Amirkabir University of Technology
(Tehran Polytechnic)

Cloud Computing

OpenStack Neutron Architecture

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https://www.slideshare.net/HaimAteya/an-intrudction-to-openstack-2017

https://docs.openstack.org/security-guide/introduction/introduction-to-openstack.html

RabbitMQ overview

- RabbitMQ is the most widely deployed open source message broker.
  - https://www.rabbitmq.com/

- Watch YouTube Video
  - https://www.youtube.com/watch?v=7rkeORD4jSw&list=RDCMUCKWaEZ-_VweaEx1j62do_vQ&index=2

Neutron

- Network as a Service (NaaS)

https://www.cisco.com/c/en/us/solutions/enterprise-networks/network-as-service-naas.html

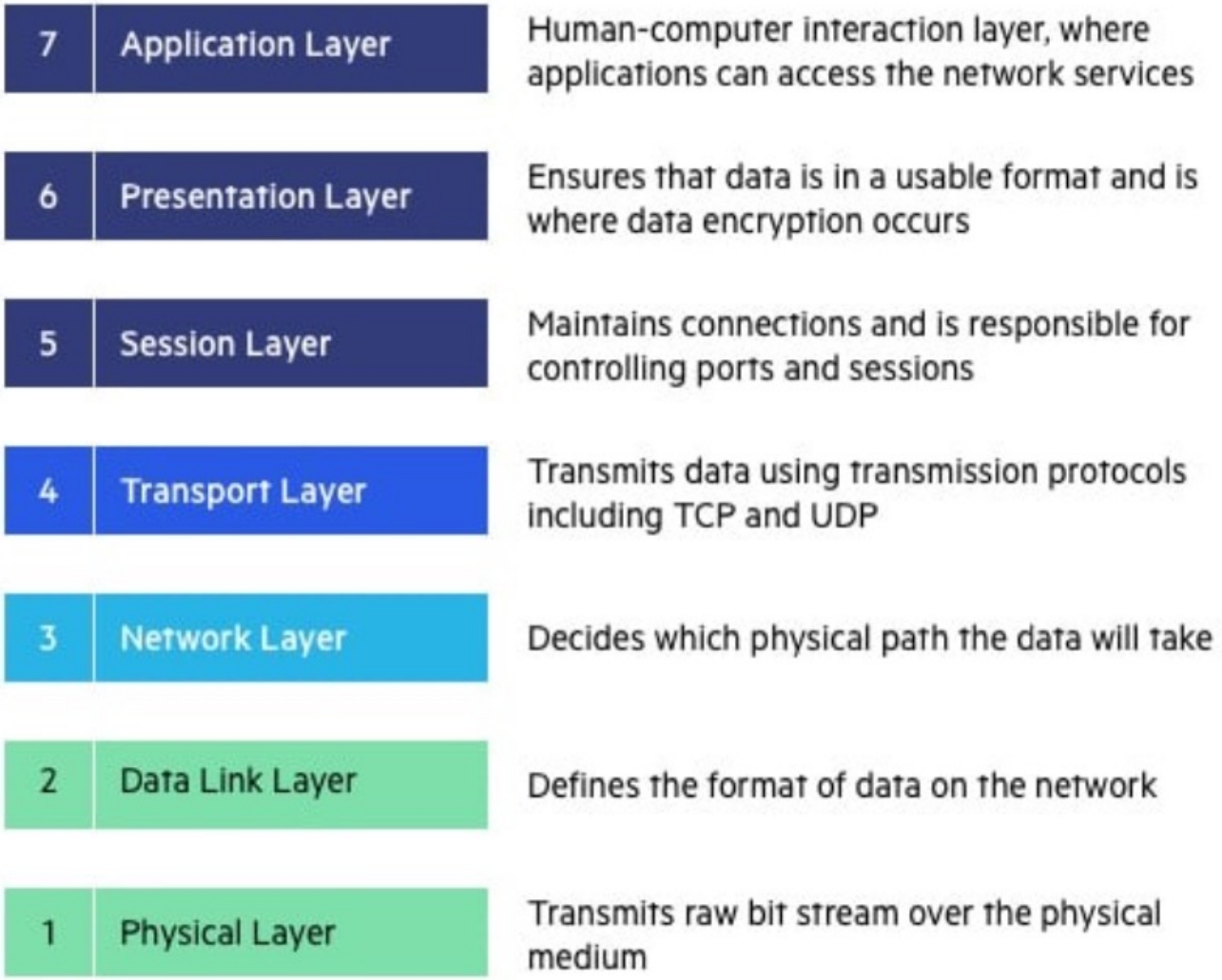
Neutron (cont.)

- Provides REST APIs to manage network connections for the resource managed by other OpenStack services.

