



ViSION Status Update

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Overview

- Introduction
- Update on Software Defined Networking
- ViSION Software Stack
 - HP SDN Controller
 - ViSION Core Framework
 - Load Balancer Module
 - The Health Monitor Module
- The Regressive Testing Application



The ViSION Project

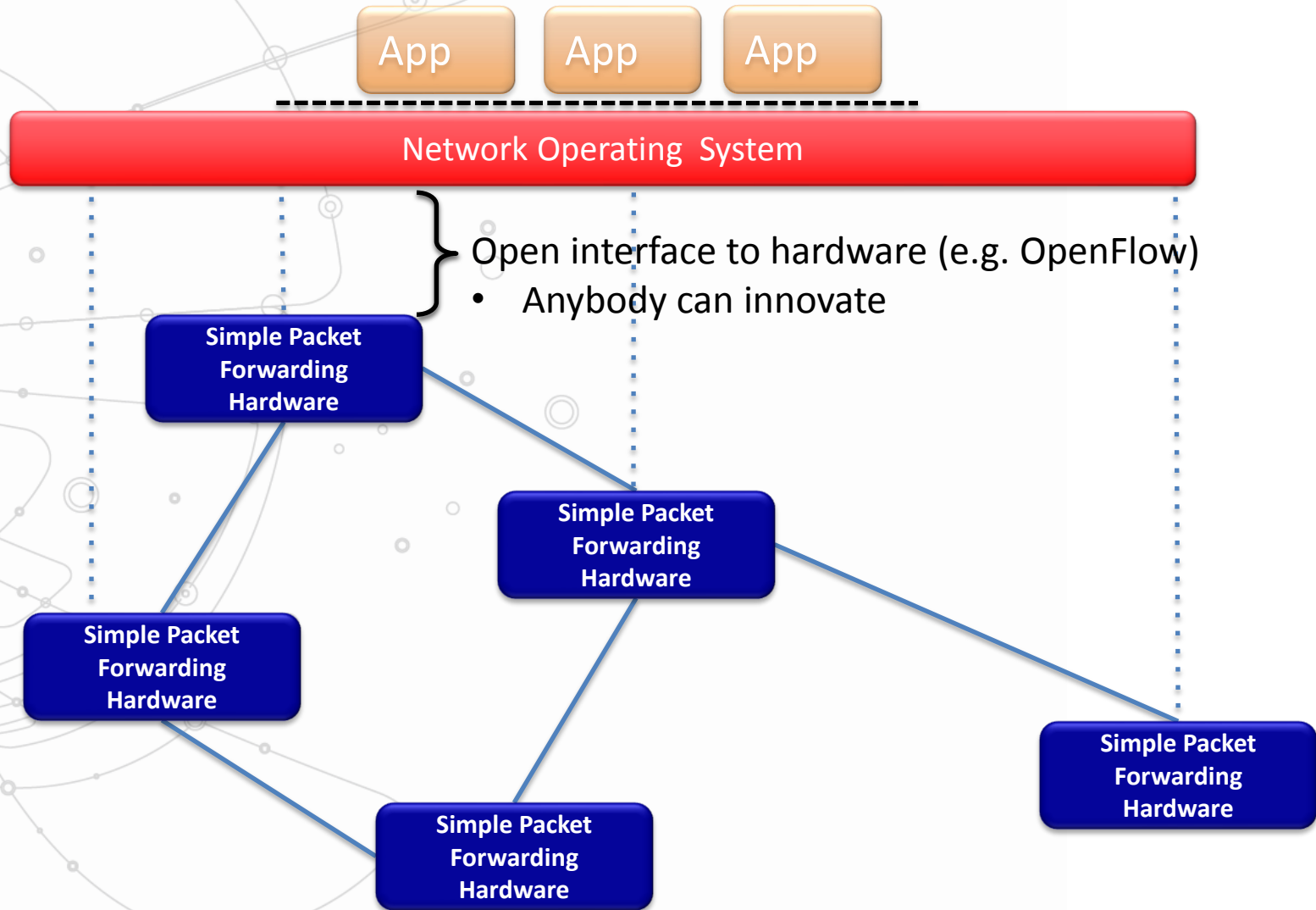
VISION
Virtual Services in Openflow Networks

- CERN openlab - HP Networking collaboration
 - Traffic orchestration
 - Software Define Networking approach
 - **Based on OpenFlow**
 - Started in February 2012
 - 2 engineers, 3 years

CERN IT/CS recognized the need to scale CERN's perimeter firewall capacity to cope with the increase of internet traffic.

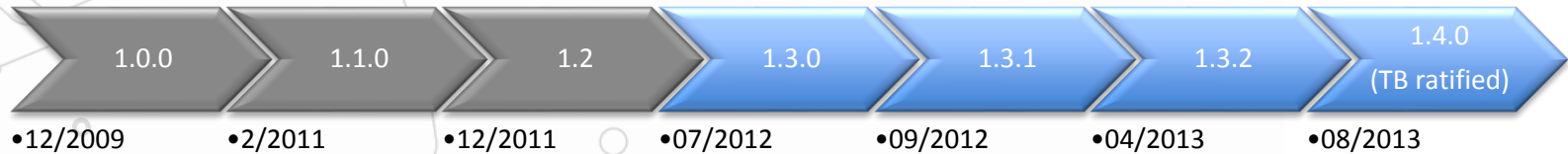


SDN: Centralized controller implementation



OpenFlow/SDN update

- **Still a very dynamic area**
- ONF is active in refining existing versions and defining new ones:



- **Controllers:**
 - Open source: Beacon, Floodlight, NOX & **POX**, Trema, Ryu, **Open Daylight**, **Open Contrail**
 - Commercial: Big Network Controller (Big Switch), Programmable Flow (NEC), **Contrail**
- **Cloud orchestration integration: Neutron/Quantum**
 - Core part of the OpenStack platform, enabling network as a Service
 - Modular plugin design allows interfacing to SDN controller platforms

