



Platform for Network-Driven Organizations

Agenda

- **OpenDaylight overview**
- Use cases
- Governance and getting involved

What is OpenDaylight?

A flexible, programmable Open Source platform underpinning a wide breadth of networking applications and use cases.



Automated Service Delivery



Cloud and NFV

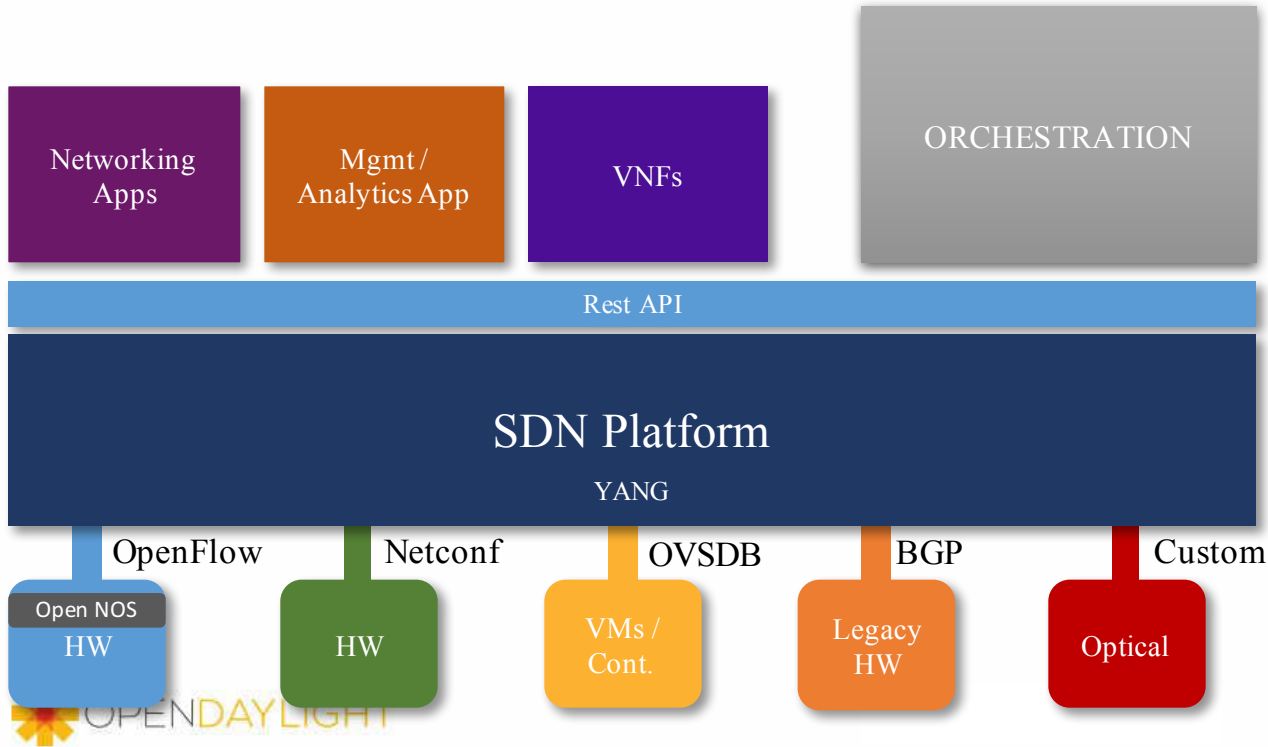


Network Resource Optimization



Network Visibility and Control

Part of a New OPEN Networking Stack



Graphical User Interface Application and Toolkit (DLUX / NeXT UI)

Independent Network Applications

AAA Authorization Filter

OpenDaylight APIs

Control Plane Functions

Embedded Controller
Applications

Network Abstractions
(Policy/Intent)

Application
(Processing)

Model

API

Data Store (Config & Operational)

Service Abstraction Layer/Core

Messaging (Notifications / RPCs)

API

Protocol
Plugin

Model

Standardized Southbound Interfaces & Protocol Plugins

Data Plane Elements (Virtual Switches, Physical Device Interfaces)



OpenFlow Enabled Devices



Open vSwitches



Additional Virtual &
Physical Devices

OpenDaylight as DeFacto Standard Platform

“ODL appears to have the most **momentum** of the controller ecosystem.”

