Project Proposals Service Function Chaining

Project Name:
- Proposed name for the project: Service Function Chaining
- Proposed name for the repository: sfc
- Project Categories: Collaborative Development
- This project was accepted by the OPNFV TSC on May 5, 2015 http://meetbot.opnfv.org/meetings/opnfv-meeting/2015/opnfv-meeting.2015-05-05-14.02.html
- OPNFV SFC Project wiki

Project description

This project will create a link between two Linux Foundation projects, OpenDaylight (ODL) and OPNFV. One of the goals is to allow OpenDaylight to create Service Function Chains across OPNFV Network Functions (NFs). The use-case for chaining Network Functions is discussed in "Network Functions Virtualisation (NFV); Architectural Framework, ETSI GS NFV 002 V1.1.1 (2013-10)", section 6.

OpenDaylight already has the capability to create Service Function Chains and will be extended as appropriate to specifically control OPNFV NFs.

This collaborative development project will work with the "OpenStack Based VNF Forwarding Graph" requirement project to achieve the best interoperability and embedding into the NFV environment.

Scope

Service Function Chaining is a key technology identified to help with the deployment and networking of VNFs in NFV environments. The project will work with the upstream communities in OVS, OpenDaylight and OpenStack to develop functionality needed to provide service chaining capabilities in the OPNFV platform.

Service chaining technologies provided by the OpenDaylight SFC implementation and intended to be integrated in the OPNFV platform currently include:

- OpenFlow programmed service chains for:
  - L2 VLAN encapsulation
  - MPLS encapsulation
- VxLAN overlay based service chains for:
  - VxLAN-GPE encapsulation with NSH headers
- Basic load balancing at SFC (planned for ODL Lithium)
- Programmatic service function selection algorithms
  - Round robin
  - Load balanced (choose the least loaded service function)
  - Random allocation
  
  Future development will include hybrid service chains (OVS and/or OFS), support for layer 4-7 classification, additional encapsulations, additional load balancing and service function instance selection algorithms.

Testing

Service Function chaining will provide a set of capabilities to the OPNFV platform that will require automated platform regression testing. The project will develop test cases to validate each of the proposed OPNFV platform capabilities and include them in the functest and qtip projects as needed.

The service chaining project will develop test cases in the robot toolchain provided by these projects.

Documentation

The service chaining project will develop documentation as described by the OPNFV documentation project and associated toolchain. These documents will include:

- Service Chaining user guide
- API Documentation
- Release documentation including test coverage.

Dependencies:

- The OPNFV Service Function Chaining project implements the ODL-related components of the features described in the 'OpenStack Based VNF Forwarding Graph' project
  - Service Function Chaining does not at this time implement the SCH header, nor support multiple SC controllers per OpenStack instance.
  - The SFC project will coordinate and cooperate with the VNFFG project on realizing target use cases and consistent encapsulations (MPLS, VXLAN overlay, NSH, etc.)
- The OPNFV Service Function Chaining project is dependant on the following upstream communities:
  - OpenStack
OPNFV SFC is dependant on the Lithium release of OpenDaylight and the Kilo release of OpenStack and OVS data plane extensions for Network Function Chaining. https://github.com/priteshik/ovs.git

SFC is currently implemented in reference to the following standards bodies and activities:

- IETF Service Function Chaining architecture and NSH headers: IETF NSH draft
- ONF service function chaining architecture and OpenFlow: ONF sb-sdn-nvf-solution.pdf
- ETSI NFV ISG Use case 4, VNF Forwarding Graphs: GS NFV 001 Network Functions Virtualisation

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Planned deliverables

- OPNFV Service Function Chaining will implement needed functionalities to deliver OPNFV service chaining capabilities in upstream projects including:
  - OpenDaylight
  - OVS
    - OpenDaylight’s SFC project is driving changes to OVS for NSH encapsulation.
- The OPNFV Service Chaining Project will deliver:
  - Documentation describing how to leverage these functions in the OPNFV platform.
  - Release documentation.
  - Required configuration files for each release.
  - Test cases to validate documented features.

Proposed Release Schedule:

- OPNFV SFC functionality is expected to be provided as part of OPNFV release 2