OpenFlow – new controllers

- POX
 - Python only version of NOX (initial OpenFlow controller)
 - Targeted largely at research and education. Suited for rapid prototyping
- Open Daylight (04/2013)
 - Linux Foundation project – open source
 - Joint industry effort. Virtually all the big players are contributing members
- Juniper launches SDN controller (09/2013)
 - Based on Contrail Systems acquisition from 12/2012
 - Open source (OpenContrail) and commercial (Contrail code + service and support)
 - Virtualization controller (network overlays)
- HP Virtual Application Network SDN Controller
 - October 21st product release (codename Flare)
 - OpenFlow 1.3 support
 - High Availability
 - Infrastructure controller (physical OF network fabric)

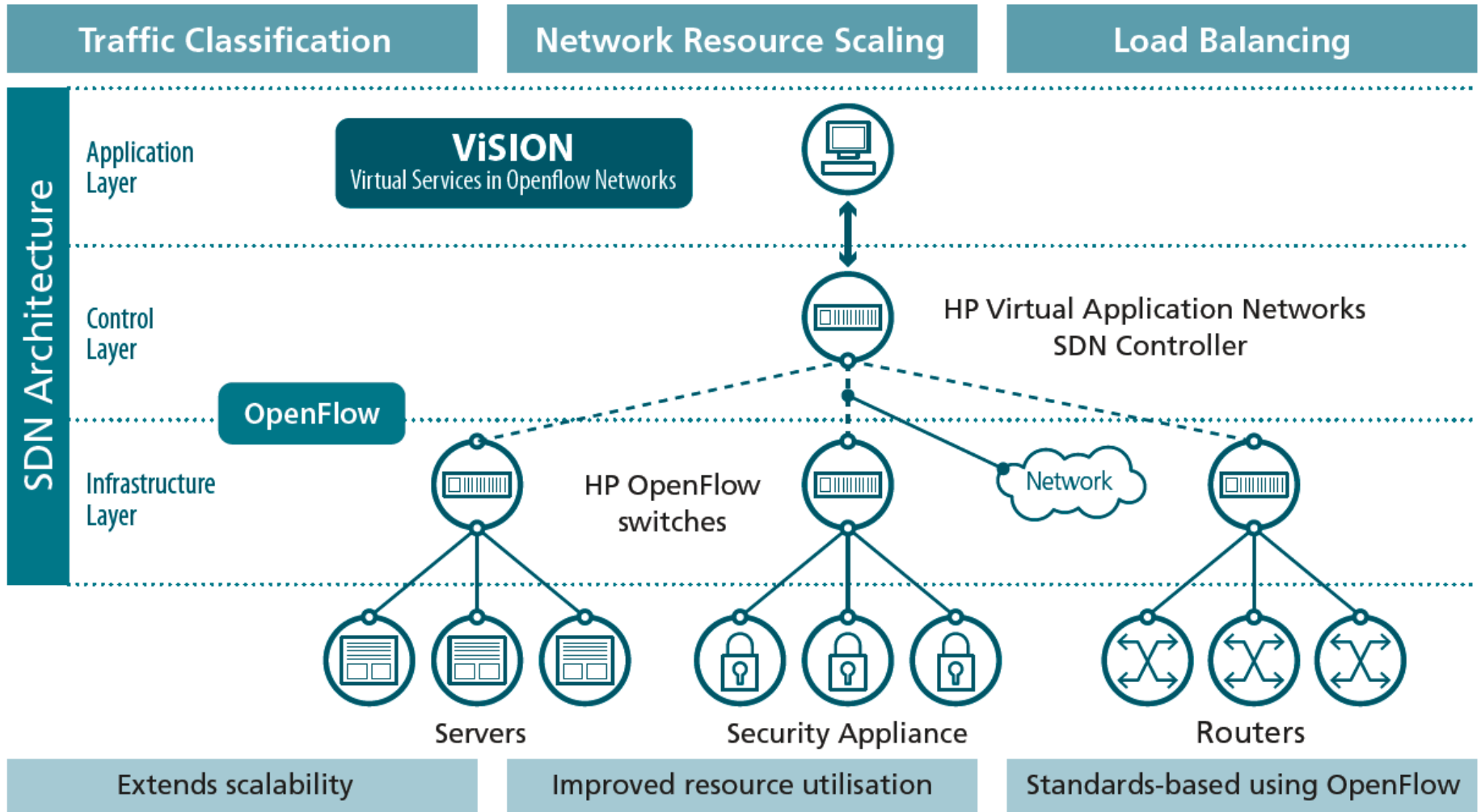


A background network diagram consisting of a complex web of interconnected nodes and lines, rendered in a light gray color. The nodes are represented by small circles, some of which are larger and more prominent than others. The lines represent connections between these nodes, creating a dense, mesh-like structure that fills the left and central portions of the slide.

Overview

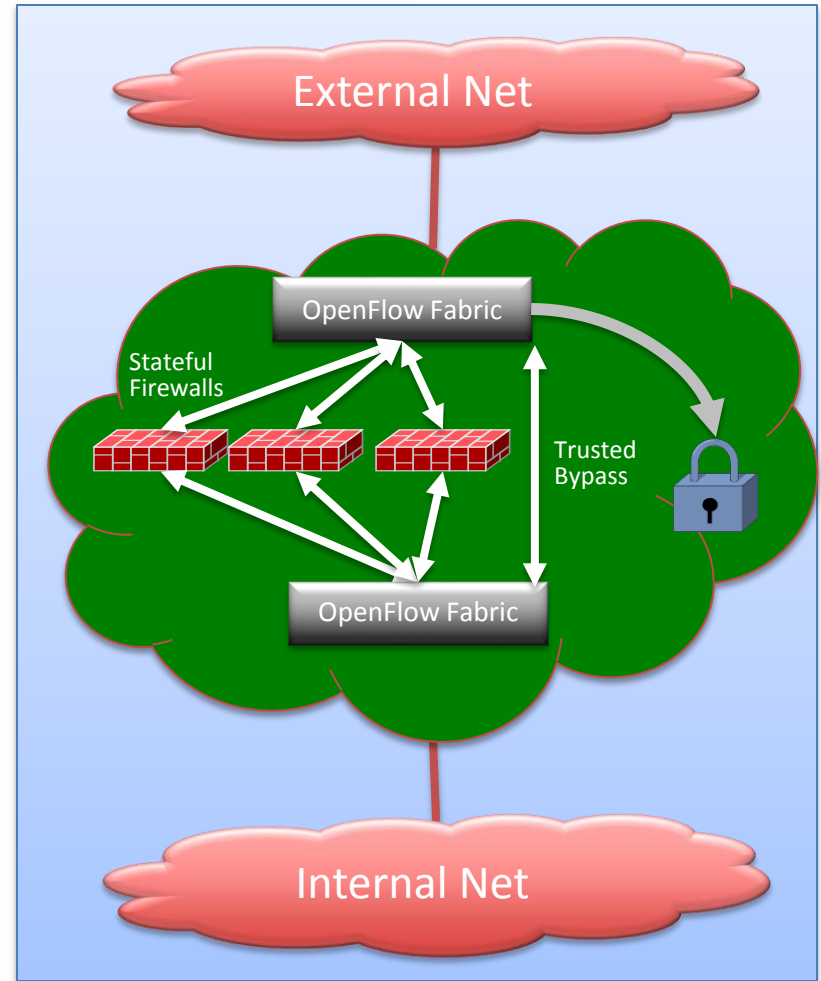
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ViSION - HP SDN Framework