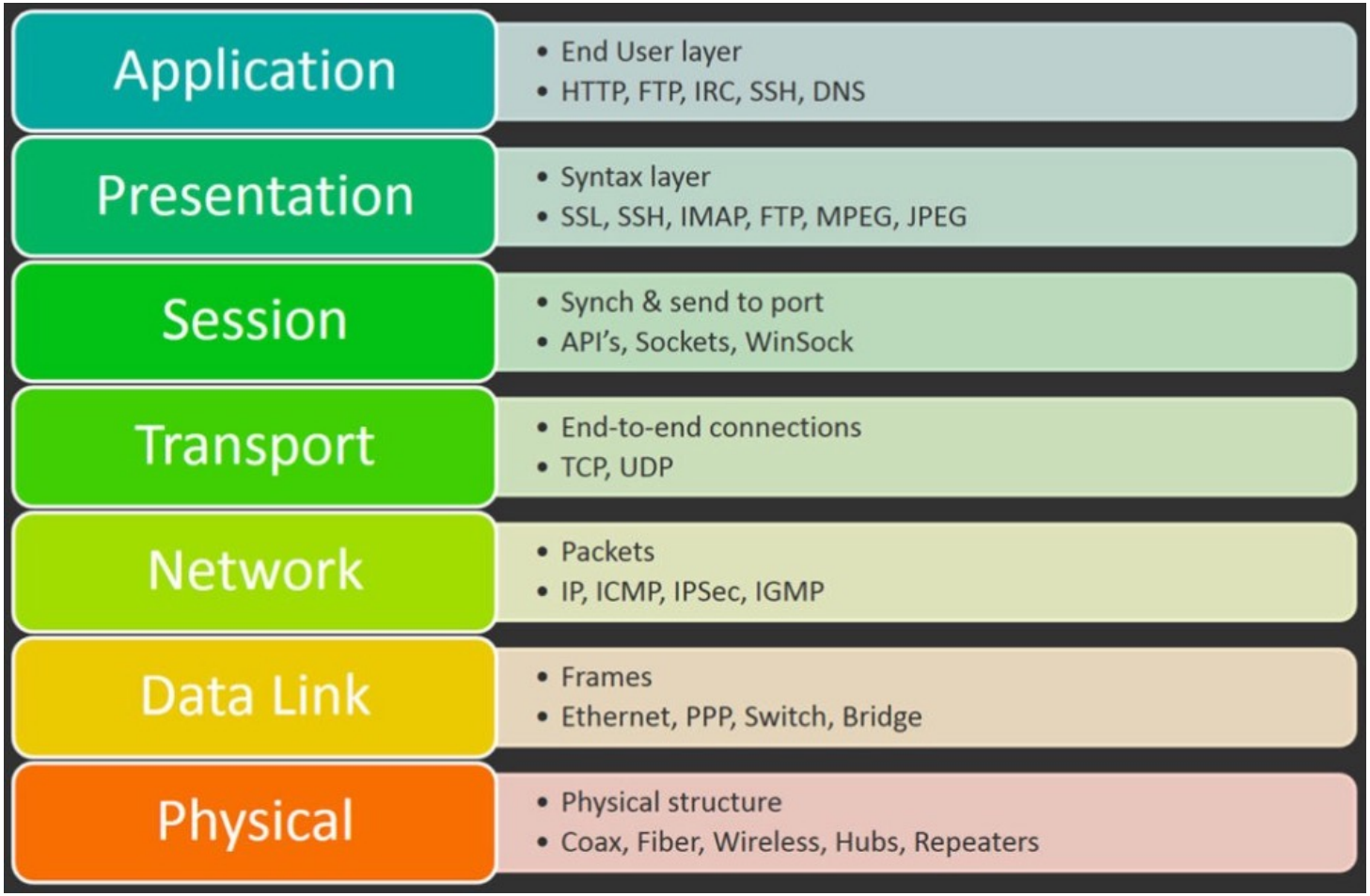
- Complete control over the network resources in OpenStack:
  - networks, ports, subnets.

- Build complex network topologies.

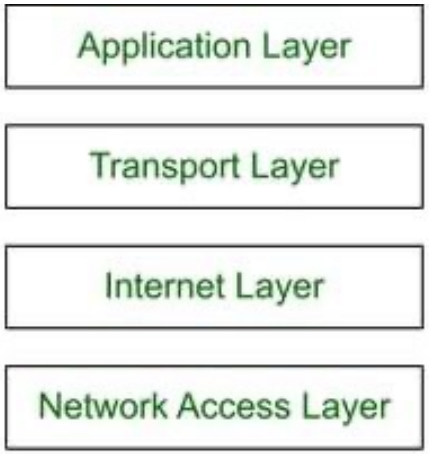
OSI Layers


7
Application Layer
Human-computer interaction layer, where applications can access the network services
6
Presentation Layer
Ensures that data is in a usable format and is where data encryption occurs
5
Session Layer
Maintains connections and is responsible for controlling ports and sessions
4
Transport Layer
Transmits data using transmission protocols including TCP and UDP
3
Network Layer
Decides which physical path the data will take
2
Data Link Layer
Defines the format of data on the network
1
Physical Layer
Transmits raw bit stream over the physical medium

