

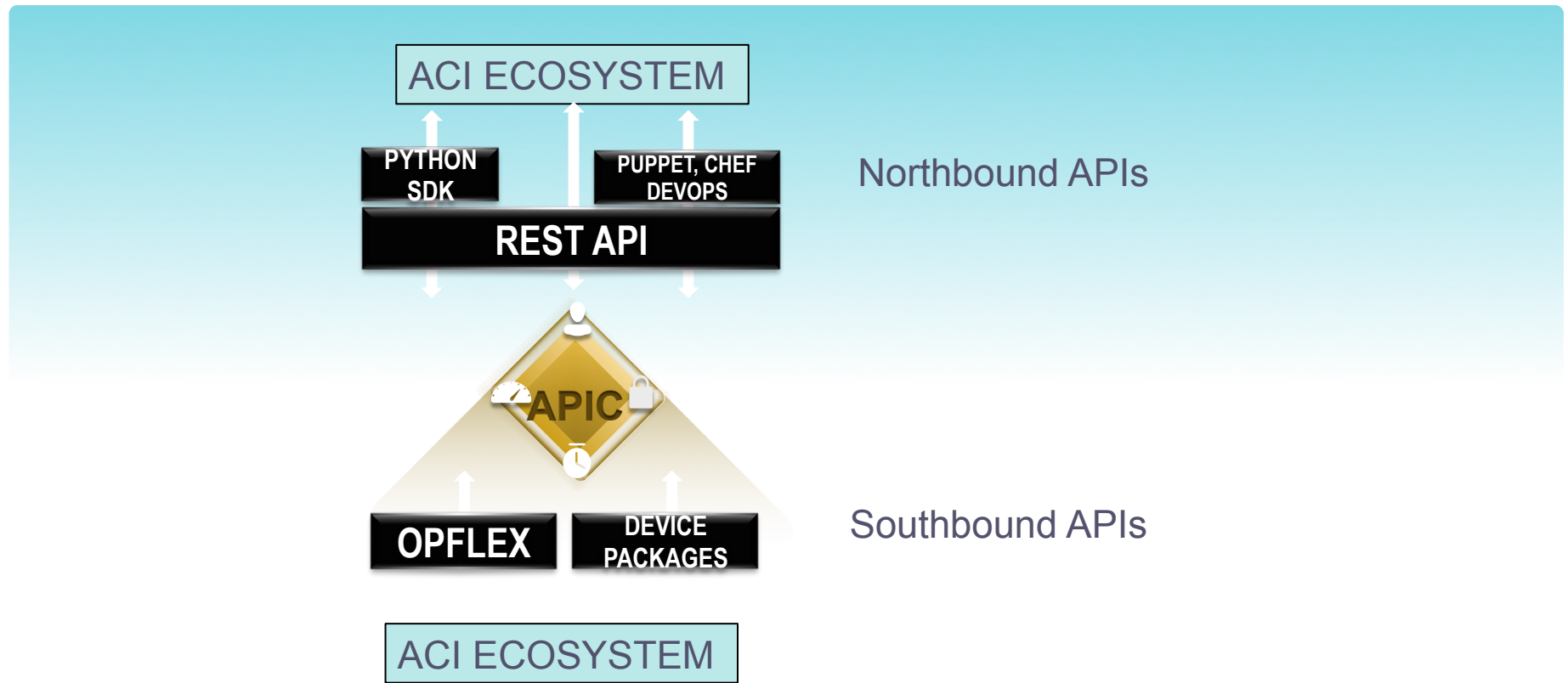


ACI-SE M07

OpenStack and OpFlex

ACI Open API's Overview

ACI OPEN API'S



ACI OpenStack

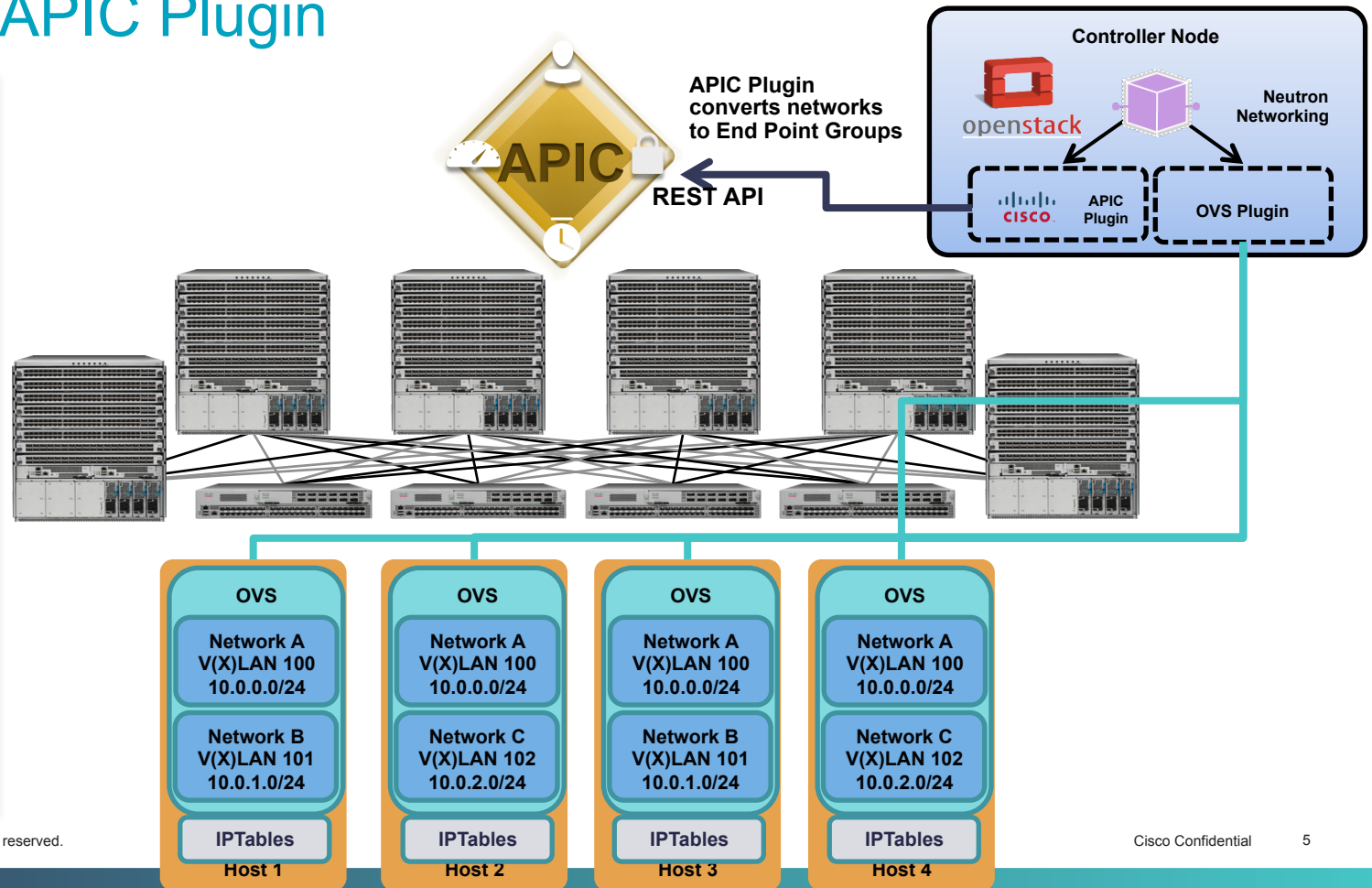
OpenStack APIC Plugin

Advantages

- ACI Fabric offers hardware VXLAN encapsulation
- Flexible placement of virtual machines
- Distributed L3 gateway
- L2 Extension to physical servers, etc.

Operation:

- Use standard OpenStack APIs and primitives – networks, subnets, etc.
- Leverage standard OVS
- IPTables available for security group functions



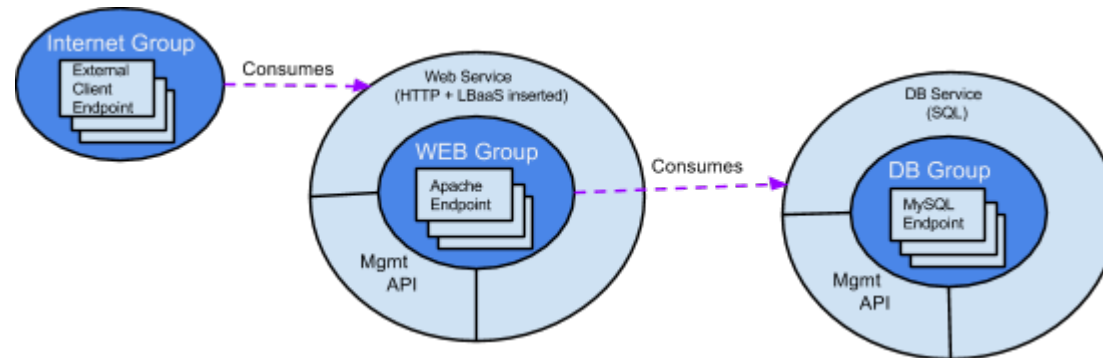
Neutron API Mapping

OpenStack	ACI
Tenant	Tenant
<i>No equivalent</i>	Application Profile
Network	EPG
Subnet	Subnet
Security Group	Handled by Host
Security Group Rule	Handled by Host
Router	Context
Network:external	Outside