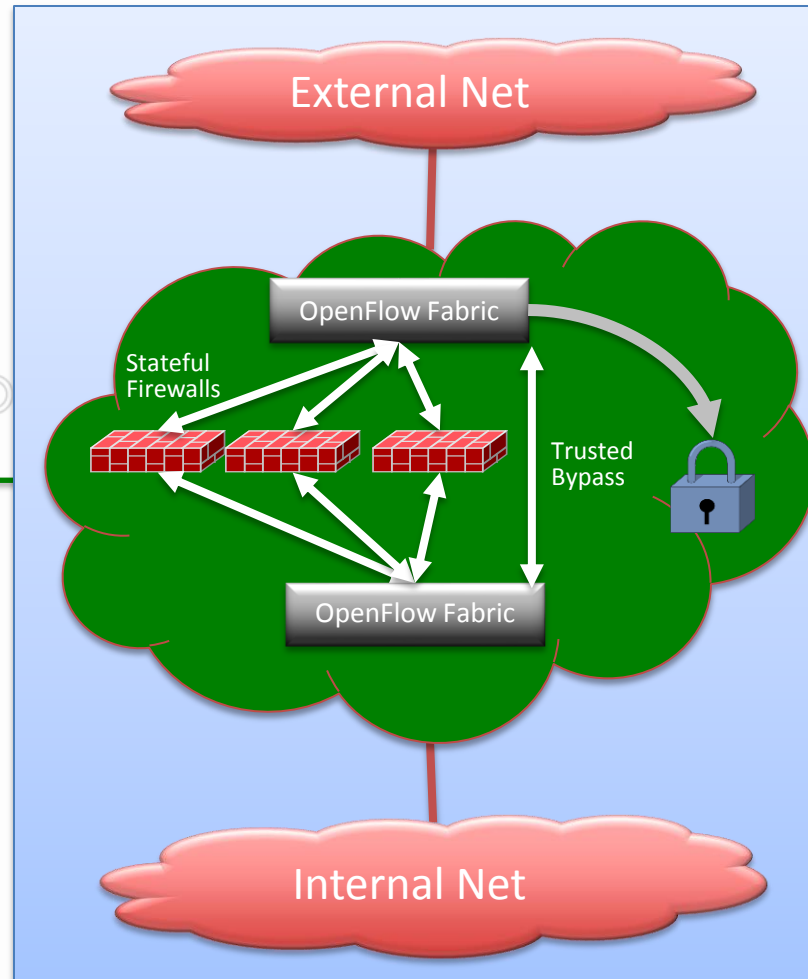
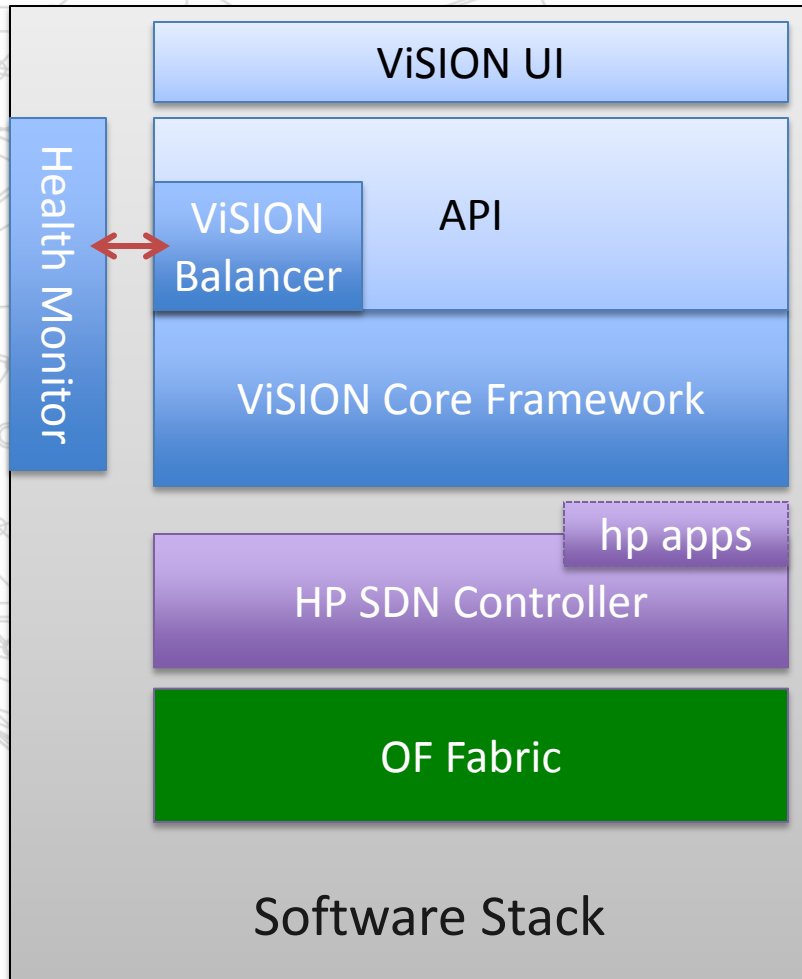


