SDN and NFV integration in Openstack Cloud to Improve Network Services and Security

Patel, Parthkumar, Vineeta Tiwari, and Manish Kumar Abhishek,
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Introduction

- Cloud networking has security problem, major threat like DoS, DDoS, Data loss or Identity theft and insecure cryptography make it vulnerable.

- This paper proposed an architecture that integrate SDN and NFV with Openstack cloud, and claim it can mitigate security problems.
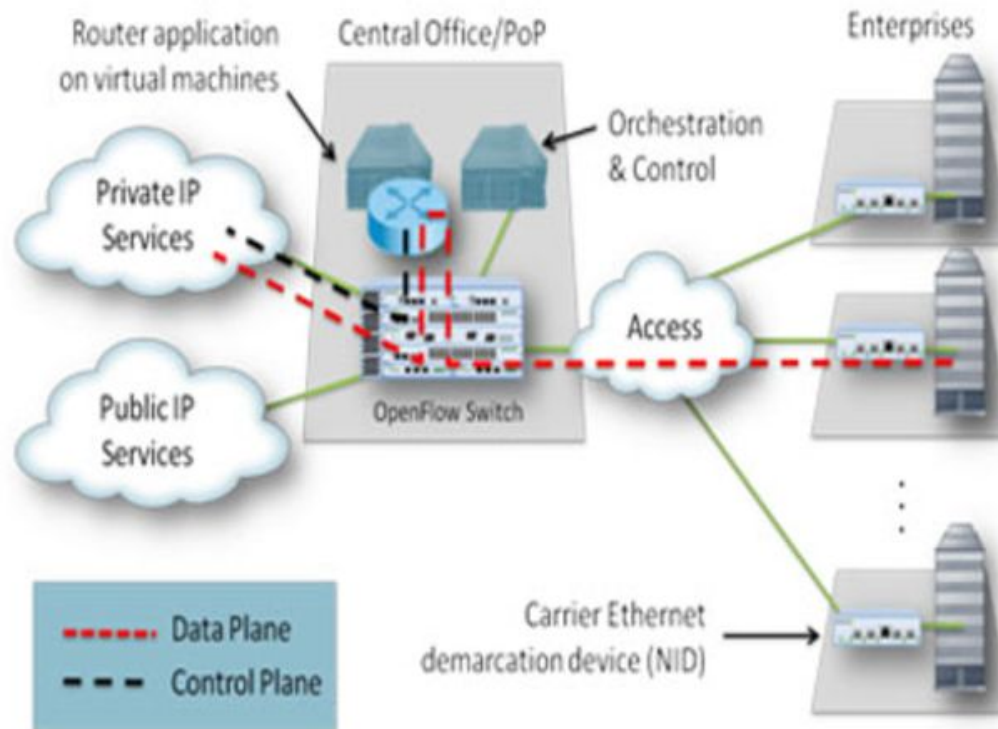
Software-defined networking

