OPEN DAYLIGHT

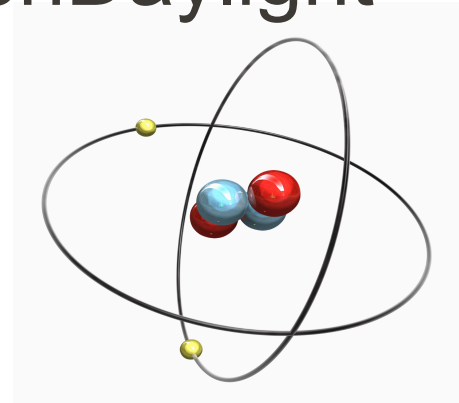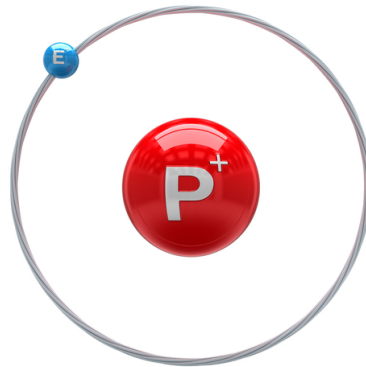## Introduction to OpenDaylight and Hydrogen, Learnings from the Year, and What's Next for OpenDaylight

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LINUX FOUNDATION
COLLABORATIVE PROJECTS

Agenda

- What is OpenDaylight/Hydrogen

- Key Personal Learning from a Year Inside ODP

- A Few Hydrogen/ODP Metrics

- What Is Queued up for "Helium"

- Were we're going

What is OpenDaylight

OpenDaylight is an **Open Source Software** project under the **Linux Foundation** with the goal of furthering the adoption and innovation of **Software Defined Networking (SDN)** through the creation of a common industry supported platform
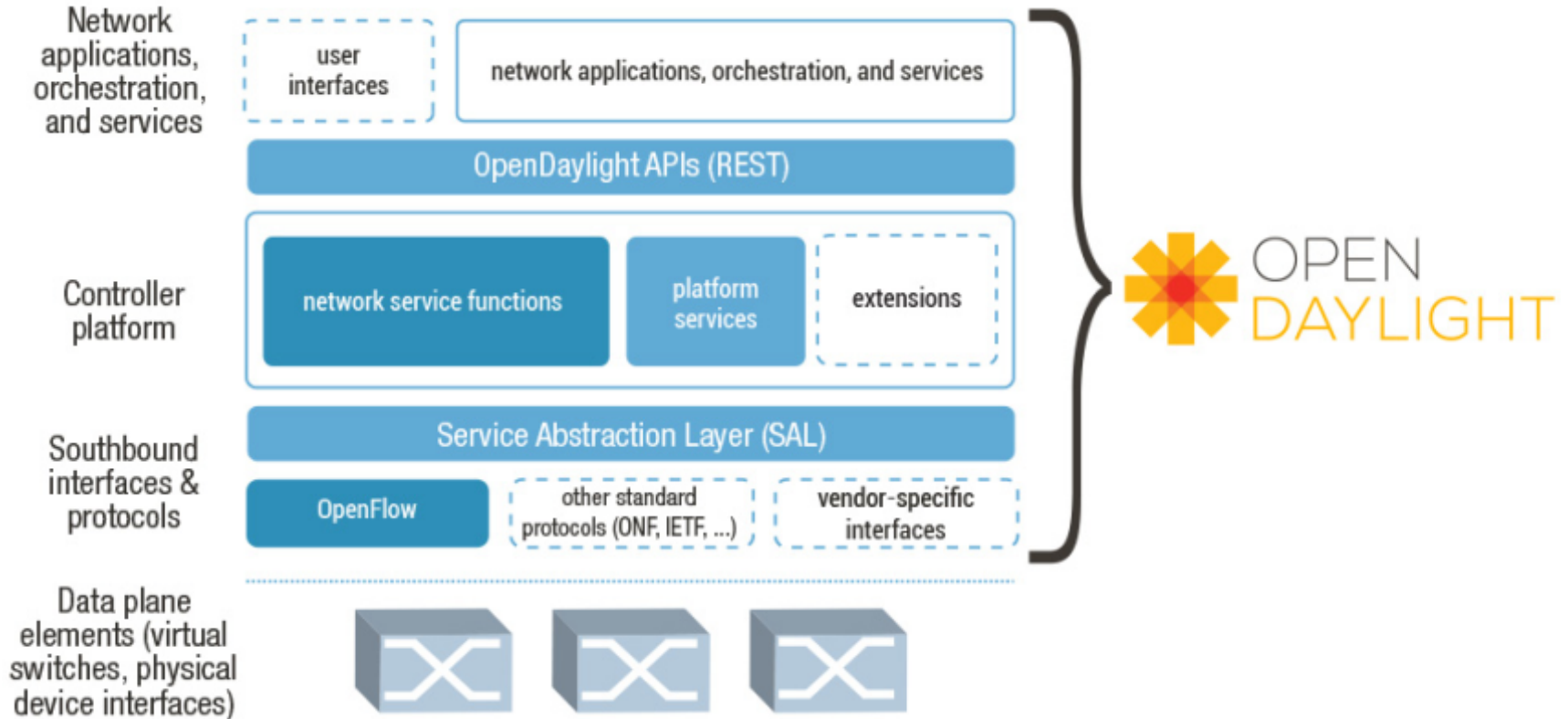
Code	Acceptance	Community
To create a robust, extensible, open source code base that covers the major common components required to build an SDN solution	To get broad industry acceptance amongst vendors and users • Using OpenDaylight code directly or through vendor products •Vendors using OpenDaylight code as part of commercial products	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.

What is OpenDaylight building?