– *SDxCentral (SDN Controllers report)*

“We like OpenDaylight for the **breadth** of ‘brownfield’ protocols that are supported, its model-driven approach that matches our service abstraction logic, and the ability to add applications on top of the controller base.”

– *Chris Rice, AT&T*

“OpenDaylight has been wildly successful.

It’s the **de facto standard** open source SDN controller for the industry today.”

– *David Ward, Cisco CTAO*

“The project’s success and momentum results from a combination of strong leadership, **transparent governance**, open development and big customers fed up with proprietary lock-in and inflexible systems.”

– *Kurt Marko, Forbes*

“[ODL makes] open source SDN **ready for production** in a wide range of situations.”

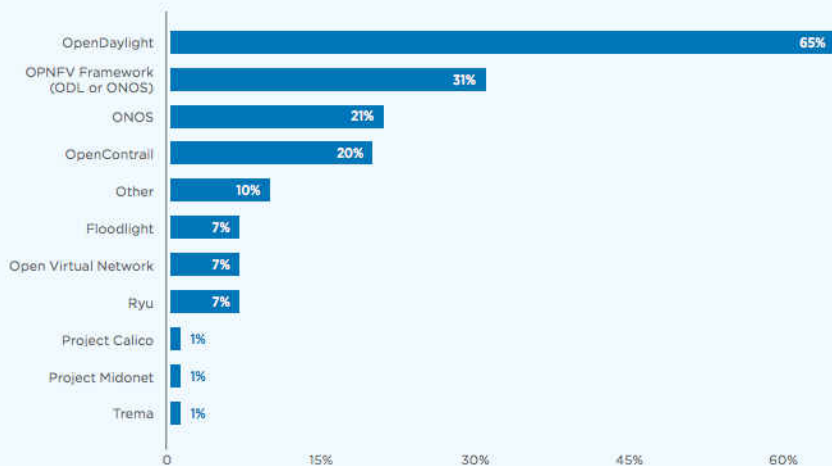
– *Christopher Tozzi, The VAR Guy*

“With the Boron release, the OpenDaylight project appears to be **settled, confident, and capable**. The next phase of ODL could be a blossoming of network functionality, nurtured by its soil.” – *Ethan Banks, Packet Pushers*



ODL Tops End User Consideration...

OPEN SOURCE NV/SDN SOLUTIONS CONSIDERED

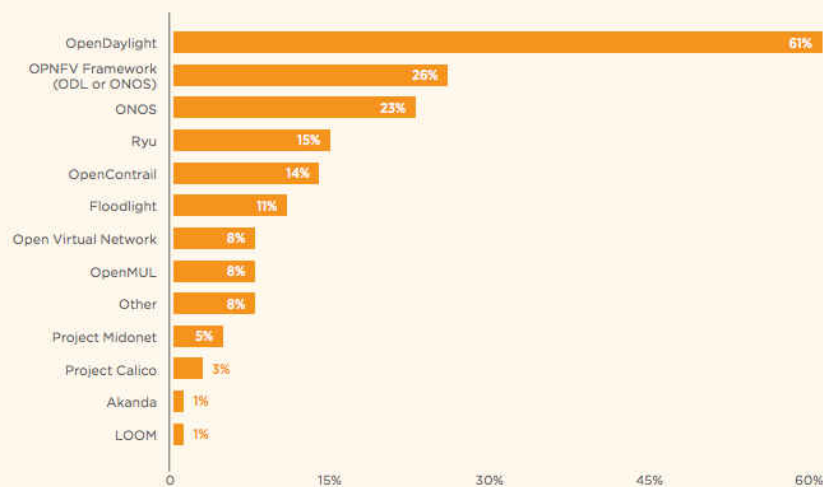


Respondents could select multiple solutions.
Results from 136 end-users and technology vendors.



sdxcentral.com

OPEN SOURCE NV/SDN SOLUTIONS DEPLOYED



Respondents could select multiple solutions. Results from 65 end-users
and technology vendors that have deployed open source NV/SDN.