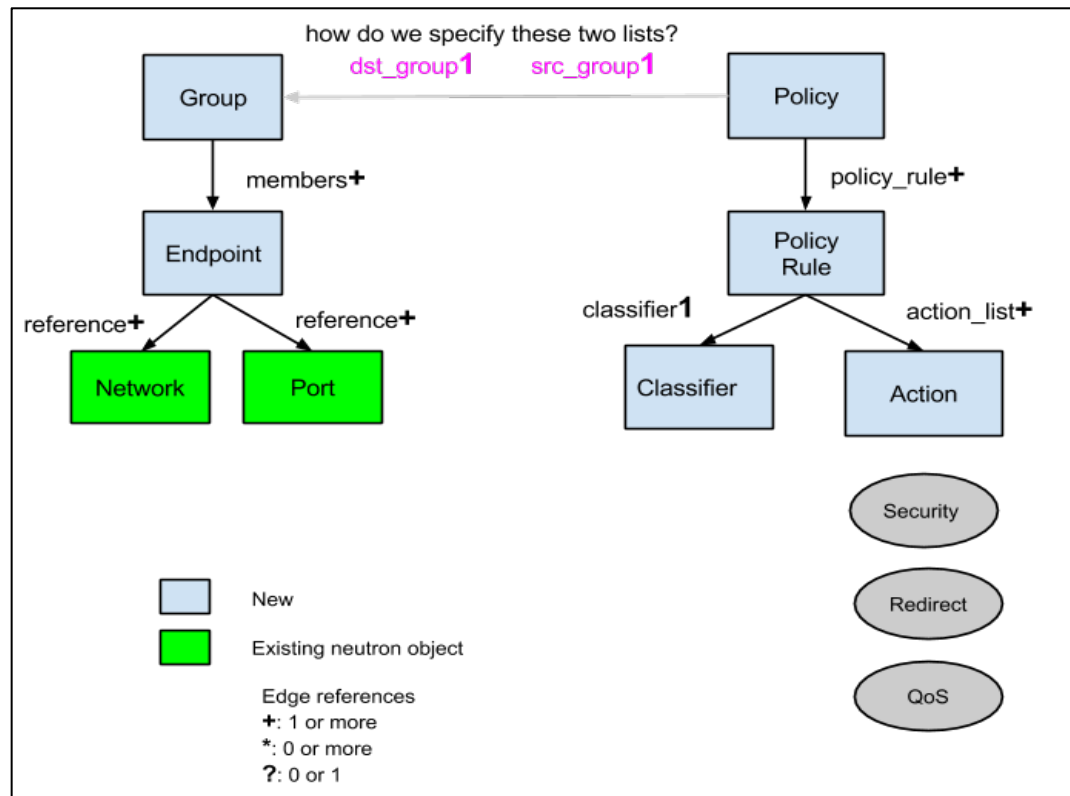
Group-based Policies In OpenStack

Group-based Policy in Openstack

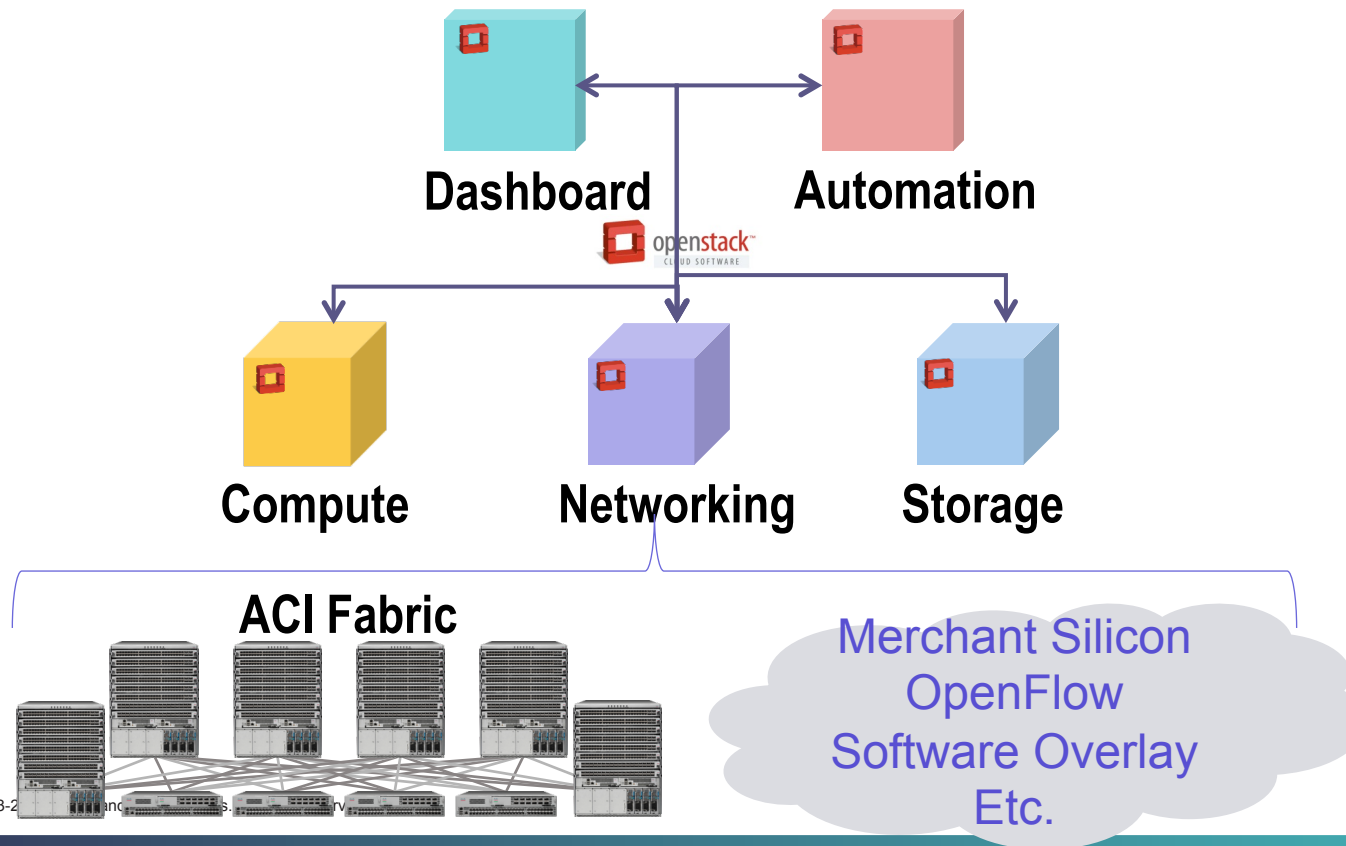
- Messy mapping ACI to current OpenStack components
 - Endpoint Groups (Ports + Security Groups)
 - Contracts (Security Groups + Security Group Rules)
- Goal : Introduce ACI model into OpenStack
- Starting with Groups and Group based Policies