OpenDaylight is an open *community* that is building:

- An evolvable SDN *platform* capable of handling diverse use cases and implementation approaches

- Common abstractions of capabilities NorthBound for people to program

- Intermediation of those capabilities to multiple Southbound implementations

- Programmable Network services

- Network Applications

- Whatever else we need to make it work

Project Framework

Who is OpenDaylight?
(the corporate sponsors)

Platinum Members

BROCADE   CISCO   CITRIX   ERICSSON   IBM

JUNIPER NETWORKS   Microsoft   redhat

Gold Members

NEC   vmware

Silver Members

ADVA Optical Networking   ARISTA   ciena   CYAN   DELL   FUJITSU

guavus   hp   HUAWEI   INOCYBE TECHNOLOGIES   intel   nuage networks

PLEXXi   PLUMgrid   radware   VERSA NETWORKS

*

OpenDaylight Simultaneous Release

- OpenDaylight is multi-project

  - 15 projects currently in "bootstrap" or "incubation"

  - Bringing components together in a simultaneous release

    - CodeName: Hydrogen

    - Release on: Jan 28, 2014

- Several "editions" to group related functionality together

  - base, virtualization, service provider

  - *virtualization edition will provide OpenStack integration*

*

Simultaneous Release Plan

Milestone	Offset 0 Date	Offset 1 Date	Offset 2 Date	Events
M0	6/24/2013	6/26/2013	6/28/2013	Simultaneous Release Open
M1	7/22/2013	7/24/2013	7/26/2013	1. Projects must have declared intent to participate in Simultaneous Release 2. Participating Projects must have published a candidate Release Plan for public comment
M2	8/19/2013	8/21/2013	8/23/2013	Participating Projects must have declared their final Release Plan
M3	9/16/2013	9/18/2013	9/20/2013	Latest possible Continuous Integration Test Start
M4	10/14//2013	10/16/2013	10/18/2013	1. API Freeze 2. Latest possible Continuous System Test Start
M5	11/11/2013	11/13/2013	11/15/2013	Code Freeze (bug fixes only from here) String Freeze (all internationalizable strings frozen to allow for translation) Latest possible date for commencing User Facing Documentation
RC0	11/18/2013	11/20/2013	11/22/2013	
RC1	11/25/2013	11/27/2013	11/29/2013	
RC2	12/2/2013	12/4/2013	12/6/2013	Participating Projects must hold their Release Reviews, including User Facing Documentation.
Formal Release	12/9/2013			

Well...

OPENDAYLIGHT

What Hydrogen Delivered

- OpenDaylight is multi-project

  - 15 projects

    - Project diversity v. mono-culture

- *Simultaneous Release*

- Release Date: Dec 9, 2013 ~   Feb 03 2014
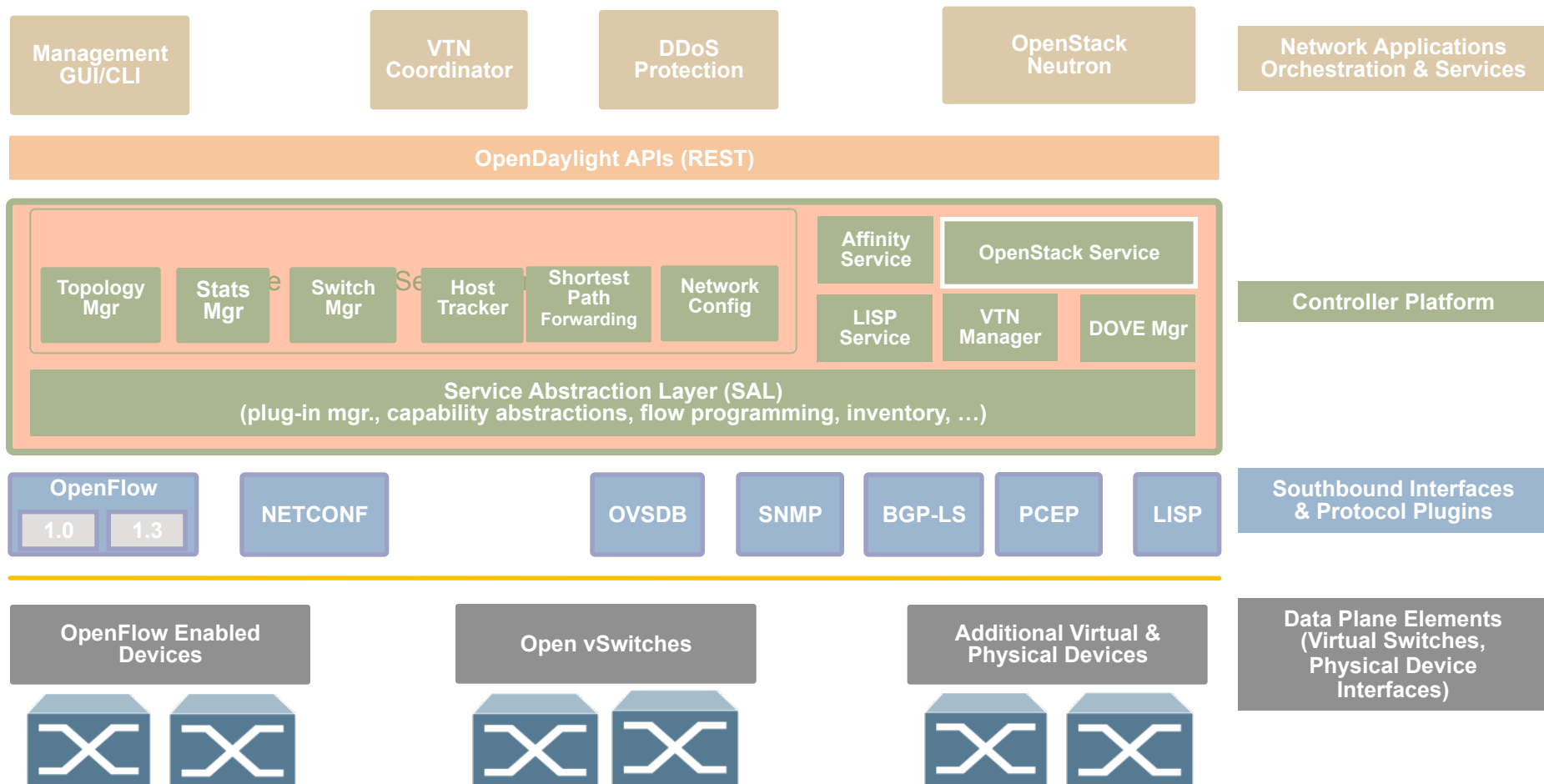
- Various Issues/Learning's