● Features of SDN:
  ○ Decouple control plane and data plane
 ○ Centralized controller
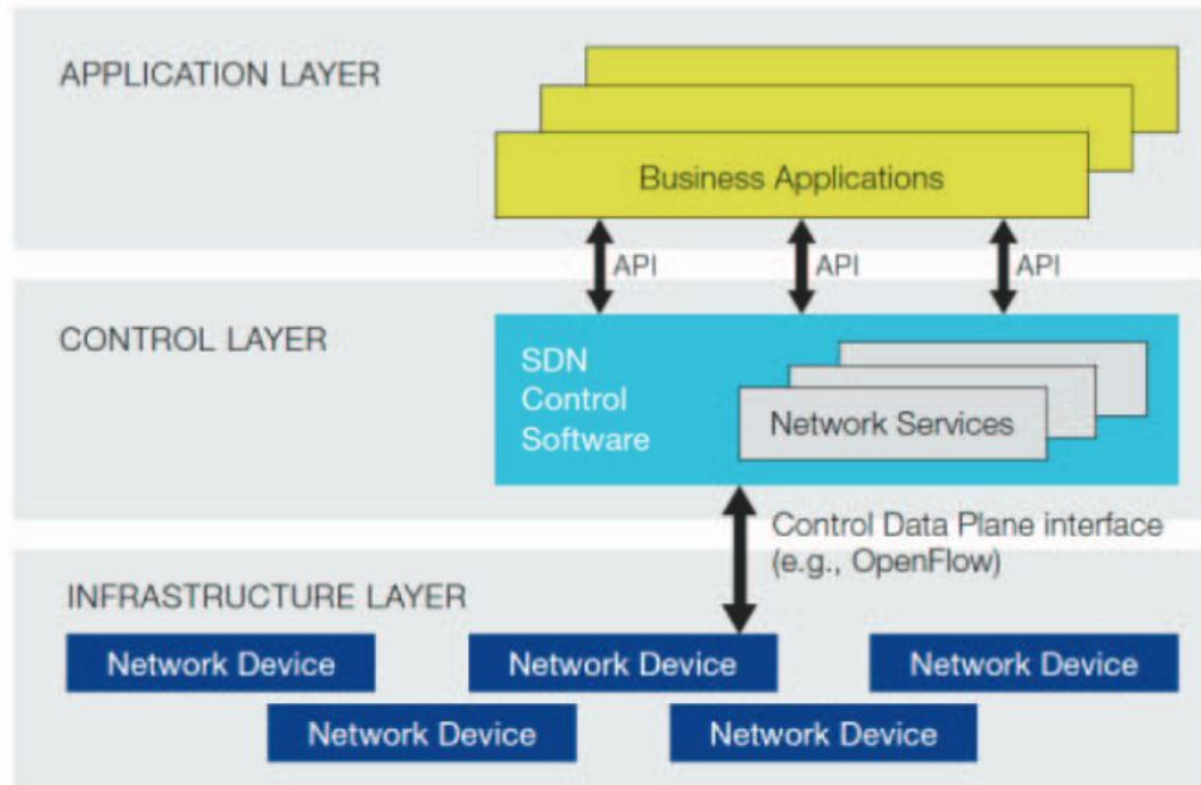
Network Functions Virtualization

● Decouples the network functions from proprietary hardware appliances so they can run in software.
● Network functions are hosted as a VMs, controlled by hypervisor.

SDN Integrate with Openstack Cloud

- Create Openstack multi node lab with neutron-nova services.
  - One neutron controller node & several compute nodes

- Use Opendaylight(ODL) as SDN controller, which has OvS-neutron manager installed.
  - Improve network security by network isolation.

