Cisco TechAdvantage Webinar: A Closer Look at OpenDaylight

June 5, 2013

LINUX FOUNDATION
COLLABORATIVE PROJECTS

Project Introduction

June 5, 2013

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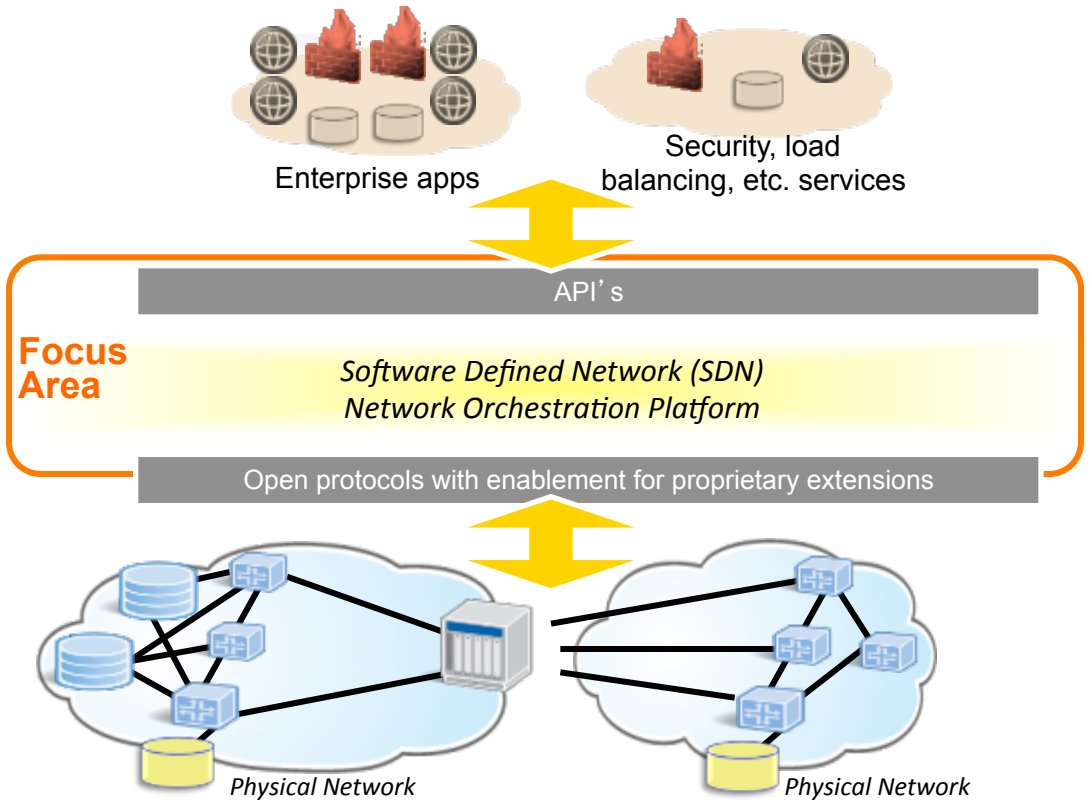
Data Center Networks are Evolving

Integrated systems and Software Defined Networking (SDN) reset business opportunities

Applications and services that ride on, optimize, exploit, and manage the network

Software Defined Networking is a software layer that makes the network more programmable, agile, and efficient

A data center "fabric" provides the physical connections within and between compute units



What is OpenDaylight Project?

OpenDaylight is an open source project under the Linux Foundation with the mutual goal of furthering the adoption and innovation of Software Defined Networking (SDN) through the creation of a common industry supported framework.

Platinum

big switch networks
BROCADE
cisco
CITRIX
ERICSSON
IBM
JUNIPER NETWORKS
Microsoft
redhat

Gold

NEC
vmware

Silver

ARISTA
ciena
CYAN
DELL
FUJITSU
hp
HUAWEI
INOCYBE TECHNOLOGIES
intel
nuagenetworks
PLEXXI
PLUMgrid
radware

OPENDAYLIGHT

www.opendaylight.org

Members as of June 4, 2013 and growing

OpenDaylight Project Goals

- **Code:** To create a robust, extensible, open source code base that covers the major common components required to build an SDN solution
- **Acceptance:** To get broad industry acceptance amongst vendors and users
- **Community:** To have a thriving and growing technical community contributing to the code base, using the code in commercial products, and adding value above, below and around.