Proposed Neutron Model

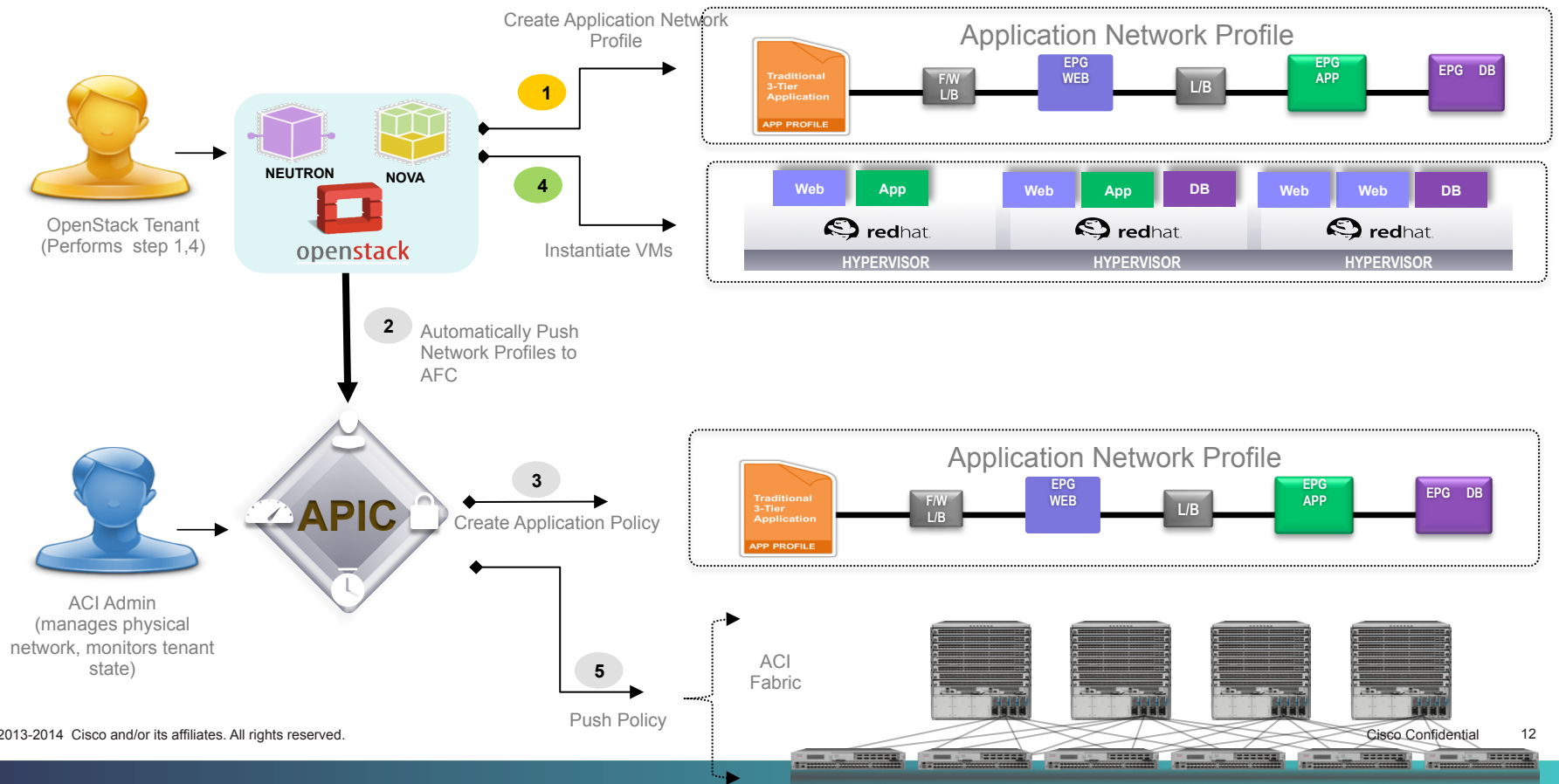


Group-based policy in OpenStack



- IBM
- redhat
- JUNIPER NETWORKS
- nuagenetworks
- PLEXxi
- midokura

GROUP-BASED POLICY WORKFLOW



Roadmap

Target date	OpenStack Release	Deliverable
Q2 '14 (Product FCS)	Ice House	Initial Neutron Plugin [Floating IP support pending APIC integration]
Q4 '14 (Juno Release)	Juno	Group Policy Extensions to Neutron

