

# Enfv

## Edge NFV Team Meetings

### Logistics

- Bi-weekly On Wednesday 1500 UTC / 11:00 am EDT / 8:00 am PDT
- "OPNFV Tech Projects meetings"
- <https://global.gotomeeting.com/join/391235029>
- United States: +1 (571) 317-3116
- Access Code: 391-235-029

### Requirements Documents:

- HTML: <http://artifacts.opnfv.org/enfv/docs/requirements/index.html>
- PDF: <http://artifacts.opnfv.org/enfv/docs/requirements/requirements.pdf>

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## Meeting Agendas and Minutes

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### May 3, 2017

**Attendees: Prayson Pate, Paul-Andre Raymond, Kevin Canady**

#### Minutes:

- Prayson investigating problems with GoToMeeting
- Paul-Andre looking into OpenStack massively distributed cloud group
- Paul-Andre sent some links to some of the Edge related activities of interest at the Openstack summit next week.
  - Verizon Keynote: <https://www.openstack.org/summit/boston-2017/summit-schedule/events/18823/taking-openstack-out-to-the-network-edges>
  - Massively Distributed Workgroup: <https://www.openstack.org/summit/boston-2017/summit-schedule/events/18671/fogedgemassively-distributed-clouds-working-group>
  - A Verizon Case study: <https://www.openstack.org/summit/boston-2017/summit-schedule/events/17470/verizon-product-case-study-openstack-at-the-edge?BackURL=https%3A%2F%2Fwww.openstack.org%2Fsummit%2Fboston-2017%2Fsummit-schedule%2Fspeakers%2F424%23eventid%3D17470>
- Kevin reported that he has asked his team to mention eNFV to customers but there is not much interest so far.

#### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2. **In Progress**
- **Jesse** will provide input on the distributed RAN use case.
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- **Michael K** to add definition of edge to document.
- **Prayson** to provide links to getting set up with the tools.
- **Kevin** to work with his contacts on the test side to try to spur interest.
- **Prayson** to propagate updates from Kevin and Paul-Andre into the requirements document.
- Prayson to investigate who is killing our online meetings - **Moved the meeting to avoid collisions, but still seeing issues.**

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### April 5, 2017

**Attendees: Prayson Pate, Rasmuss Graaf, Paul-Andre Raymond**

#### Minutes:

- Kevin Canady sent some text on tunneling types.

- Our meeting is on the OPNFV calendar, but someone kept preempting it. Prayson to investigate.

#### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2. **In Progress**
- **Jesse** will provide input on the distributed RAN use case.
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- **Michael K** to add definition of edge to document.
- **Prayson** to provide links to getting set up with the tools.
- **Kevin** to work with his contacts on the test side to try to spur interest.
- **Prayson** to propagate updates from Kevin and Paul-Andre into the requirements document.
- **Prayson to investigate who is killing our online meetings**

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## March 22, 2017

**Attendees: Prayson Pate, Kevin Canady, Rasmuss Graaf, Paul-Andre Raymond**

#### Minutes:

- Kevin Canady reported some progress on the document.
- Paul-Andre Raymond sent some text for the document.
- Paul-Andre attended the IRC meeting of the Massively Distributed OpenStack group.

#### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
- **Jesse** will provide input on the distributed RAN use case.
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- **Michael K** to add definition of edge to document.
- **Prayson** to provide links to getting set up with the tools.
- **Kevin** to work with his contacts on the test side to try to spur interest.
- **Prayson** to propagate updates into the requirements document.

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## March 8, 2017

**Attendees: Prayson Pate, Kevin Canady, Liang Geng, Rasmuss Graaf, Paul-Andre Raymond, Anders Roxell**

#### Minutes:

- Paul-Andre gave an update on his survey of industry forums. There is a "massively distributed cloud" discussion group in OpenStack discussing requirements for edge nodes. Paul-Andre will give another update after the next call.
- Paul-Andre gave an update on his discussion with Tapio Talgren for his advice on way forward. His advice was that groups focused on testing or integration tend to drive more interest. Also, mobility and residential use cases tend to drive interest.
- Liang gave an update from China Mobile on the Novonet project using VNFs in residential and enterprise applications of vCPE. The ARM processor is quite interesting from the standpoint of low cost and power. Other players include NXP, Huawei, ZTE and possibly Intel. Liang will try to get some involvement.
- Paul-Andre gave an update on his email exchange with Steven Wright and Bryan Sullivan of AT&T regarding involvement. Steven Wright is investigating portability of VNFs across different NFVI implementations. Bryan Sullivan mentioned the complexity involved with different NFVI distributions. The Pharos, Functest and Dovetail groups in OPNFV that may be consumers of any requirements.
- Prayson offered to propagate updates into the requirements document.

#### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
- **Jesse** will provide input on the distributed RAN use case.
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).

- **Michael K** to add definition of edge to document.
  - **Prayson** to provide links to getting set up with the tools.
  - **Paul-Andre** to contact Tapio Tallgren about working with upstream groups and test groups. **Complete. Closed.**
  - **Kevin** to work with his contacts on the test side to try to spur interest.
  - **Prayson** to propagate updates into the requirements document.
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## February 22, 2017

**Attendees: Prayson Pate, Kevin Canady, Paul-Andre Raymond, Anders Roxell, Mike Ludwig**

### Minutes:

- Welcome to Anders Roxell.
- Kevin talked to his sales team to see if they could identify customers who might be interested.
- Paul-Andre tried to reach out to the new head of the TSC (Tapio Tallgren).
- Prayson and Paul-Andre will be at Mobile World Congress next week. Feel free to reach out if you would like to meet.

### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner (agardner@li  
[nuxfoundation.org](http://nuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
  - **Prayson** to provide links to getting set up with the tools.
  - **Paul-Andre** to contact Chris Price about working with upstream groups and test groups.
  - **Kevin** to work with his contacts on the test side to try to spur interest.
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## February 8, 2017

**Attendees: Prayson Pate, Kevin Canady, Paul-Andre Raymond**

### Minutes:

- Paul-Andre discussed the results of his investigation into work on NFV at the edge, including OpenStack, Open Daylight, Open Edge Computing, TIP and CORD. He found very little activity in these bodies wrt to creating code for NFV at the edge.
- Discussed how to create more interest and participation in the committee.

### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner (agardner@li  
[nuxfoundation.org](http://nuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
  - **Prayson** to provide links to getting set up with the tools.
  - **Paul-Andre** to contact Chris Price about working with upstream groups and test groups.
  - **Kevin** to work with his contacts on the test side to try to spur interest.
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## January 25, 2017

**Attendees: Prayson Pate, Paul-Andre Raymond**

### Minutes:

- Discussed areas for eNFV work and what are the relevant upstream work groups.

#### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
  - **Prayson** to provide links to getting set up with the tools.
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## December 14, 2016

**Attendees:** Prayson Pate, Kevin Canady

#### Minutes:

- Discussed links to OPNFV tools

#### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
  - **Prayson** to provide links to getting set up with the tools.
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## October 5, 2016

**Attendees:** Prayson Pate, Kevin Canady

#### Minutes:

- Kevin said that he and Mike expect to be able to make some progress in the next few weeks.

#### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
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## September 21, 2016

**Attendees:** Prayson Pate, Jesse Hong

#### Minutes:

- Jesse reported some issues with updating the documents.

## Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
- 

## September 7, 2016

**Attendees: Prayson Pate, Jesse Hong**

### Minutes:

- Reviewed the action items.
- Jesse mentioned his work with CORD.

### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
- 

## August 24, 2016

**Attendees: Prayson Pate, Edna Ganon**

### Minutes:

- Reviewed the action items.

### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Jesse** will provide input on the distributed RAN use case.
  - **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
  - **Michael K** to add definition of edge to document.
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## July 27, 2016

**Attendees: Prayson Pate, Michael Kloberdans**

### Minutes:

- Reviewed definition of edge supplied by Michael K.

### Action Items:

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
- **Prayson** agreed to review the definition of "edge" supplied by Michael K. **Complete. Email sent to team. Closed.**
- **Jesse** will provide input on the distributed RAN use case.
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- **Prayson** to poll the current list of attendees to see who still has interest. **Complete. Closed.**
- **Michael K** to add definition of edge to document.