7 Layers of the OSI Model



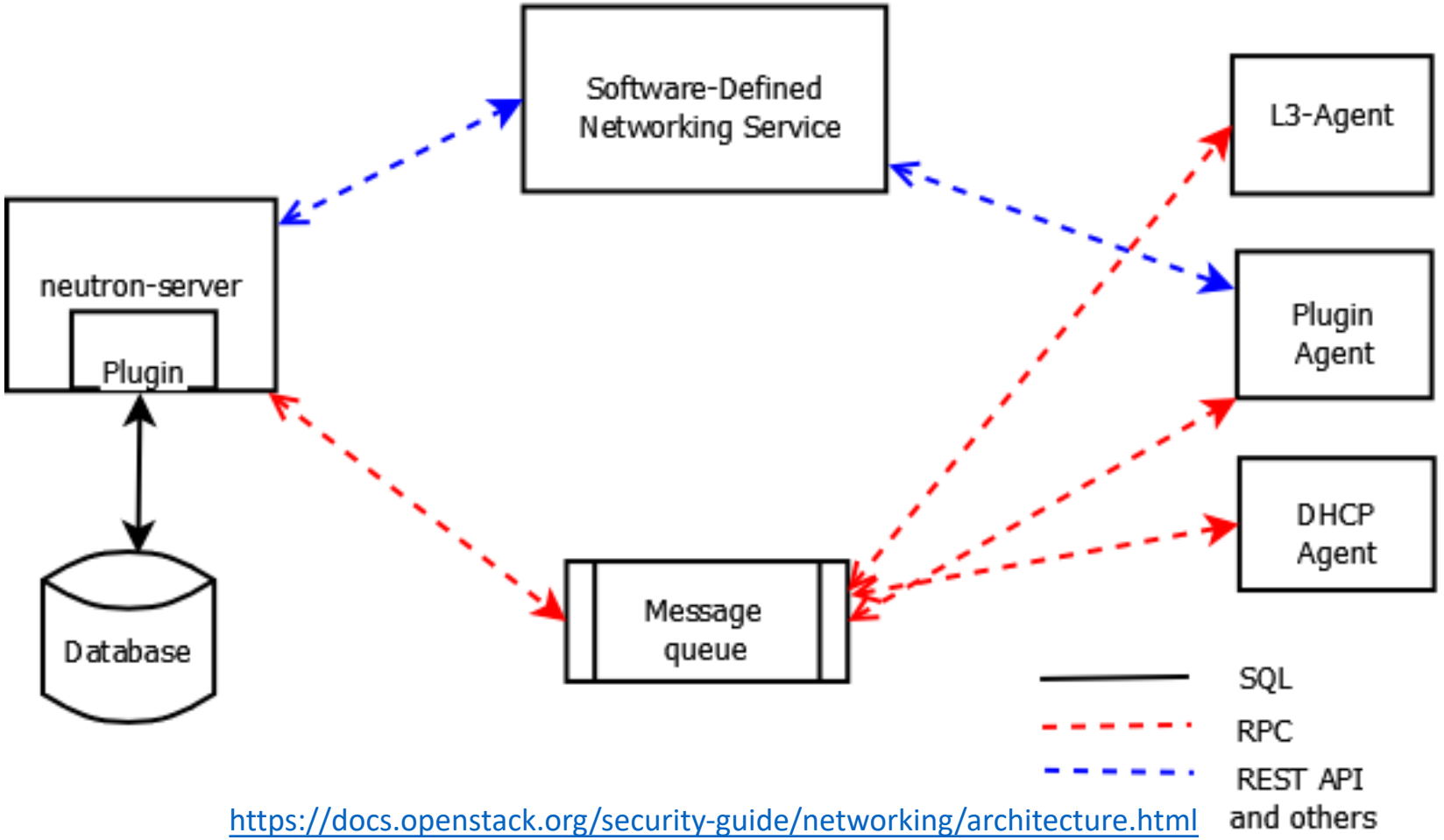
TCP/IP Model



Various Layers of the TCP/ IP Model

https://www.geeksforgeeks.org/difference-between-osi-model-and-tcp-ip-model/

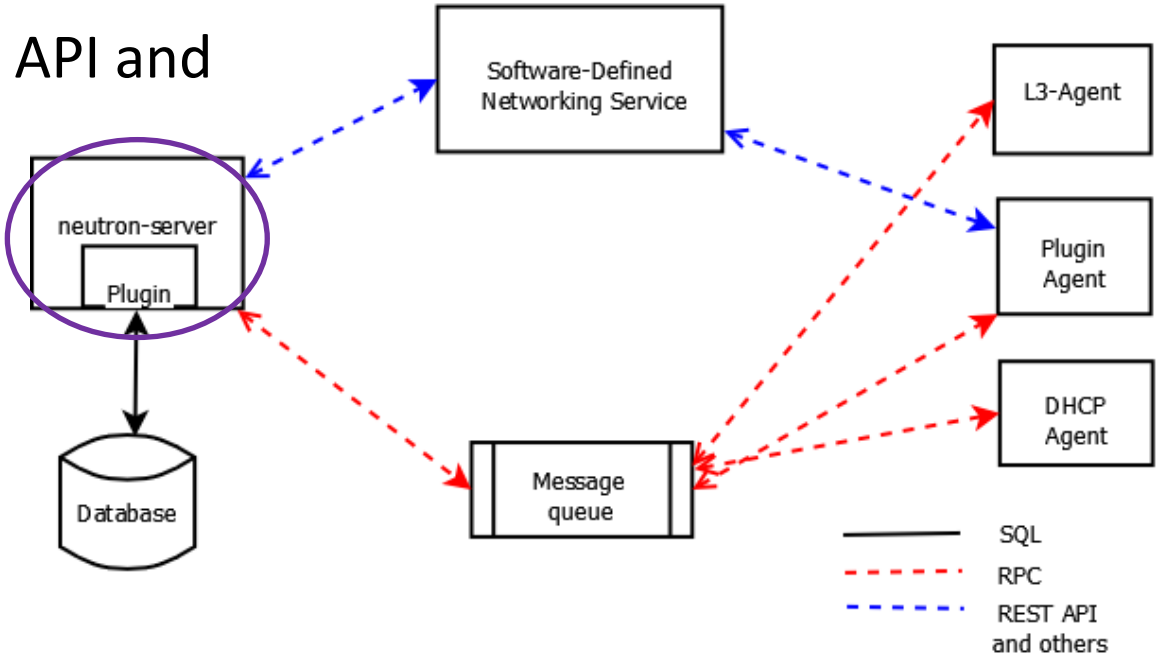
Architectural and Networking Flow Diagram



https://docs.openstack.org/security-guide/networking/architecture.html
https://access.redhat.com/documentation/en-us/red_hat_openstack_platform/16.0/html/networking_guide/sec-networking-concepts - l3-agent

neutron server

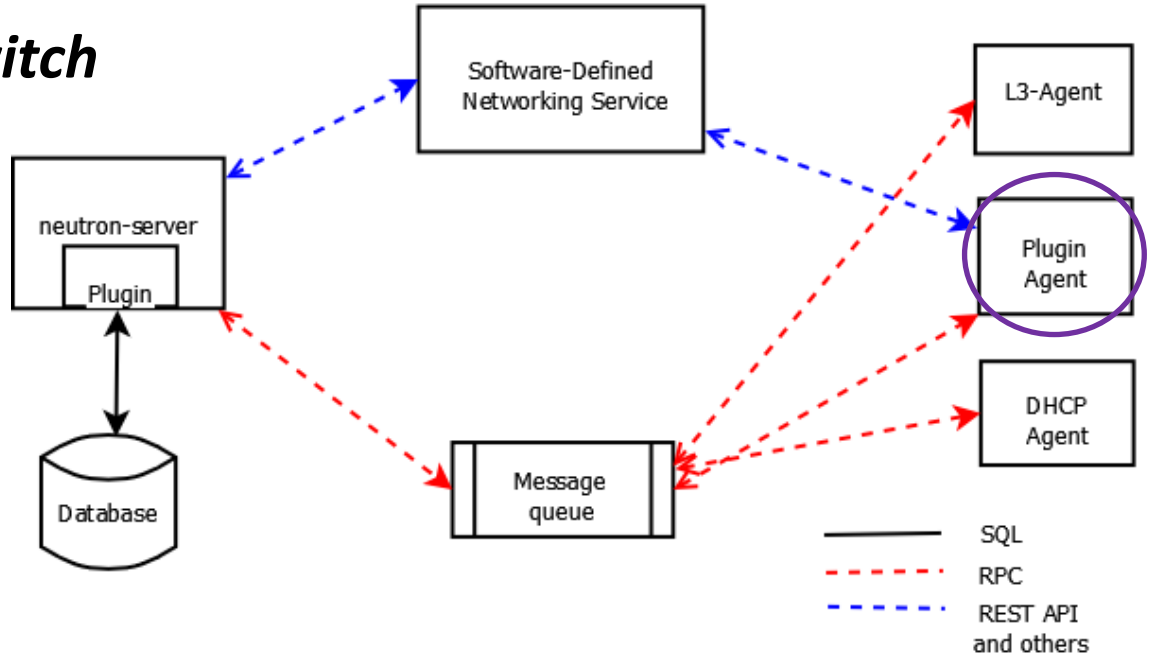
- Runs on the ***network node*** to service the Networking API and its extensions.



