

SFC Architecture Model using OpenFlow comparing using NSH



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What is the better architecture for SFC ?

- SFC needs a chaining mechanism
 - Network Service Header (NSH)
 - Path Controlling
- Which network part NFV / SFC is deployable ?
 - Mobile Core
 - Edge or Customer Network
- Requirements
 - Reducing CAPEX / OPEX
 - Easy, Incremental, and Rapid deployment
- **Not Complex Architecture, Simple Architecture is deployable !**

SFC Problems

- Standardization or Definition is missing
 - Role of Classifier
 - Control and Monitoring Protocol of SF and SFF
 - SFC Proxy for NSH unaware SF
- Who is a champion ?
 - Path Decision of SFC
 - Control of SF and SFF
- Deployment is complex
 - Header Push / Pop
 - NSH is deployable ?

Existing OpenSource for SFC

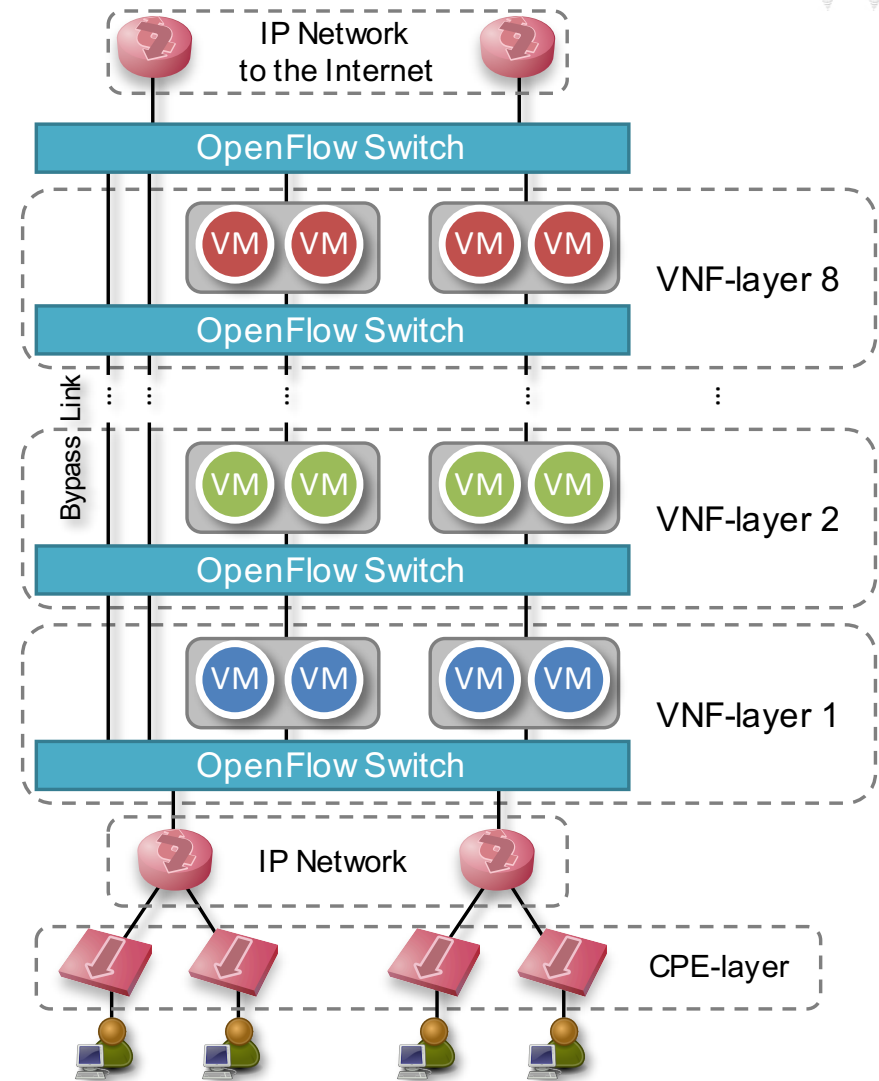
	SFC Proxy	SFF location	SF Control Method	Networking	Transport Encapsulation
ODL NSH	Undefined	OVS	Undefined	C : None D: OpenFlow + ovsdb	VXLAN-GPE
ODL SFCOFL2	IP Header Rewrite by OpenFlow	OVS	Undefined	C: None D: OpenFlow	None
Open Contrail	vRouter	vRouter	IF-MAP XMPP	C: EVPN D: Netconf	VXLAN or MPLS-over-GRE

