Lanner

Whitepaper

Accelerate Open Application Development with Optimized Hardware Library and OpenNSL API Library

Abstract

Disaggregation has been considered as the main concept of next-generation open network architecture. Recent trends of software-defined network (SDN) and network function virtualization (NFV) have performed successfully in bringing up open and interoperable elements into existing closed-architecture network. However, to reach the ultimate goal of "open" network, the importance of hardware should not be overlooked and in fact, the processor design and the hardware/middleware API libraries play a significant role in the transition to total open network. This paper will discuss the challenges faced in today's network structure and how the hardware will play a critical role to complement the open software.

The Challenges in Today's Network

Today's data centers are facing unprecedented traffic loads due to the widespread of mobile Internet devices and cloud-based services. In a closed network infrastructure, operators have to implement additional equipments to fulfill the required layers of networking technologies. During the process, there will be codes customized for the added hardware integration and the codes cannot be shared. Obviously, this legacy pipeline design introduces higher level of complexity for maintenance when the infrastructure is expanded by proprietary equipments.

In addition, there is lack of interoperability among proprietary equipments as they are supplied from different vendors and the codes programmed into the equipments are all customized based on the specialization of each vendor. Therefore, operators are pushed to turn to a new network design that enables flexibility by disaggregation.

Software & Hardware Collaboration

A common misleading concept emerged from the trend of open network overvalues a software policy-driven environment. However, as observed from the success of SDN and NFV in telecommunications, enterprise network, and cyber security, the open source software elements are leveraged by vendor-specific appliances. If the operators are still relying on traditional hardware pipelines, the effects of SDN will be limited. Therefore, it is clear that open source software require capable hardware platforms to achieve optimal performances for mission-critical applications.

Lanner and OpenNSL

Industry leaders have been working to further open up the networking ecosystem by releasing revolutionizing solutions to integrate software and hardware elements. At the software aspect, Broadcom has introduced its open source software system for switch silicon in data center applications, named OpenNSL (Open Network Switch Library), featuring a rich library of APIs for developers in their customization efforts. Developers are allowed to write codes directly onto the hardware platform, as long as it is empowered by Broadcom Strata family.

Benefits of OpenNSL:

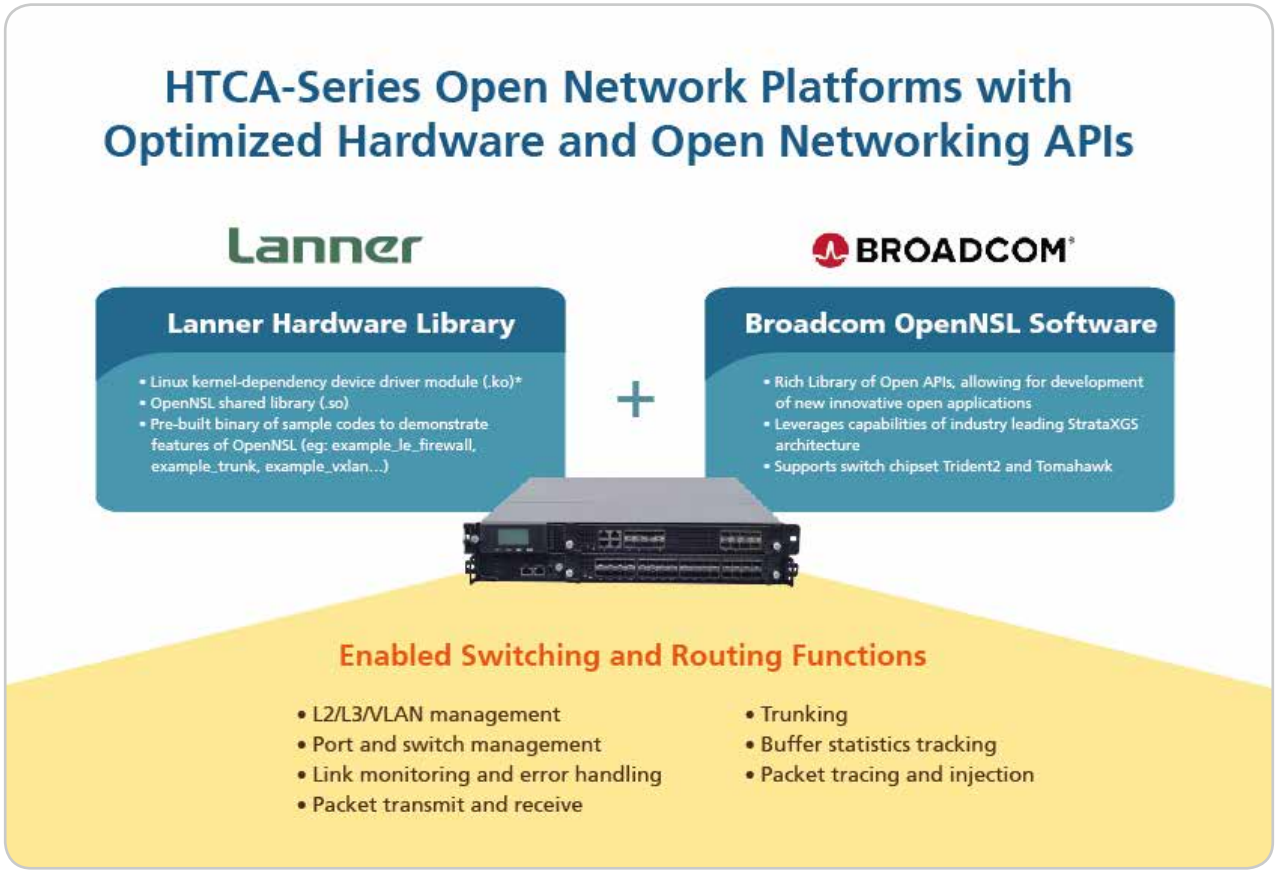
- Rich API library for new, open and innovative developments
- Boosting open applications on StrataXGS platforms as well as the 1/10/40/100 Gigabit Ethernet throughputs of such hardware
- Enables traffic monitoring and load balancing
- Interoperability
- Open Network Linux
- Open Switch functionality