Opflex

Problem: Micromanagement of infrastructure

- Networks today are high touch, micromanaged environments
- Infrastructure, operations, and tenant desires are all co-mingled
- Causes huge problems in **scaling, coping with failures, and interoperability**
- SDN to date has not fixed this problem

Now that you have logged on, click on the Start button and navigate to your email account. Take five minutes to read, then make a cup of tea...



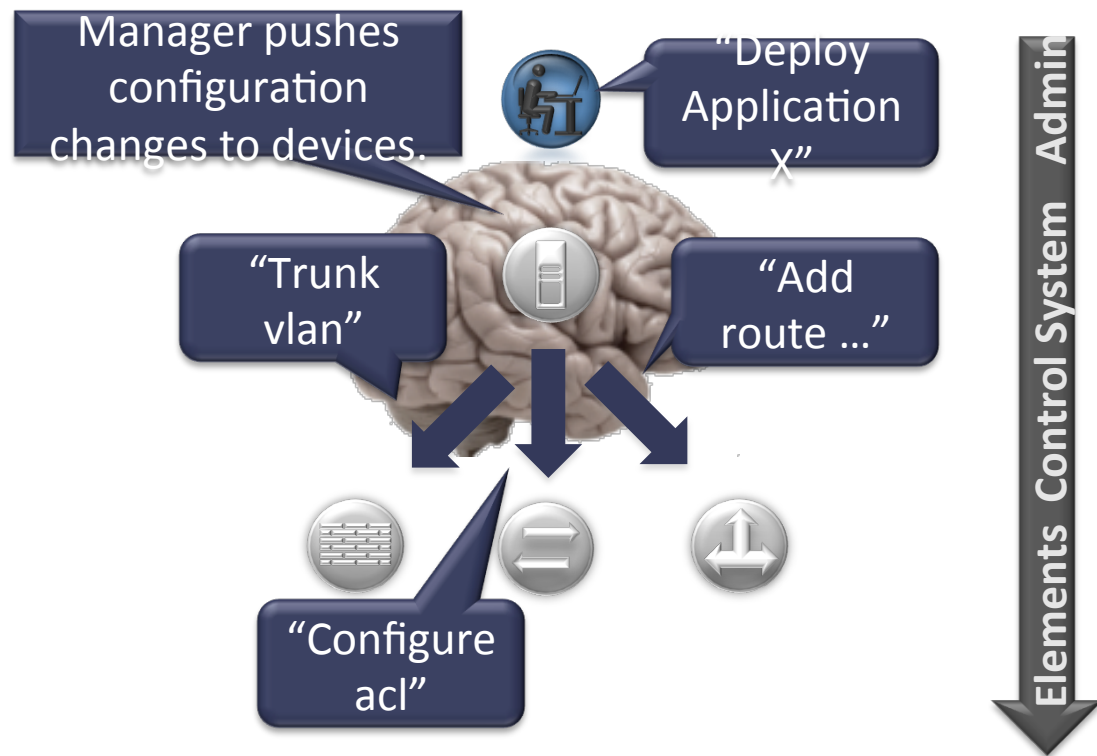
Example: Configuring Networking on New Server

Imperative Control

User request is decomposed to a large number of infrastructure specific commands

What can go wrong?

- Central manager may not scale
- System cannot react to failure with consulting the manager
- Manager must know capabilities of every device



Imperative Control and Why I should care

Imperative control systems (such as OVSBD):

1. Depend on a centralized management plane. This limits scale as all network devices must register with the centralized management plane.
2. Centralized management also exposes a large failure domain.
3. Mandates a strict definition of objects based on low level network functions, limiting vendor innovation
4. Uses a narrow set of features intended to overcome scale limitations of first generation SDN LAN Emulation models

Imperative control systems requires all these devices to look the same

Limited features stifle innovation and require secondary provision for the network