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## July 13, 2016

No call.

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## June 29, 2016

**Attendees:** Prayson Pate, Michael Kloberdans, Kevin Canady, Mike Ludwig

**Minutes:**

- Reviewed action items.
- Prayson gave a brief update on the OPNFV Summit. See below for notes.
- Michael K suggested that we poll the current email distribution list to see who is still interested. Prayson will do so.
- Michael K asked about providing guidance to other groups. Prayson will ping TSC chair Chris Price on this.

**Action Items**

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
- **Prayson** agreed to review the definition of "edge" supplied by Michael K.
- **Jesse** will provide input on the distributed RAN use case.
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- **Prayson** to send a poll for attendance at the OPNFV Summit in Berlin. **Update: Edna and Prayson attended.**
- **Prayson** to send a poll for interest in document sections. **Complete. Prayson resent. Jesse Hong, Michael Kloberdans, Kevin Canady expressed interest in helping.**
- **Prayson** to give a synopsis of the OPNFV Summit. **Complete. Summary:**
  - The OPNFV Summit in Berlin was very worthwhile, especially the orientation session on Sunday.
  - Monday and Tuesday had a number of mini-summits.
  - On Monday I attended the ONOS and CORD mini-summit. Very interesting to see the progress on applying SDN and NFV to the next-gen central office.
  - On Tuesday I attended the FD.io/DPDK mini-summit. FD.io is aimed at fleshing out the VPP packet forwarding software contributed by Cisco. The FD.io team reported some amazing throughput numbers for late-model Xeon servers.
  - Wednesday and Thursday were regular multi-stream sessions. I attended some very interesting real-world deployment reports.
  - I also talked with the TSC chair Chris Price to get some advice on re-invigorating the eNFV project. He suggested joining a TSC call then the technical call. The purpose would be to describe what we are doing and to try to drum up additional support and participation.
- **Prayson** to poll the current list of attendees to see who still has interest.

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## June 15, 2016

**Attendees:** Prayson Pate, Michael Kloberdans, Kevin Canady, Edna Ganon

**Minutes:**

- Reviewed action items.
- Poll of NFV Summit - Edna and Prayson will attend. Jesse may attend
- Poll of document sections - no responses. I will resend.
- Edna Ganon of MRV joined. She expressed interest in addressing the issues associate with running OpenStack in a distributed environment.

**Action Items**

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
- **Prayson** agreed to review the definition of "edge" supplied by Michael K.
- **Jesse** will provide input on the distributed RAN use case.
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- **Prayson** to send a poll for attendance at the OPNFV Summit in Berlin. **Update: Edna and Prayson will attend. Jesse may attend.**
- **Prayson** to send a poll for interest in document sections. **Update: no responses. Prayson will resend.**
- **Prayson** to send a synopsis of the OPNFV Summit

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**May 18, 2016**

**Attendees: Prayson Pate, Michael Kloberdans, Jesse Hong, Mike Ludwig, Kevin Canady, Shang Xiadong**

**Minutes:**

- People reported problems accessing the GoToMeeting session using the web access. Dial in worked.
- Reviewed action items.
- Discussed whether people will attend the OPNVF Summit in Berlin. Prayson will send a poll.
- Discussed how to move the project and the requirements document forward. We need to get agreement on the use cases and gaps, and we need to flesh out the text. Doing so will require individual inputs. Prayson will send a poll on interest in particular sections.

**Action Items**

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2. **Update: Prayson provided some comments by email.**
- **Michael K** agreed to provide input on the definition of "edge." **Update: Michael reviewed his PowerPoint deck. Prayson will comment.**
- **Jesse** will provide input on the distributed RAN use case. **Update: Jesse will provide an update.**
- **All** need to verify access to Gerrit and Git to participate in the document editing process. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- **Prayson** to send a poll for attendance at the OPNFV Summit in Berlin. **Update: Poll sent.**
- **Prayson** to send a poll for interest in document sections. **Update: Poll sent.**

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**May 4, 2016**

**Attendees: Prayson Pate, Michael Kloberdans, Jesse Hong, Shang Xiadong**

**Minutes:**

- Jesse shared some info on the RAN use case. There are 2 key gaps: 1) ability to steer traffic from different network users and micro clouds and 2) support inOpenStack for placement and control of containers. He will excerpt these for submission to the group.
- Michael K shared his slides on the definition of edge. Prayson will provide a response.
- Jesse verified that he has access to Gerrit and Git.
- Next meeting will be on Wednesday May 18.