Industry Impact

- Develop a common environment for customers
- An open framework, an open standard and an industry wide supported open controller codebase that anyone can use, plug into or contribute new enhancements
- Customers can participate and gain access new technologies more quickly
- Enable faster innovation by vendors

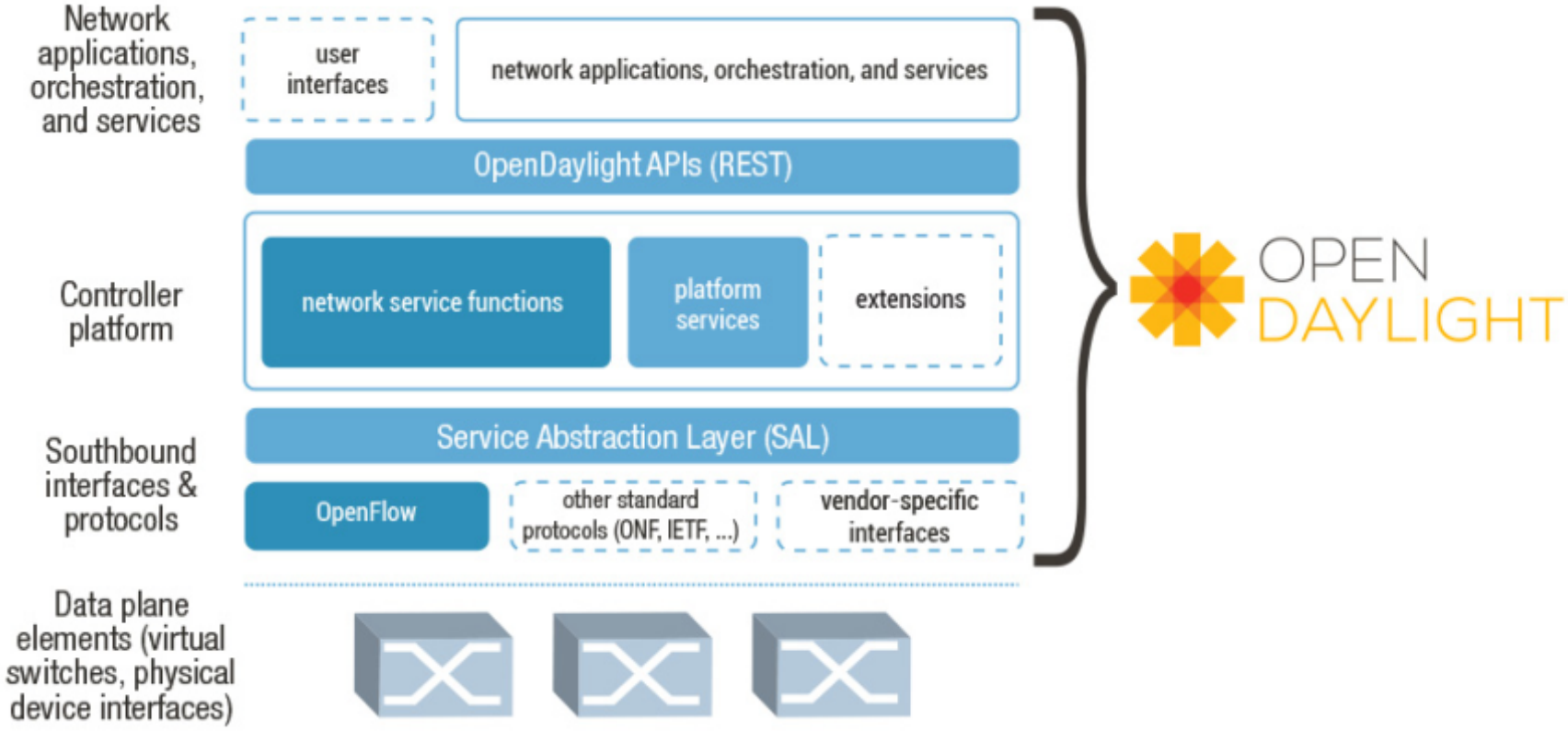
Progress through Innovation

- Membership open to all
  - No charge for individual developers
  - Fee-based vendor membership to provide common resources
- Business leadership: Board of Directors
  - Governance, marketing, operations
- Technical leadership: Technical Steering Committee (TSC)
  - Meritocracy
  - Technical direction, project selection, technical decisions