Impressive List of Projects in H_2

- Controller
- VTN
- OpenDove
- Affinity Management Service
- LISP Mapping Service
- Yang Tools
- Defense4All
- BGP-LS/PCEP

- OpenFlow Protocol
- OpenFlow SB Plugin
- OVSDB
- SNMP4SDN
- DLUX
- STI

Hydrogen Release (Jan 2014)

OPEN DAYLIGHT

| Management GUI/CLI | VTN Coordinator | DDoS Protection | OpenStack Neutron | **Network Applications Orchestration & Services** |

OpenDaylight APIs (REST)

| Topology Mgr | Stats Mgr | Switch Mgr | Host Tracker | Shortest Path Forwarding | Network Config | | Affinity Service | OpenStack Service | **Controller Platform** |
| | | | | | | | LISP Service | VTN Manager | DOVE Mgr | |

Service Abstraction Layer (SAL)
(plug-in mgr., capability abstractions, flow programming, inventory, …)

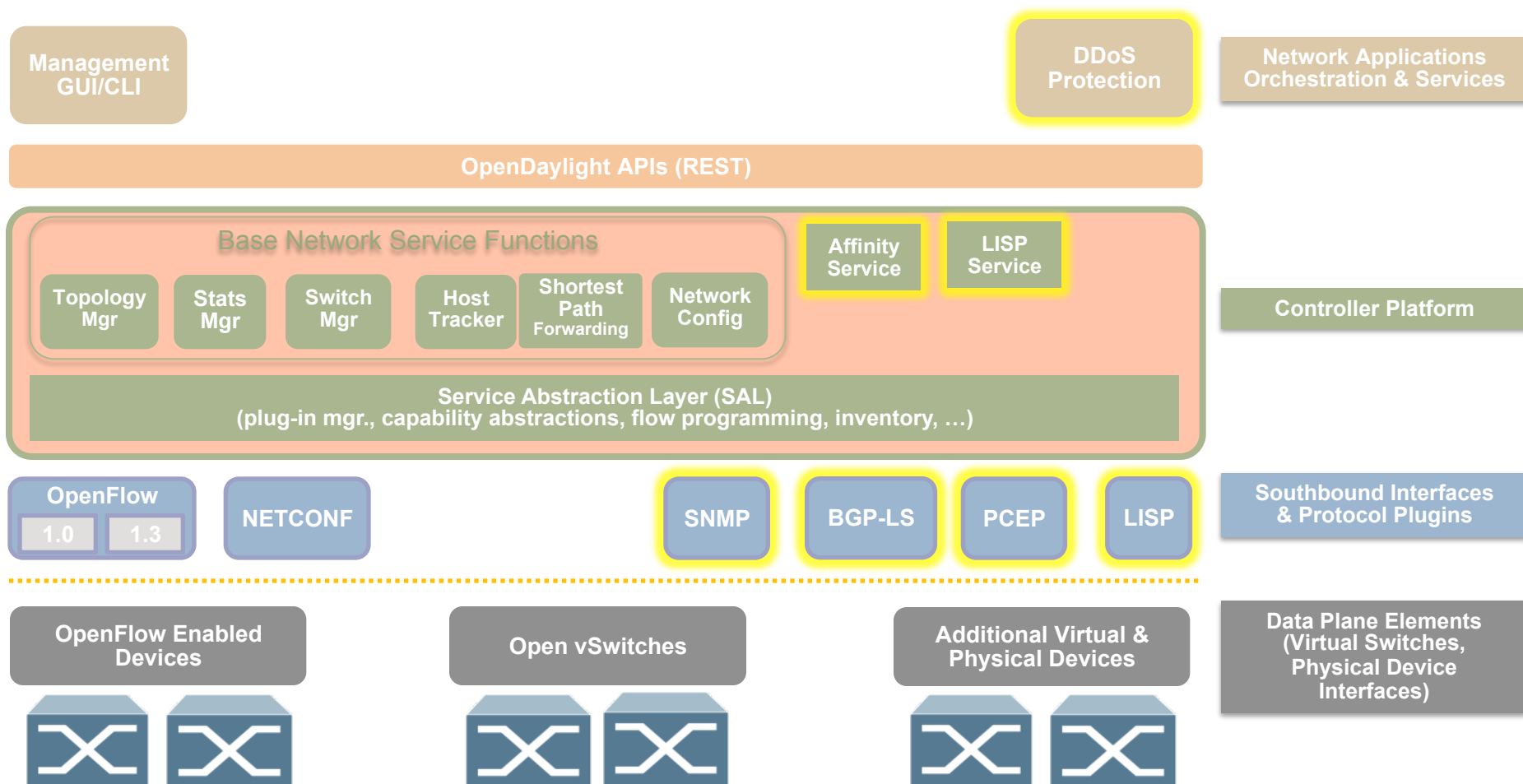| OpenFlow 1.0 1.3 | NETCONF | OVSDB | SNMP | BGP-LS | PCEP | LISP | **Southbound Interfaces & Protocol Plugins** |