**Action Items:**

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2. **Update: Prayson provided some comments by email.**
- **Michael K** agreed to provide input on the definition of "edge." **Update: Michael reviewed his PowerPoint deck. Prayson will comment.**
- **Jesse** will provide input on the distributed RAN use case. **Update: Jesse presented some diagrams and will follow up with gaps.**
- **All** need to verify access to Gerrit and Git to participate in the document editing process.

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**April 12, 2016**

**Attendees: Prayson Pate, Mike Ludwig, Jesse Hong, Du Mengmeng, Shang Xiadong**

**Minutes**

- The next call will be on Wednesday, April 27.
- We discussed the need to have access to Gerrit and Git in order to submit changes to the documents or to review others changes. To get access, please contact Aric Gardner ([agardner@linuxfoundation.org](mailto:agardner@linuxfoundation.org)).
- We reviewed and updated the action items below.

**Action Items**

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2. **Update: Mike presented some draft text. Prayson will provide some comments.**
  - **Prayson** agreed to provide some input on the multi-DC management item in section 1 and the vE-CPE items in section 2. **Update: Prayson added text to the requirements document. Closed.**
  - **Michael K** agreed to provide input on the definition of "edge."
  - **Jesse** will provide input on the distributed RAN use case. **Update: Jesse presented some diagrams and will follow up with gaps.**
  - **Prayson** will examine other requirements documents regarding requirements versus recommendations. **Update: Prayson provided some example documents. All focus on requirements. Closed.**
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## March 30, 2016

**Attendees: Prayson Pate, Kevin Canady, Mike Ludwig, Michael Kloberdans, James Buchanan, Jesse Hong**

### Minutes

**Note: The next call will be on Tuesday, April 12. I will send out an updated Outlook invitation.**

- Discussed definition of "edge" for the project. Should include residential, mobile applications and CORD. Michael Kloberdans will provide some words.
- Mike L and Kevin provided an update on input on the first two tunneling items in section 1. They will capture internal discussions on security, scale, etc. and submit.
- Discussed the distributed base station app in section 2. Jesse agreed to provide some text.
- Prayson to provide an update on the multi-DC management item in section 1 and the vE-CPE items in section 2.
- Discussed the scope of the document regarding pure requirements versus recommendations. Prayson will look at other OPNFV documents for precedents.

### Action Items

- **Mike L and Kevin** agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - **Prayson** agreed to provide some input on the multi-DC management item in section 1 and the vE-CPE items in section 2.
  - **Michael K** agreed to provide input on the definition of "edge."
  - **Jesse** will provide input on the distributed RAN use case.
  - **Prayson** will examine other requirements documents regarding requirements versus recommendations.
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## March 16, 2016

**Attendees: Prayson Pate, Kevin Canady, Mike Ludwig, Michael Kloberdans**

### Minutes

- We talked about the items listed below in sections 1 and 2
  - Mike L and Kevin agreed to provide some input on the first two tunneling items in section 1 and the distributed base station app in section 2.
  - Prayson agreed to provide some input on the multi-DC management item in section 1 and the vE-CPE items in section 2.
  - Mike L and Kevin raised a question on the scope and level of detail for the group. We agreed that we should constrain ourselves to gaps within the context of OPNFV.
  - Michael K will send some separate notes by email.
  - Du Mengmeng provided the attached input on a RAN use case.
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## December 10, 2015

**Attendees: James, Michael, Jesse, Taiyun**

### Minutes

#### Item 1: Scope of Group

MK: In tunneling section, broaden the question to allow for segment routing

MK: In Monitoring ... propose we use Assurance as a slightly broader term

MK: Noted that MANO is now in scope for OPNFV

MK: Propose that "edge" gets defined a little more explicitly (E.g. Home, business service and mobile)

MK: Should add an item listing out the gaps/challenges associated with pushing the NFV location from the "ISP POP" (or similar) to the true network edge (e.g. Scaling, security ... )

Taiyun: Ensure that a distributed base station use case is in scope. (Agreed!)

