IPv6 Gap Analysis

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Abstract

This document provides the users with top-down gap analysis regarding IPv6 feature requirements with OpenStack Kilo Official Release and Open Daylight Lithium Official Release.

CHAPTER

ONE

IPV6 GAP ANALYSIS WITH OPENSTACK KILO

This section provides users with IPv6 gap analysis regarding feature requirement with OpenStack Neutron in Kilo Official Release. The following table lists the use cases / feature requirements of VIM-agnostic IPv6 functionality, including infrastructure layer and VNF (VM) layer, and its gap analysis with OpenStack Neutron in Kilo Official Release.

Use Case / Requirement	Supported in Kilo Neutron	Notes
All topologies work in a multi-tenant environment	Yes	The IPv6 design is following the Neutron tenant networks model; dnsmasq is being used inside DHCP network namespaces, while radvd is being used inside Neutron routers namespaces to provide full isolation between tenants. Tenant isolation can be based on VLANs, GRE, or VXLAN encapsulation. In case of overlays, the transport network (and VTEPs) must be IPv4 based as of today.
IPv6 VM to VM only	Yes	It is possible to assign IPv6-only addresses to VMs. Both switching (within VMs on the same tenant network) as well as east/west routing (between different networks of the same tenant) are supported.
IPv6 external L2 VLAN directly attached to a VM	Yes	IPv6 provider network model; RA messages from upstream (external) router are forwarded into the VMs
IPv6 subnet routed via L3 agent to an external IPv6 network 1. Both VLAN and overlay (e.g. GRE, VXLAN) subnet attached to VMs; 2. Must be able to support multiple L3 agents for a given external network to support scaling (neutron scheduler to assign vRouters to the L3 agents)	1. Yes 2. Yes	Configuration is enhanced in Kilo to allow easier setup of the upstream gateway, without the user forced to create an IPv6 subnet for the external network.
Ability for a NIC to support both IPv4 and IPv6 (dual stack) address. 1. VM with a single interface associated with a network, which is then associated with two subnets. 2. VM with two different interfaces associated with two different networks and two different subnets.	1. Yes 2. Yes	Dual-stack is supported in Neutron with the addition of `Multiple IPv6 Prefixes` Blueprint
Support IPv6 Address assignment modes. 1. SLAAC 2. DHCPv6 Stateless 3. DHCPv6 Stateful	1. Yes 2. Yes 3. Yes	
Ability to create a port on an IPv6 DHCPv6 Stateful subnet and assign a specific IPv6 address to the port and have it taken out of the DHCP address pool.	Yes	
Ability to create a port with fixed_ip for a SLAAC/DHCPv6-Stateless Subnet.	**No**	The following patch disables this operation: https://review.openstack.org/#/c/129144/
Support for private IPv6 to external IPv6 floating IP; Ability to specify	**Rejected**	Blueprint proposed in upstream and got rejected. General expectation

CHAPTER

TWO

IPV6 GAP ANALYSIS WITH OPEN DAYLIGHT LITHIUM

This section provides users with IPv6 gap analysis regarding feature requirement with Open Daylight Lithium Official Release. The following table lists the use cases / feature requirements of VIM-agnostic IPv6 functionality, including infrastructure layer and VNF (VM) layer, and its gap analysis with Open Daylight Lithium Official Release.

Use Case / Requirement	Supported in ODL Lithium	Notes
REST API support for IPv6 subnet creation in ODL	Yes	Yes, it is possible to create IPv6 subnets in ODL using Neutron REST API. For a network which has both IPv4 and IPv6 subnets, ODL mechanism driver will send the port information which includes IPv4/v6 addresses to ODL Neutron northbound API. When port information is queried it displays IPv4 and IPv6 addresses. However, in Lithium release, ODL net-virt provider does not support IPv6 features (i.e., the actual functionality is missing and would be available only in the later releases of ODL).
IPv6 Router support in ODL 1. Communication between VMs on same compute node 2. Communication between VMs on different compute nodes (east-west) 3. External routing (north-south)	**No**	ODL net-virt provider in Lithium release only supports IPv4 Router. Support for IPv6 Router is planned using `Routing Manager` as part of Beryllium Release. In the meantime, if IPv6 Routing is necessary, we can use ODL for L2 connectivity and Neutron L3 agent for IPv4/v6 routing. **Note**: In Lithium SR1 release, we have the following issue, which is fixed upstream and back-ported to `stable/lithium`.
IPAM: Support for IPv6 Address assignment modes. 1. SLAAC 2. DHCPv6 Stateless 3. DHCPv6 Stateful	**No**	Although it is possible to create different types of IPv6 subnets in ODL, ODL_L3 would have to implement the IPv6 Router that can send out Router Advertisements based on the IPv6 addressing mode. Router Advertisement is also necessary for VMs to configure the default route. This could be part of `Routing Manager` in `Beryllium` release.
When using ODL for L2 forwarding/tunneling, is it compatible with IPv6.	Yes	
Full support for IPv6 matching (i.e., IPv6, ICMPv6, TCP, UDP) in security groups. Ability to control and manage all IPv6 security group capabilities via Neutron/Nova API (REST and CLI) as well as via Horizon.	**No**	Security Groups for IPv6 are currently not supported.
Shared Networks support	**No**	ODL currently assumes a single tenant to network mapping and does not support shared networks among tenants.
IPv6 external L2 VLAN directly attached to a VM.	**ToDo**	
ODL on an IPv6 only Infrastructure.	**ToDo**	Deploying OpenStack with ODL on an IPv6 only Infrastructure where the API endpoints are all IPv6 addresses.