SDN and OpenDayLight integration with Openstack
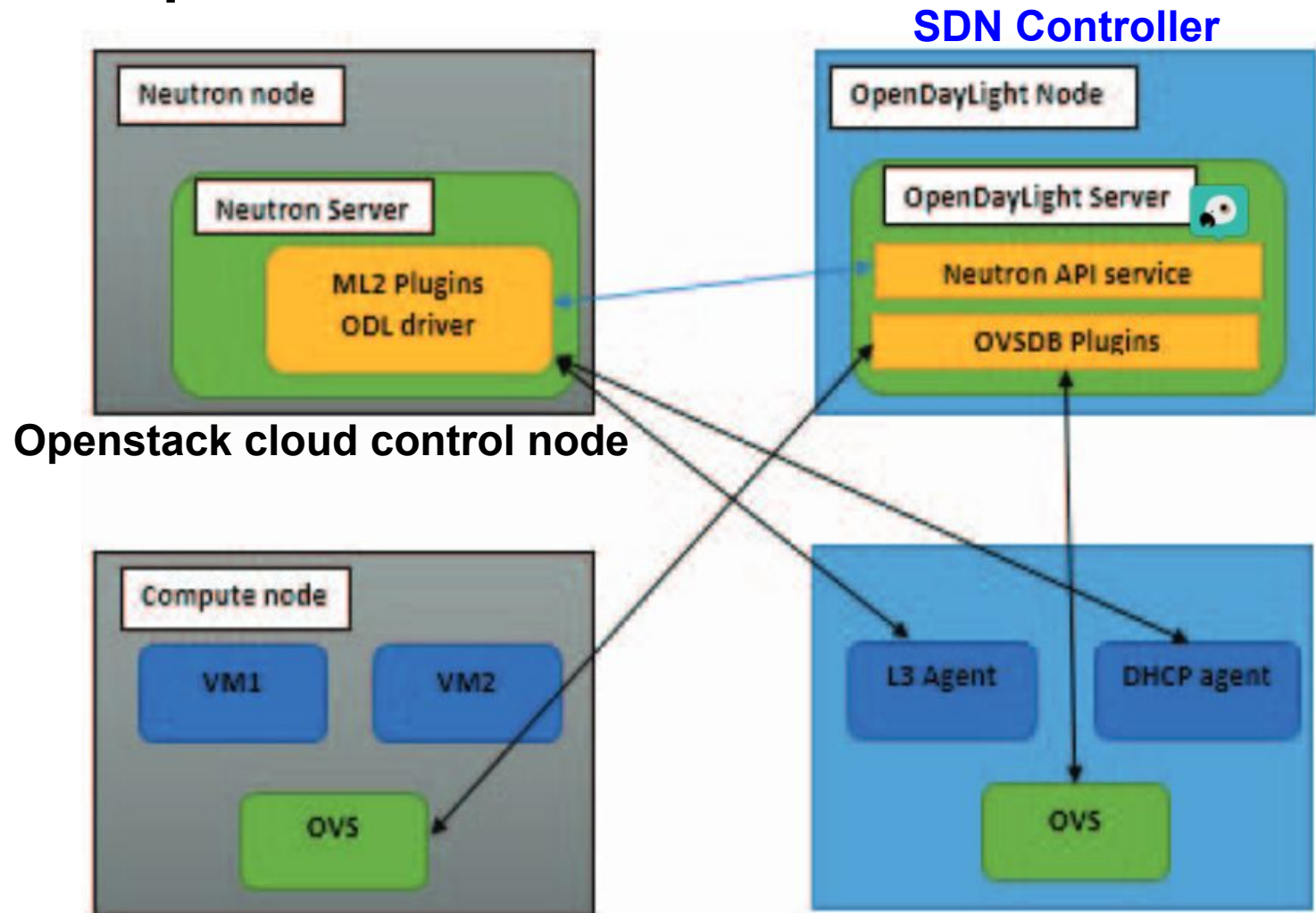
Implementation of ODL with Cloud

- **Neutron ML2(Modular layer 2) plugin**
  - Framework in Openstack, used for utilizing the variety of layer 2 networking technologies.
- **OVS(Open Virtual Switch)**
  - Enable massive network automation for VMs that run in the cloud.
- **ODL driver**
  - Offer interface between ODL and ML2 plugin.

NFV Integrate with SDN Cloud

- NFV is integrated in juniper OpenContrail distribution.
  - Install OpenContrail package in cloud controller node.
  - Configure them with SDN controller.

