



FLOWFORWARDING.ORG

SDN with Network White Boxes

Shivaram Mysore, November 2013

What are Software Defined Networks

Application aware networks - an application may request and receive network-wide guarantees

Programmable networks – Defining and deploying basic primitives which allow any software provider to deliver network centric software

Build on the pervasive reach of Ethernet as opposed to Ethernet replacement like InfiniBand

FlowForwarding.org is focused in enabling OpenFlow based SDN on Network White boxes



Motivation behind FlowForwarding.Org

- Understand and demonstrate value of OpenFlow
- Focused on OpenFlow based SDN for Enterprises
- Promote the concept of Network White Boxes
- Fill-in architecture gaps with code to build true SDN applications
- Sandbox for OF-Config
- Rapid prototyping with appropriate tools/languages
 - LINC switch is built using Erlang OTP
 - Warp is built in Java



FlowForwarding.org & LINC

FlowForwarding.org

- **Open Source community promoting Open Network Foundation Standard implementations**
- **Implementations under Apache v2 License**
- **Supported by Industry**

LINC

- **Open Flow v1.2/1.3.2 based Capable Switch with support for OF-Config 1.1**
- **Works with any Open Flow controller supporting corresponding OF protocols**

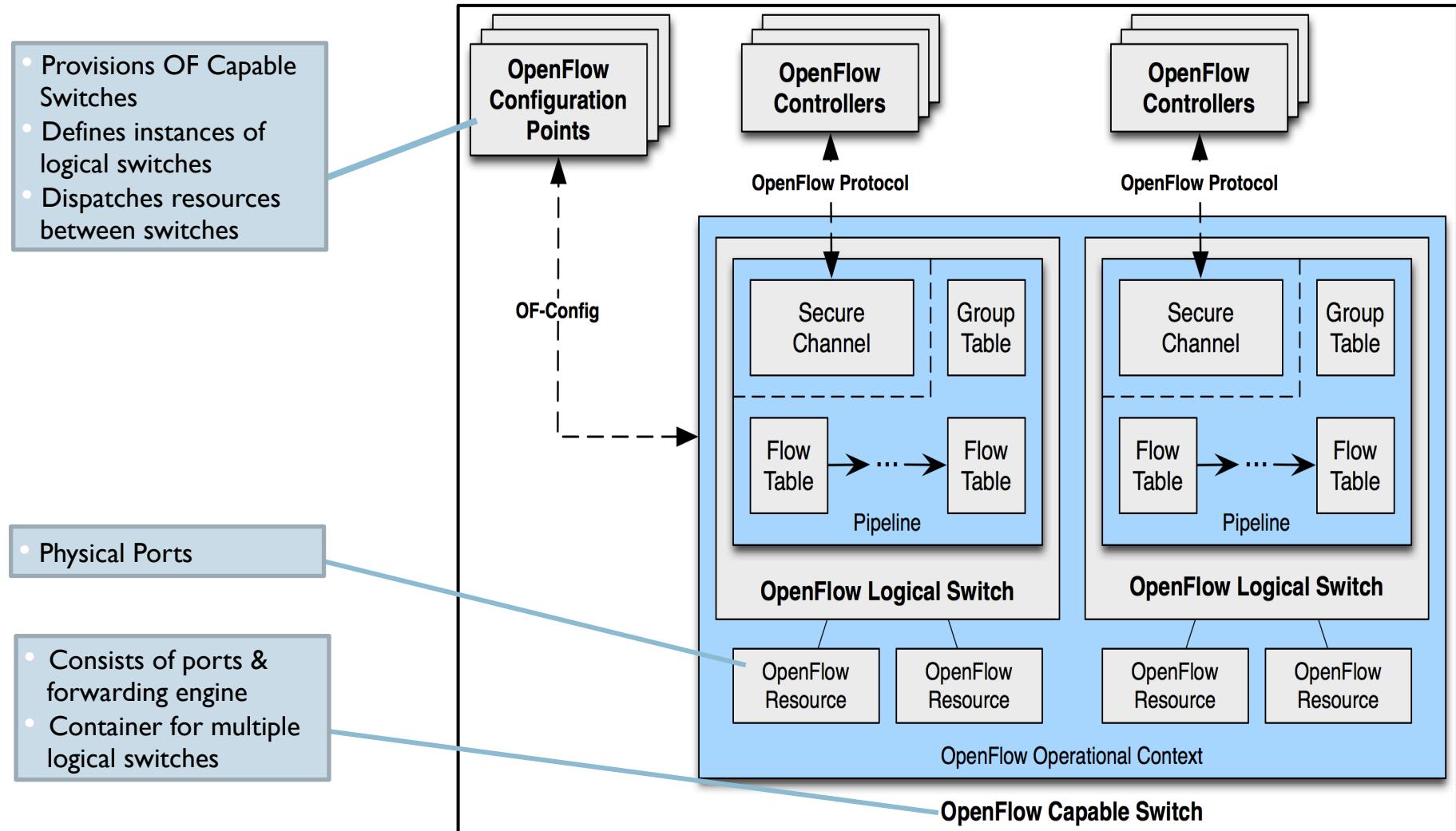


LINC and OpenVSwitch

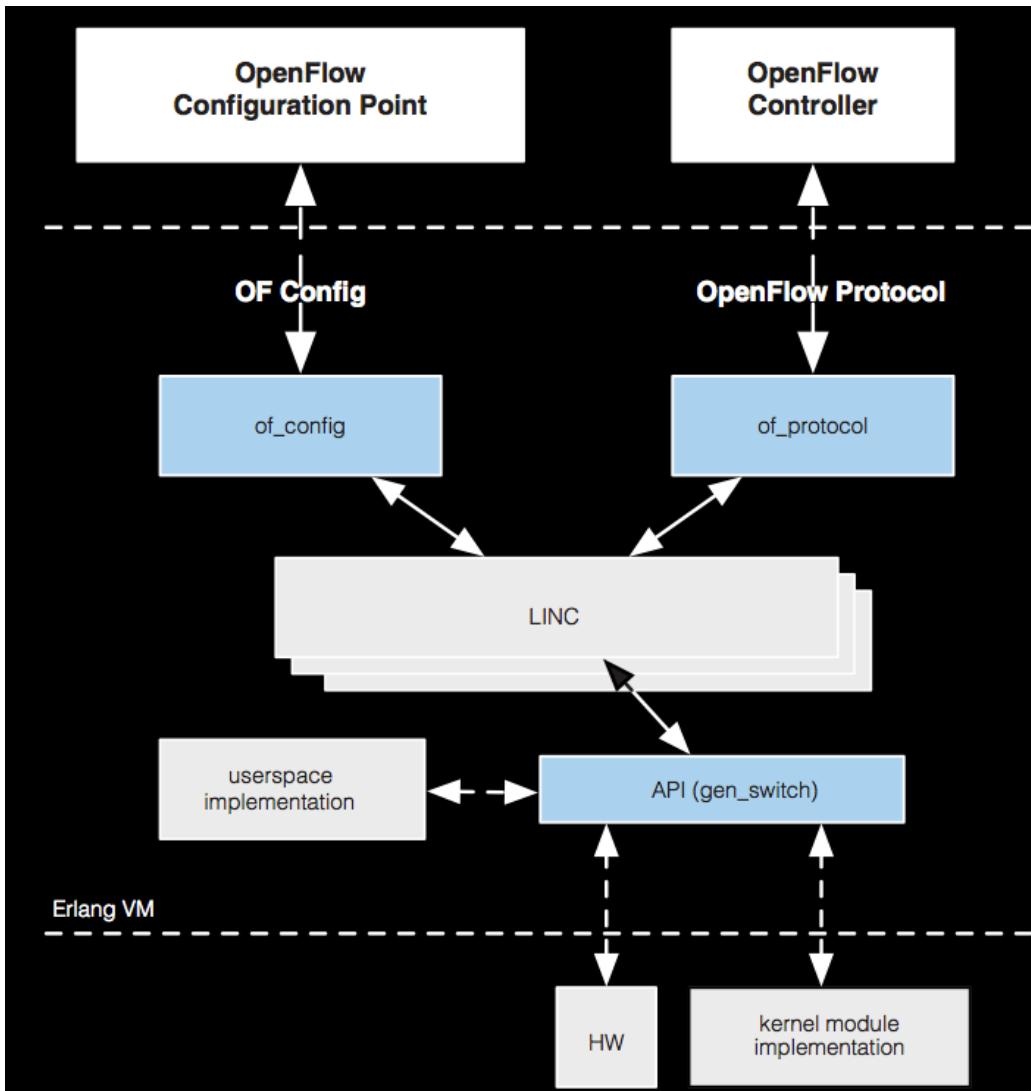
- **Both provide**
 - Completely different architectures and implementation to solve similar problem
 - OpenFlow based programmable data path
 - Soft Switches
- **OVS provides**
 - Legacy L2/L3 support
- **LINC provides**
 - OpenFlow Capable Switch – instantiate multiple logical switches
 - Easy portability to various operating platforms and hardware
 - Uses the power of Erlang for promise of scalability, hot patch fixing, concurrency, fault-tolerance and distribution
 - First switch implementation was done in 2 months by non-networking experts; Rapid prototyping