ViSION Openflow Fabric

- OpenFlow fabrics desired functionality:
 - (1) Classification
 - (2) Load Balancing
 - (3) Mirroring
 - (4) Fault tolerance
- Potential limitations (early days for OF)
 - No mirroring support in early OF versions
 - Classification based on port ranges scales poorly
 - Uniform load distribution not straight forward
 - Can't hash on high entropy bits (e.g. lower IP bits)
 - Adaptive load distribution is complex
 - Requires API for synchronizing the FW's state
- Investigating migration to OF 1.3 with HP to address some of these limitations



ViSION Software Stack



HP SDN Controller Overview

Base OpenFlow Controller Appliance

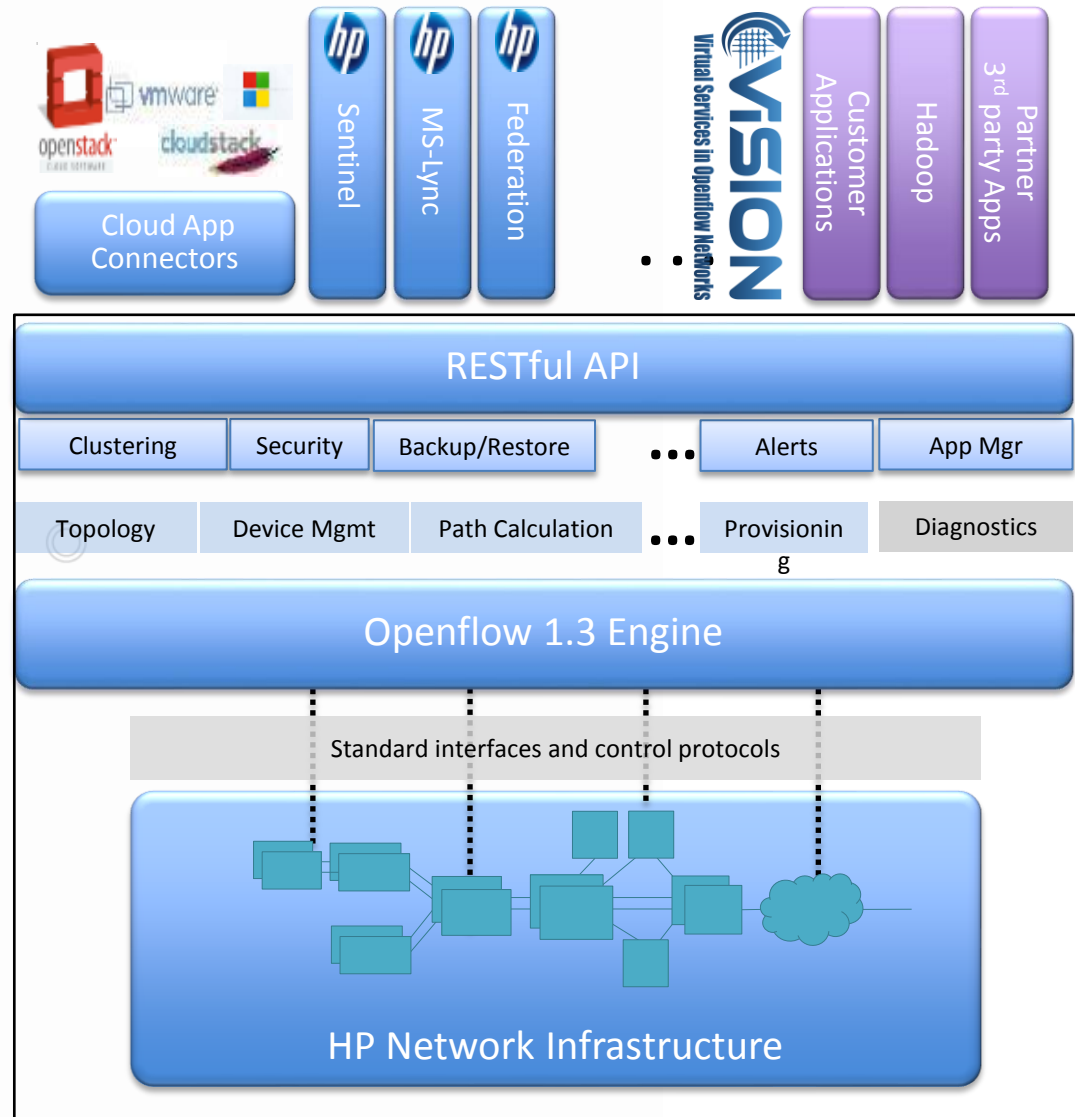
- Virtual Appliance deployed as SW on an Industry standard x86 server
- OpenFlow 1.3 Controller
- Built-in Network Services
- Appliance Administration

A Distributed Platform for High-Availability & Scalability

- Controller Clustering for Load-Balancing and Fail-Over
- Control State Mirroring across cluster for transparent failure recovery