- Enforces the network model and IP addressing of each port.

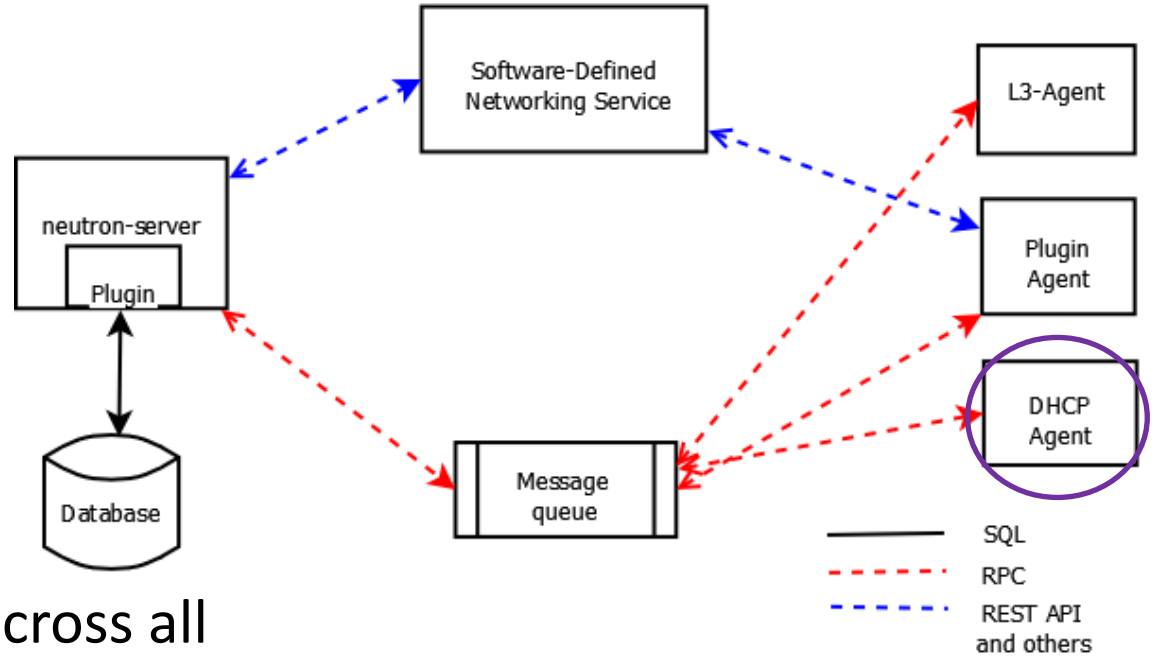
plugin agent

- Runs on ***each compute node*** to manage ***local virtual switch*** (vswitch) configuration.



DHCP agent

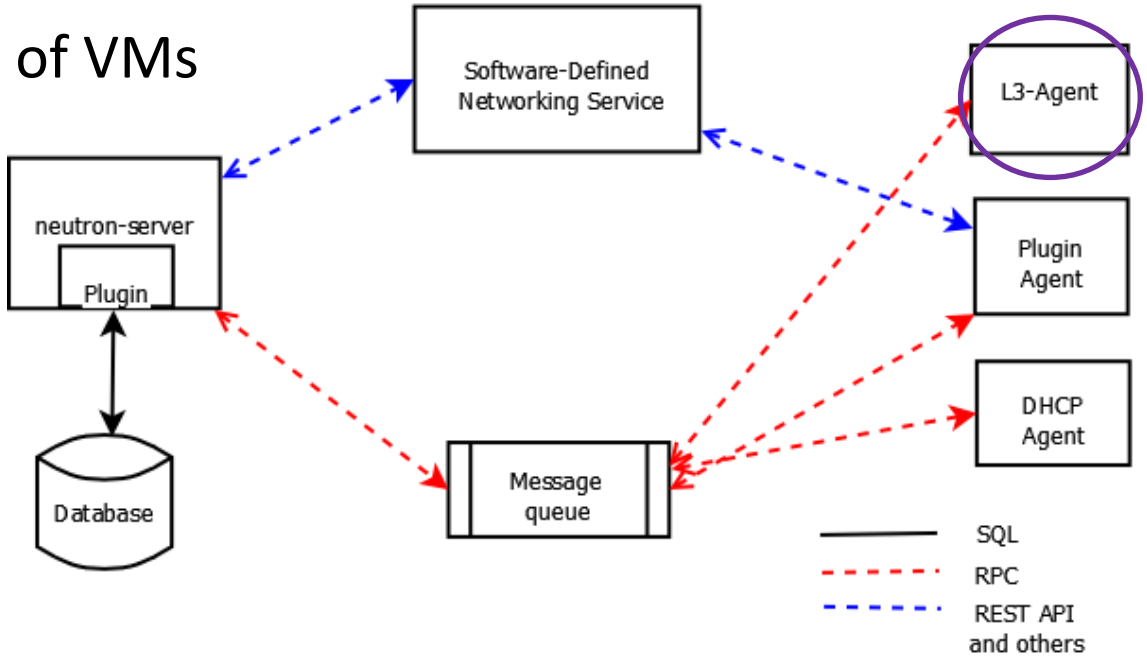
- Provides DHCP services to tenant networks.



- This agent is the same across all plug-ins and is responsible for maintaining DHCP configuration.