The Code

- A wide array of technologies contributed by leading companies and developers
- Developers can contribute code at the individual level — no money necessary
- Robust platform for new apps and tools
- Eclipse Public License (EPL)

Project Framework



Timeline

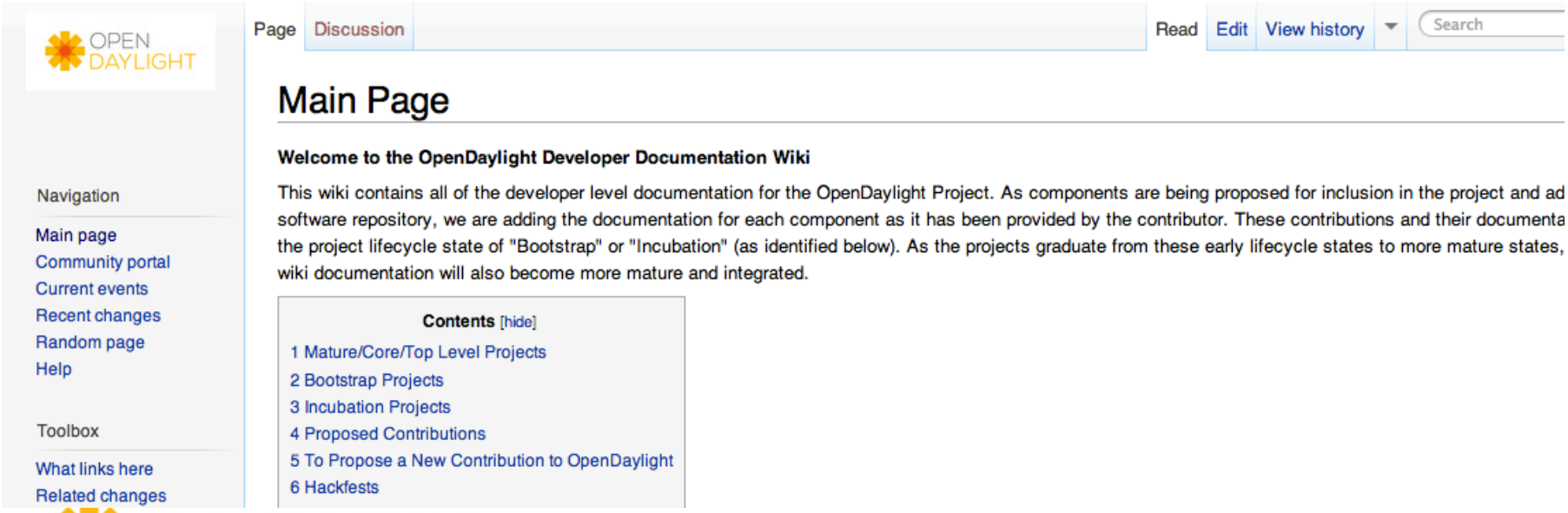
Date	Event
08 April 2013	Pubic announcement & first code contributed
15-17 April 2013	Plenary and Technical Sessions at Open Networking Summit Video Archive
6-10 May 2013	Interop Las Vegas
Q2 CY13	Technical architecture released
Q3 CY13	Initial code drop

Resources

- More information and to join:
  - www.opendaylight.org
  - info@opendaylight.org
- Keep informed
  - @openDaylightSDN

Getting started with OpenDaylight

- Developer documentation: wiki.opendaylight.org
  - List of current projects in various states
  - Links to documentation on current projects, e.g., how to get/build code, architecture, etc.
  - Information on proposing new projects for OpenDaylight



Getting involved in OpenDaylight

- Open mailing lists: **lists.opendaylight.org**
  - Discussion groups on specific projects
  - Cross-project discussions
  - Announcements

lists.opendaylight.org Mailing Lists

Welcome!

Below is a listing of all the public mailing lists on lists.opendaylight.org. Click on a list name to get more information about the list, or to subscribe, unsubscribe, and change the preferences on your subscription. To visit the general information page for an unadvertised list, open a URL similar to this one, but with a '/' and the list name appended.

List administrators, you can visit the list admin overview page to find the management interface for your list.

If you are having trouble using the lists, please contact mailman@lists.opendaylight.org.