Extensible Platform for SDN Application Developers

- Embedded Java Application Deployment
- REST APIs
- GUI



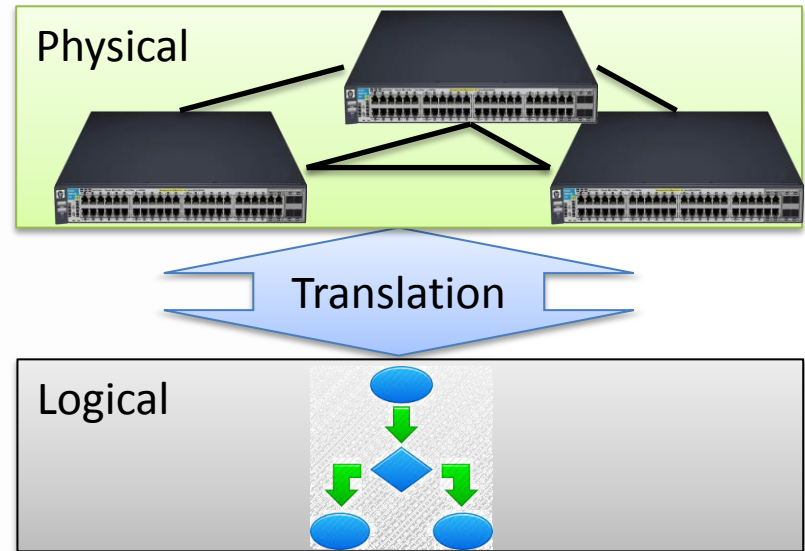
ViSION/ Core Framework

- Traffic orchestration decomposition

1. Physical layer
2. Translation layer
3. Logical layer

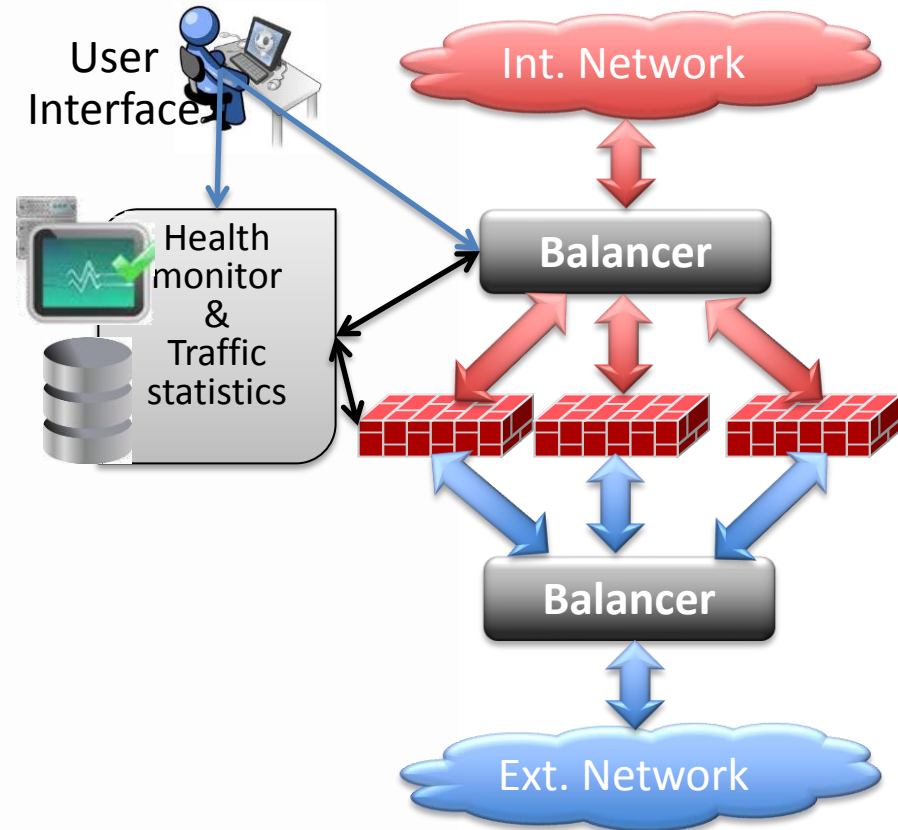
- Core module

- Implements the first two layers
 - Provides support for redundancy by using multiple links/paths
 - Allows the higher logical layer to focus on traffic orchestration only
- Integrated with latest HPN Controller
- **Status:**
 - code development to end this sprint
 - final package to be delivered before our visit to HPN (mid October)

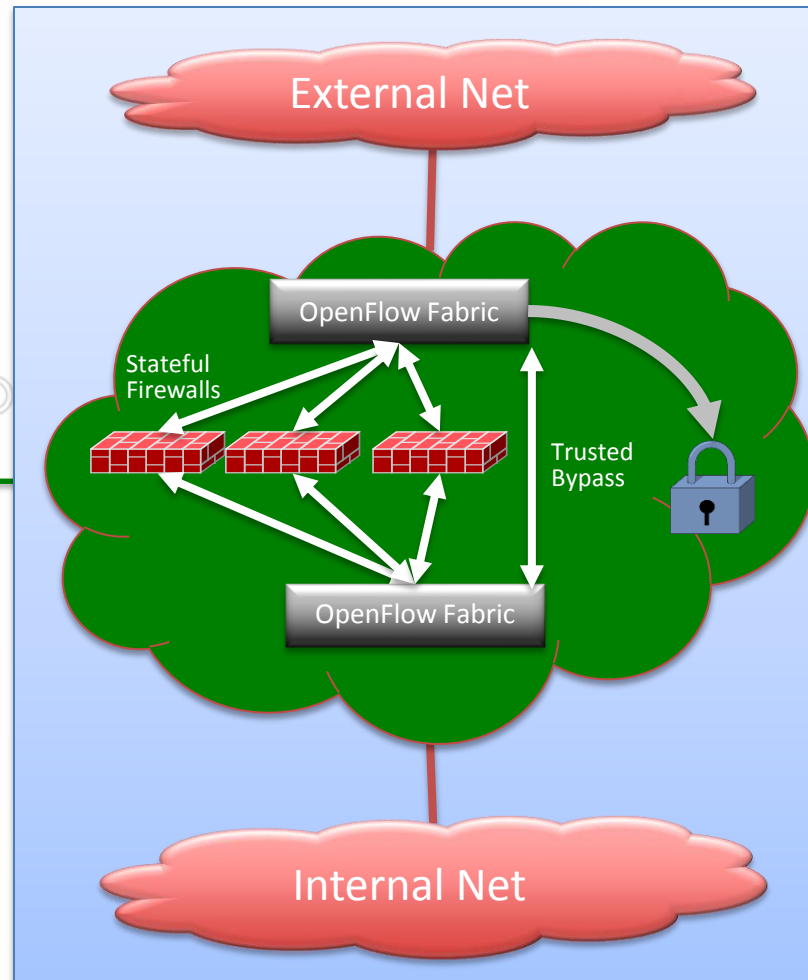
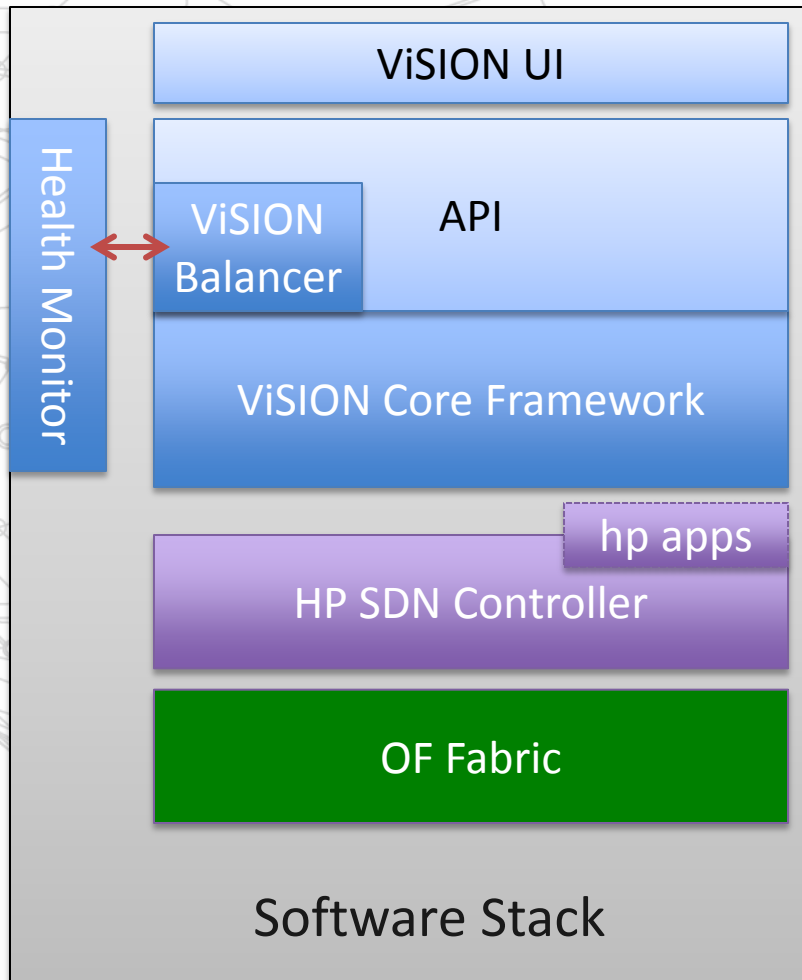


