Open Networking Foundation (ONF) Northbound Interfaces (NBI) WG

ONF NBI WG core APIs

# Use cases

NBI study -- use-cases:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=503&tid=1399449531>

Software Defined Office Connectivity use case:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=416&tid=1399449531>

Anti-DoS use case:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=468&tid=1399449531>

Diagnostics and Monitoring use case:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=591&tid=1399449531>

Network Snapshot use case:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=592&tid=1399449531>

Gateways and Virtual Networks:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=550&tid=1399449531>

Deploy Multi-tier application:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=549&tid=1399449531>

Unified Communications (UC) SDN Use Case:

<http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=631&tid=1399449531>

# Common APIs needed

## APIs for Topology (or virtual topology)

The network (or virtual network) topology is basic need of SDN application. The network topology provided to different applications may be different.

The below figure show the view of network that may be provided to the application or network user via the NBI. The APIs of topology should provide any type of topology view shown in below to the application.



*Figure reference to “SDN architecture”*

Any network based application may need one or more types of the topology shown in above figure.

There should be core APIs for topology.

## APIs for connection between OpenStack Neutron and controller

OpenStack is widely used and deployed in cloud scenarios. OpenStack-based data center is becoming mainstream.

There should be APIs for connection between SDN controller and OpenStack Neutron.

## APIs for Flow (traffic)

The NBI should provide the open network capabilities to the application for using the network capabilities. In the data plane, the open capabilities are reflected as opening flow operating to the application.

Including:

Flow definition (flow filter, or traffic-Selector definition). For example, “flow element” mentioned in the “Unified-Communications-UC-SDN-Use-Case”.

Flow action. For example, forwarding, drop, etc.

API for flow (or information model) is needed by UC case, Service chaining case, Anti-DoS case, etc.

There should be APIs for flow policy (including flow definition and flow action).

## APIs for Group-Based-Policy (GBP)

The GBP is a hot item in ODL and OpenStack. It should be considered in the NBI.

There should be APIs for GBP.

## APIs for Network Node

Network node is the main body that policy is executed. Flow policy or group-based-policy is executed in the network node.

The Node may include the following type of network node

L2 node (Switch or vSwitch)

L3 node (Router or vRouter)

MPLS node (LSR or vLSR)

Service node (e.g. Firewall node, Balancers, etc.)

There should be APIs for GBP.

## APIs for Tunnel

The network tunnel (MPLS tunnel, GRE tunnel, VxLAN, etc.) is widely deployed. VPN service and connection between data centers are based on tunnels. The NBI should provide a unified tunnel operating model for application and/or network service.

There should be APIs for tunnel.

## APIs for Virtual-Tenant-Network (VTN)

VTN allows users and developers to design and deploy virtual networks without the need to know the physical network. This is very useful in data center.

There should be APIs for virtual tenant network.

## APIs for IP path

This intends to provide application and network service control their paths in the L3 network.

For example, the Segment-Routing (reference to Project onf-0015), the PCE service and the ALTO service need to define and manage their services path in L3 network.

There should be APIs for IP path.

## APIs for VPN

VPN is also widely use in enterprise network, interconnection between data centers and mobile environments.

The management and operation of VPN are necessary. There should be APIs for VPN.

The VPN may include the following type

L2 VPN

L3 VPN

## APIs for QoS

QoS is usually for end user application. For example, the UC-SDN-Use-Case needs the network to guarantee its flow QoS to improve the user’s QoE.

There should be APIs for QoS.

## APIs for network stats/state

The network stats/state is needed by application so that the application can react with the corresponding policy.

There should be APIs for network stats/state.

## APIs for hierarchical SDN controller

This need is reference to ONF-Architecture <http://login.opennetworking.org/bin/c5i?mid=4&rid=5&gid=0&k1=257&tid=1399863625> .

Figure 4.1 "Recursive hierarchical roles" and figure 4.7 "Common controller coordination example" show the example of hierarchical controller.

The information of the controller should be provided via NBI.

There should be APIs for hierarchical SDN controller.

# Relationship

The following tables show the common APIs that are implemented (or needed) by current controllers or NBI use cases or ONF project.

|  | Current controllers implementing | ONF project | Case:  Anti-DoS | Case:  UC-SDN | Case:  Follow-Me cloud | Case:  Instant VPN/TE | Case:  ALTO-SDN | Case:  Application-aware service programming | Case:  Mobile Backhaul Network | Case:  Service Chaining |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Topology | x | X | x |  |  |  | x |  | x | x |
| Neutron | x |  |  |  |  |  |  |  |  |  |
| Flow | x | X | x | x |  | x | x | x |  | x |
| GBP | x |  |  |  |  |  |  |  |  |  |
| Node | x | X | x |  | x |  | x | x | x |  |
| Tunnel | x |  |  |  |  | x |  |  |  |  |
| VTN | x |  |  |  |  |  |  |  |  |  |
| IP Path | x | X |  |  |  |  | x |  |  |  |
| VPN | x |  |  |  |  | x |  |  | x |  |
| QoS | x | X |  | x |  |  |  |  |  |  |
| Stats/state | x | X | x |  |  |  |  |  |  |  |
| Hierarchical controller |  |  |  |  | x |  |  |  |  |  |

|  | Case:  IPv6 Transition | Case:  OpenStack Quantum | Case:  vRGW | Case:  Controller to Controller Path Computation | Case:  Diagnostics and Monitoring | Case:  Network Snapshot | Case:  Software Defined Office Connectivity | Case:  Gateways and Virtual Networks | Case:  Deploy Multi-tier application |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Topology |  |  |  |  | x | x |  | x | x |
| Neutron |  | x |  |  |  |  |  |  |  |
| Flow | x |  |  |  | x |  | x |  |  |
| GBP |  |  |  |  |  |  |  |  |  |
| Node |  |  |  |  |  | x |  | x | x |
| Tunnel | x |  |  |  |  |  |  |  |  |
| VTN |  | x |  |  |  |  |  |  |  |
| IP Path |  |  |  |  |  |  | x |  |  |
| VPN |  |  |  |  |  |  |  | x |  |
| QoS |  |  |  |  |  |  |  |  |  |
| Stats/state |  |  |  |  | x |  |  |  |  |
| Hierarchical controller |  |  |  | x |  |  |  |  |  |