List	Description
controller-announce	OpenDaylight Controller Announcements (low volume)
controller-bugs	Notifications from Bugzilla for the OpenDaylight Controller.
controller-dev	Developer discussions for the Open Daylight Controller.
controller-gerrit	Gerrit automated notices about the OpenDaylight Controller.
controller-jenkins	Jenkins CI notifications for the OpenDaylight Controller
controller-users	Community driven support alias for the OpenDaylight Controller.
Discuss	OpenDaylight cross project discussion
opendaylight-announce	OpenDaylight Announcements (low volume)
opendaylight-users	OpenDaylight community support
project-proposals	OpenDaylight project proposals to the TSC
TSC	OpenDaylight Technical Steering Committee

OpenDaylight Structure

- Organized as a separate project within The Linux Foundation with separate Board and Technical Steering Committee components.
  - Board of Directors. The consortium is a 501(c)(6) non-profit corporation as a project under the Linux Foundation
  - Technical Steering Committee. Formed from the Project Leads from the core projects and one representative designated by each Platinum member

- Goal to ramp to 140 developers and $2-3M/year within 12 months of launch and eventually 200-300 developers
  - Includes modest number of build, test, and program-management personnel
  - Contributions licensed to the consortium under EPL and licensed out to interested parties under that same license

- Includes tiered membership of Platinum, Gold, Silver, and individual memberships
  - Annual fee and full-time engineers (FTEs) - verification of committed number of FTEs on honor system
  - Levels provide member with either a default board position (Platinum) or to have an opportunity to be elected to the Board (Gold and Single members)
  - Contributors, committers and project leads influence TSC

Membership Level	Annual Fee	FTEs	IP contribution	Technical Steering Committee	Board / Voting position
Platinum	$500K	10	Desired significant, in addition to FTEs	One seat per member not otherwise represented	Includes board position
Gold	$50K-250K ($50/employee)	3	Not required	May be on TSC if Project Lead	One Board seat per every three, subject to Board size limit
Silver	$10K-20K ($10/employee)	0	Not required	May be on TSC if Project Lead	One Board seat elected by all Silver members
Individual	$0	0		May be on TSC if Project Lead	May be elected to community board seat

OpenDaylight Governance Basics

- Most large, complex open source communities have both a business and a technical governance model – where technical leadership contains both a Technical Steering Committee (TSC) and project leads for major components and the business leadership is instantiated in a Board of Directors of the Consortium (Board). The Board and TSC have the ability to change the way they operate over time, subject to the policy and by-laws of the consortium.

- The consortium will operate transparently, openly, collaboratively, and ethically.
  - **Business (Board component):** The consortium will be established as a 501(c)(6) non-profit corporation as a project under the Linux Foundation to avoid duplicating the corporate organization framework.
    - Responsible for corporate organization, marketing, press, legal, IP policy (including license choice), recruiting new members, and funding/organizing periodic design summits.
    - Multi-tiered membership fee structure, with different levels of voting rights, TSC membership, board seats, etc.
    - Certain membership levels require the member to provide contributors/committer FTEs to the project.
    - Board will set overall Consortium Policy in consultation with the TSC. This policy will describe consortium scope (the aggregate scope of projects) & consortium technical vision & direction, and consortium release guidance to the TSC (e.g., deliver via regularly-scheduled release trains). Typically the Board as no say on technical issues, individual project scope & direction as long as they remain within the scope & direction of the Consortium Policy.
  - **Technical (Technical Steering Committee (TSC) component):** Formed from the Project Leads from the core projects and one representative designated by each Platinum member (see later slides). Spans entire project.
    - Subject to consortium policy set by board, is responsible for simultaneous release dates, release quality standards, technical best practices, monitoring technical progress, mediating technical conflicts between committers and project leads, and organizing inter-project collaboration.
    - Decision via voting as described on slide #8.
    - Daylight will seek to avoid duplicating technology and will use existing technology (e.g. open source libraries) from trusted sources (e.g. Eclipse Foundation and others) as appropriate.