Pros. and Cons. of Using NSH

- Pros.
 - Separating Service Layer and Network Layer
 - Operator can use any routing protocol in Network Layer
 - Classifier can decide the end-to-end path
- Cons.
 - NSH unaware SF, need SFC Proxy
 - SFC Proxy should define the kinds of SF type
- **NSH is mandatory for SFC ? ⇒ Overspec in small/middle scale**

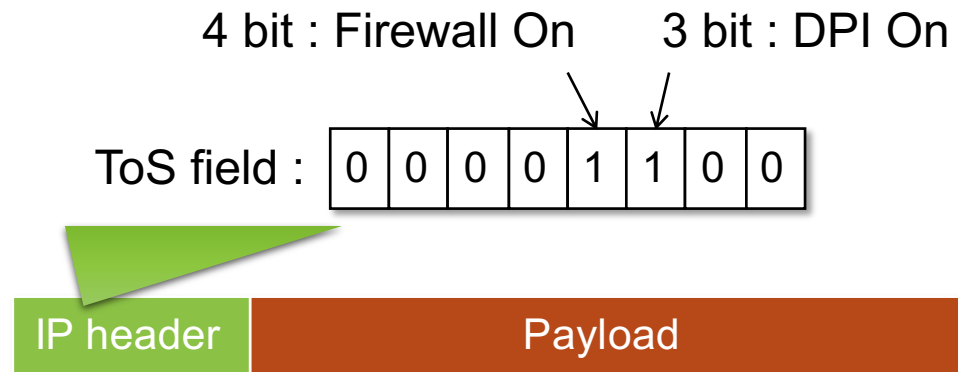
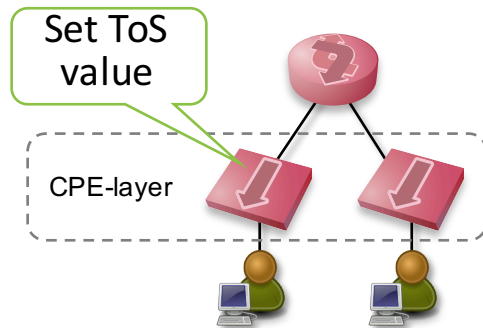
Proposed Architecture

- For small / middle case
 - More simple architecture : **FlowFall model**
- VNF-layering model
 - A single VNF composed of multiple VMs for load-balancing
- Using ToS as a service identifier
 - ToS value is set by CPEs
- OpenFlow switches take packets through VNFs or bypass-links
 - if a bit of **ToS filed** of a packet is 1, the packet is taken through VNF.
 - if the bit is 0, the packet is taken through bypass-link.