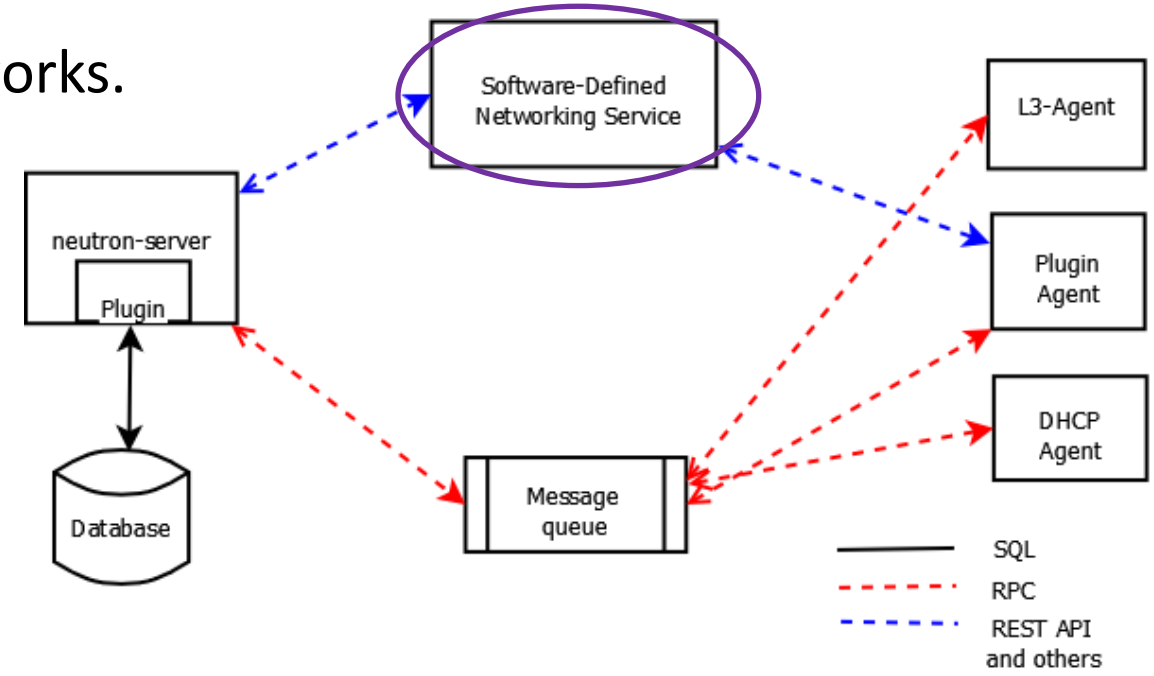
L3 agent

- Provides L3/NAT forwarding for external network access of VMs on tenant networks.

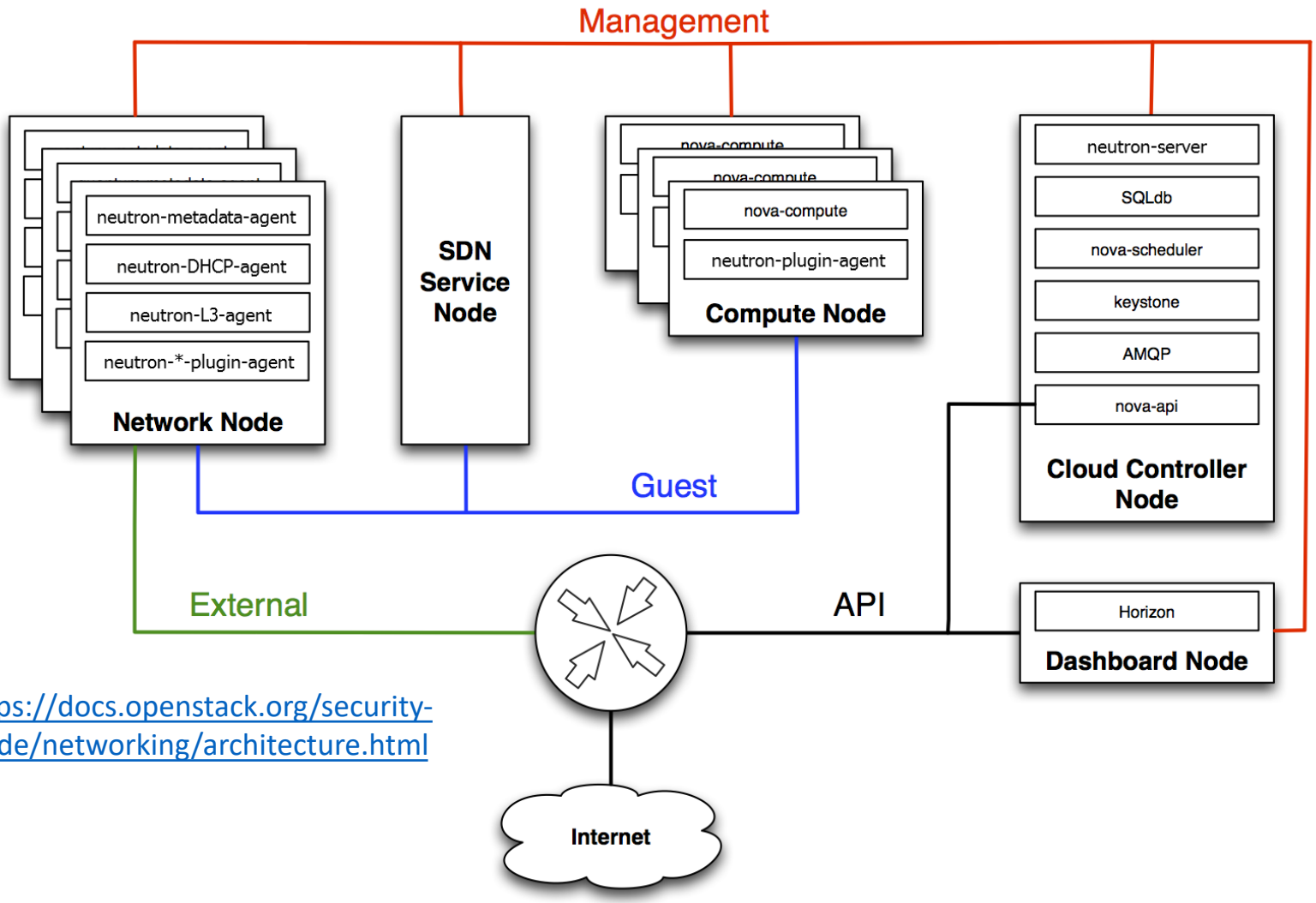


network provider services (SDN server)

- Provides additional networking services to tenant networks.