Accelerate Open Application Development with Optimized Hardware Library and OpenNSL API Library

In terms of hardware, the physical platform is ideally based on Intel x86 open architectures that can be programmable for customized applications. Performance-wise, the hardware platform shall be empowered by high-performance CPUs and DDR memories to boost the application. For example, Lanner's HTCA-6000 series are empowered by Intel® Xeon® E5-2690 v3/v4 CPUs, DDR4 memory and Broadcom StrataXGS switch silicon, capable of running Broadcom OpenNSL.

Together with Broadcom OpenNSL, Lanner's HTCA-6000 series can accelerate deployment time with built-in hardware library for device driver enabling based on the kernel versions in specific environments or applications, including

- Linux kernel-dependency device driver module (.ko)
  Lanner can customize OpenNSL package for client's specific kernel version and the corresponding contents.
- OpenNSL shared library (.so)
  The shared library allows developers to seek sample codes over OpenNSL, a rich library of Open APIs.
- Pre-built binary of sample codes to demonstrate OpenNSL features
  The sample codes can serve as SDK for customization purposes when deploying network functions, such as example_le_firewall, example_trunk, or example_vxlan.



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Featured Products

HTCA-6200

High Availability Chassis 2U Telecom Network Appliance with 2 x86 CPU Blades and 2 I/O Blades

- High availability, full redundancy and extreme high performance
- 2 CPU blades in the rear, per blade supports up to 2 Intel® Xeon® E5-2690 v3/v4 CPUs and 16x DDR4
- BCM StrataXGS™ Trident-II/II+ BCM56854/56860 Switch Fabric with 720/1280 Gbps
- 2 x Swappable I/O blades in front, supporting up to 2 switch blades or Ethernet blade configuration
- Redundant power supply and removable fan module
- NEBS compliant design

Lanner Platform Porting with OpenNSL

To accelerate open application development, Lanner has conducted tests about porting steps.
Please keep in mind that system requirements are important references for the porting configurations, especially the hardware requirements.

System Requirements

Hardware	
Motherboard	Lanner HTCA platforms with dual CPU sockets
CPU	Intel® Xeon ® CPU E5-2670 @ 2.60GHz
Switch board	SX-10a (Broadcom Trident2)
Software	
Operating System	CentOS 7.2 x86_64 [Kernel: 3.10.0-327.36.3.e17.x86_64]
OpenNSL	opennsl-3.2.0.5-cdp-lanner-x86-trident2-sx10a-cent72.tar.bz2

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To test CDP package

Browse to openNSL web site OpenNSL git site and clone code

```
#  git clone https://github.com/Broadcom-Switch/OpenNSL.git
....
# mv OpenNSL OpenNSL-3.3.0.2
# cd OpenNSL-3.3.0.2
```

Since OpenNSL on website is 3.3.0.2 this time, I had to checkout to our version(3.2.0.5) for test

```
[lanner@localhost OpenNSL-3.3.0.2]$ git checkout tags/v3.2.0.5
Checking out files: 100% (979/979), done.
Note: checking out 'tags/v3.2.0.5'.

HEAD is now at 13226ca... Sep-15 Release
[lanner@localhost OpenNSL-3.3.0.2]$
```

extract Lanner's cdp package into OpenNSL tree

```
# cd bin
# tar -jxvf <path_to_cdp_apckage>/opennsl-3.2.0.5-cdp-lanner-x86-trident2-sx10a-cent72.tar.bz2
```

modify example/Makefile to point to correct platform,
build example code by make

Now you can run example_stat program to verify function.

Conclusion

As discussed above, the ecosystem is faced with the challenges in the transition from closed architecture to an open network. To relieve the bottleneck, it is necessary to bridge the hardware and the software elements. For new, open and innovative applications, developers may leverage Broadcom OpenNSL software APIs to integrate with Lanner's hardware library and HTCA-6000 series appliances in applications of network monitoring, traffic engineering and workload optimization. The integration of Lanner hardware and Broadcom platforms brings together a customizable, enhanced and fast-delivered solution with optimized hardware and open networking APIs.

For more information, please visit the URLs:
Lanner HTCA-6000 Series Appliance at: http://www.lannerinc.com/telecom-datacenter-appliances/hybridtca-platforms/
Broadcom OpenNSL at: https://www.broadcom.com/products/ethernet-connectivity/software/opennsl/