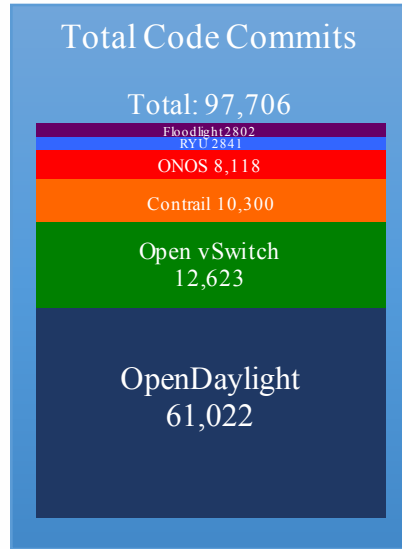
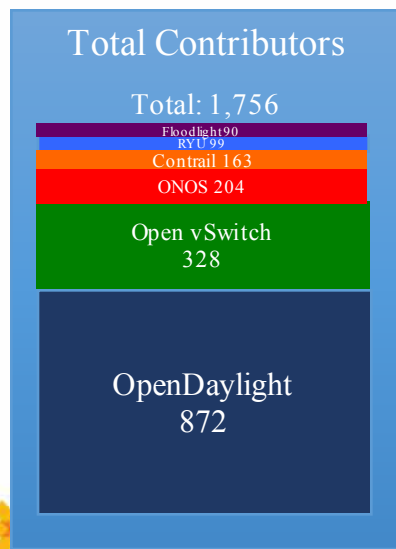


sdxcentral.com

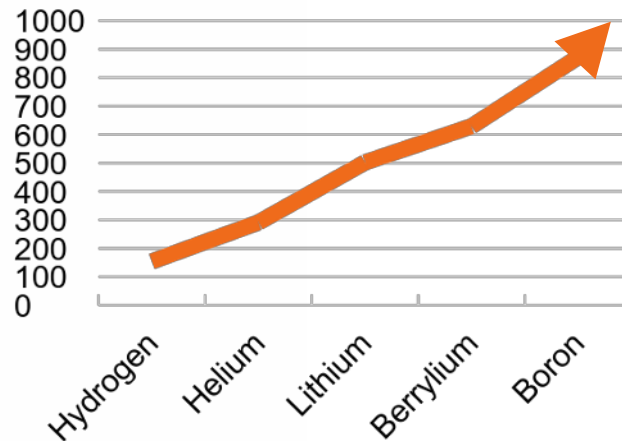


Largest Open Networking Dev Community

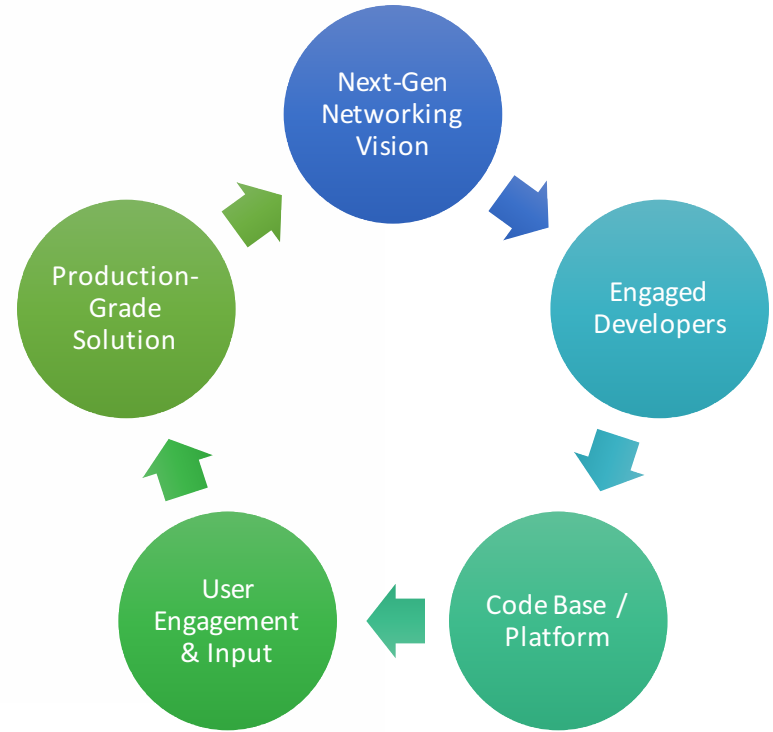
Open Networking / SDN Cumulative Contributions