Modular 1



Modular 2



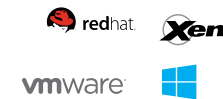
Vendor 1



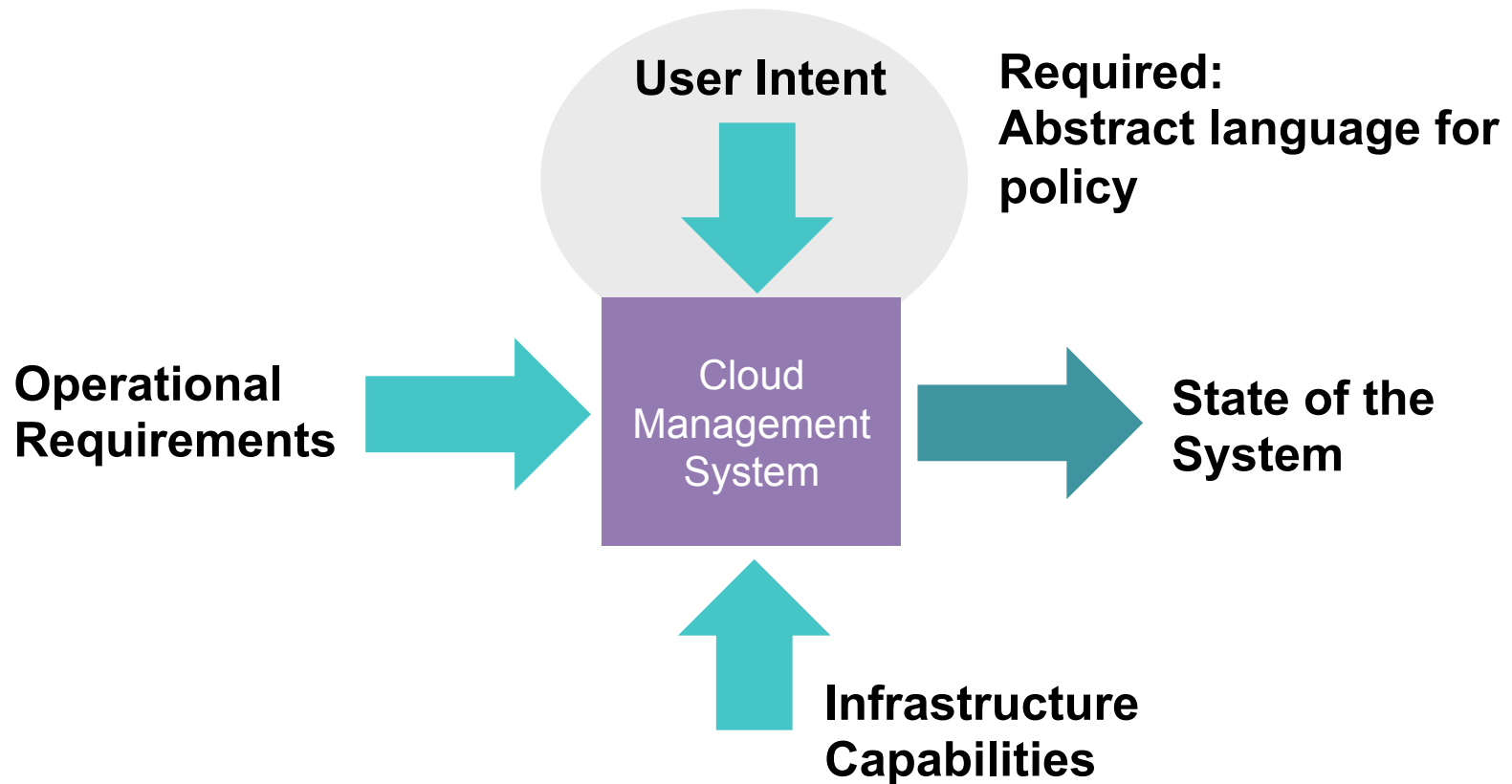
Vendor 2



Hypervisor vSwitches

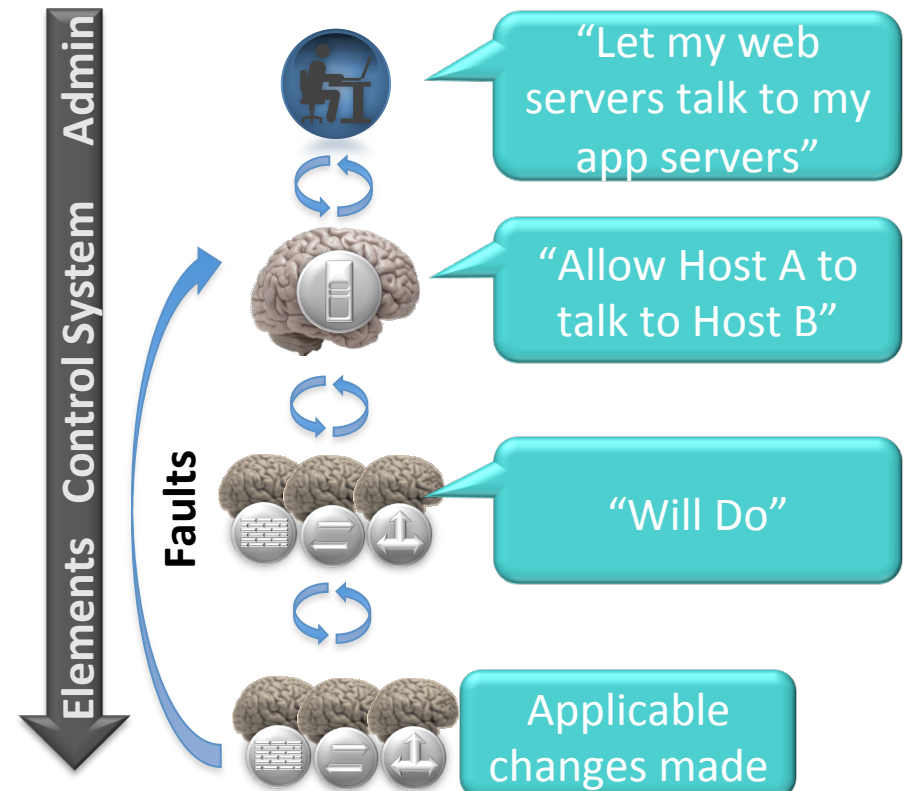


Goal: Capture and Preserve user intent



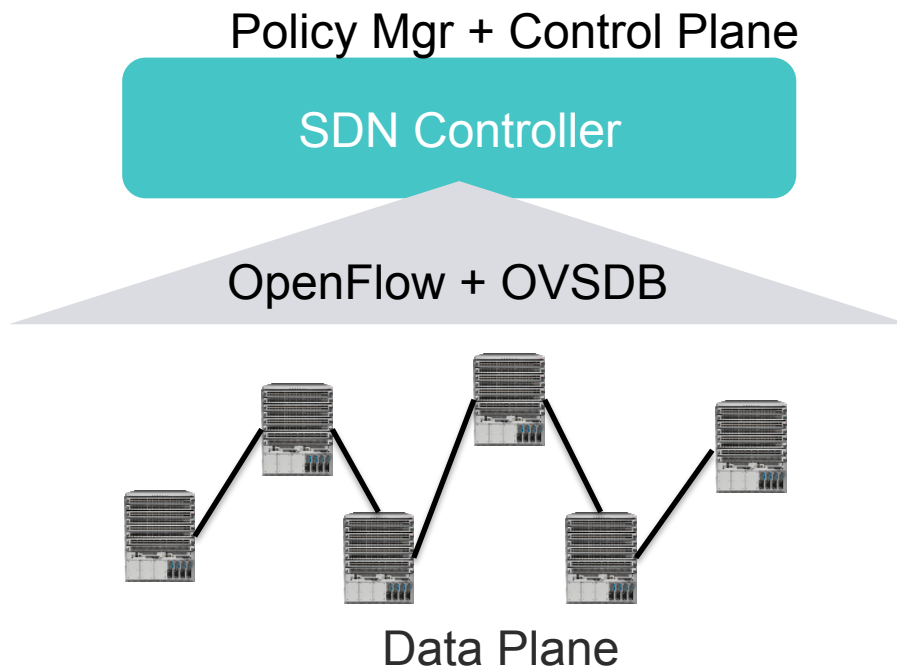
Solution: Declarative Control

- Capture abstract policies and share them with the infrastructure directly
- Let infrastructure interpret them directly based on its capabilities
- Handle and resolve faults that occur