OpenDaylight Governance Basics 2

- **Projects:** There will be multiple projects under the consortium. Each project, from the start, must be within Consortium policy and have a well defined scope and must work within that scope. Project will follow the Daylight Development Process as described in the Project Life Cycle doc.
- **Committers:** For each project there is a set of people with rights to commit code to the source code management system: the committers. They are the decision makers on design, code, and patches for their project. They must responsibly participate in the consensus decisions of the TSC
    - Committer rights are earned via code contribution, community trust, etc. – standard meritocracy model with new committers to be approved by the TSC
    - Fully open code submission, review, acceptance, build, test, delivery, and support model
    - Committer rights are per project, being a committer on one project does not necessarily give an individual committers rights on any other project.
    - Initial committers are specified at project creation. Additional committers are admitted by a vote of existing committers with appropriate process to handle dissent.
    - Committers are not necessarily from member/funding companies – they are the best available, but usually full-time for any components in active development
    - Initial projects that form the consortium base will need to have the first set of committers "boot-strapped". In order to preserve meritocracy in selection of committers while insuring diversity of committers, each initial project will commit to taking on at least 3 committers not from the company of origin within the first 3 months after consortium launch based upon evaluation of participation of contributors during that time.
    - The process the committers will use to accept/force modifications/reject code submissions and to add/delete committers (and other development details) will be defined by the Daylight Project Lifecycle document.
- **Contributors:** Most contributors work with their committer and their component's sub-community. They contribute code or other artifacts, but do not have the right to commit to the code base. A contributor may be promoted to a committer by the projects' committers. Done right, most contributors are rarely encumbered by the TSC and never by the Board.

The OpenDaylight Project

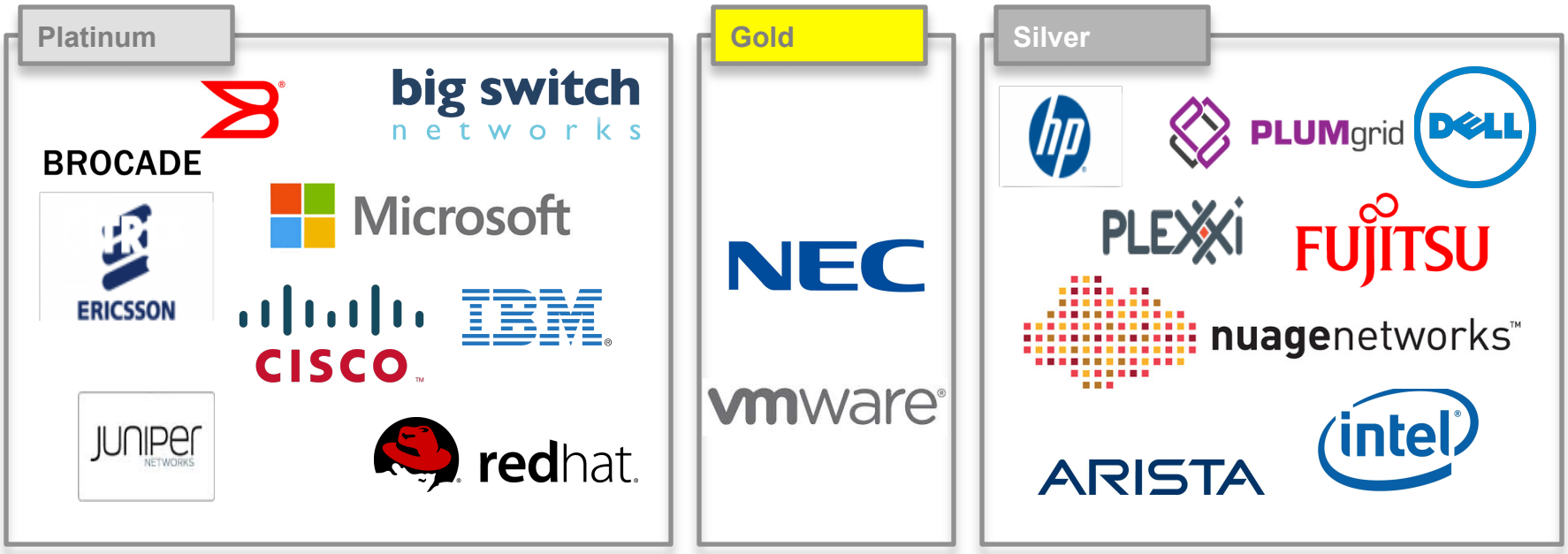
Jan Medved (jmedved@cisco.com)