OpenDaylight Contributors by Release



Developer / User Intimacy & Collaboration: Our Secret Sauce



End Users Experience Value, Lead Projects

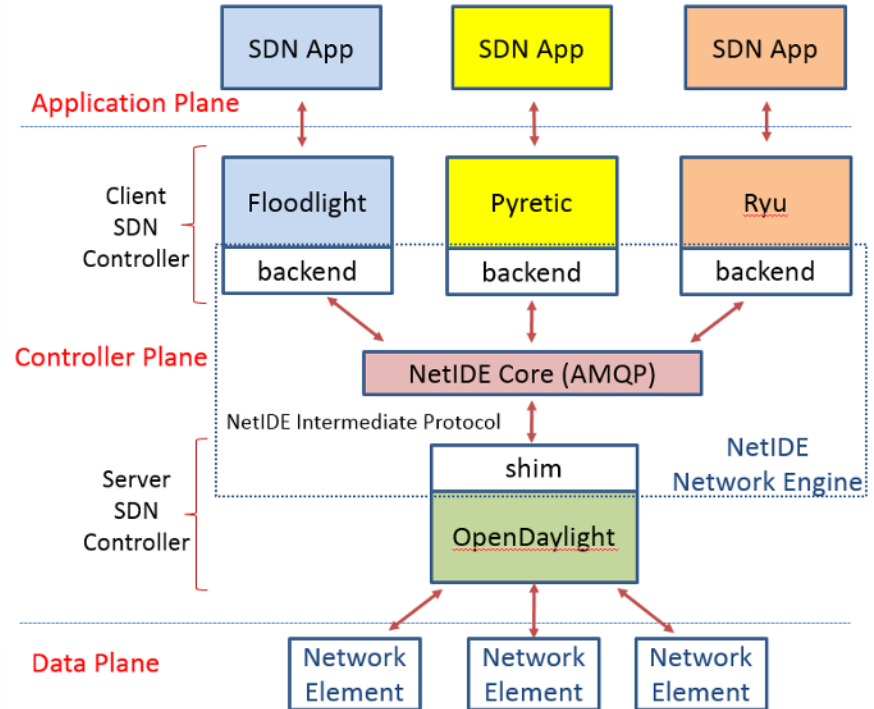
YANG Model Design Studio	 at&t
Transport PCE	  Telia  at&t
Software-Defined Packet Transport Network	 中国移动通信 CHINA MOBILE
Packet Optical Transport Network	 
Packet Cable MultiMedia & EMAN	 CableLabs®  Comcast.

User Led Project Spotlight - NetIDE

The NetIDE Network Engine enables portability and cooperation inside a single network by using a client/server multi-controller architecture

Initial Committers

- Alec Leckey [alexander.j.leckey@intel.com (aleckey)]
- Elisa Rojas [elisa.rojas@telcaria.com (erojas)]
- Roberto Doriguzzi [roberto.doriguzzi@create-net.org (doriguzzi)]
- Christian Stritzke [christian.stritzke@ipt.fraunhofer.de (cstritzke)]
- Pedro Aranda Gutierrez [pedroa.aranda@telefonica.com (paaguti)]



“Powered by OpenDaylight” Program



Mark of quality & consistency for OpenDaylight-based solutions

- Requires product or service to be on current or recent previous release
- Ensures commercial solution leverages 4 core ODL components
- Launched at OpenDaylight Summit, September 2016 – 5 initial members, more already signed up

A satellite view of Earth showing the Eastern Hemisphere, including Africa, Europe, and Asia, with a text overlay at the bottom.

