot health check.
  - DCAE: Keystone V2 API (O1: Turn on V2 in Integration Lab; O2: leverage Multivim API)

<table>
<thead>
<tr>
<th>Key</th>
<th>Summary</th>
<th>Created</th>
<th>Updated</th>
<th>Due</th>
<th>Assignee</th>
<th>Reporter</th>
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<tbody>
<tr>
<td>DCAEGEN2-69</td>
<td>DCAE initialisation failure</td>
<td>Jul 18, 2017</td>
<td>Sep 20, 2017</td>
<td></td>
<td>Lusheng Ji</td>
<td>Kanagaraj Manickam</td>
<td></td>
</tr>
<tr>
<td>INT-203</td>
<td>SDNC Failed Robot Health Check</td>
<td>Sep 16, 2017</td>
<td>Sep 18, 2017</td>
<td></td>
<td>Marco Platania</td>
<td>Yang Xu</td>
<td>t</td>
</tr>
<tr>
<td>INT-204</td>
<td>APPC Failed Robot Health Check</td>
<td>Sep 16, 2017</td>
<td>Sep 18, 2017</td>
<td></td>
<td>Marco Platania</td>
<td>Yang Xu</td>
<td>t</td>
</tr>
<tr>
<td>SO-123</td>
<td>Bad request response from SDNC during VF module creation</td>
<td>Sep 12, 2017</td>
<td>Sep 18, 2017</td>
<td></td>
<td>Rob Daugherty</td>
<td>Parvez Shaik</td>
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<tr>
<td>SDNC-77</td>
<td>VF_MODULE_MODEL table is not present in SDNC database.</td>
<td>Sep 09, 2017</td>
<td>Sep 18, 2017</td>
<td></td>
<td>Dan Timoney</td>
<td>Parvez Shaik</td>
<td>t</td>
</tr>
</tbody>
</table>
Integration Testing Plan

• For Integration team,
  o We’ll do more testing on Integration Lab with a goal of weekly update with the latest ONAP build before RC0,
  o After RC0, we’ll do daily update

• The testing results will be published at:
  https://wiki.onap.org/display/DW/ONAP+master+branch+Stabilization
Pair / Integration Testing Suggestion in Integration Lab

- Keep two instances of the whole ONAP for integration testing
  - One each project could patch it, one is not
  - Integration Testing will take from staging repo, update daily

- Pairing testing could get from either staging or snapshot or local build; staging is recommended

- Recommend to always commit your code into git first and then testing
We currently have registered 85 users, 27 of which have logged on.

Of the 27 users we are averaging 8 concurrent users.

A & AI, APPC, DCAE, OOM, VIM, and Integration projects are currently active.

Resource used:
- Local Storage: using 1.6TB of 48.9TB.
- Memory: using 424GB of 2.8TB
- CPU: using 7 physical of 600 (or ~112 logical vCPUs because the flavors or not dedicated)
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• Needs
The hardware is ready.

VNFs
- vDHCP, vAAA, vDNS are ready
- The VPPs based VNFs are ready
- End to end testing and integration without ONAP has done (not at this env).

Please attend “Residential vCPE Use Case Deep Dive” session for more details (by Yoav Kluger & Kang Xi)
<table>
<thead>
<tr>
<th>Category</th>
<th>Test Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>External System Registration</td>
<td>T101: WindRiver OpenStack VIM Registration</td>
</tr>
<tr>
<td></td>
<td>T202: vCPE Service Creation</td>
</tr>
<tr>
<td></td>
<td>T203: Closed Loop Configuration</td>
</tr>
<tr>
<td></td>
<td>T204: Closed Loop Deployment</td>
</tr>
<tr>
<td>Service Instantiation and Monitoring</td>
<td>T301: vCPE Infrastructure Service Instantiation</td>
</tr>
<tr>
<td></td>
<td>T302: vCPE Customer Service Instantiation</td>
</tr>
<tr>
<td>Closed Loop</td>
<td>T401: vCPE Auto-healing</td>
</tr>
<tr>
<td>Service Termination</td>
<td>T501: vCPE Service Termination</td>
</tr>
</tbody>
</table>

- Please give feedback: [https://wiki.onap.org/display/DW/vCPE+Integration+Test+Case](https://wiki.onap.org/display/DW/vCPE+Integration+Test+Case)
ONAP Related vCPE Use Case

Projects Used by vCPE Use Case

- SDC
- SO
- AAI
- Policy
- SDNC
- DCAE
- APPC
- VNF SDK
- CLAMP
- MultiVIM
- DMaaP
- Integration