LINC Switch Architecture



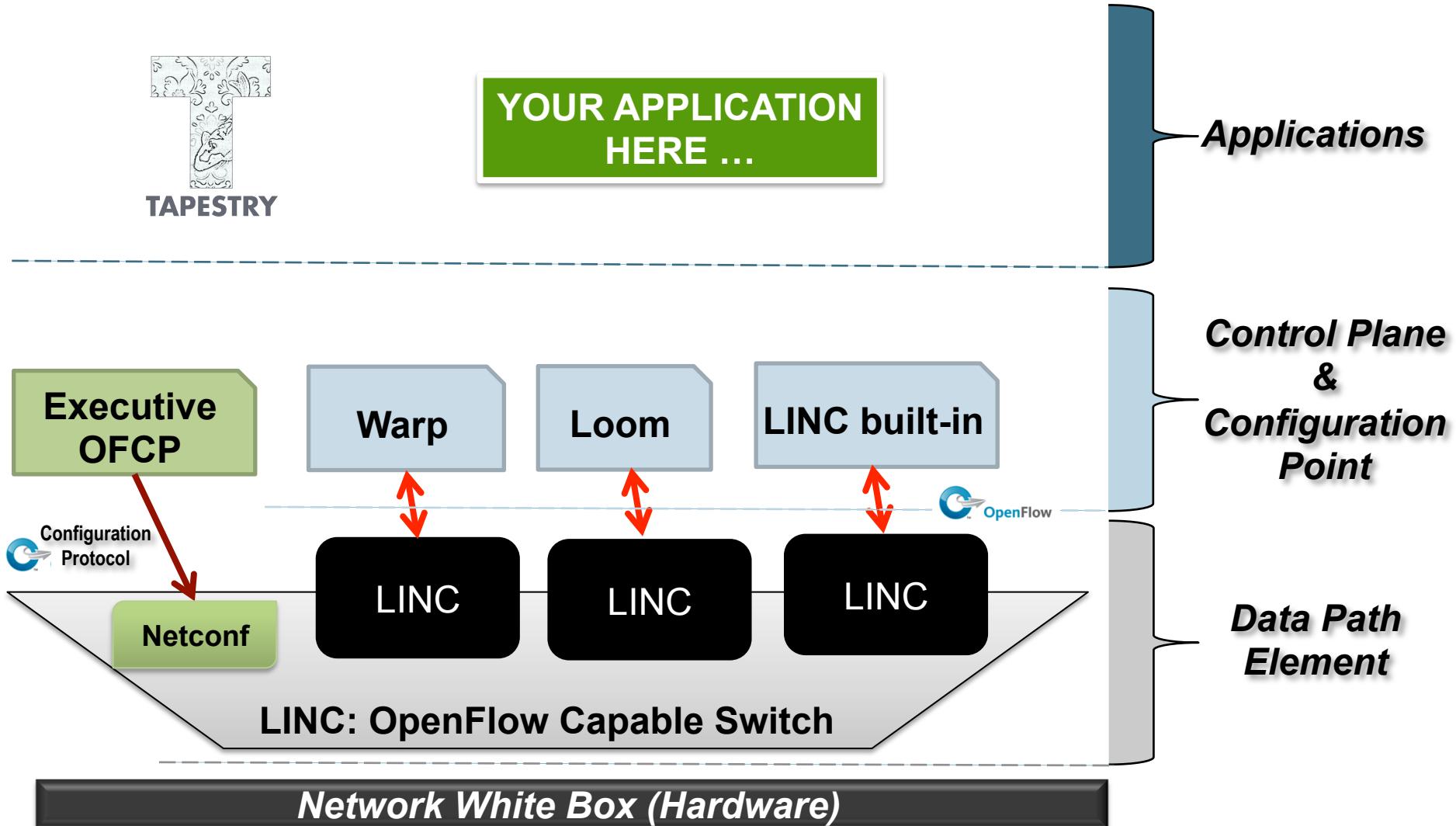
LINC: Detailed Implementation Architecture



Detailed architecture information available on FlowForwarding GitHub wiki @

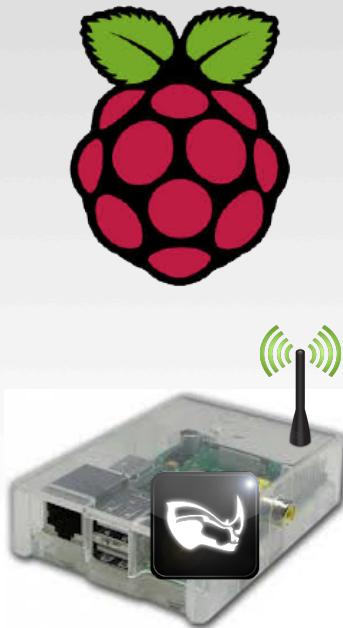
<https://github.com/FlowForwarding/LINC-Switch/wiki>

FlowForwarding.Org Projects



LINC Platform Support

Raspberry Pi



This slide features the Intel logo at the top. Below it are two Intel product logos: "intel inside Xeon" and "intel Atom inside". The central part of the slide is a diagram titled "Open Network Platform Switch Reference Design". It shows a network stack with an "SDN Controller" at the top, followed by "SP App", "OEM App", and "ISV App". Below this is a box labeled "Open Network Platform Software: Open Extensible Management APIs, Open Source Linux OS, OpenFlow, Open vSwitch". This is divided into "SW" (Software) and "HW" (Hardware). The "SW" section includes icons for Intel Architecture, Intel Communications Chipset 89xx Series, and Intel FM 6700 Switch. The "HW" section shows a photograph of a network switch module. At the bottom, there are buttons for "Intel Product", "Wind River Product", and "3rd Party". The entire diagram is set against a blue background with wavy lines.