Balancer

- Allocates flows to resources based on
 - Resource capacity
 - Resource availability
 - Resource load
- Higher level of abstraction
 - Deals with the available resources and consumers
 - The core implements its decision into the physical OF fabric
- Flow allocation
 - Static → compromise for stateful firewalls
 - Dynamic
- High availability
 - Relocate flows in case a resource becomes unavailable

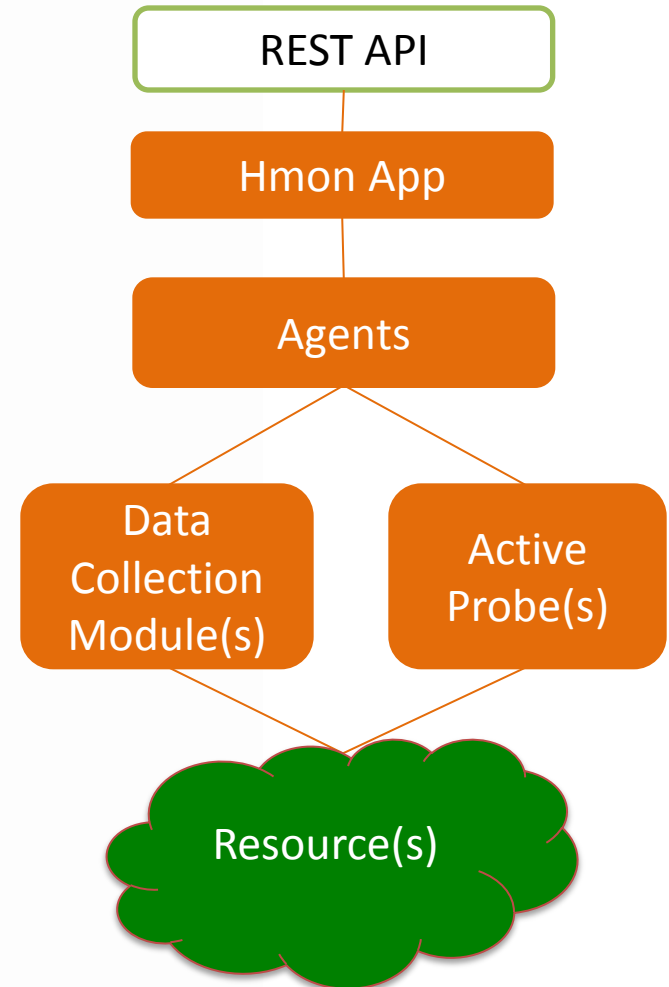


ViSION Software Stack



ViSION/ Health Monitor Module

- Real-time resource status information
- Flexible module system
- Multi-module data aggregation per agent
- Custom agent configuration
- **Current modules:**
 - SNMP
 - Ping
 - HTTP Web Request
 - LinkProbe via OF packet injection
- **Status**
 - finalized, ready for hp code review
 - summer student involvement