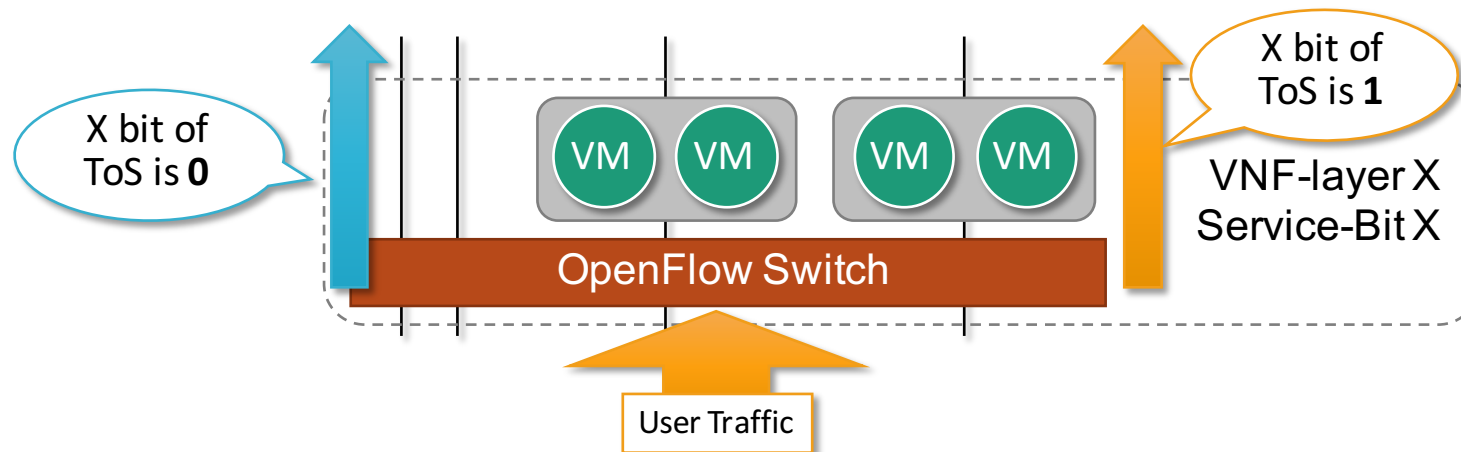
ToS filed as a Service Identifier

- **Each bit of the ToS field indicates each service**
 - User select services, CPE changes the ToS value of a series of packets for the user.
 - bitmap configuration is designed by network operators
 - (Max 8 services)



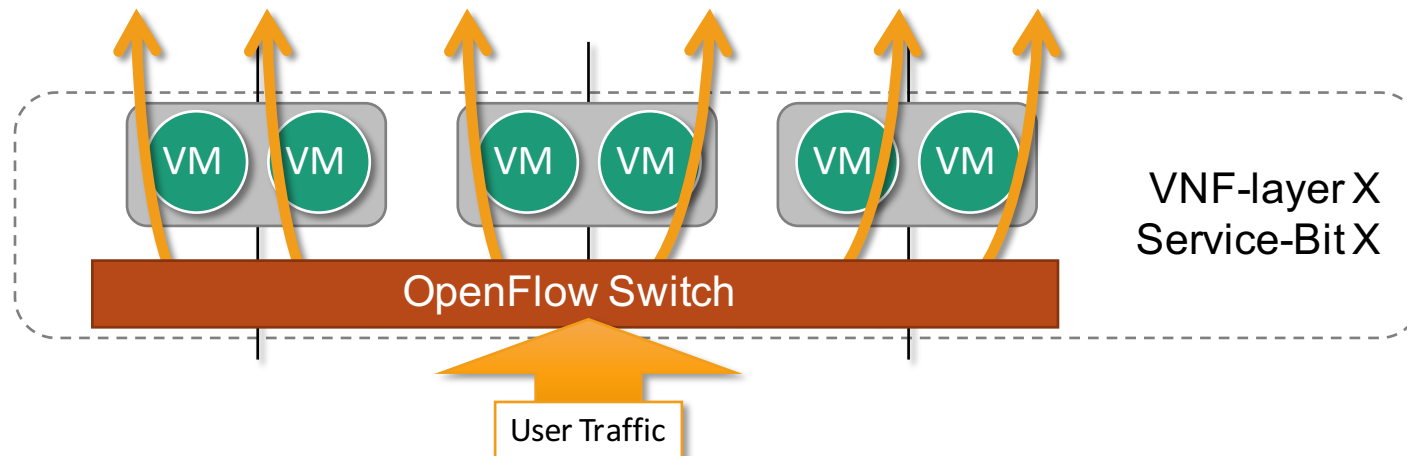
Traffic Handling

- **OpenFlow switch installs flows in accordance with Service-Bit and ToS**
 - if the bit is 1, packets are forwarded to VNF (VMs)
 - if the bit is 0, packets are forwarded to By-pass link
 - Each VNF-layer works on this same procedure.