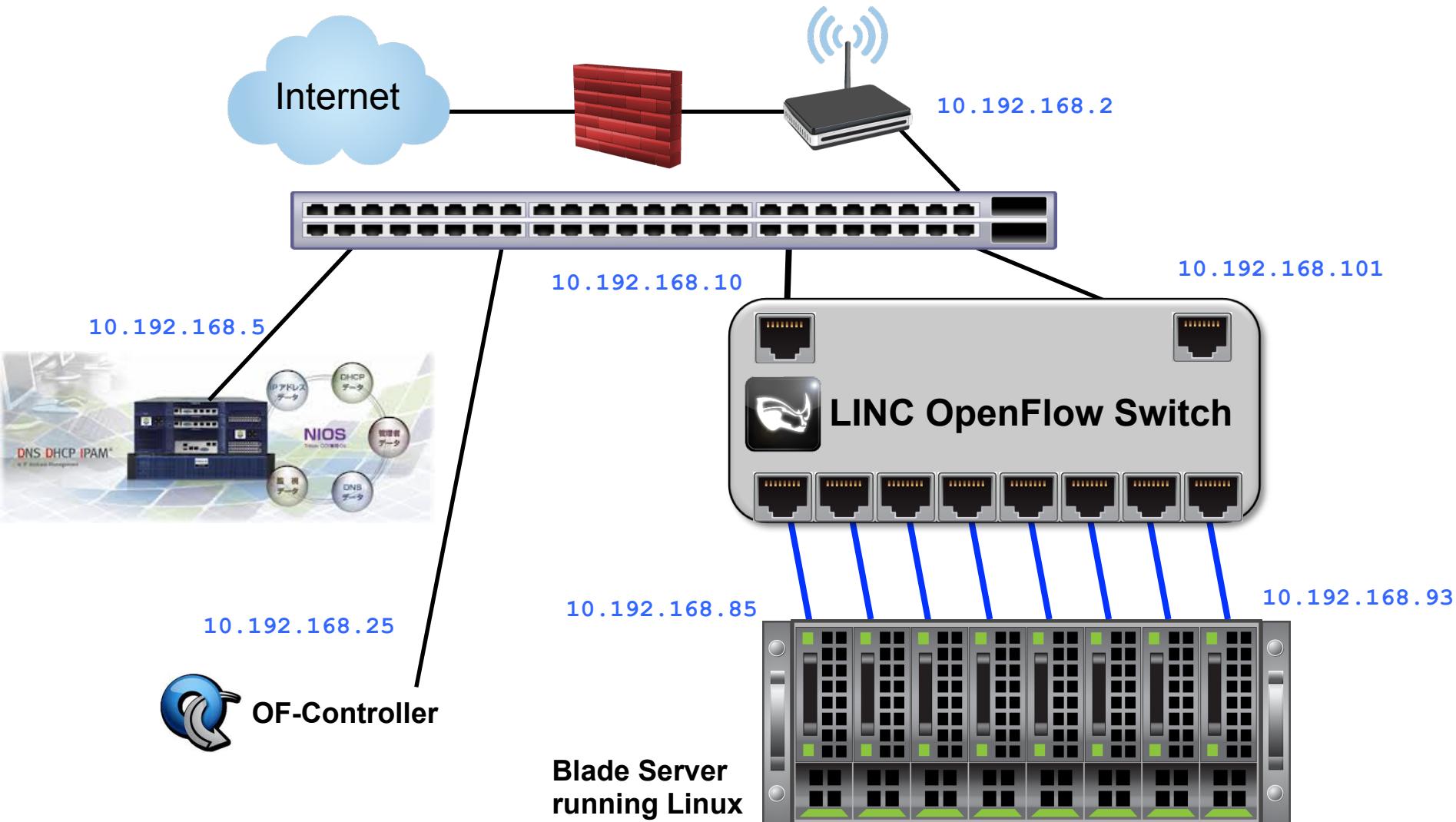




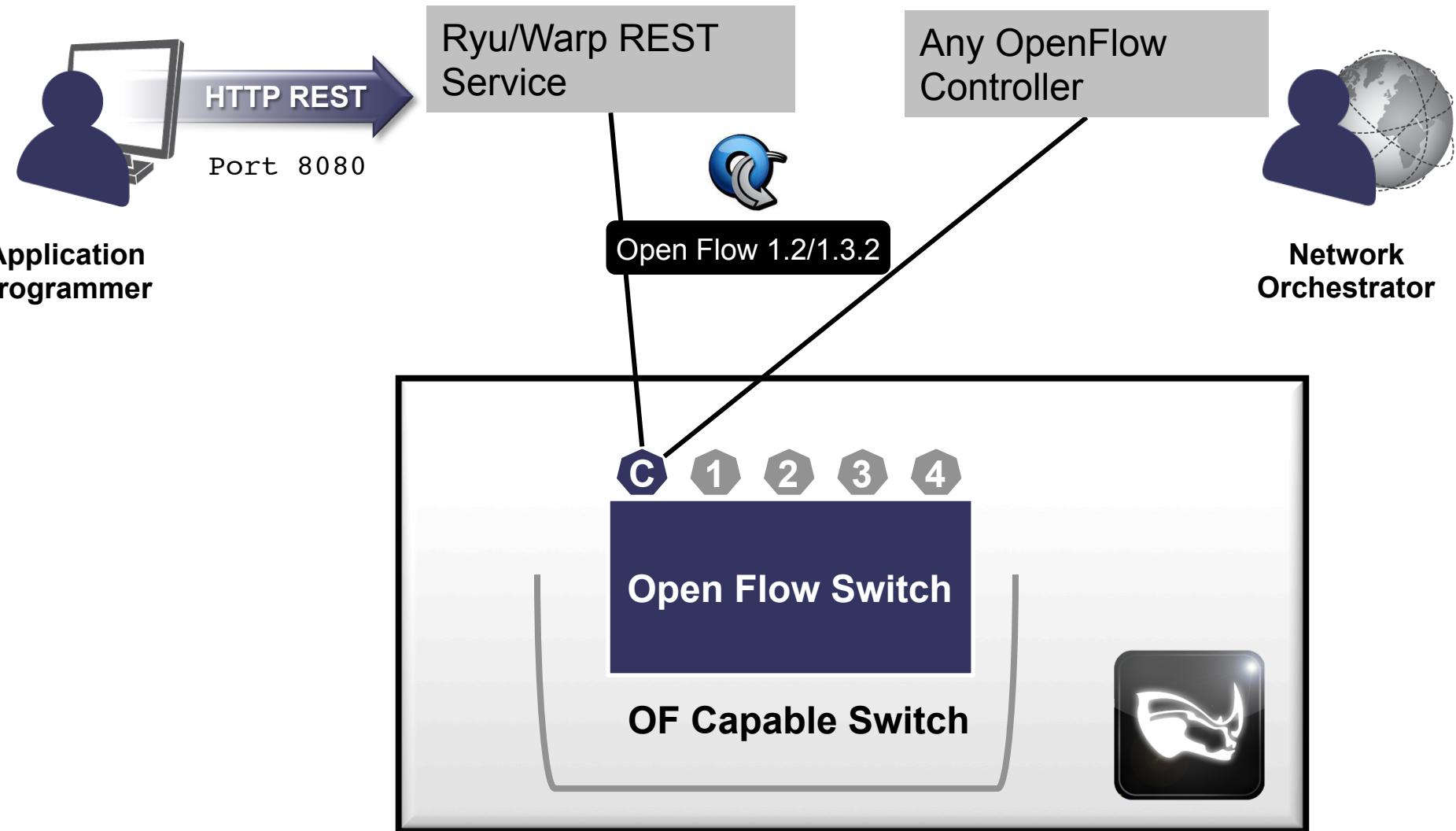
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OpenFlow SDN by Use Cases

LINC Deployed on Corporate Networks (Overlay)