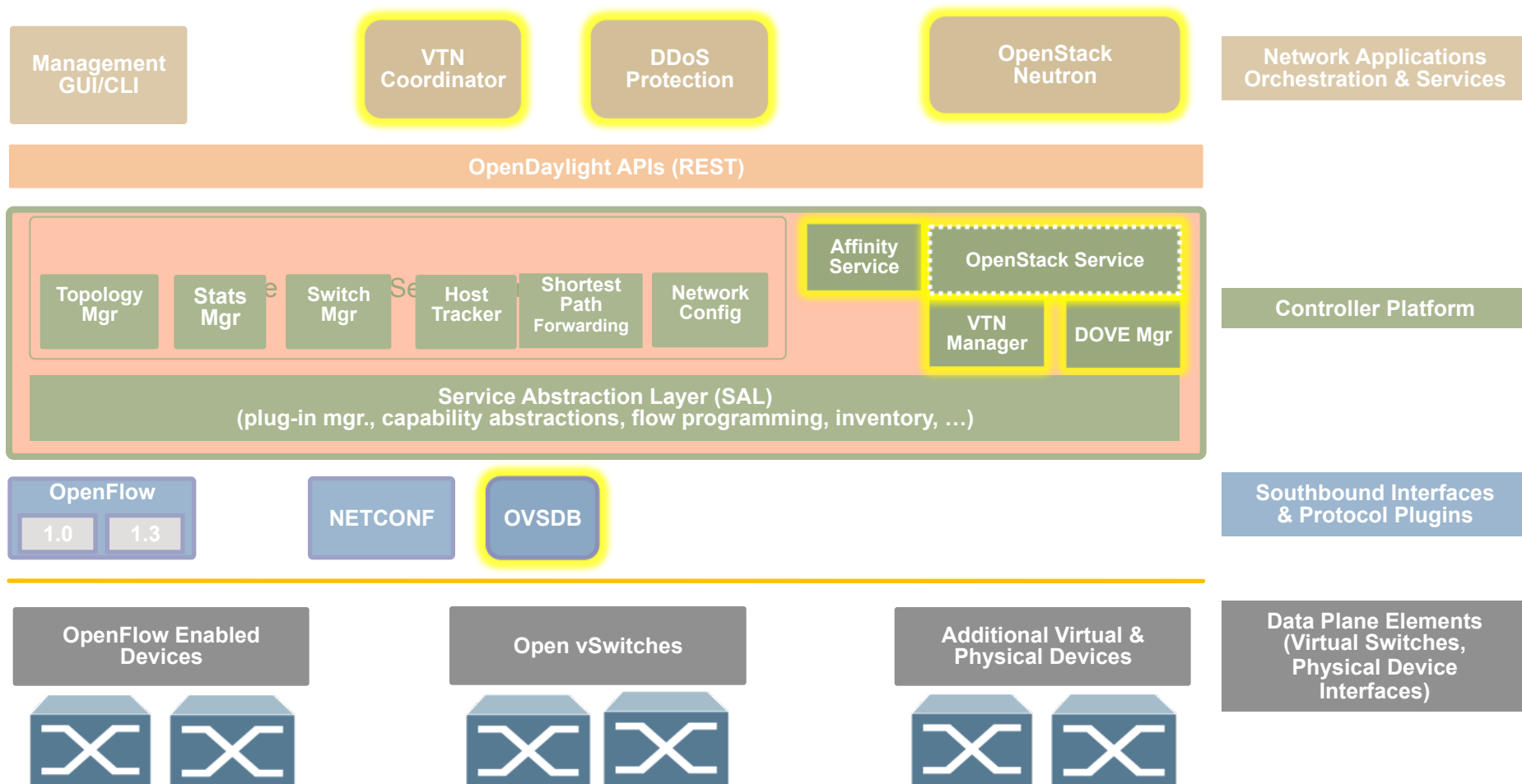| OpenFlow Enabled Devices | Open vSwitches | Additional Virtual & Physical Devices | **Data Plane Elements (Virtual Switches, Physical Device Interfaces)** |

VTN: Virtual Tenant Network
DOVE: Distributed Overlay Virtual Ethernet
DDoS: Distributed Denial Of Service
LISP: Locator/Identifier Separation Protocol
OVSDB: Open vSwitch DataBase Protocol
BGP: Border Gateway Protocol
PCEP: Path Computation Element Communication Protocol
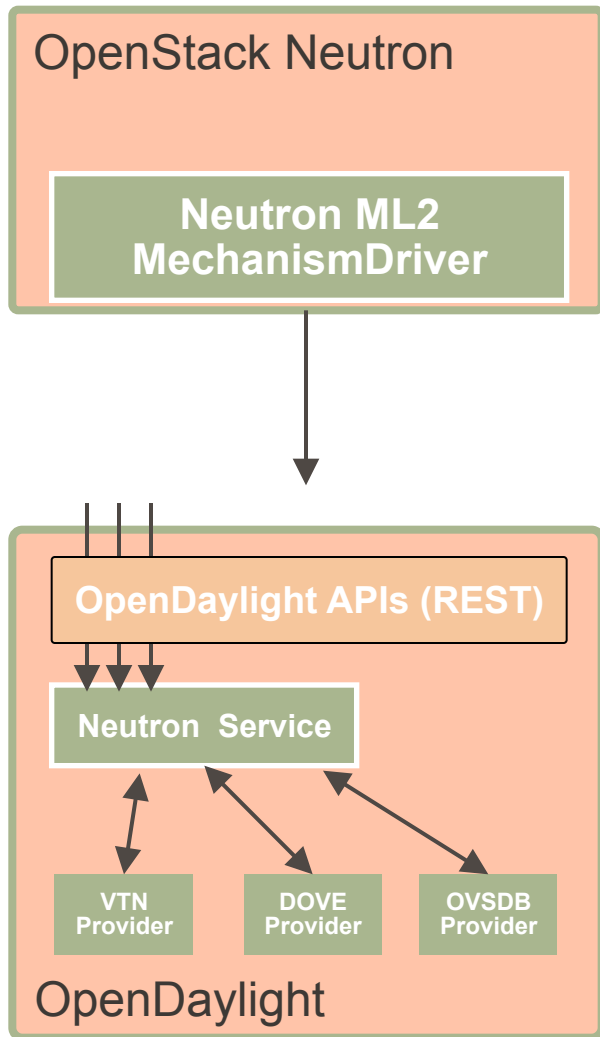SNMP: Simple Network Management Protocol