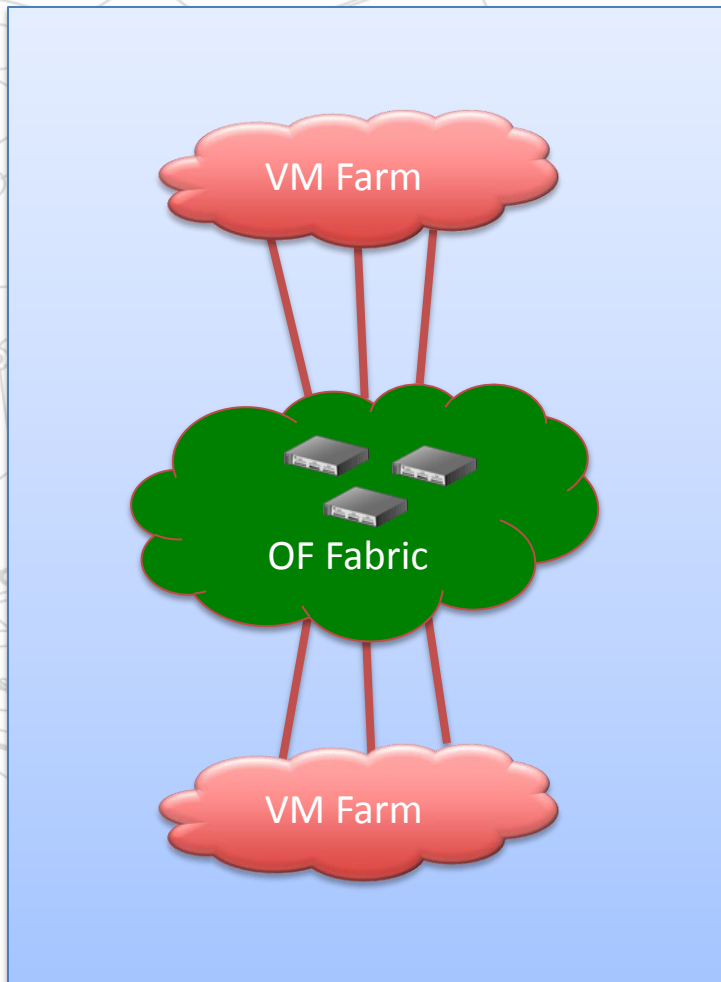


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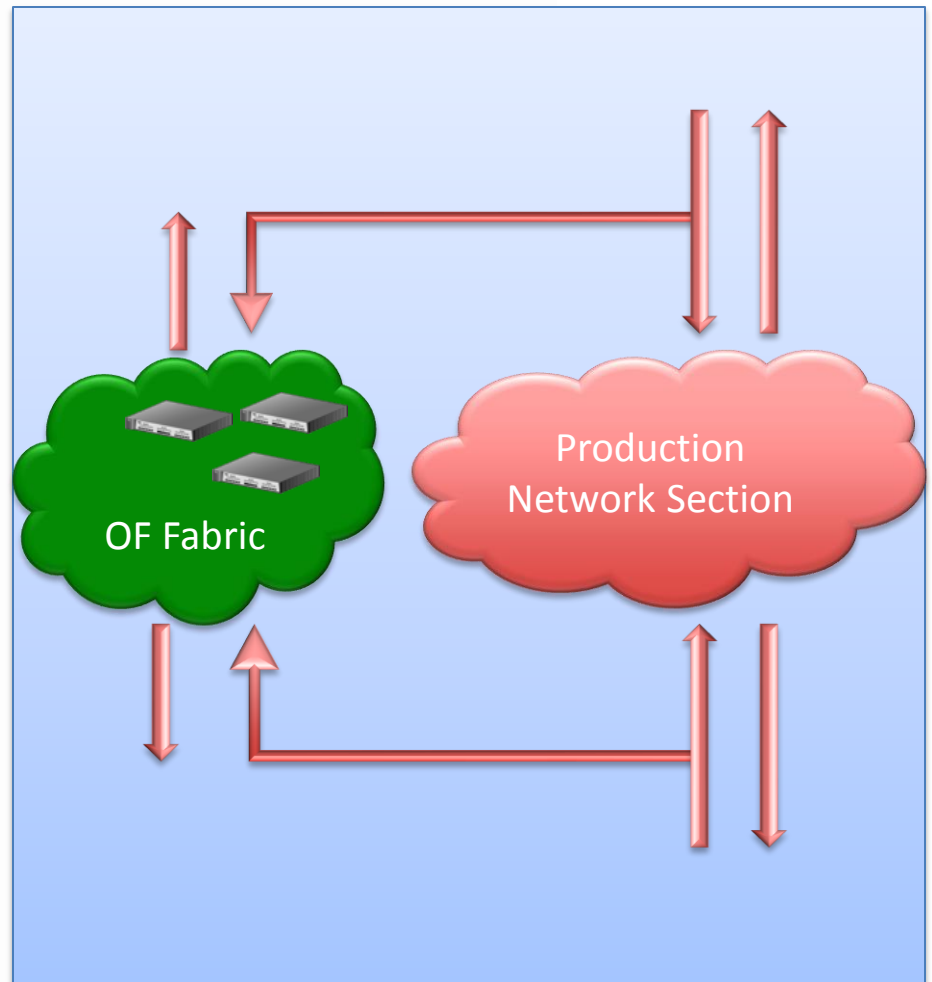
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ViSION System Level Testing