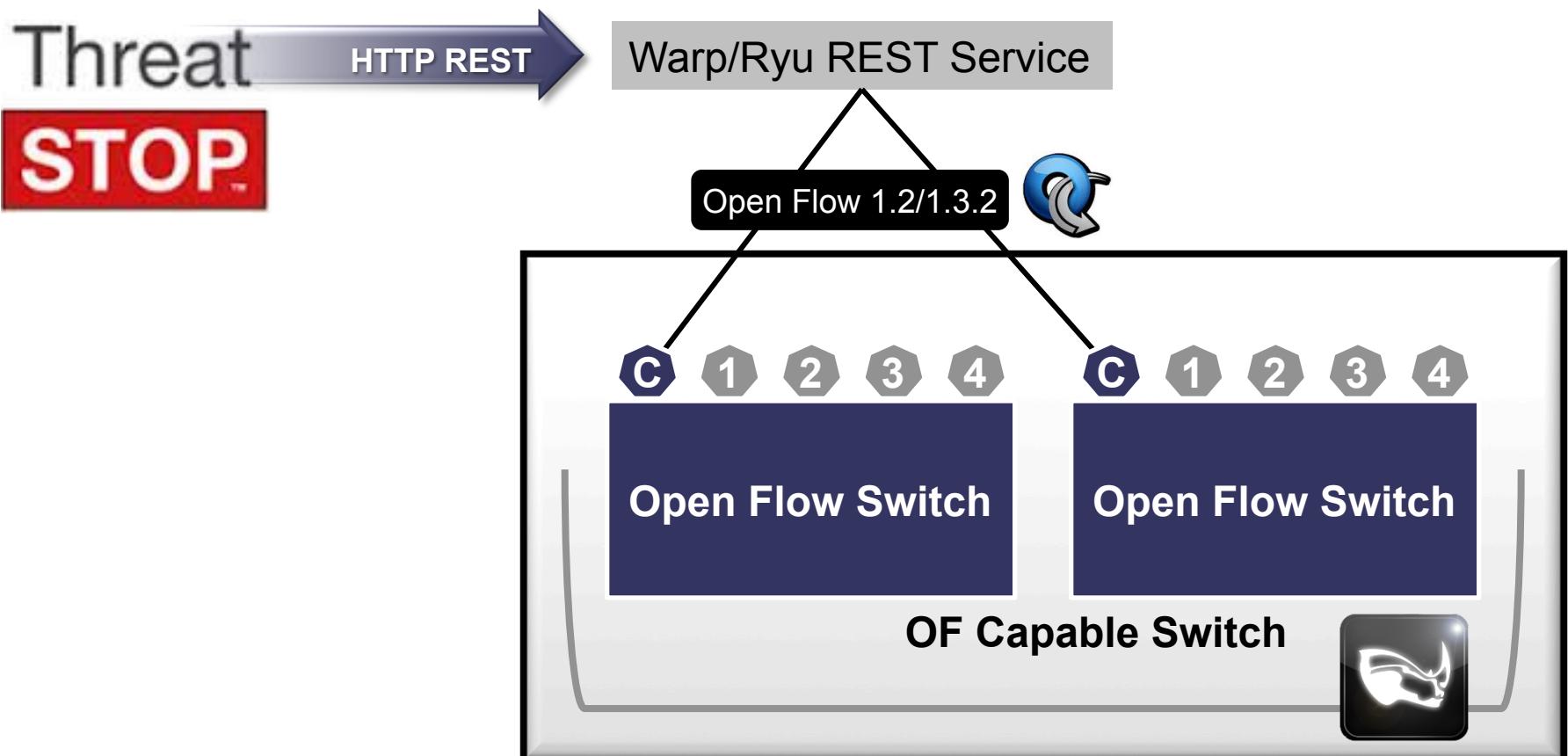


SDN for OpenFlow Networks

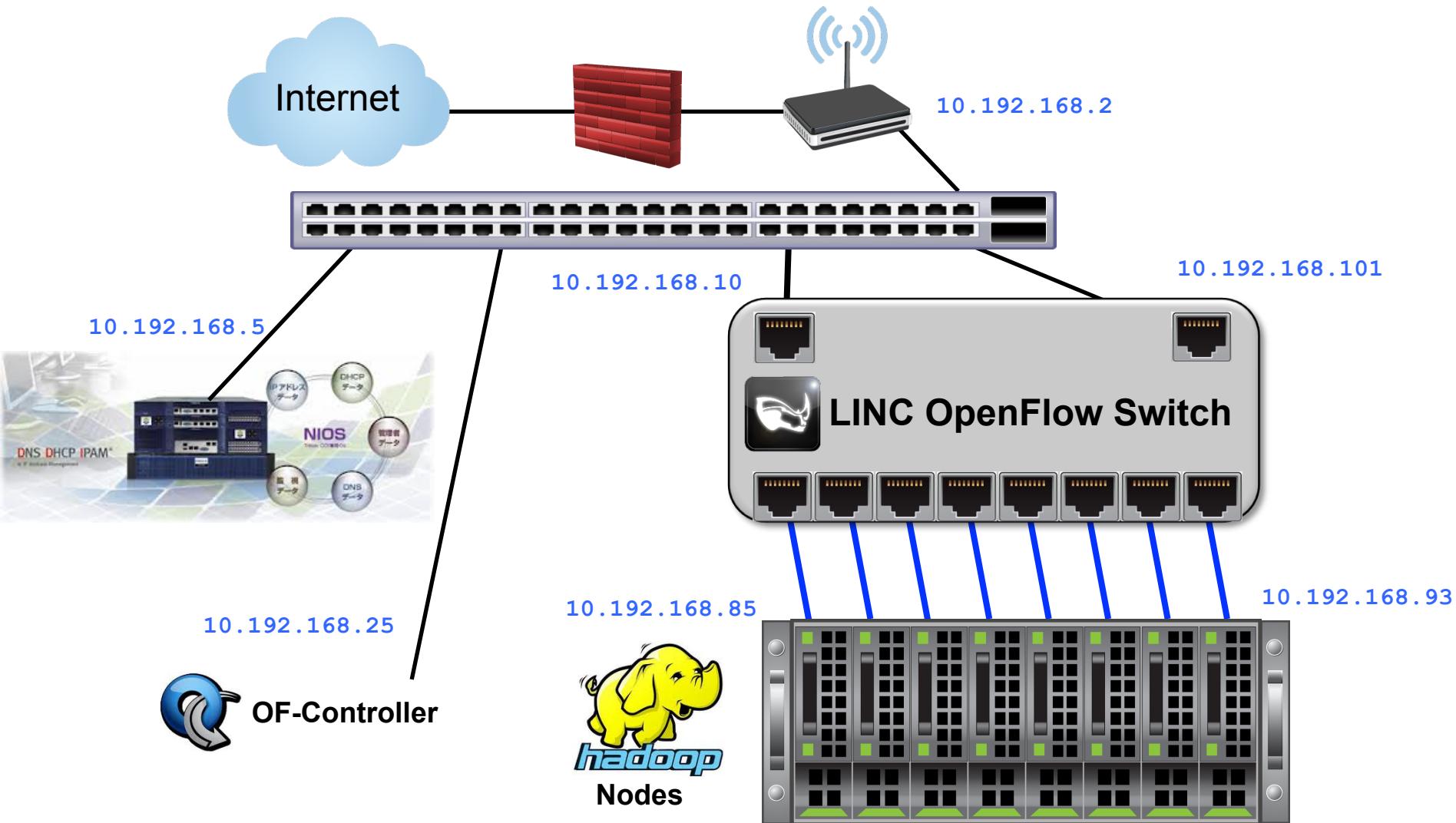


Dynamically Programmable