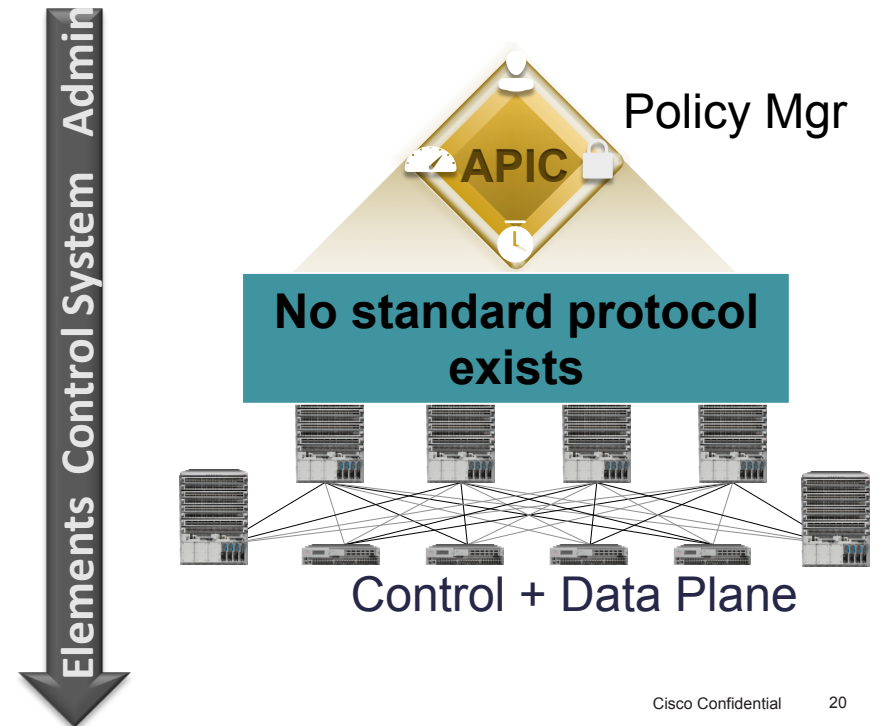


Mapping to SDN Today

Imperative Control



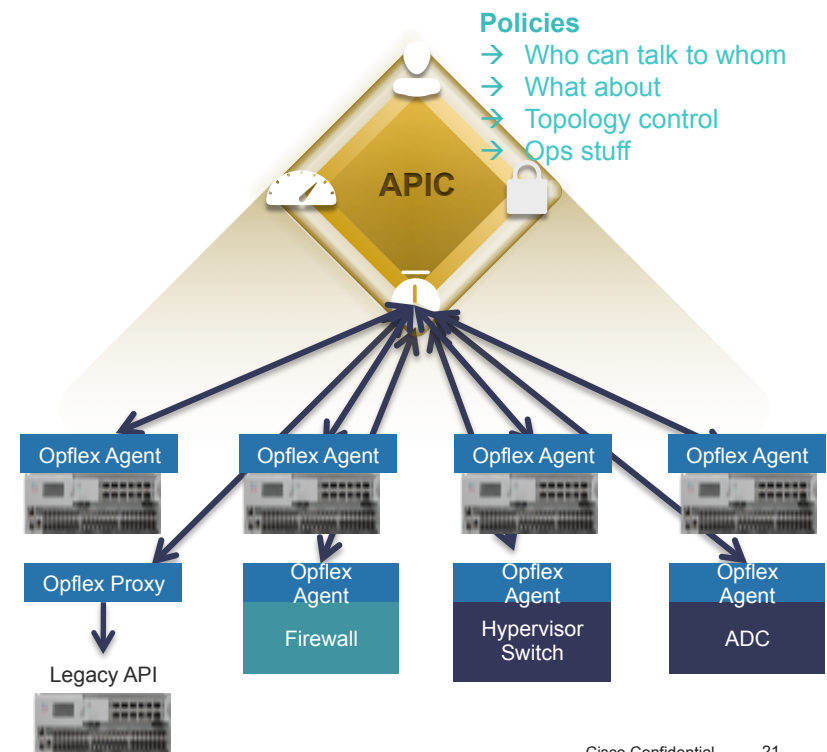
Declarative Control



Opflex – A flexible, extensible policy protocol

OPFLEX is a new extensible policy resolution protocol designed for declarative control of any datacenter infrastructure. OPFLEX was designed to offer:

1. Abstract policies rather than device-specific configuration
2. Flexible, extensible definition of using XML / JSON
3. Support for any device – vswitch, physical switch, network services, servers, etc.