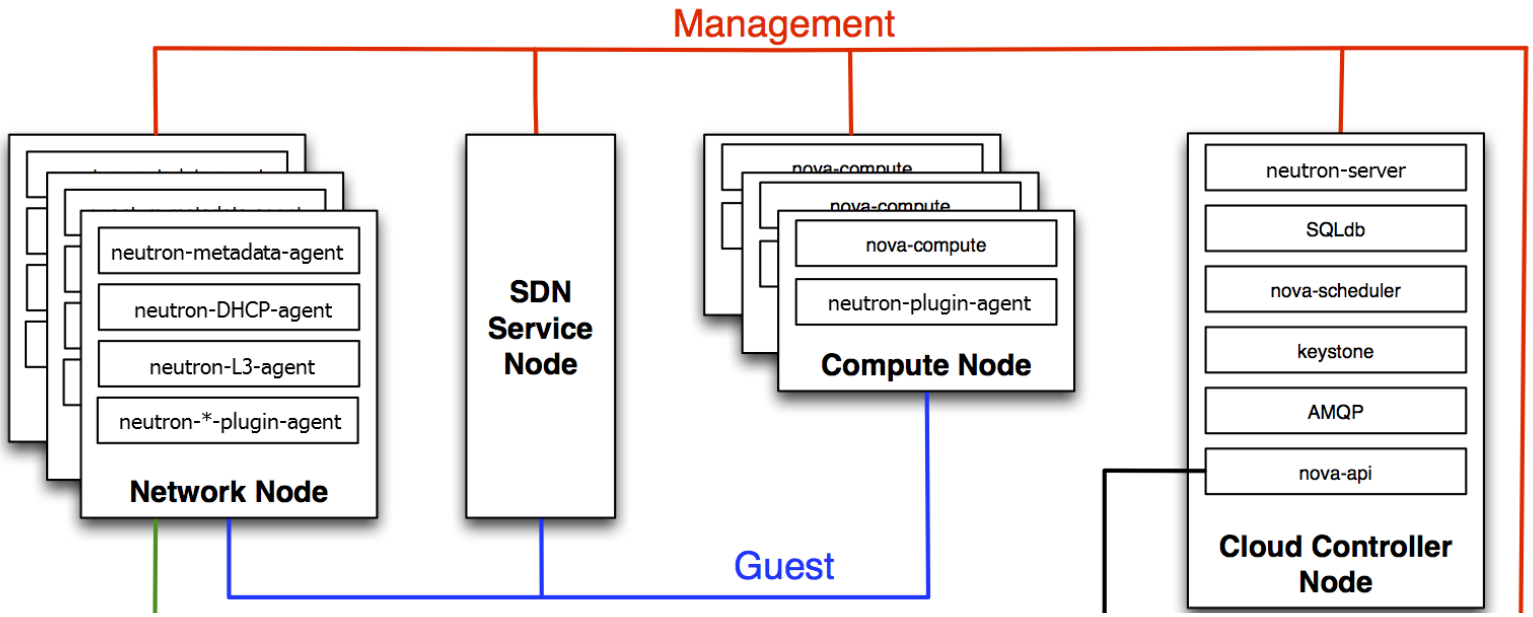
Network connectivity of physical servers¶



https://docs.openstack.org/security-guide/networking/architecture.html

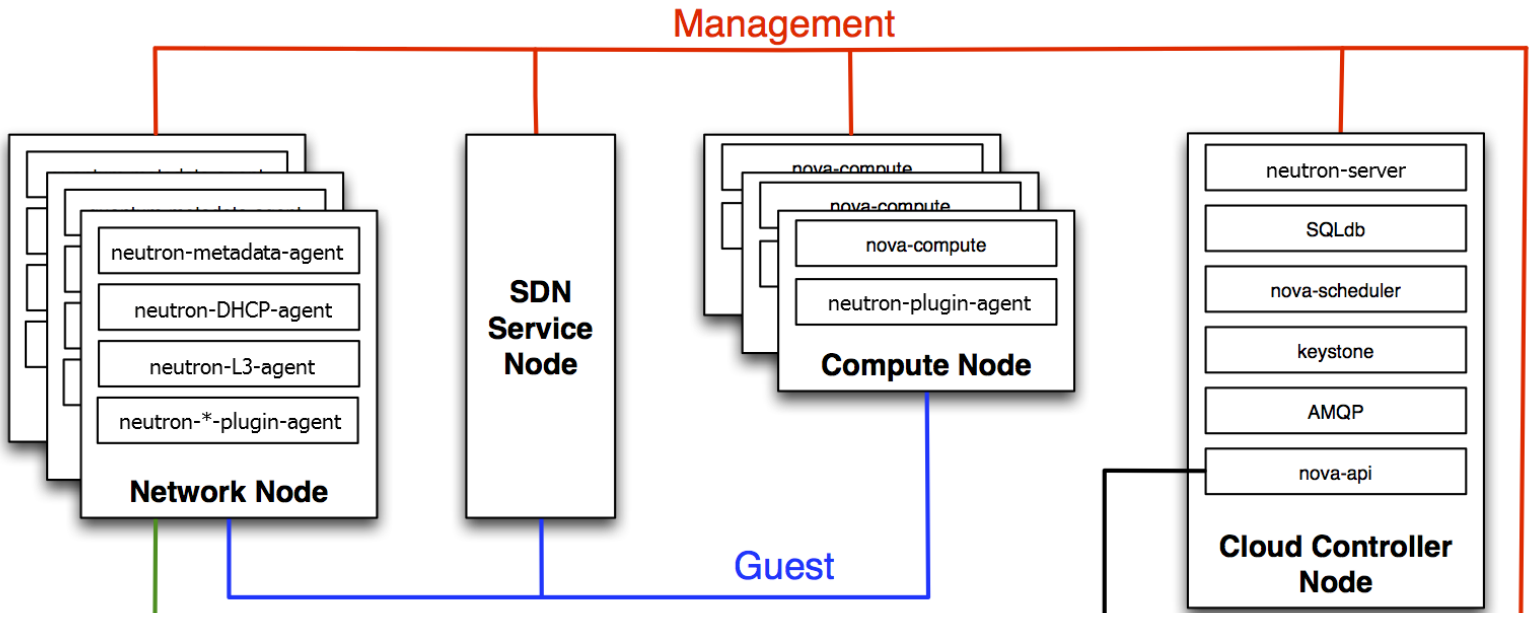
Management Network

- Used for internal communication between OpenStack Components.
- The IP addresses on this network should be reachable only within the data center and is considered the Management Security Domain.



