Open Network Switch Layer (OpenNSL)

An Open Switch Interface for OCP

Executive Summary

Open Network Switch Layer (OpenNSL) defines an open abstraction interface to switching ASICs. The interface is designed to provide a set of APIs to program and manage switching silicon in a silicon-agnostic manner. This specification also allows exposing silicon-specific differentiation and extensions to existing features so that applications can leverage those differentiations if they so choose.

Traditionally Network devices were vertically integrated with closed vendor network stack (NOS) running over usually vendor silicon. Open Networking is driving disaggregation with Open Software (NOS) running over merchant Silicon. Further disaggregation is driving towards vendors and customers wanting to run their own applications alongside the Network Stack working the same silicon. This allows the customers to implement and deploy their own business intelligence without disclosing those to the software stack vendors and waiting for them to implement it in their software stack.

OpenNSL allows the network stack to run over a variety of silicon. More importantly it also allows for the development and deployment of applications which complement and work alongside the network stack.

We believe that fulfills a necessary part of the software ecosystem and further accelerates disaggregation and open networking.

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Revision History

Name	Date	Version	Description
Bhushan Kanekar	2015-07-10	0.1	Initial Release

Overview

Open Network Switch Layer (OpenNSL) defines an open abstraction interface to switching ASICs. The interface is designed to provide a set of APIs to program and manage switching silicon .

OpenNSL allows the network stack to run over a variety of silicon. More importantly it also allows for the development and deployment of applications..OpenNSL will allow open sourcing of NOS and Applications that use OpenNSL and run over Broadcom Silicon.
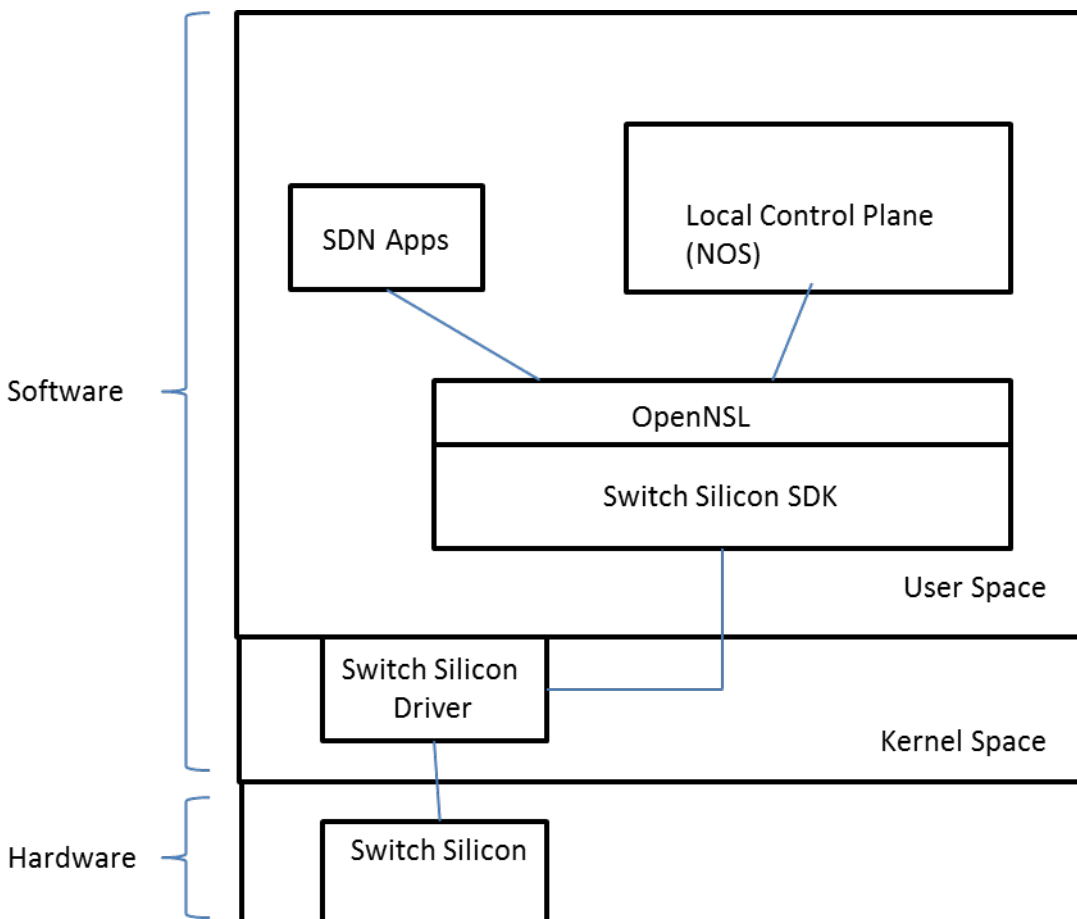