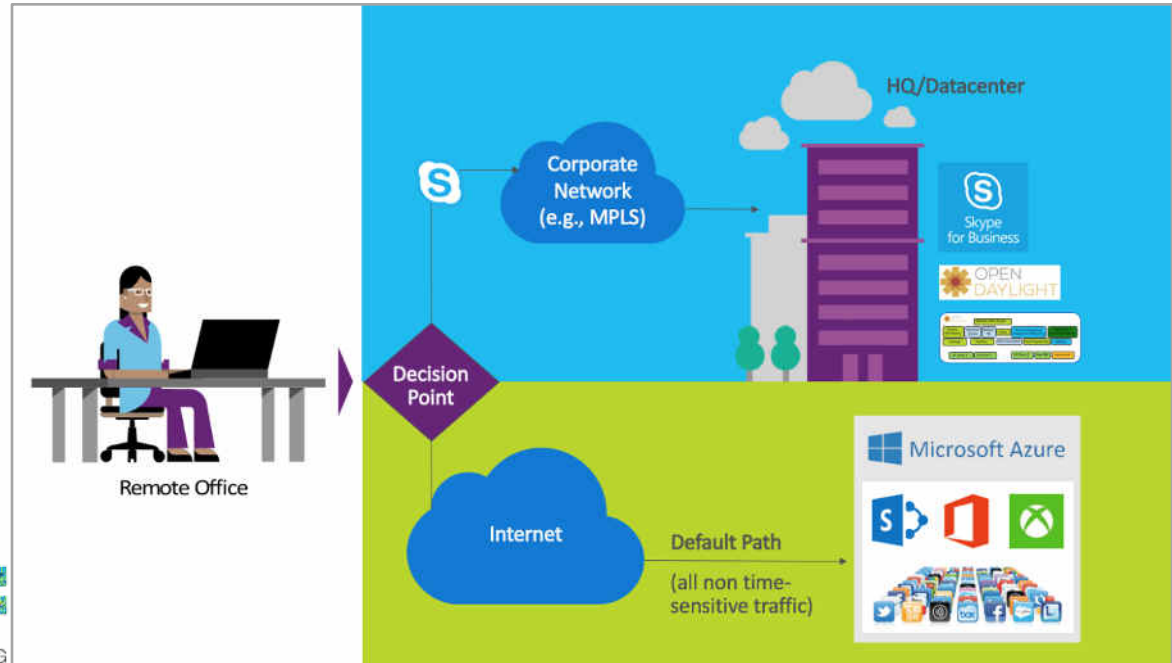
The Rise of a Truly Global Community

Agenda

- OpenDaylight overview
- **Use cases**
 - Enterprise
 - Cloud
 - Telco
 - Webscale
- Governance and getting involved

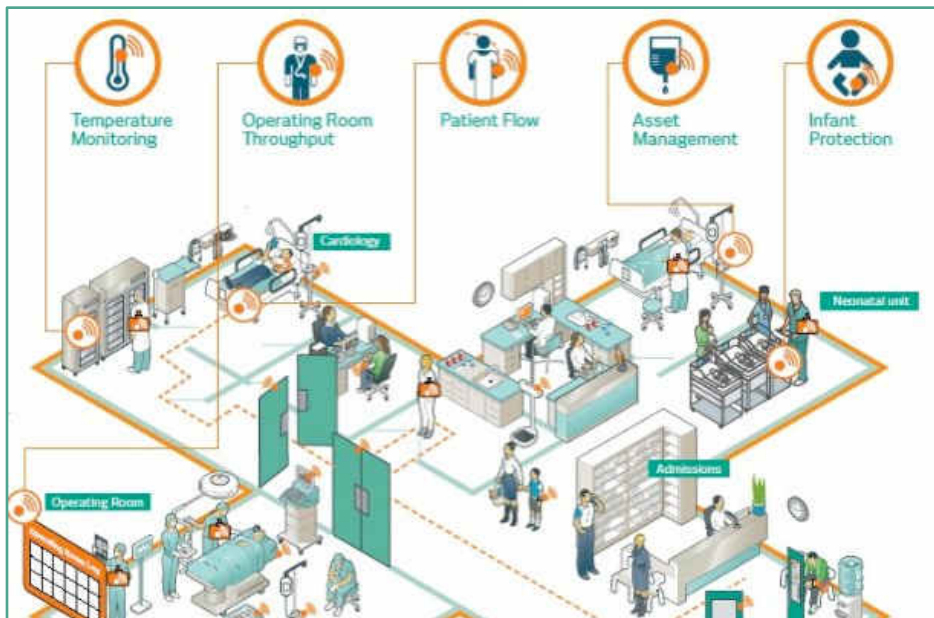
Mobile/Remote Worker-Centric Enterprise

- Microsoft IT – Atrium Enterprise project
- Goal: no corporate network – same security everywhere
- Mobile-first, internet-first IT philosophy
- Huge WAN \$\$ savings



IoT – Healthcare

- Fast-growing number of devices + highly regulated environment
 - One Veterans Administration hospital can have 10,000+ total connected devices
- Demonstrated to scale to support over 168,000 devices from one controller
- Leverages Open Standards and Open Source:
 - OpenDaylight
 - OpenvSwitch
 - OpenFlow, Netconf