OPEN DAYLIGHT

Virtualization Edition

Management GUI/CLI	VTN Coordinator	DDoS Protection	OpenStack Neutron	**Network Applications Orchestration & Services**

OpenDaylight APIs (REST)

Topology Mgr	Stats Mgr	Switch Mgr	Host Tracker	Shortest Path Forwarding	Network Config	Affinity Service	OpenStack Service	**Controller Platform**
							VTN Manager DOVE Mgr	

Service Abstraction Layer (SAL)
(plug-in mgr., capability abstractions, flow programming, inventory, …)

OpenFlow		NETCONF	OVSDB	**Southbound Interfaces & Protocol Plugins**
1.0	1.3			

OpenFlow Enabled Devices	Open vSwitches	Additional Virtual & Physical Devices	**Data Plane Elements (Virtual Switches, Physical Device Interfaces)**

VTN: Virtual Tenant Network
DOVE: Distributed Overlay Virtual Ethernet
DDoS: Distributed Denial Of Service
LISP: Locator/Identifier Separation Protocol
OVSDB: Open vSwitch DataBase Protocol
BGP: Border Gateway Protocol
PCEP: Path Computation Element Communication Protocol
SNMP: Simple Network Management Protocol

OpenStack Integration

OpenStack Neutron

Neutron ML2 MechanismDriver

OpenDaylight

OpenDaylight APIs (REST)

Neutron Service

VTN Provider   **DOVE Provider**   **OVSDB Provider**

- OpenDaylight exposes a single common OpenStack Service Northbound
  - API exposed matches Neutron API precisely
  - multiple implementations of Neutron networks in OpenDaylight

- OpenDaylight OpenStack Neutron Plugin simply passes through
  - simplifies OpenStack plugin
  - pushes complexity to OpenDaylight

OpenStack Integration: Status

- **ML2 Driver available in Icehouse release!**
  - Supports VXLAN and GRE tunnel networks
  - devstack support merged upstream
    - *Run OpenDaylight as a top-level service in devstack!*
- *OpenStack Neutron API Service* available now in OpenDaylight
  - o provides Neutron API handling for multiple implementations
- Initial ML2 plugin focused on core Neutron functionality
  - o Still uses Neutron [DHCP, L3] agents

openstack™

# OpenStack Integration: Next Steps

- Updates planned for Helium and Juno:
  - VIF plugging changes for stability improvements
    - Notify from ODL to MechanismDriver once ODL has setup the port on the host
  - Security groups implemented using OpenFlow rules
  - L3 routing handled by OpenDaylight
    - *Removes the need for the L3 agent*
  - Additional refinements and bug fixes

openstack™

Agenda

- What is OpenDaylight/Hydrogen

- Key Personal Learning's from a Year Inside ODP

- A Few Hydrogen/ODP Metrics

- What Is Queued up for "Helium"

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Key Learnings
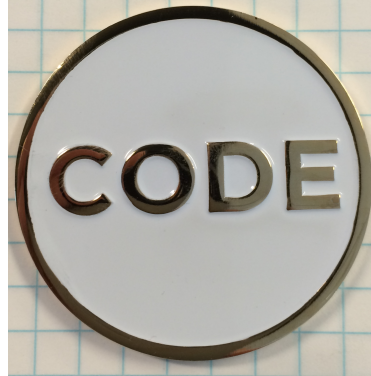
- ***Community building*** **is a core objective**
  - **In fact, innovation through collaboration is one of the most powerful features of OSD**

- ***Code*** **is the coin of the realm**

- ***Engineering systems*** **are as important as artifacts**

Putting this all Together →

http://www.sdncentral.com/education/david-meyer-reflections-opendaylight-open-source-project-brocade/2014/03/