Figure 1: A Switch Implementation using OpenNSL

We believe OpenNSL would provide:

1. Open API for development of innovative SW (NOS and Apps) over a variety of Silicon.
2. High level abstractions that would work across a variety of Silicon.
3. Enable Operators to develop/deploy develop their own custom applications to take advantage of silicon capabilities and innovations
4. Faster adoption of silicon innovations

5. A catalyst to a thriving ecosystem of networking SW (NOS and Applications) that work in unison.

OpenNSL API will be published with version control. A roadmap will be published and updated regularly as additional API are defined and released. A community will be built around OpenNSL to enrich it. Contributions to the OCP community for the OpenNSL initiative are submitted as proposals to the OCP Networking OpenNSL GitHub Repository. . Following a proposal submission, are discussions on the OCP mailing list that further define the proposal. Eventually the code is also submitted to a GitHub repository.

The OpenNSL would introduces numerous proposals that would cover: :
*   Access Control Lists (ACL)
*   Equal Cost Multi Path (ECMP)
*   Forwarding Data Base (FDB, MAC address table)
*   Host Interface
*   Neighbor database, Next hop and next hop groups
*   Port management
*   Quality of Service (QoS)
*   VLAN, Trunk
*   BST Instrumentation
*   Route, router, and router interfaces

License

All of the OpenNSL APIs contributed to OCP are licensed under the Apache License, Version 2.0 (the "License"). You may obtain a copy of this license at http://www.apache.org/licenses/LICENSE-2.0

Background

Traditionally Network devices were vertically integrated with closed vendor network stack (NOS) running over usually vendor silicon. Open Networking is driving disaggregation with Open Software (NOS) running over merchant Silicon. Further disaggregation is driving towards vendors and customers wanting to run their own applications alongside the Network Stack working the same silicon. This allows the customers to implement and deploy their own business intelligence without disclosing those to the software stack vendors and waiting for them to implement it in their software stack.

OpenNSL allows the network stack to run over a variety of silicon. More importantly it also allows for the development and deployment of applications which complement and work alongside the network stack.

For the Network Vendors OpenNSL would help to reduce the time to market, and adopt the latest available hardware. To the operators it provides the freedom to choose applications or build applications which work alongside the network stack (NOS). These applications can leverage features of the silicon and give better performance.

A standardized API allows network hardware vendors to develop innovative hardware architectures while keeping the programming interface consistent.. Revisions to the baseline standard could occur. This would introduce change at the hardware programming level, but this change would be much less frequent than today as it would only be required for functional changes, not simply implementation differences.

Design

A Network OS or a SDN App interfaces with the switch device using OpenNSL.

OpenNSL API:

The OpenNSL API is a local interface between the NOS, SDN App and the SDK.

The API is designed to be platform-agnostic (*nix/ Windows/etc…).

The API is a collection of C-style interfaces.

Test Plan

The test plan is still being worked.

Checklist for Maintenance

Currently the code is maintained in GitHub and the development uses GitHub-based best practices. All code changes are reviewed publicly (using GitHub's online code review tools) and approved by committers/Maintainers with commit rights. The current list of committers includes:

- Broadcom

As other contributors emerge the committer/maintainer list will grow.

In the event that all maintainers are permanently unavailable, a duly appointed representative of the Open Compute Project may take over the project.

Software releases will be made as time and major features are committed. While many open source projects with regular committers have a time-based release model, at least for the near future until the projects popularity increases, we will follow a feature-based release schedule.

Checklist for Governance

This is the list of current governance sites which may change with acceptance into OCP.

Website: N/A

Mailing list: opencompute-networking@lists.opencompute.org

IRC: N/A

Mirror: N/A

GitHub: https://github.com/opencomputeproject/OCP-Networking-Project-Community-Contributions

Wiki: http://www.opencompute.org/wiki/Networking

Roadmap

The success of OpenNSL project is in its adoption. It is a goal to build an ecosystem of partners who will adopt and build code (NOS, Control Plane, Applications) using the API. As part of this activity more requirements would emerge leading to further additions to the OpenNSL API spec and code. We envision innovations and development in the following areas occurring:

Networking applications using OpenNSL:
- Vendors and operators would develop Applications leveraging the capabilities of the Silicon. E.g. Telemetry Applications reading counters and other instrumentation features for greater visibility

Control Stack
- Development of Open Source (or vendor sourced) NOS or Control Planes which run across a variety of silicon and operators could add specific features leveraging custom or differentiated features of specific silicon.

Supporting Documents

The majority of the technical documents live in the GitHub directory in the source, including:
- OpenNSL API Specs
- Individual proposals
- Code