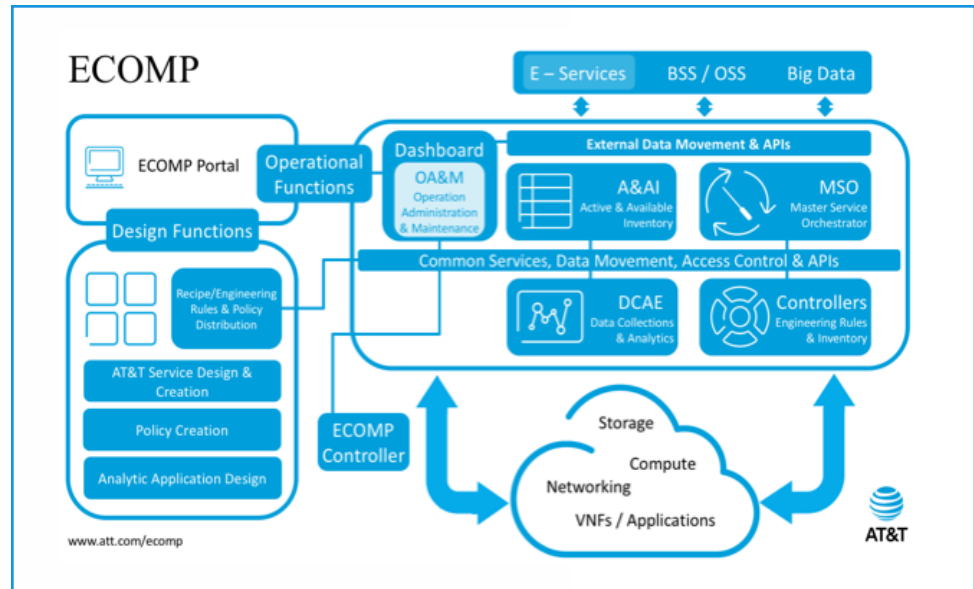
Many Flavors of ODL Deployments

Customer	Description
Satellite Service Provider	Integrate Mid-Earth Orbit satellites to intelligently create route paths based on live weather streams from NOAA
Cloud Malware Service Provider	SD-WAN deployment to automate global routing to POP centers to more efficiently mitigate malware detection
Cloud DDoS Mitigation (Nexusguard)	SD-WAN deployment to automate global routing to scrubbing centers to more efficiently mitigate DDoS attacks

AT&T's ECOMP Platform

(Enhanced Control Orchestration, Management & Policy)

- AT&T's infra delivery platform
 - A scalable, comprehensive network cloud service for a **software-centric** network
- Leverages **OpenDaylight**
- In **production** for >2 years!
- Intention to **Open Source**
- Already being tested by Orange



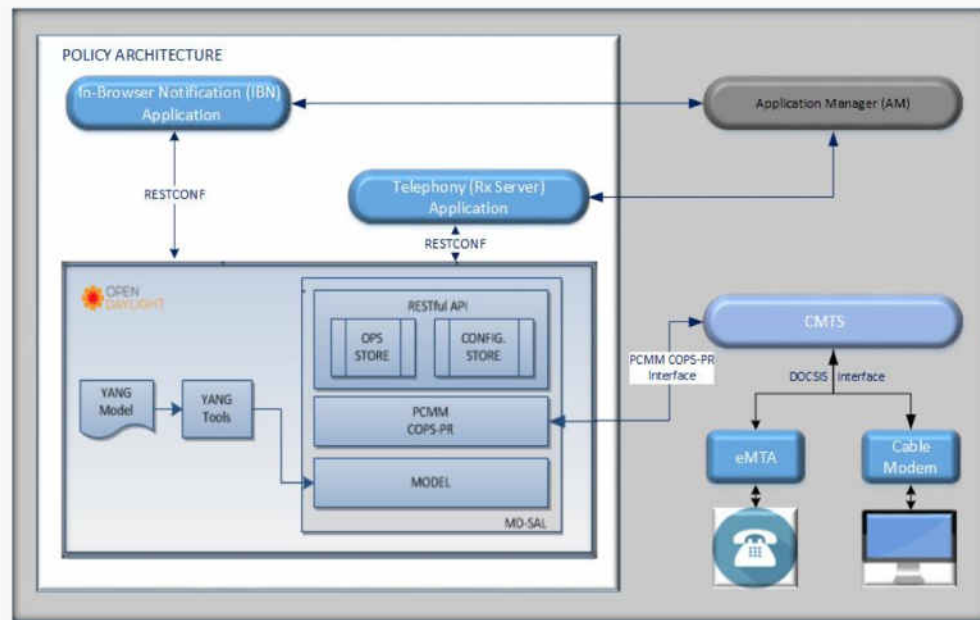
ODL @ Comcast

Why OpenDaylight?