LINUX FOUNDATION
COLLABORATIVE PROJECTS

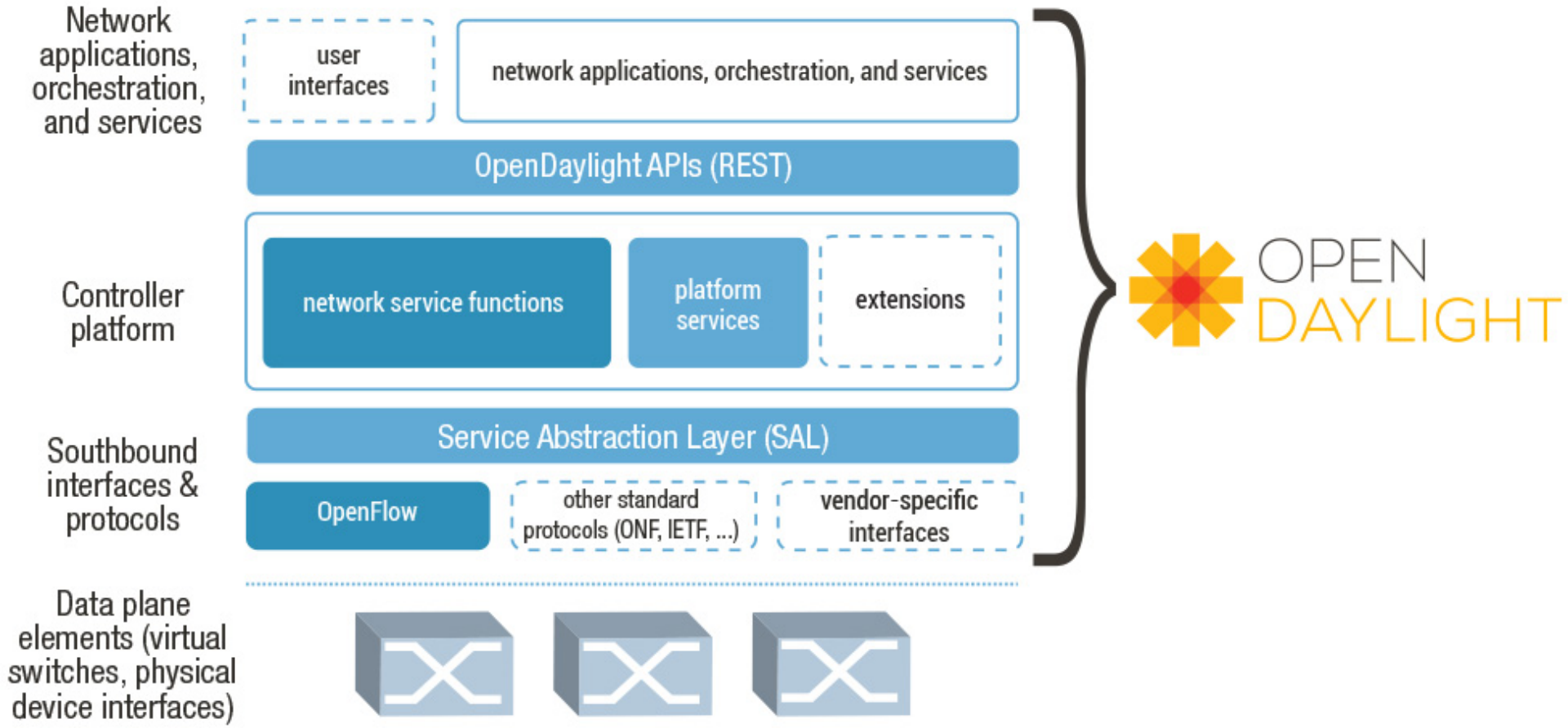
Project Overview

- Open source project formed by industry leaders and others under the Linux Foundation
- Goals:
  - Furthering the adoption and innovation of Software Defined Networking (SDN).
  - Accelerate real, deployable solutions for the industry:
    - Collaboration that leverages open source development best practices
    - Enable agile networks that can flexibly adapt to application requirements (e.g. Hadoop, Video)

OpenDaylight Members



OpenDaylight Controller Architecture



Network Layers – the Controller View

- **Network Apps & Orchestration**:
  - Applications that use the network for communication
  - Business and network logic applications that control, and monitor network behavior.
- **Controller Platform**:
  - The framework in which the SDN abstractions can manifest;
  - Provides a set of common APIs to the app layer (the NB API)
  - Implements one or more protocols for command and control of the physical hardware (the SB API).
- **Physical & Virtual Network Devices**:
  - Physical & virtual devices, switches, routers, etc.