Trend: Engineering artifacts are *no longer* the source of sustainable advantage and/or innovation
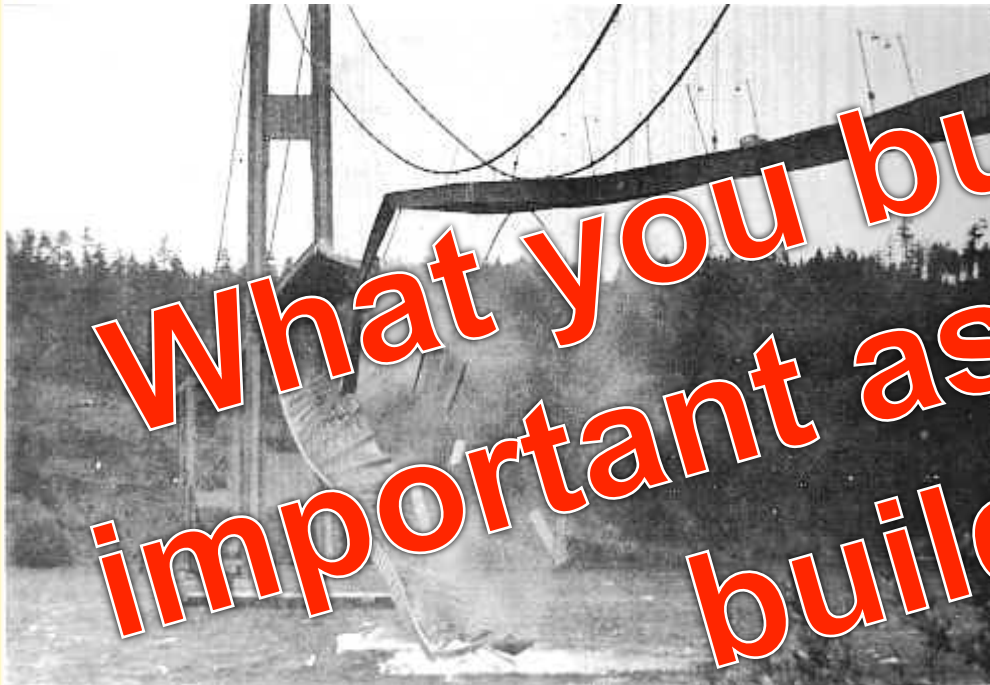
Perhaps surprisingly, the "hyper-scale" and open source communities have taught me that actual artifacts (in our case network applications as well as HW/SW) are epiphenomenal entities and that the only source of sustainable advantage/innovation consists of

- Engineering Systems
- Culture
- People/Process

What you build isn't as important as how you build it

http://en.wikipedia.org/wiki/Aeroelasticity - Flutter

OPENDAYLIGHT

www.opendaylight.org

One Way To Think About OSD

David Meyer
March 28 · Edited

One way to think about open source development: Early on things are chaotic, there is a lot of stuff orbiting anything with enough gravity, there are epic collisions and everything is molten (e.g., like the surface of the earth during the LHB [0]). But if you wait a couple of billion years and let things evolve you can wind up with a beautiful blue planet or the Linux kernel or ...

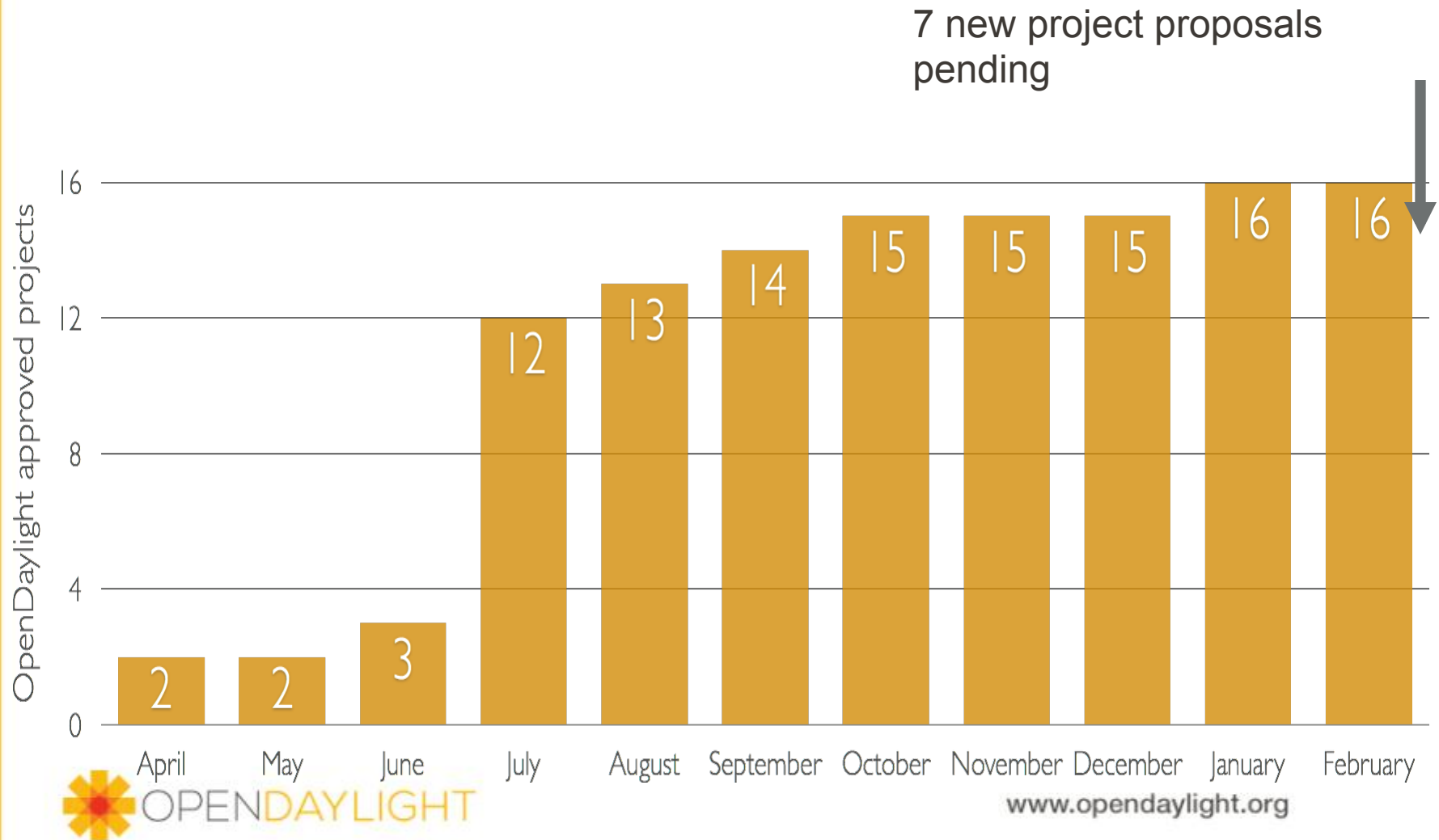[0] http://en.wikipedia.org/wiki/Late_Heavy_Bombardment

Like · Comment · Promote · Share

Michael Howard, Chris Grundemann, Ken'ichiro Hashimoto and 11 others like this.