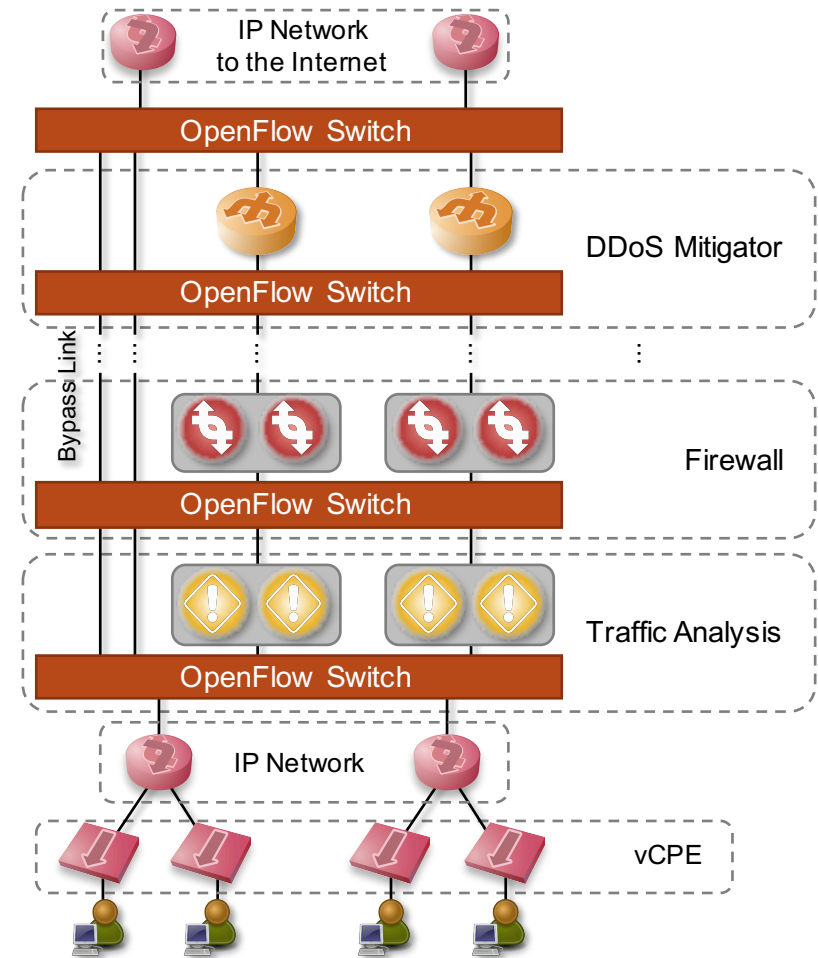
Load balancing among VMs

- **User traffic is balanced among VMs on a VNF-layer**
 - Destination VM for a flow is decided by a hash value of source IP address
 - OF Match : [in_port, ip_src, ip_tos]
 - OF Action is : [set-dl-dst, output-port]



Demonstration of FlowFall model @ Interop Tokyo 2015

- **We constructed 3 VNF-layers at ShowNet**
 - DDoS Mitigator
 - A10 Networks, Thunder 6435tps
 - Firewall
 - Cisco Systems, CSR1000V
 - Traffic Analysis
 - Palo Alto Networks, PA-VM
 - (virtualized) CPE
 - Juniper Networks, vSRX
- **Thanks for Interop Tokyo 2015 ShowNet NOC Team**
 - Over 20 networks are deployed.



THANK YOU !

Network Service Platform Consortium
<http://www.next-nsp.org/>