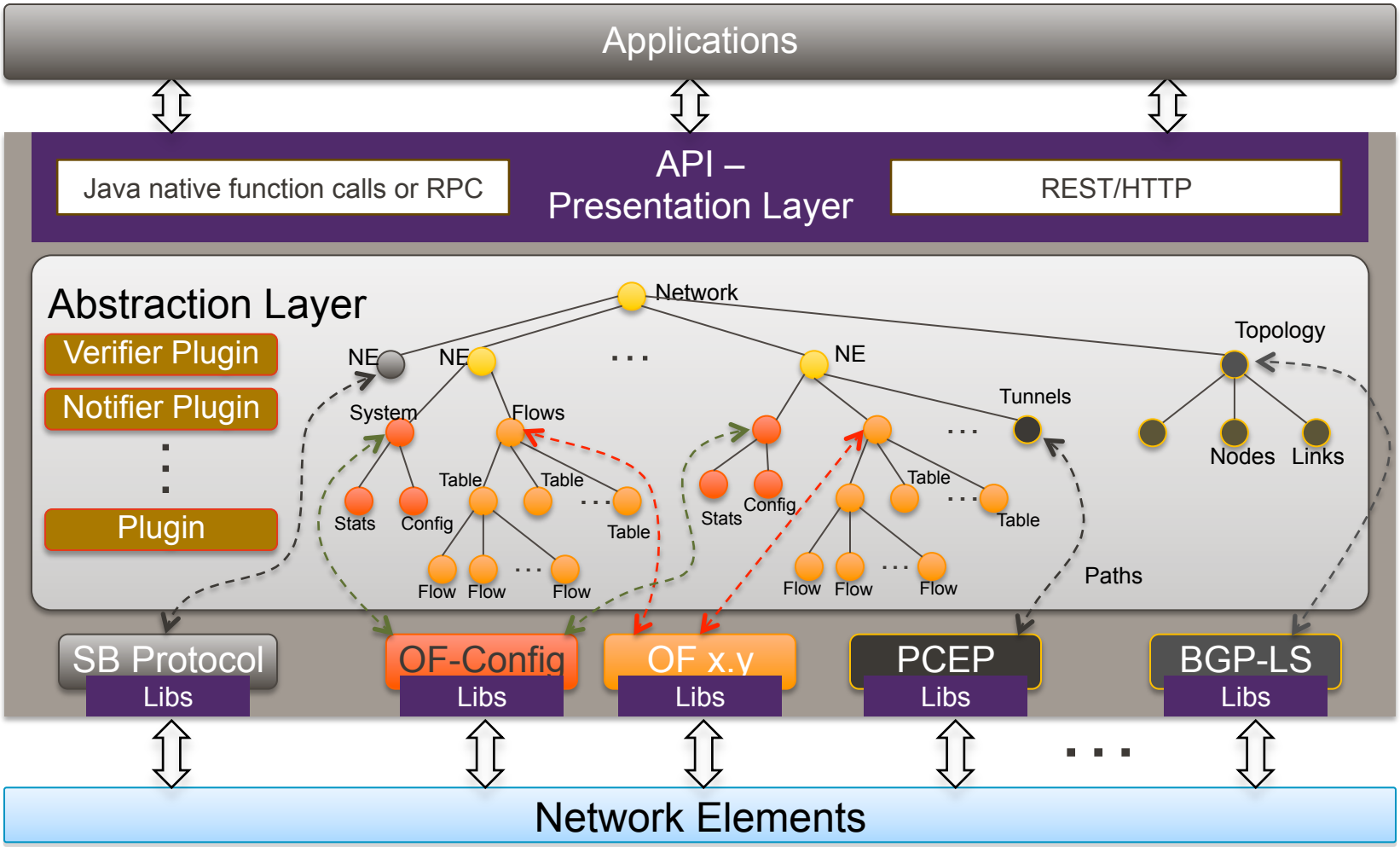
The Controller Platform

- Modular, pluggable, and flexible
- Implemented in Java
  - OSGI Framework
- Dynamically pluggable modules
  - Base functionality extensible with plugins
- Base network services:
  - NE & NE capability discovery
  - Statistics collection
  - Flow programming
  - …