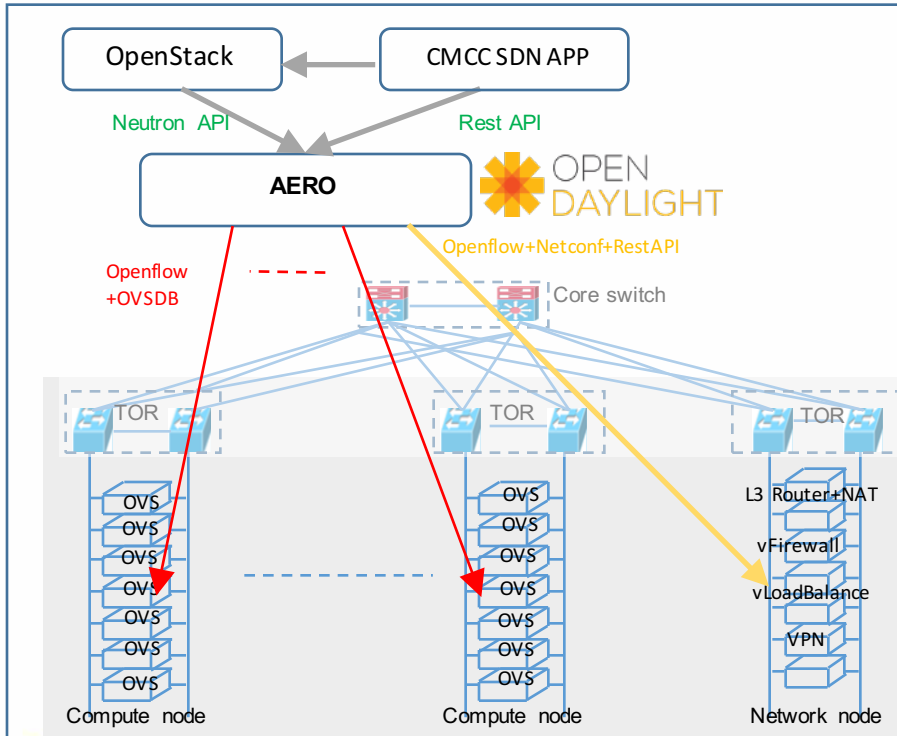
- PacketCable Multimedia ODL Plugin
- Software Defined Network (SDN)
- Model Driven Service Abstraction Layer (MD-SAL)
- Performance and Scalability
- Operational Visibility and Control
- Ease of Adoption
- Yang modeling for API hooks on network layer
- Advanced Message Queuing Protocol (AMQP)



Architecture - NextGen PCMM



OpenDaylight Member China Mobile



- AERO Datacenter Cloud Controller
- Multi-vendor deployment in the cloud datacenter
- Virtual switch:
 - Integrates multi-vendor virtual switches as well as OVS
 - Defines openflow TTP between Aero and virtual switch
- Router/FW/LB: Define routing related REST API between Aero and network function to integrate multi-vendor solutions
- Performance/Scale Testing Platform:
 - Simulate **290 virtual switches** connected to the SDN controller and launch up to **1500 VMs simultaneously**
 - **~1.7 million openflow entries** to be installed to the virtual switches

Optimizing One of the World's Largest Networks

Tencent



Social networking



China's largest instant messaging software/monthly active accounts reach 877 million and peak concurrent accounts reach 260 million



Fastest-growing mobile social platform/combined number of monthly active Weixin and WeChat accounts reaches 762 million