OPENING THE ACI POLICY ENGINE WITH OPFLEX

OPFLEX PROTOCOL + ECOSYSTEM



OPEN SOURCE

Open source implementation available to anyone

STANDARD

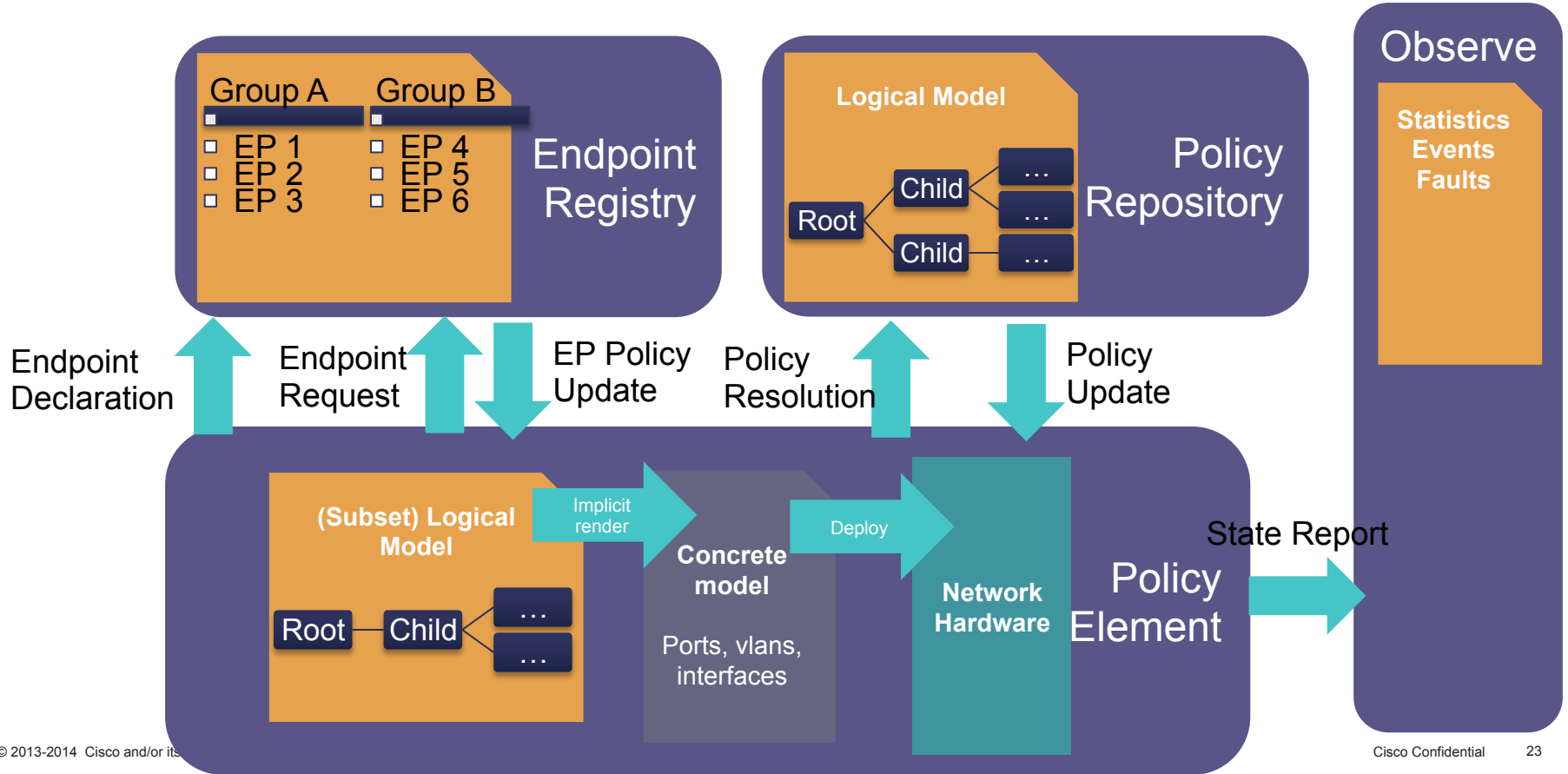
Upcoming Opflex standard through IETF

ECOSYSTEM

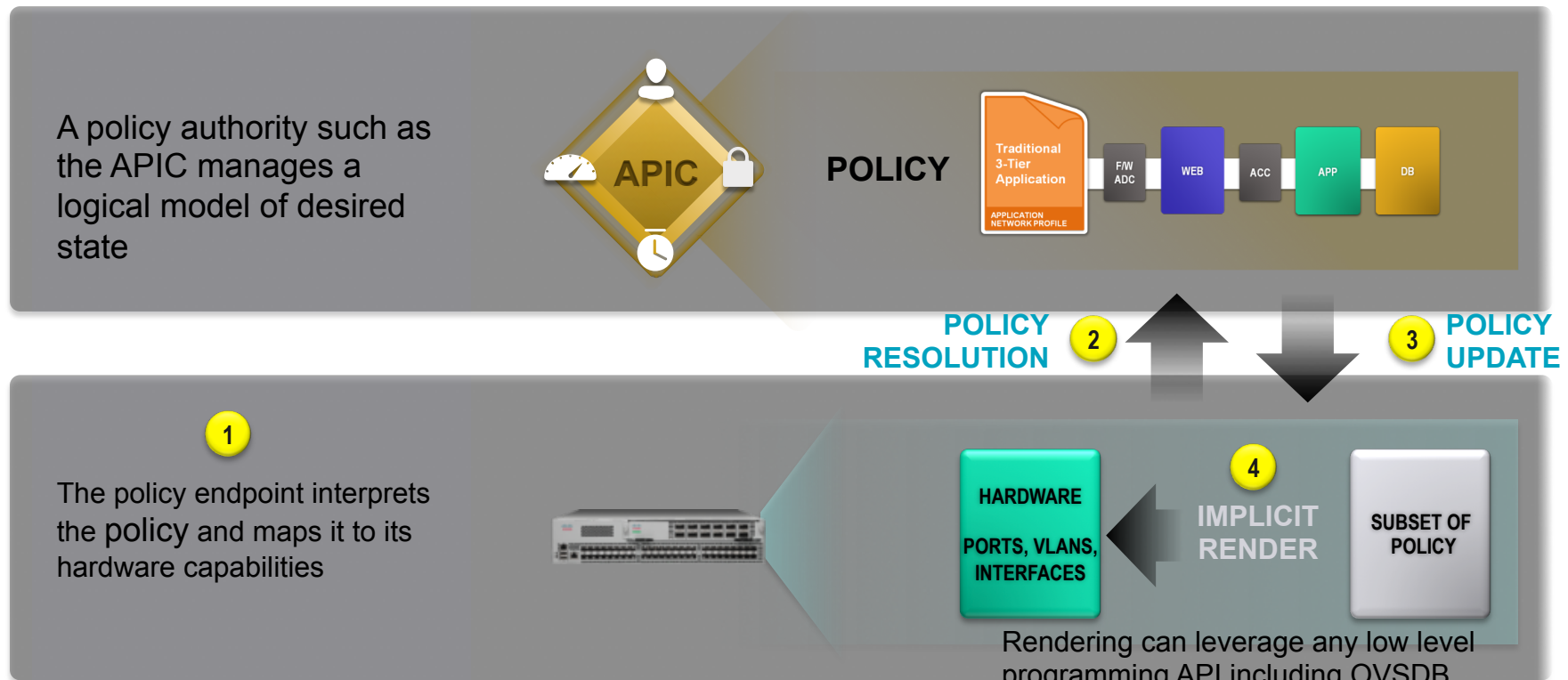
Broad, growing vendor support including hypervisor, network, and L4-7