Agenda

- What is ODP/Hydrogen

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OpenDaylight project creation

7 new project proposals pending

www.opendaylight.org

OpenDaylight code volume (ohloh.net)

Project comparisons (ohloh.net)

In a Nutshell, OpenDaylight...

... has had 4,759 commits made by 154 contributors
representing 1,045,938 lines of code

... is mostly written in Java
with an average number of source code comments

... has a young, but established codebase
maintained by a very large development team
with stable Y-O-Y commits

... took an estimated 292 years of effort (COCOMO model)

Quick Reference

Project Links:	⬀ Homepage
Code Locations:	(14 Locations)
Licenses:	EPL-1.0
Similar Projects:	CDO Model Centreon Re... Netty OpenNMS
Managers:	mavenugo

	LOC	contributors
OpenStack	1.67M	1,974
CloudStack	1.5M	250
Eclipse platform	2.67M	404
OpenDaylight	1.05M	154
Floodlight	97K	52
contrail-vrouter	19K	15
contrail controller	258K	53

www.opendaylight.org

Membership — who wants to play
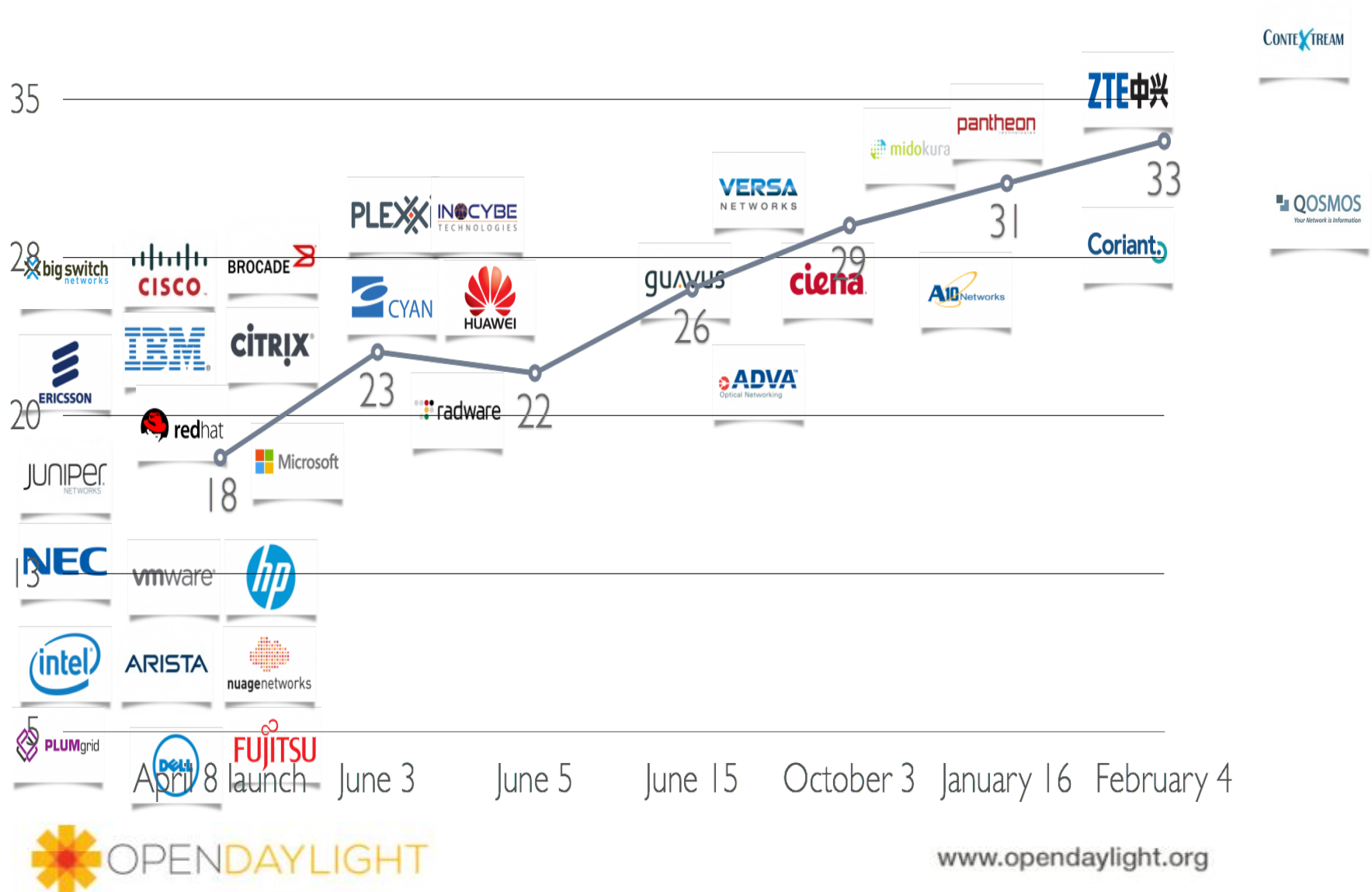
April 8 launch   June 3   June 5   June 15   October 3   January 16   February 4

