Service Function Chaining

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What is Service Function Chaining

- Service Chaining Downstreamed from OpenDaylight
  - Open Daylight Service Function Chaining (ODL SFC)
  - ODL SFC implements the NSH and SFC IETF specification drafts
- Integrates SFC into NFV Cloud Data Center environments
- Use Cases solved with SFC
  - Service Function scaling
  - Any sort of Dynamic Service Insertion
Service Function Chaining Use Case: Parental Control

1. Update/create chains
   - ODL SFC GUI

2. Subscriber classification rules
   - HTTP Content Filtering
     - Block URLs

Legend:
- SFF: Service Function Forwarder
- SF: Service Function
- RSP: Rendered Service Path, a Service Chain

Parental control, block certain URLs
No control for parents

SDN network
Internet
Service Chaining Encapsulation

Network Service Headers (NSH) in detail
Service Function Chaining with NSH

- Network Service Headers (NSH)
  - Reusable classification for pre-programmed paths
Service Function Chaining with NSH

Example: NSH encapsulated in VXLAN

Network Services Header
- NSH Base Header
- Service Path (24 bit) / Index
- Optional Metadata

Advantages
- Forwarding complexity is much simpler
- Optional Metadata can be sent with packets
- Supports flexible encapsulation (Ethernet, MPLS, VXLAN, etc)

Challenges
- Limited support in switches, kernels, and applications
- Service Function needs to become NSH-aware
Service Chaining Classification

Mapping Subscriber traffic to Service Chains with Group Based Policy
Group Based Policy made easy

Concepts:
- Group Endpoints (Eps) into Endpoint Groups (EPGs)
- Apply Policy (Contracts) to traffic between groups
- Contracts apply directionally

Contracts
- web
  - Match: dstport:80
  - Action: Allow

- ssh
  - Match: dstport:22
  - Action: Allow

- any
  - Match: *
  - Action: Allow

Copied from Ed Warnicke’s GBP slides:
https://docs.google.com/presentation/d/1vsYddlHFRnVG9cDwWyldT2BN5fUTPcR1IYtUrFA8U/edit?usp=sharing
Group Based Policy with SFC

Add Contracts for “chain-in” and “chain-out” with the name of the SFC chain.

Contracts

chain-in
- Match: *
- Action: chain:foo

chain-out
- Match: *
- Action: chain:bar

EPG: Hosts

EPG: Web Servers

SFC network

EP:1
EP:2
EP:3
EP:4
OPNFV SFC
The Current Status
OPNFV SFC Current Network Topology
OPNFV SFC Current Network Topology

**Legend**
- VxLAN tunnel SF/SFF
- OpenFlow 1.3/OVSDB
- GBP creates VxLAN tunnel
- Original packets, no encap
- GBP EPG: Group Based Policy, End Point Group
- Used as Classifier in OPNFV
OPNFV SFC Brahmaputra Target Use Case

1. Update/create chains

- SDN network

1) Can NOT do HTTP
2) Can do SSH

1) Can do HTTP
2) Can NOT do SSH

2. Subscriber classification rules

SFF: Service Function Forwarder
SF: Service Function
RSP: Rendered Service Path, a Service Chain

Legend:
The VNF Manager

- The technical definition of a VNF Manager
  - Lifecycle management of VNF instances
  - Overall coordination and adaption role for configuration and event reporting between NFV-Infrastructure and Network management system (NMS)

- What do we need a VNF Manager for in OPNFV SFC?
  - Coordinating Service Function VM Lifecycle management
  - We decided to use the OpenStack Tacker VNF Mgr

- Technically MANO (management and orchestration) is out of scope for Brahmaputra
  - We'll install Tacker post-installation for testing
Additional Information

- **OPNFV SFC wiki**
  - [https://wiki.opnfv.org/service_function_chaining](https://wiki.opnfv.org/service_function_chaining)

- **OPNFV SFC Brahmaputra Release Planning**
  - [https://docs.google.com/presentation/d/1GEt8Vi6hQL9kOknowxr3o9aE_VYoe5zljz8MyQtdgw/edit?usp=sharing](https://docs.google.com/presentation/d/1GEt8Vi6hQL9kOknowxr3o9aE_VYoe5zljz8MyQtdgw/edit?usp=sharing)

- **OPNFV SFC discussion slides**
  - [https://docs.google.com/presentation/d/1gbhAnrTYbLCrNMhMXin0lxjyg7IHNPiBlBTjwAzys/edit?usp=sharing](https://docs.google.com/presentation/d/1gbhAnrTYbLCrNMhMXin0lxjyg7IHNPiBlBTjwAzys/edit?usp=sharing)

- **OPNFV JIRA**
  - [https://jira.opnfv.org/browse/SFC/?selectedTab=com.atlassian.jira.jira-projectsplugin:summary-panel](https://jira.opnfv.org/browse/SFC/?selectedTab=com.atlassian.jira.jira-projectsplugin:summary-panel)
What’s next in OPNFV SFC?
Brahmaputra and beyond
On the Roadmap…

- Multiple compute nodes
  - OpenDaylight clustering
  - Enhanced SF VM placement (load balancing, fault tolerance)

- Hybrid Service Chains
  - Multi-protocol SFFs (OpenFlow, Netconf)

- Enhanced VnfMgr functionality in Tacker

- Scale SF VMs in/out based on CPU/Network load

- SF network readiness detection
  - Block RSP creation until all SFs “ready”