Other Assets for vCPE

- VNF packaging & certification
  - IN PROGRESS
  - Marco Platania
- VNF-based VNF development
  - IN PROGRESS
  - Danny Zhou
- VNF onboarding
  - IN PROGRESS
  - Marco Platania
- AAI data model
  - DONE
  - Helen Chen
- Closed loop design
  - TO DO
  - Ron Shacham
- Test of generic service level and resource level workflows
  - TO DO
  - Kang Xi
- SDNC artifacts
  - TO DO
  - Dan Timoney
- APPC artifacts
  - IN PROGRESS
  - Kang Xi
- Data analytics application
  - TO DO
  - Alexei Neikrassov
- DCAE Collector
  - IN PROGRESS
  - Vijay Venkatesh Kumar
- Robot design
  - DONE
  - Kang Xi
- VNF TOSCA template development
  - TO DO
  - DeWayne Filippi
- vCPE Test Case creation
  - DONE
  - Kang Xi
- Infrastructure Service template creation
  - DONE
  - Marco Platania
- Customer Service template creation
  - DONE
  - Marco Platania
- Design and test of custom workflows
  - DONE
  - Kang Xi
- SNRIO Emulator
  - IN PROGRESS
  - Geora Barsky

- All development tasks are on track to meet M4
- More details: https://wiki.onap.org/display/DW/vCPE+Design+and+Test+Cases
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VoLTE Use Case Deployment @ CMCC Lab Update

Integrate with 3rd Part Specific Components

- Remotely access: done
- All hardware needed by VoLTE case: on-site
- Re-adjust network topology: done
- Software deployment:
  - TIC Core (complain with Mitaka): done
  - TIC Edge (VIO 4.0 (complain with Ocata): done
  - ONAP deployment environment (WindRiver R4 compliant with Ocata, the same with Developer lab sponsored by Intel & WindRiver): done
  - All S-VNFMs from Huawei, Nokia, and ZTE are ready
  - All VNFs located in TIC core from HUAWEI/NOKIA/ZTE are successfully deployed manually, integration test with WindRiver Cloud is done
  - The VNFs, located in TIC Edge, integrate with VIO in TIC Edge is in process

Next Step (High Level):
- Debug/configure IMS/EPC service, make a VoLTE call successfully
- Debug SDN overlay/underlay solution manually
- Deploy ONAP release candidate version to do the E2E integration test: targeting starts at 10/12/2017

Please attend "VoLTE Use Case Deep Dive" session for more details (by Chengli Wang & Yang Xu)
# VoLTE Test Cases Draft

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<tr>
<td><strong>External System Registration</strong></td>
<td>V00001~V00006: to register VIM, SDN Controllers, SVNFM, EMS</td>
</tr>
</tbody>
</table>
| **VNF Onboarding and Service Creation**      | V00007: VNFs onboarding
V00008~V00010: vEPC, vIMS, WAN underlay and overlay service creation
V00011: E2E VoLTE service creation
V00012: Closed loop configuration by CLAMP   |
| **Service Instantiation and Monitoring**      | V00013: VoLTE service instantiation
V00014: System performance and alarm monitoring                                    |
| **Data Collection and Closed Loop**          | V00015: Auto-healing                                                         |
| **Service Termination**                      | V00016: Service termination                                                   |

Please give feedback: [https://wiki.onap.org/pages/viewpage.action?pageId=11928104](https://wiki.onap.org/pages/viewpage.action?pageId=11928104)
ONAP Related VoLTE Use Case

**Projects Used by VoLTE Use Case**
- ✓ SDC
- ✓ Usecase UI
- ✓ CLAMP
- ✓ A&AI
- ✓ SO
- ✓ DCAE
- ✓ Policy
- ✓ MultiVIM

**Other Assets for VoLTE**
- ❑ Vendor VNF package *(risk)*
- ❑ SO workflow
- ❑ WAN underlay and overlay templates
- ❑ SDNC YANG and DG
- ❑ Holmes correlation rules
- ❑ Closed loop policy

- o Integration between Holmes/DCAE/AAI, Integration between SDNC/SDN controller
- o We need SDC finish its development before we can try vendor’s VNF template.
- o More details: https://wiki.onap.org/display/DW/VoLTE+Use+Case+Development+Tasks
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• Needs
Integration: Feedbacks from Orange tests

• Internal lab platform based on Newton OpenStack solution
  - HP hardware
  - No controller
  - Based on OPNFV Installer

• Manually launch Heat Template on a (daily) basis
  - Platform constraints also used for other projects
Heat installation feedback

• Heat template: OK
  - No more Rackspace constraints

• Very easy to launch…
  - Just adapt environment variables => 10 minutes
  - `openstack stack create -e onap_openstack.env -t onap_openstack.yaml ONAP`

• Use a small script to clean DCAE artifacts (VM, keys, networks…)

• Launch manually robot health check after ~ one hour
Error detection

• Launch manually robot health check after one hour
  - Not always Green!