JH: Worried about too many use cases, propose focusing on Mobile and Enterprise

JB: Let's start with three and include Residential

JH: Would we cover MANO?

All: Agreed that we would identify the needs we place on MANO from eNFV, but we wouldn't spec MANO itself.

MK: Will publish a link to the ETSI MANO definition document (with crib notes!)

JH: Wondering if MPLS is out of scope.

All: Its borderline ... simply of interest when we talk of options for forwarding user and management traffic

#### Item 2: Who is working on what

MK: Looking at Home Gateway and ISP Edge from the forwarding point of view ... has something to contribute

MK: In the middle of containers vs VM's ... Would also like to work there

MK: Not a security guy, but is in possession of a report

MK: List of gaps

JB: Squaring bare metal with remote survivability

JB: Multi DC management/orchestration

JB: Securing the link

JB: List of gaps

JH: Containers vs VM

JH: Mano

#### Next Steps

- Those that stepped forward should work on capturing lead ideas/thoughts in as much detail as possible for

the next meeting

- Comments invited from everyone on all topics under development, especially including the list of gaps.
- James to solicit input on times for next meetings initial target is week of Jan 11.
- At next meeting, we will present initial notes

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## November 25, 2015

### Agenda

- 5 minute on Scope to check for additions/deletions
- Review of Residential Services topic (MK)
- Time permitting
- Review of Service Use Cases (Andrew S)
- Dividing up the agreed topics so that work can begin

### Minutes

#### Edge NFV scope

No further items suggested

#### Review of Residential Services

Michael K presented his slides on "Disposable Containers at the Edge", initially presented during the 'Futures' track at 2015 OPNFV Summit  
Question: where is the edge? Virtualization initially developed in data centers. Now the edge has moved outward. Recently "edge" represents ISP premise location closest to the customer.

Customer premises - the home - is the opposite of the data center in that compute and store are distributed rather than centralized. Orchestration as it exists was not designed for massive scale distributed endpoints such as the homes of service provider customers.

Should VNFs be deployed in subscribers' homes? Some examples illustrate why this is useful.

Examples include: WAN fault monitoring, performance monitoring, reduce traffic between the premises and service provider's network.

Introduction to Profiles (aka "templates")

Michael proposes that orchestration software will change from data center orchestration to pre-defined 'profiles'

Next proposal: "Disposable" or short-deployment-time VNFs

Another potential use of VNF is to measure link metrics, e.g., to measure metrics required by FCC in U.S.A.

Building hardware or software into the end device, e.g., residential gateway to measure link metrics represents a fixed cost to the device. This functionality can be performed by a VNF that is loaded temporarily to collect the data, then removed. i.e., the VNF is transient in the device.

Question: is this transient VNF always there and only used occasionally, e.g., on a licensed basis?

Disposable means requirement for hypervisor, right?

Under the proposal the VNF is removed from the subscriber's device when a trigger occurs. Examples of trigger include time limits or external or internal usage limits.

Removing the VNF can reduce the complexity of orchestration by eliminating or reducing the need for the orchestrator to manage the lifecycle of the VNF.

Propose to use a simpler solution like profiles, think of it as a "pre-determined service chain", rather than an orchestrated service chain.

James said some service providers he has spoken with have similar ideas to what Michael proposed, e.g., static service chains previously defined and each with its own SKU.

Another chain of thoughts from Peter Willis from BT: OpenStack doesn't scale. Several fundamental features of OpenStack need to mature or be modified before they are ready for large scale ISP deployments.

James will explore inviting Peter to attend an eNFV meeting.

Michael defers the topic of security considerations to a future call.

