SFC with NSH and OVS

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What is SFC?
Programmable chains of Network Functions

VNF1 → VNF2 → VNF3
Why SFC for OVS?

• Service functions are being virtualized, become more scalable and are migrated to live in VMs
• OVS is usually the first forwarding point to redirect packets to a service graph
What is NSH?

- Carries service graph + service metadata in additional header
- Allows VNFs to exchange metadata
Is NSH just another encap for OVS?

- Almost, but an NSH vport won’t work:
  - Guests (VNFs) require to see the NSH headers
  - A push/pop action like VLAN is a better comparison
  - Lightweight Tunnel (LWT) in datapath requires some work to feed encapsulated packets back into OVS for forwarding to VNF
NSH-Based SFC in OvS

Pass metadata / change metadata / add external headers as metadata

Control Plane

fwd-table (SPI, SI, Symmetric, end of chain)

NSH aware SF (VNF)

VM (VNF)

NSH Encap

VxLAN-gpe Encap

CLASS-IFY

Plain Old vSwitch

Port (+vTEP)

Port (+vTEP)

SFF

LC Encap

L2 UDP VXLAN-gpe

NSH Next = IPv4

SPI, Metadata

Original packet

L2 UDP VXLAN-gpe

NSH Next = IPv4

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Original packet

L2 UDP VXLAN-gpe

NSH Next = IPv4

SPI, Metadata

Original packet

NSH Encap

Next protocol = NSH

NSH

Next = IPv4

SPI, Metadata

Original packet

NSH

Next = IPv4

SPI, Metadata

Original packet

RX

• Control of vSwitch Port vTEP decap action?
• OvS recognize & pass VxLAN-gpe and NSH (NSH patch/s…)
• Local Circuit header required to form a “legal” NSH packet
• Ability to pass LC tunnel + NSH headers to SF
  • Header passing exclusively to SFs?
  • How to identify an SF?
• Multi-tenant SF:
  • External VXLAN SHOULD be sent to SF
  • Authority of SFF or OvS?

TX

• SF is “trusted”
• Keep state
  • E.g. NAT, SI
• Decap/Encap from local to external
• Shared VNI – VxLAN and gpe?

3 packet format examples
SFC, ODL and OvS OF Tables

Classify impacts

Table 0

OvS table vs.

ODL assumptions?

Assumes a single

Controller per

OVS!

OvS Match

ifications?
SFC in NFV systems with OpenDaylight

Functional code, 2nd release in progress
Used by OPNFV, allows the orchestrator to create Service Graph
SFC use by OPNFV
OpenStack SFC API

- Proposed SFC API for OpenStack Neutron -- “networking-sfc”
- [http://docs.openstack.org/developer/networking-sfc/api.html](http://docs.openstack.org/developer/networking-sfc/api.html)

- API defines a service chain as:
  - Flow classifier - definition of what traffic enters the chain
  - An ordered list of Neutron ports that define the chain
  - Correlation type -- chain metadata encapsulation type
SFC in OVN

- Status: discussion and early prototyping
  - Prototype based on chaining logical ports on a single logical switch
- Seems like SFC will have a place in OVN
- Lots of questions to answer to come up with a design
SFC in OVN - Metadata

• Metadata in and out of the VM
  • networking-sfc defines use of an MPLS header
  • NSH seems to have the most interest

• Metadata between hosts
  • OVN uses Geneve today
  • Could use vxlan-gpe + NSH in the future
SFC in OVN -- Classifier

• OVN already exposes a nice traffic matching syntax
• We can reuse this for SFC
• See “match” for ACLs in OVN Northbound DB
• Examples:
  • HTTP: ip && tcp && tcp.dst == {80,443}
  • SIP: ip && ((tcp && tcp.dst == {5060,5061}) || (udp && udp.dst == {5060,5061}))
SFC in OVN’s Northbound DB

• Could add as a new action to ACLs
  • Are priorities enough, or do we need separate stages for ACLs and chaining?
• Defining chains
  • Could be arguments to a chain() action
  • Can add new tables for structured chaining definition if needed
Conclusions and next steps

- Asks of OVS for SFC
  - NSH encap/decap, VxLAN-gpe encap/decap, VxLAN to VxLAN-gpe interop
  - Local Circuit and External, control Tunnel port actions!
  - Multi Tenant support – allow external headers and multi VNI to a multi-tenant SF
  - SF privileges vs. VM
  - Expose data plane / local capabilities to orchestrator for best SF placement
- Watch ovs-dev for discussion of OVN SFC design in coming weeks