- **OpenContrail**
  - OpenContrail controller
  - OpenContrail virtual router
    - Extends the network from the physical routers and switches into a virtual overlay network
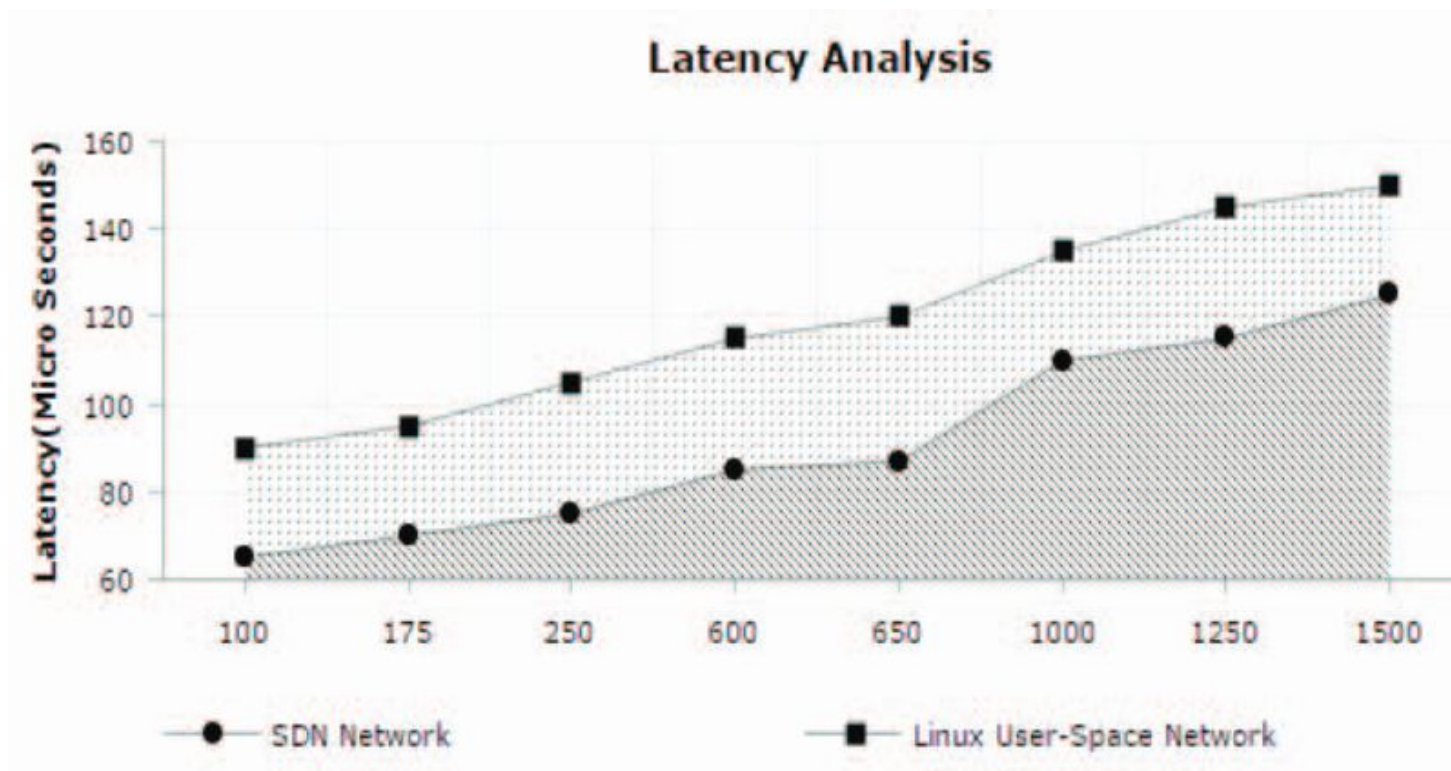
Proposed Architecture
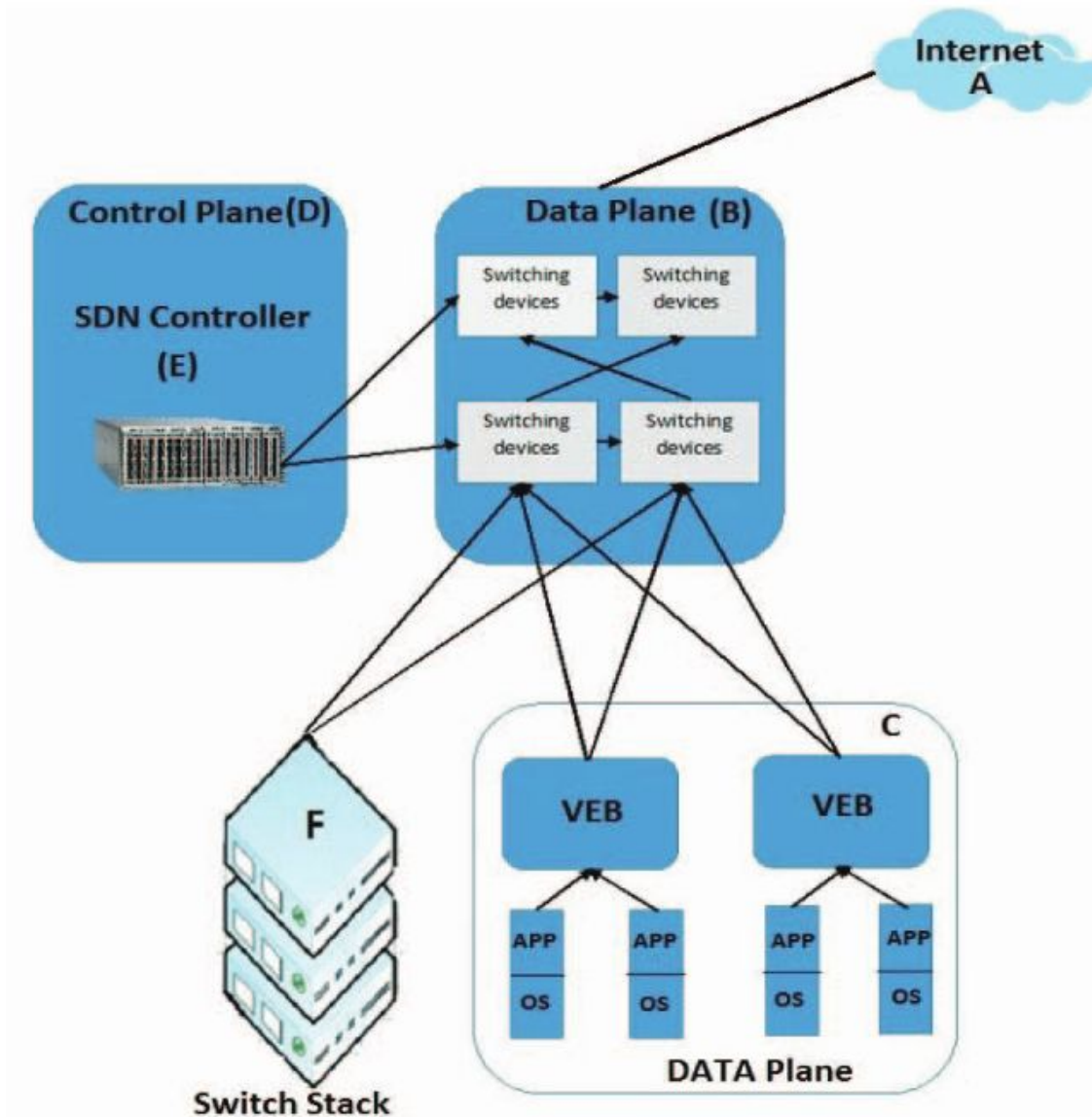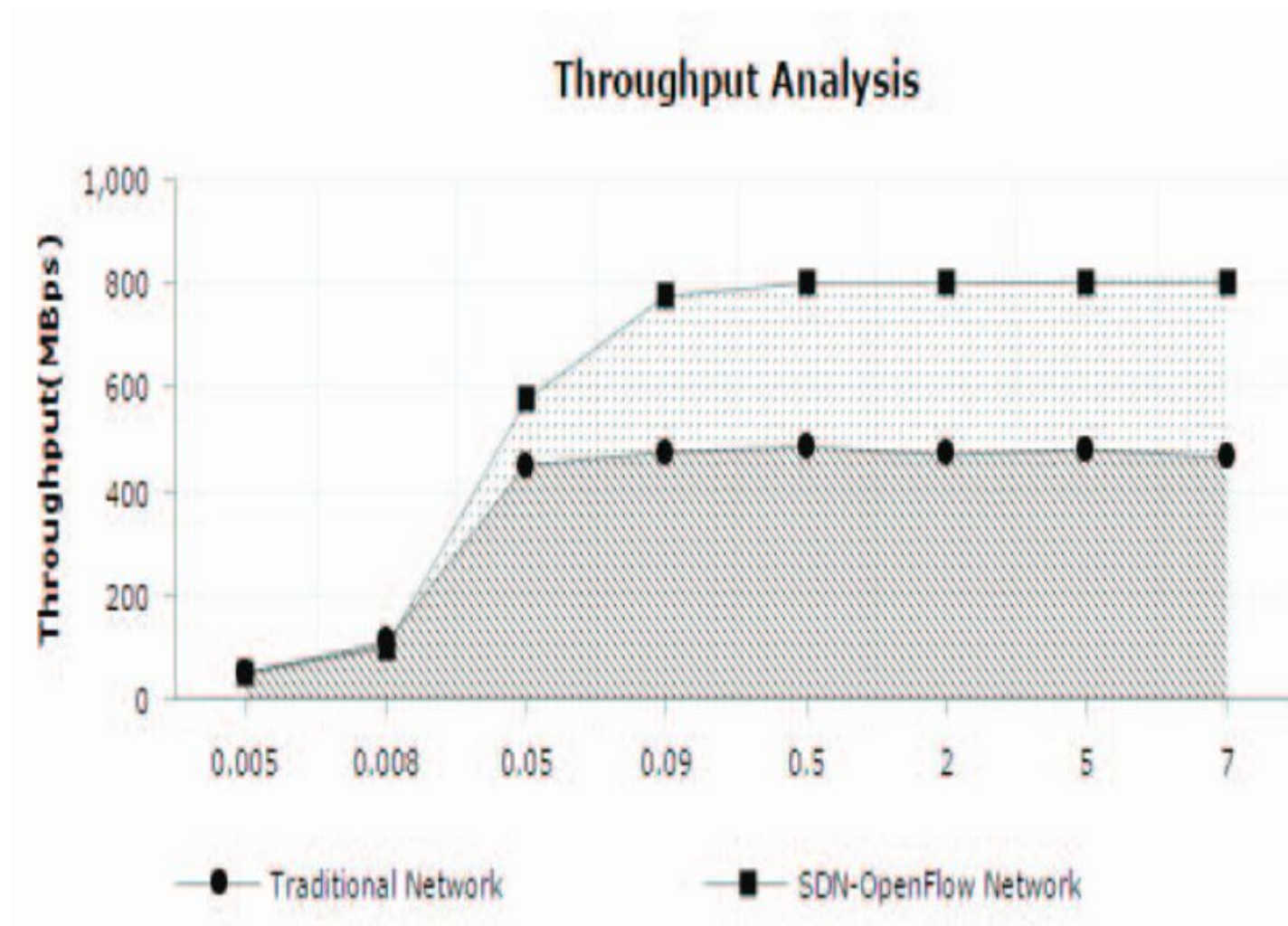
Proposed Architecture (cont.)

- Cloud network is directly connected with virtual switching devices. which are created using NFV.
  - Networks are isolated using OpenContrail.

- External SDN controller are establish for controlling the cloud network traffic.

Evaluations

- Compare performance of traditional cloud and SDN cloud.
    - Throughput analysis used iperf tool.
    - Latency analysis used wireshark and TCP connection.

Latency Analysis

Evaluations (cont.)

Throughput Analysis

Conclusion

- This paper present an architecture that integrate SDN and NFV with Openstack cloud.
- Evaluation shows that performance of the proposed architecture with security improvement is still better than traditional cloud.