#### Adva Service Use Cases

Andrew presented slides on the topic OPNFV for eNFVI Platform [https://wiki.opnfv.org/\\_media/project\\_proposals/opnfv-edge-nfvi.pptx](https://wiki.opnfv.org/_media/project_proposals/opnfv-edge-nfvi.pptx)

The presentation introduces an Edge NFVI deployment use case: CPE hosted VNF, thousands of "micro data centers", host is explicitly selected rather than orchestrated by NOVA scheduler, usually a single host at the site, all management traffic is inband due to limited number of device interfaces.

This model applies to mid- to large-size enterprises, but perhaps eventually to smaller enterprises as well.

Michael suggests identifying differences between large and small enterprises. For example large enterprises may have redundant resources while smaller enterprises may not.

Use Case: WAN: uplinks 1 GE, demarcation is mandatory, tunneling over IP/MPLS WAN, underlying network might fail, tenant traffic may be intercepted  
For further discussion: should architecture be 'bare metal' or virtual components at the edge?

#### Core Questions

Large number of small centers: what is the viable approach? Static, semi-static, full dynamic

Bare metal vs. not bare metal at edge

What is the model for getting traffic back from edge to core? What is the security model?

James proposes to subdivide the project group to sub-groups to investigate these topics.

#### Action Items

Define what class of enterprise this project considers in scope and document in the project charter.

James will request an e-mail reflector for eNFV from Linux Foundation

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## November 18, 2015

### Agenda

- Review of the Scope
- Review of the Connectivity Services LSO activity in ODL and OPNFV

### Minutes

#### Project description:

- The NFV movement is largely focused gaining the efficiencies of large data centre compute infrastructure. This is sensible, however to paraphrase the old switching/routing saying ... centralize what you can, distribute what you must. Some applications naturally belong at the edge: WAN Acceleration, Content Cacheing, and depending on your philosophy, Firewalling all fall into that category. Other more specialized test applications also need to be at the edge to exercise the portions of the network under test. Similarly many business applications are most efficiently delivered at the edge.
- The purpose of this Requirements Project is to articulate the capabilities and behaviours needed in Edge NFV platforms, and how they interact with centralized NFVI and MANO components of NFV solutions
- MK propose to strike/clarify the use of the word "centralized" since large eNFV scenarios likely can't be handled by a single NFVI instance
- Appropriate Tunneling for User Traffic across WAN (Ethernet, IP/MPLS) links
- Appropriate Tunneling for Management Traffic across WAN links
- Including reachability requirements to the compute platform
- Extending Multi-DC management to address many small "DC" locations (Jesse interested ... "micro DC running on the edge")
- Monitoring Capabilities required for a remote Compute Node
- Squaring Bare Metal with remote survivability and whether IaaS is more appropriate for remote locations
- Include any architecture diagrams or specifications, reference to OPNFV requirements list.
- Jesse: IaaS needs to support VMs and Containers co-existing (Liberty is all about containers) ... Google Container Service, AWS Containers ... Containers will reside in the VMs
- ML: Landslide product working on Edge ... just letting us all know
- MK: is interested in home ... so scaling to millions ... smaller number of VNFs, larger number of CNs ... perhaps service chaining gets simpler
- MK: Cablelabs working with MEF. Very focused at L2 setting up interfaces and formats (whereas his interface) ... MK can give overview of this.
- ML: Curious about security aspect across the WAN ... how does one secure inter-VNF communication between VNFs in the chain. MK: Authentication of remote nodes to the controller ... MK can share what they did at Cablelabs
- Kevin Luehrs Data Plane Optimization (TBD if eNFV needs to specifically address this, or pick up work from other groups ... DPACC?)
- We discussed MANO and MK explained that OPNFV was likely to expand scope to address this.
- John pointed out that we need to Define some use cases ...

#### Content

- Kevin shared description of OPNFV Connectivity Services LSO (LSOAPI) project and OpenDaylight UNI Manager project
  - MEF ELINE service description
  - Defined YANG model to feed into ODL
  - Instances were OVS running in Raspberry Pi ... and talk to it using OVSDB
  - Service model is to connect UNI's with GRE tunnel
  - Connectivity Services LSO is the aspect of this in OPNFV
  - Next steps is to migrate to MEF's latest service model
  - Focused on the "SDN aspect of this problem"
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## November 11, 2015

### Agenda

- <add agenda here>

### Minutes

- <add minutes here>

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