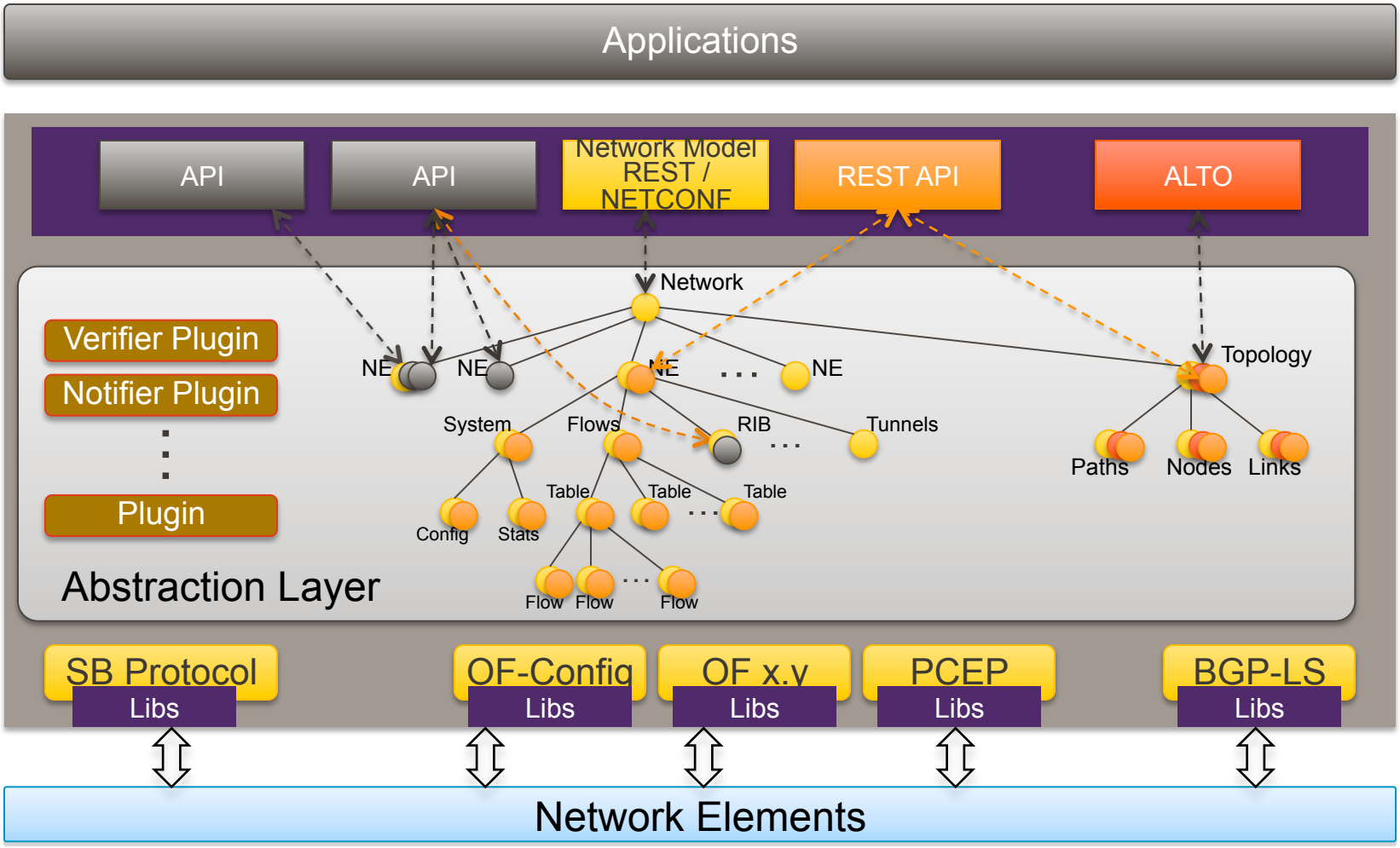
Controller APIs

- North-Bound APIs:
  - Java: tightly coupled applications, same address space
  - REST: loosely coupled applications
- South-Bound APIs:
  - Multiple protocols (as separate plugins):
    - OpenFlow 1.x, Of-Config, BGP-LS, etc.
- The SAL (Service Abstraction Layer):
  - Exposes device services & capabilities to apps
  - Determines how to fulfill requested service irrespective of the underlying protocol

Moving to Model-Driven SAL



Moving to Model-Driven SAL (Cont.)



Moving to Model-Driven SAL (Cont.)