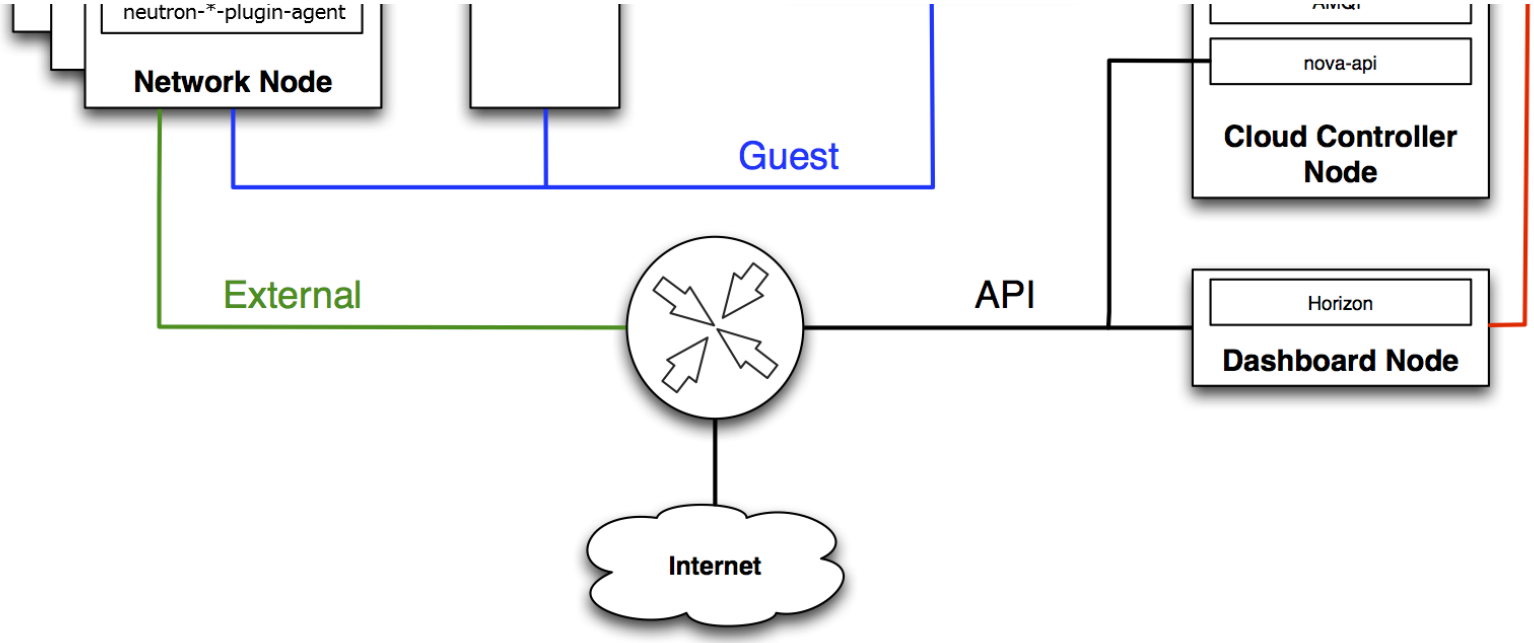
Guest network

- Used for VM data communication within the cloud deployment.
- This network is considered the Guest Security Domain.