Firewall for SDN

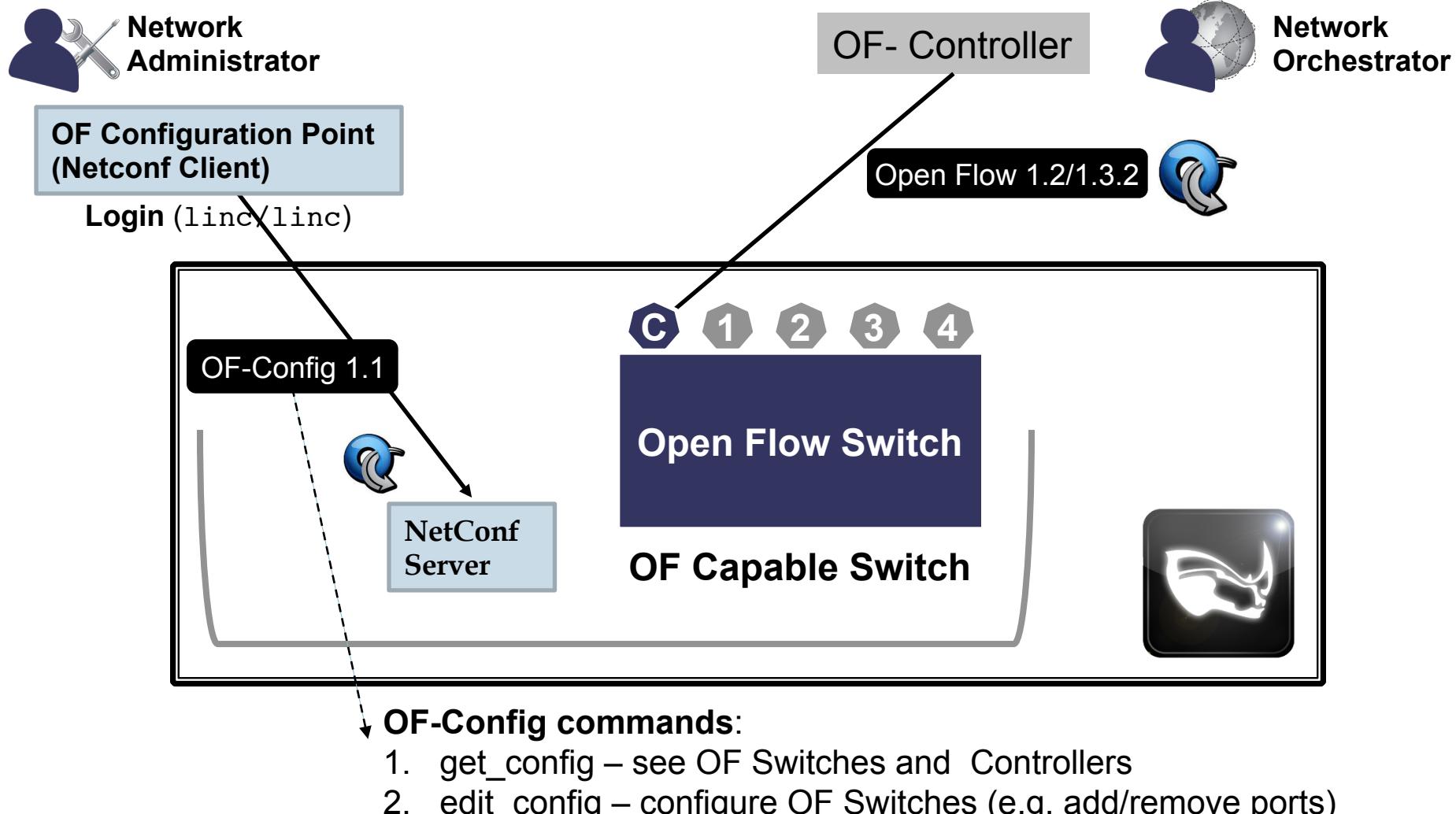
Install and Update firewall rules as flows based on ThreatSTOP events