www.opendaylight.org

Agenda

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Helium Release Plan

Milestone	Date	Events
M0	4/14/2014	Simultaneous Release Open
Last call for new projects eligible to join	4/30/2014	This is the latest date a project proposal can be brought and still have the two week public comment period before its project creation review at the last TSC meeting before it needs to declare its intent to join the Simultaneous Release at M1.
M1	5/12/2014	1. Projects must have declared intent to participate in Simultaneous Release 2. Participating Projects must have published a candidate Release Plan for public comment (Release Plan Template) 3. TSC commits to initiate public discussion of Lithium Simultaneous Release Plan
M2	6/09/2014	1. Participating Projects must have declared their final Release Plan 2. TSC commits to finalize basic dates and Milestones for the Lithium Simultaneous Release Plan (some details of requirements and Milestone contents may be decided later). 3. TSC commits to initiate public discussion of Release Vehicles
M3	7/07/2014	1. Latest possible Continuous Integration Test Start 2. TSC commits to decide on Final Release Vehicles Defined 3. Latest possible date for commencing Documentation
M4	8/04/2014	1. API Freeze 2. Latest possible Continuous System Test Start 3. TSC commits to begin public discussion of Stable Update Expectations
M5	9/1/2014	1. Code Freeze (bug fixes only from here) 2. String Freeze (all internationalizable strings frozen to allow for translation) 3. TSC commits to have finalized Stable Update Expectations
RC0	9/9/2014	
RC1	9/15/2014	
RC2	9/22/2014	Participating Projects must hold their Release Reviews, including User Facing Documentation.
Formal Helium Release	9/29/2014	1. Formal Helium Release 2. Latest possible date for each project to add a stable/helium branch
SU1 (Stable Update 1 aka Helium.1)	11/10/2014	First Stable Update for Helium. See Stable Update section. NOTE: This date is provisional, but will not move earlier. Please note, event based Updates (security/critical bugs) are distinct and may occur at any point.
SU2 (Stable Update 2 aka Helium.2)	01/12/2015	Second Stable Update for Helium. See Stable Update section. NOTE: This date is provisional, but will not move earlier. Please note, event based Updates (security/critical bugs) are distinct and may occur at any point.

What's in the queue?

https://wiki.opendaylight.org/view/Project_Proposals:Main

- Application Policy Plugin

- Python OpenDaylight Client

- Packet Cable PCMM Manager

- Dynamic Resource Reservation

- SDN Simulation Platform

- Data Persistence

- Distributed Systems (Infinispan, Akka, …)

- Developer Toolkit (archetypes, etc)

- And more…

OPENDAYLIGHT

New Projects

ODL-SDNi App

Southbound Plugin to the OpenContrail Platform

SubscriberAwareness

L2 Switch

Secure Network Bootstrapping Infrastructure

AAA Service

Service Function Chaining

Application Policy Plugin entered as Incubation project on January 23, 2014
OpenDaylight Toolkit entered as Incubation project on April 3, 2014
Documentation entered as Incubation on April 10, 2014
Dynamic Resource Reservation entered as Incubation project on April 10, 2014
Negotiable Datapath Models entered as Incubation project on April 17, 2014
ODL Root Parent entered as Incubation project on April 24, 2014
OpFlex entered as Incubation project on April 24th, 2014

Tomorrow's TSC Agenda

Agenda Summary

- **Agenda Bashing/Administrivia (dmm)**
- **Event Updates**
- **System Integration and Testing Update**
- **Committer Promotions**
- **Creation Reviews**
  - AAA Service 🔒 (Dave Lenrow 30 minutes)
    - #link https://wiki.opendaylight.org/view/Project_Proposals:AAA_Service 🔒 (AAA Service Proposal)
  - L2 Switch 🔒 (Raghurama Bhat 30 minutes)
    - #link https://wiki.opendaylight.org/view/Project_Proposals:L2_Switch 🔒 (L2 Switch Proposal)
  - Service Function Chaining 🔒 (Paul Quinn 30 minutes)
    - #link https://wiki.opendaylight.org/view/Project_Proposals:Service_function_chaining 🔒 (Service Function Chaining Proposal)
  - Secure Network Bootstrapping Infrastructure 🔒 (Frank Brockners 30 minutes)
    - #link https://wiki.opendaylight.org/view/Project_Proposals:Secure_Network_Bootstrapping_Infrastructure 🔒 (Secure Network Bootstrapping Infrastructure Proposal)
- **Hydrogen Stable Release** 🔒 (ChrisW, Ed)
  - #link https://wiki.opendaylight.org/view/CrossProject:Stable_Release 🔒 (Stable Release)
- **Creation Review Queue**
  - Reminder: Code scans
- **Simultaneous Release Queue**
  - AAA Service 🔒 (Wojciech Dec)
- **Misc**
  - At-Large TSC election logistics (Phil)
  - Copyright Issues (Devin)
    - #link https://lists.opendaylight.org/pipermail/discuss/2014-May/002347.html 🔒
  - NDM 🔒 rename (Colin, Curt)

Agenda

- Key Personal Learning from a Year Inside ODP

- Quick Level Set: What is Hydrogen

- A Few Hydrogen/ODP Metrics

- What Is Queued up for "Helium"

- **Were we're going**

Quasi-technical things we want to work on
(necessarily incomplete list)

- Continue to build/refine our community
    - Including increasing committer diversity across the projects
    - Code Quality and Coverage
        - Stability, Performance, Bug fixes ($Major.$Minor)
    - Distributed Systems Issues (Akka, Inifinspan)

- "Staffing"
    - Release engineering
    - Documentation

- Continue to refine our engineering systems
    - Thanks Andrew!
    - Fewer humans in the loop

- We need more code that writes code
    - MD-SAL is an example
    - Fewer humans in the loop
    - More automation more better

And of course

- Sustaining Engineering
  - No end to the number of bugs we find

- Performance and scalability

- Again, Code Quality

- New Projects
  - I mentioned a few
  - Several others were informally proposed at the ODP Summit

Thanks!