**DELIVERING INVESTMENT PROTECTION BY
ALLOWING ANY DEVICE TO INTEGRATE WITH CISCO ACI**

Opflex Protocol



HOW OPFLEX WORKS - SIMPLIFIED



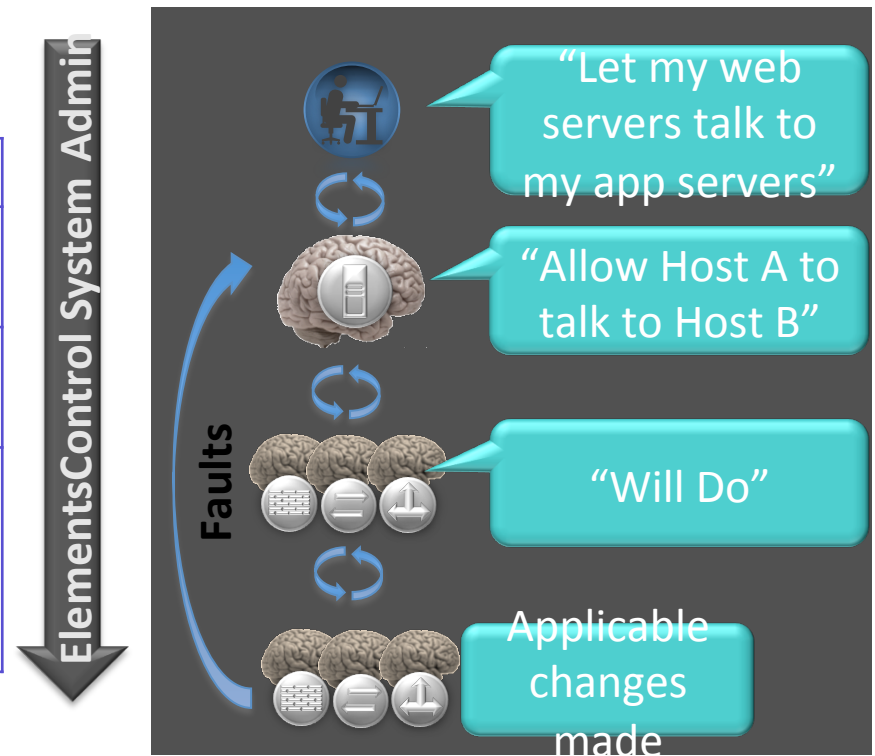
Advantages of declarative Control + Opflex

Declarative management (ie. Promise Theory) is the voluntary cooperation of individuals or agents who publish their intentions via commitments to each other.

Key Advantages include:	
Scalability	Simple, abstract way of managing infrastructure
Resiliency	Promise interfaces provide an easy way to cope with failures
Interoperability	Device complexity / versions is hidden from users and control software

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Declarative Management



Opflex – Declarative Models and Why I should care

OPFLEX leverages a declarative model:

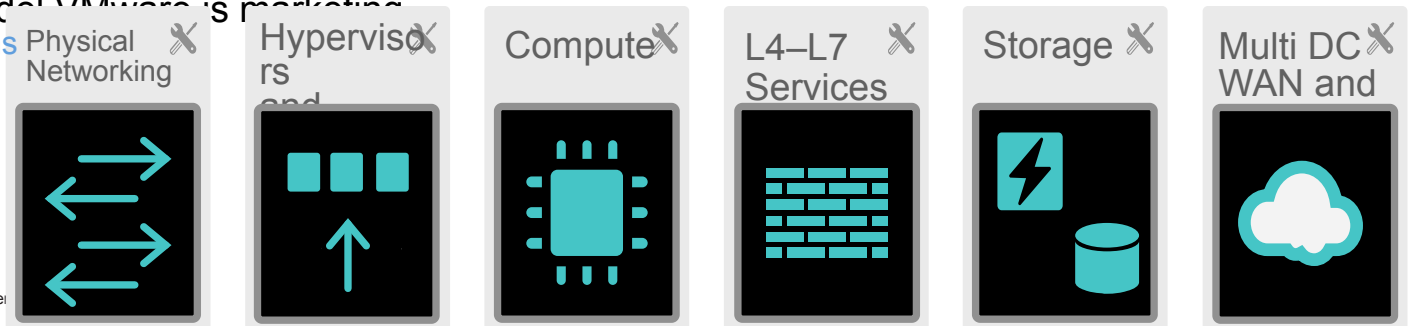
1. OPFLEX enables a distributed control plane allowing scale for next generation solutions eliminating the legacy dependencies of first generation SDN LAN Emulation
2. OPFLEX is open-sourced, open to any vendor & supports any device in the data center, campus, and WAN
3. OPFLEX enables vendor innovation by declaring the feature / function –not mandating it and allows vendors to implement the functions aligned with the device or software capability.
4. Declarative models enable each platform to maximize its capability and avoids lowest common denominator implementations limiting vendor innovation and avoiding control plane lock in and expense shift as with the model VMware is marketing

OPFLEX Simplifies Operations

Enables customer choice and innovation

Extends automation beyond the data center

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Opening Opflex

- IETF Informational RFC for Opflex
- **Open source agent** supporting the protocol that can be used by any hypervisor switch, physical switch, or L4-7 device

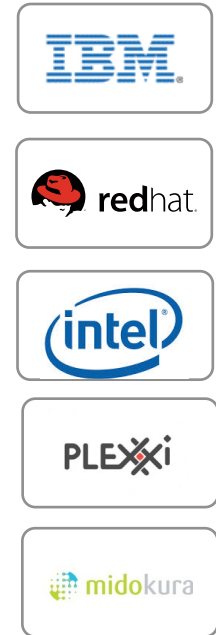
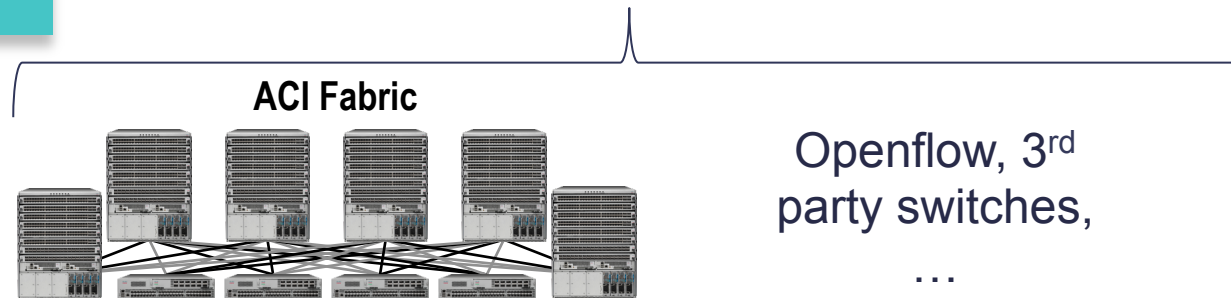
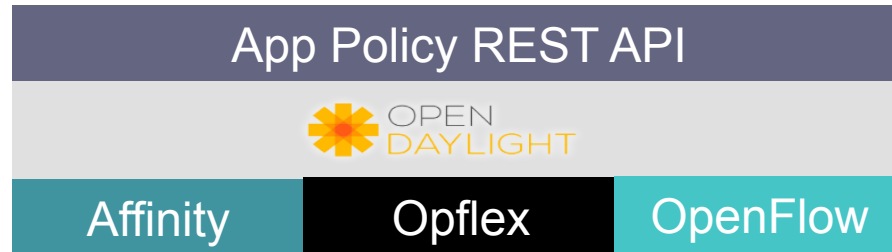
Open DayLight Integration

Application Policy in Open Daylight

Goals:

- Expose policy through ODL
- Support heterogeneous backend environments

Note: Still very much a work in progress!



Project currently in “Incubation” Status in ODL. See: https://wiki.opendaylight.org/view/Project_Proposals:Application_Policy_Plugin

Thank you.