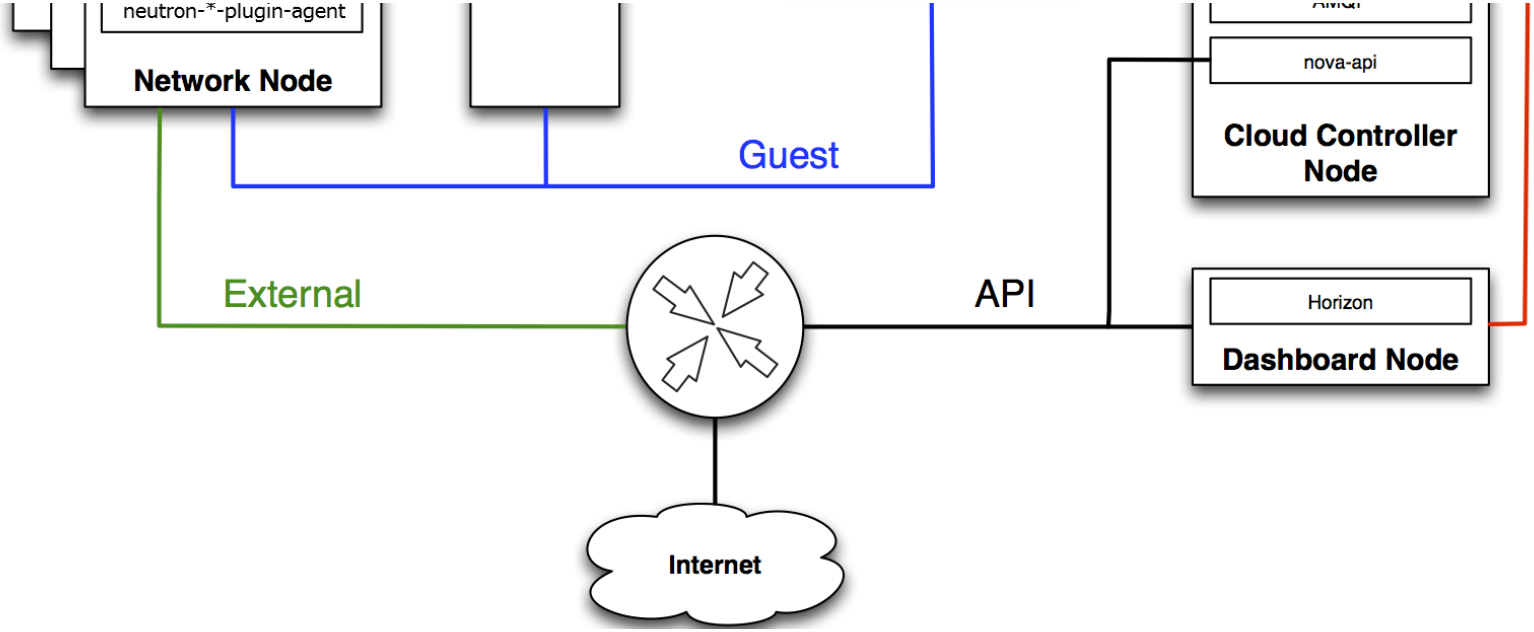
External network

- Used to provide VMs with Internet access in some deployment scenarios.
- IP addresses on this network should be reachable by anyone on the Internet.
- This network is considered to be in the Public Security Domain.



API network

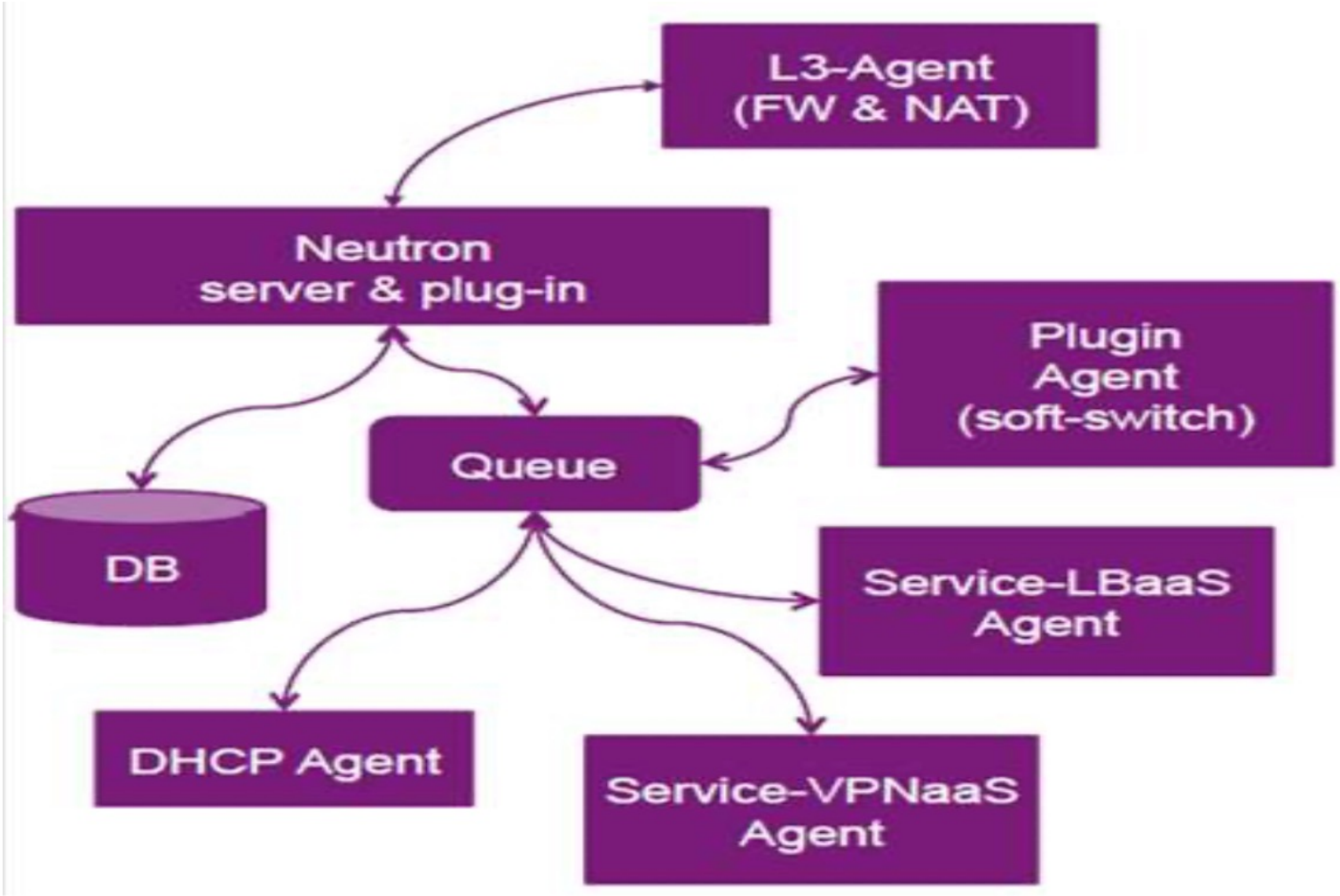
- Exposes all OpenStack APIs (e.g., OpenStack Networking API), to tenants.
- IP addresses on this network should be reachable by anyone on the Internet.
- This may be the same network as the external network
- This network is considered the Public Security Domain.



Neutron Services

- Load Balancer as a Service (LBaaS)
- Virtual Private Network as a Service (VPNaaS)
- Firewall as a Service (FWaaS)

Neutron Components



Neutron Components (cont.)

- Neutron Server
  - Implement REST APIs
  - Enforce network model
  - Network, subnet, and port
  - IP addressing to each port (IPAM)
- Plugin agent
  - Run on each compute node
  - Connect instances to network port

Neutron Components (cont.)

- Queue
  - Enhanced communication between each components of neutron
- Database
  - Persistent network model
- DHCP agent
  - In multi-host mode, run on each compute node
  - Maintain dhcp configuration
- L3 agent
  - To implement floating IPs and other L3 features, such as NAT