Big Data Apache Hadoop Acceleration with OpenFlow



Scalable, Programmable OF Switch Deployments with OF-Config

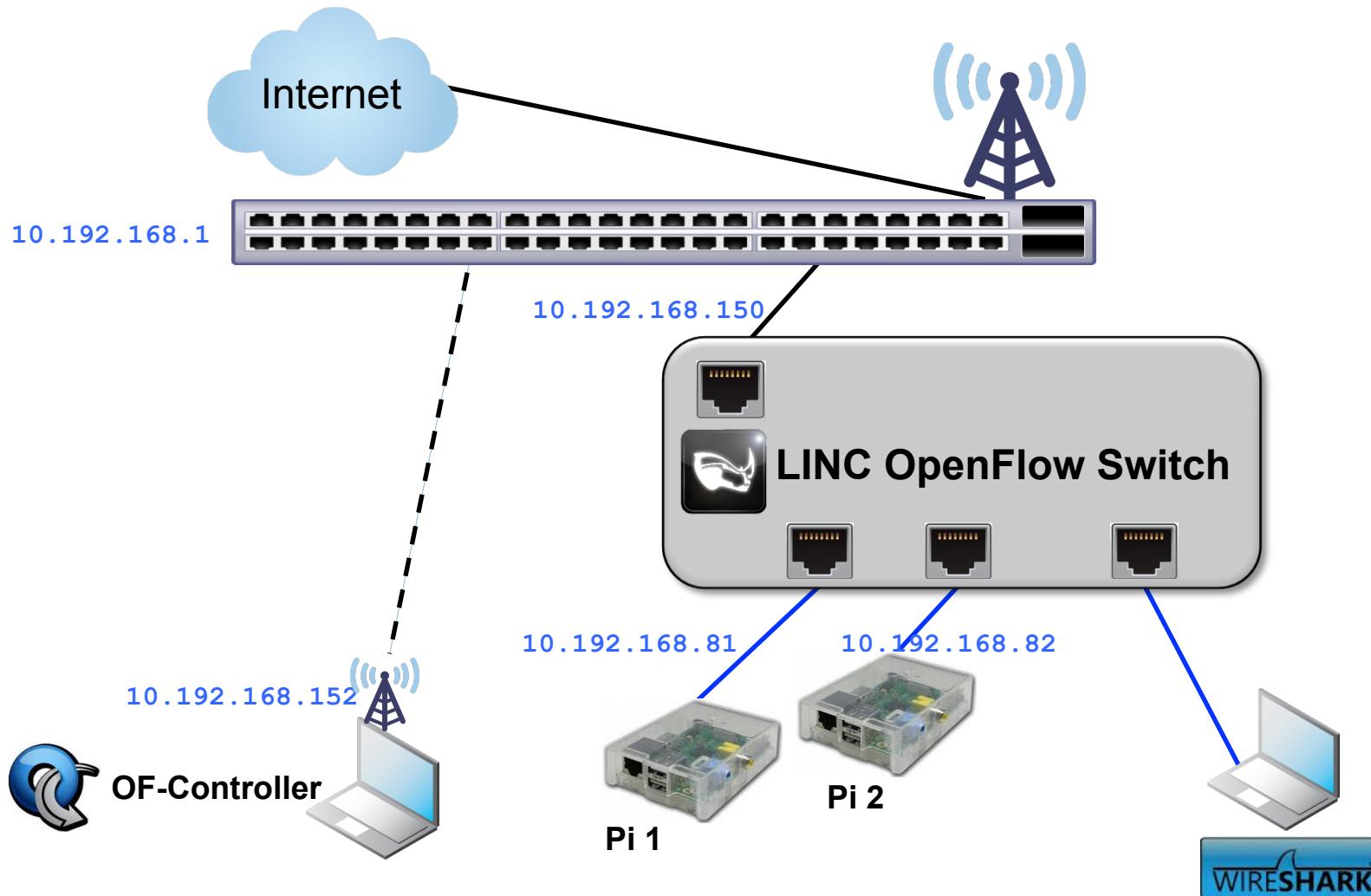


Demonstration

- 1. Overlay network deployment**
- 2. Switching**
- 3. Switch also acting as a Firewall**
- 4. Network Monitor**
- 5. Send REST Commands to the Switch**



Demo: Switching, Firewall Network Tap/Monitor



Demonstration Summary

- ✓ Overlay network deployment
- ✓ Switching
- ✓ Switch also acting as a Firewall
- ✓ Network Monitor
- ✓ Send REST Commands to the Switch



FlowForwarding.org Roadmap

LINC – OpenFlow Switch

- Standards Support: OpenFlow 1.3.2  and 1.4
- Security: Configuration with OF-Config
- Performance: Kernel modules and Intel DPDK support
- Hardware support: Intel x86, Intel Seacliff Trail, Broadcom Trident II, Tilera
- Continuous testing with OpenSource Twister Framework
- Successfully tested @ every ONF Plugfest event so far

Controller

- A REST based Java Controller (OF1.3.1) library for  SDN Programmers – Warp
- Loom – Distributed Controller
- Tested with other controllers such as Ryu and Ixia 

Applications

- Tapestry



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- Contribute – github.com/FlowForwarding/