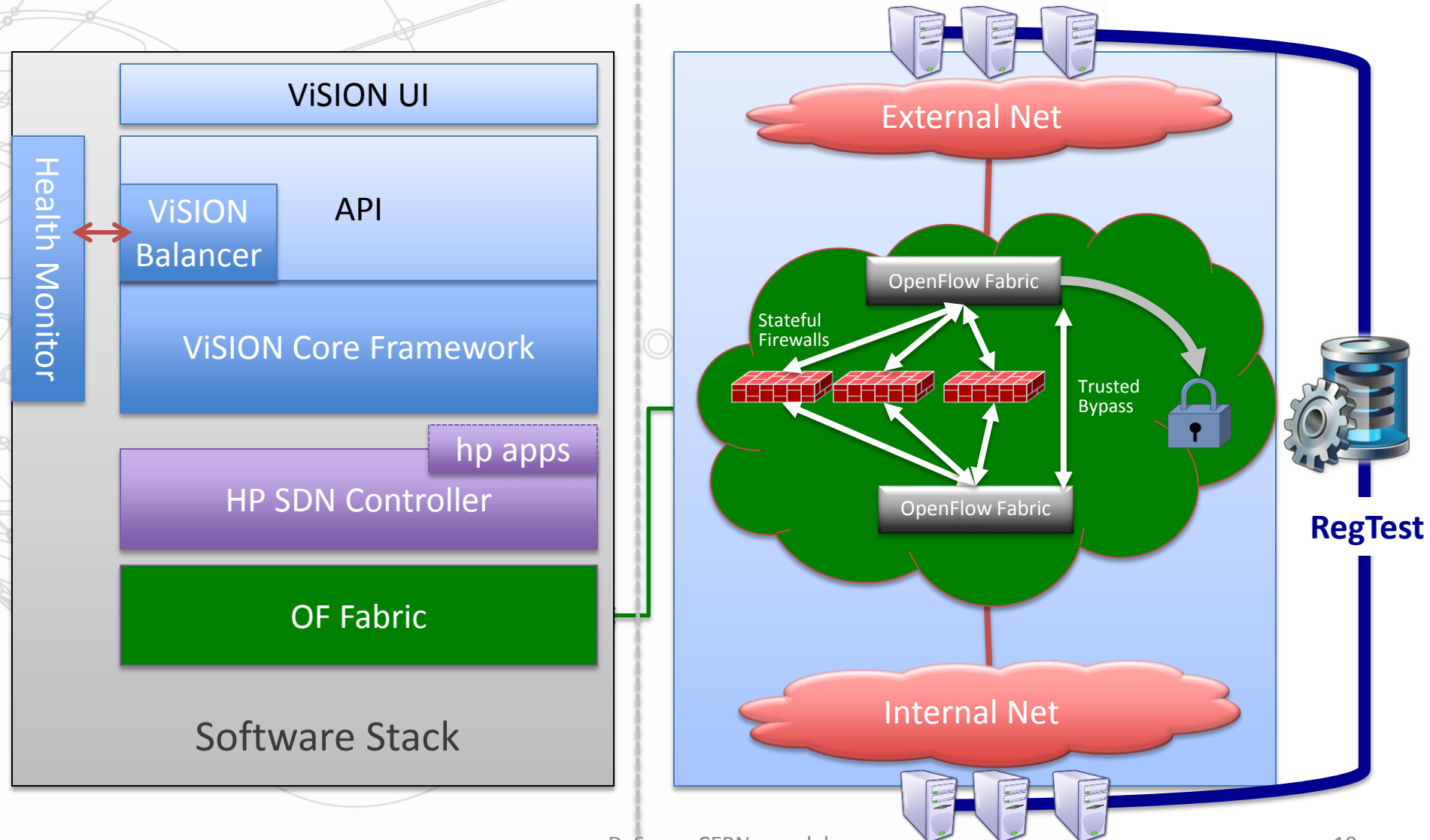
a. Regressive Testing



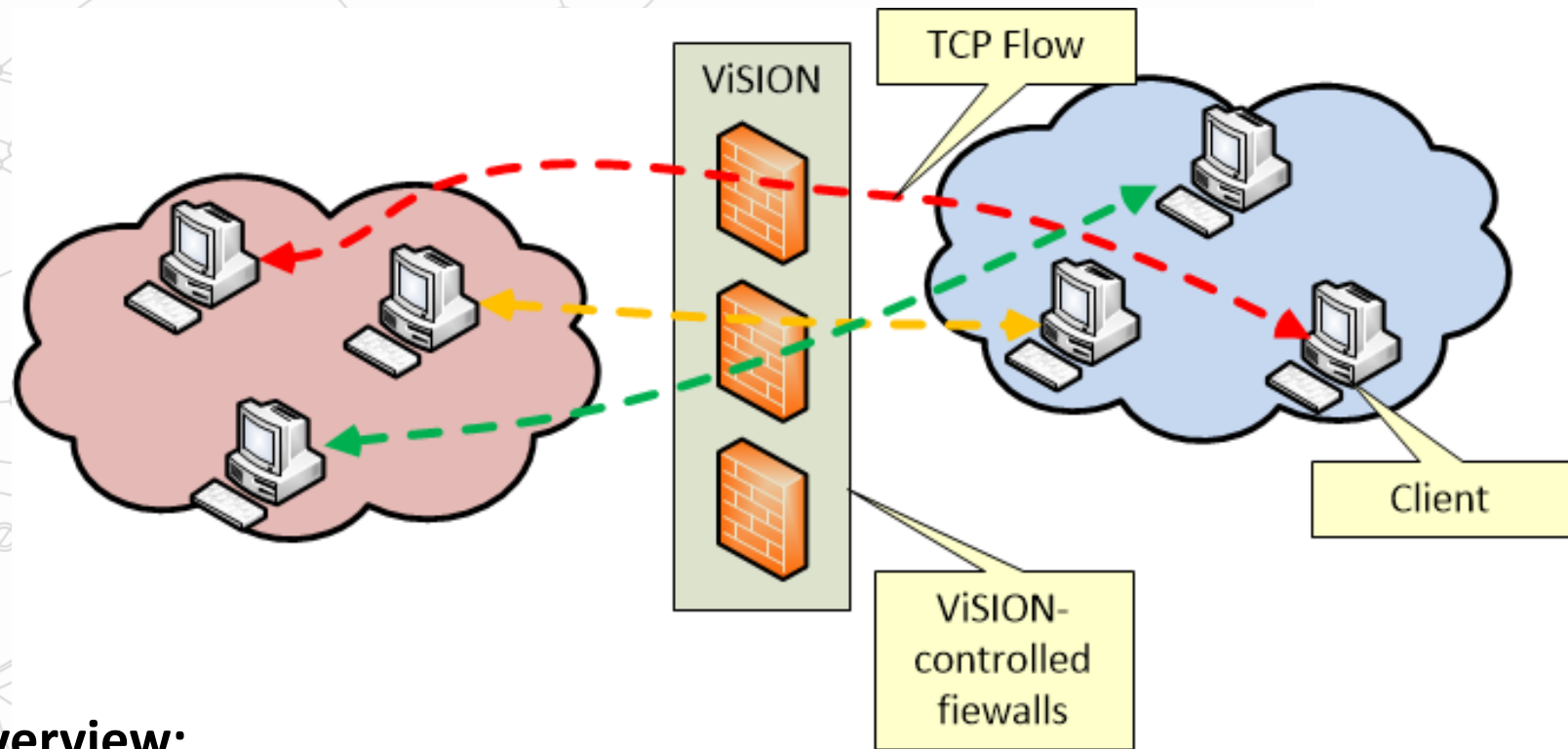
b. Mirroring



ViSION Regressive Testing App



ViSION Regressive Testing App



Overview:

- adapted mgen used for traffic injection
- agent application to coordinate and monitor a machine's flows
- manager application to coordinate a pool of agents

Status:

- prototype, not yet finalized
- summer student involvement

ViSION Project Timeline