• Analysis
  - OpenStack VM logs (cloud-init)
  - Docker container logs in VM

• Detected some errors
  - Code bug in the components
  - Docker tags images
  - Shared with the community (with the PTL)

• Not a Heat template problem!
  - Most of problem comes from component code error

• Perfect to better understand the code!
Components API tests

• API tests on various components
  - SDC
  - AAI
  - SO
  - APPC

• To test API, check the documentation

• No yet automated
Towards full automation

• Leveraging OpenLab platform
  - Using OPNFV X-CI Installer

• Objective:
  - Automatically launch ONAP installation + tests
  - Test internally and then to be included in the ONAP Jenkins
  - Detect problems as fast as possible to get a R1 “working”

• How?
  - Ansible playbook to both launch OpenStack Heat (or OOM ?) + Robot Docker container

• When?
  - This week
OPNFV Existing CI Pipeline

The XCI initiative integrates the latest from all supported branches of select upstream projects on a periodic basis instead of waiting for a major release. The initiative will start with regular integration of OpenStack, OpenDaylight (ODL) SDN controller and the FD.io virtual switch. The below diagram shows how this works:
Lessons Learnt

• Community
  - Some minor corrections can take time to be merged => review process to be improved with more reviewers

• E2E integration is key
  - Detect tests are key to detect side-effects
  - Concentrate on ONAP components installation

• Need to get a “stable version”
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• Needs
The Heat template creates one VM per component for components from OpenECOMP seed code

The OPEN-O VM contains:
- MSB
- Multi-VIM
- VNFSDK
- VF-C
- UUI

Robot is used for testing
## Resource Requirements

<table>
<thead>
<tr>
<th>Nr.</th>
<th>VM</th>
<th>FLAVOR</th>
<th>CPU</th>
<th>RAM (GB)</th>
<th>DISK (GB)</th>
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<td>SMALL</td>
<td>1</td>
<td>2</td>
<td>20</td>
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<td>2</td>
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<td>LARGE</td>
<td>4</td>
<td>8</td>
<td>80</td>
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<td>mrouter</td>
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<tr>
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<td>70</td>
<td>180</td>
<td>1240</td>
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</tbody>
</table>

**NOTE:** It uses standard OpenStack flavors. It is possible to create custom flavors that require less resources, CPU, RAM and Disk. (Targeting for post Amsterdam)
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Preparation of ONAP Heat Template:

Wiki Instruction to install ONAP HEAT:

https://wiki.onap.org/display/DW/ONAP+Installation+in+Vanilla+OpenStack

```
> source v2_ONAP-openrc.sh
> git clone http://gerrit.onap.org/r/demo
> vi demo/heat/ONAP/onap_openstack_float.env
```
HEAT Environment File

From Openstack console -> Network -> Networks

From Openstack console -> Compute > Images

From Openstack console -> System -> Flavors

From Openstack console -> Access & Security -> Key Pairs

From Openstack console -> Identity -> Projects & Users

From Openstack console -> Compute -> Access & Security -> API Access

From Openstack console -> Compute -> Access & Security -> Floating IPs, find IPs that are in public net and are not being Used. Ping those IPs to make sure no one is using the IP
ONAP Installation - Stack Creation

• The ONAP stack is created via the OpenStack CLI tools installed before
  - `openstack stack create -t onap_openstack.yaml -e onap_openstack.env` ONAP

• There are three different templates:
  - `onap_openstack.yaml`: uses floating IPs, assigned by OpenStack
  - `onap_openstack_float.yaml`: uses floating IPs, the user decide the IP of each VM (requires OpenStack admin permissions)
  - `onap_openstack_nofloat.yaml`: no floating IP is specified, each VM has two vNICs (one public IP assigned by OpenStack and one private IP)

• The user is free to choose the template that they prefer
Post Installation

- **SSH access to a VM:**
  - `ssh -i private_key root@IP_ADDR`

- **List all containers**
  - `docker ps -a`

- **Print container logs**
  - `docker logs <container ID>`

- **Access a container**
  - `docker exec -it <container ID> /bin/bash`
ONAP Health Check

• To assess the health status of the ONAP platform, the user can login to the Robot VM and run health checks against all components
  - `ssh -i private_key root@ROBOT_IP`
  - `cd /opt`
  - `./ete.sh health`

• Output of health check available at
  `/opt/eteshare/logs/ETE_X`
Frequently Asked Questions From Developers

• How to install only my own components?
  - Go to delete the definition of the rest from the heat template

• How my daily deployment experience like?
  - You just need to run `vm_init.sh`, which automatically pull the necessary new docker/resources images from nexus server
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• Needs
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• Integration, Integration, Integration
  - Please start the integration testing as earlier as possible
  - Leverage the Integration Lab, right now we only use very little of it
  - Planning to have an Integration day each week, Friday? (10/6/2017)
    • IRC channel
    • Zoom bridge
    • On site (?)
      • California
      • New Jersey
  - Could we have an Integration testing session this Thursday afternoon?

• Please response to those issues “blocking” integration as soon as possible
  - [https://wiki.onap.org/display/DW/Integration+Test+Blocking+Issues](https://wiki.onap.org/display/DW/Integration+Test+Blocking+Issues)
  - If we don’t see those jira tickets been handled, someone from Integration team will contact you, please don’t get annoyed. 😊
Merci