China's largest SNS/monthly active accounts reach 648 million



Entertainment



Client and web games/largest market share of over 50%



China's largest authorized comic & animation online platform



China's 2nd largest online video platform



Mobile music APP's MAU reach more than 100 million



China's largest online literature platform



Information



1st Mobile news platform in terms of daily active users in China



China's largest portal website



Payment



2nd largest online payment platform



Advanced mobile payment solution



To create a fun mobile payment tool for young mobile QQ users



Tools

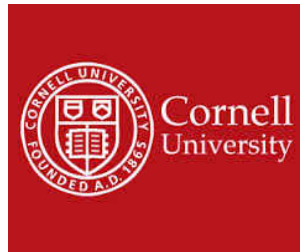


Rank 1st in terms of MAU



Daily distribution of android.myapp.com reaches 180 million

ODL in Edu and Research - Examples

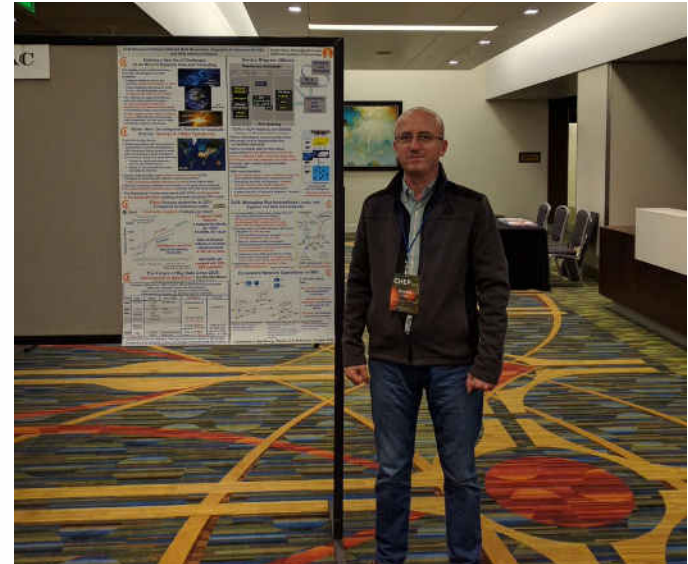


ODL @ CalTech – CHEP2016



SC15 Demonstration Goals

- SDN Traffic Flows**
 - Network should solely be controlled by the SDN application (*done partially*)
 - Relying mostly on the North Bound interface
 - Install flows among a pair of DTN nodes
 - Re-engineer flows crossing alternate routes across the ring (shortest or with more bandwidth) (*Stability issues: ODL / OF Agent in HW, NICs / Cables*)
- NSI WAN Paths**
 - Connect Caltech booth with the remote sites: FIU, RNP, UMich.
- High Speed DTN Transfers**
 - 100G to 100G (Network to Network)
 - 100G to 100G (Disk to Disk)
 - 400G to 400G (Network to Network) (*limited to 280Gbps*)
- NDN**
 - Provide/Announce another set of Caltech LHC data (on NDN server) from Austin. Thus clients may find shorter paths and retrieve from show floor.
 - Display the overlay traffic flow map designed by CSU. (*not deployed, resource issues*)



Agenda

- OpenDaylight overview
- Use cases
- **Governance and getting involved**

OpenDaylight Governance

OpenDaylight is funded and driven by the Linux Foundation

<http://www.linuxfoundation.org/>

- OpenDaylight Board of Directors
 - Manages the business leadership for OpenDaylight including finances, governance, marketing and operational decisions
 - Does not get directly involved in technical decisions
- OpenDaylight Technical Steering Committee (TSC)
 - Comprised of elected ODL members
 - Provides technical leadership for OpenDaylight projects and community

OpenDaylight Projects and Committers

- OpenDaylight projects
 - Each project has a Project Tech Lead (PTL) that is responsible for the technical aspects of the project
 - Project interface to the ODL TSC
 - Project Leaders are elected by project committers
- Contributor versus Committer
 - Anybody can be a contributor
 - Committers are per project, and elected by the project and the TSC
 - A contributor can ***write and submit code***, but only a committer can ***merge*** code into the code base

Getting involved in OpenDaylight

OpenDaylight User Groups (ODLUG)

- <https://www.opendaylight.org/odlug>
- Regional, self-organized, informal associations that meet regularly to discuss ODL

OpenDaylight Advisory Group

- <https://www.opendaylight.org/advisors>
- End users providing technical and strategic feedback to the ODL TSC and ODL Developers derived from running a real-world network

OpenDaylight mailing lists

- <https://lists.opendaylight.org/pipermail/>
- Each project has an ODL mailing list
 - Great way to follow what's happening in a project
- Interesting email lists: TSC, Release, Discuss



Rule of Collaboration

Collaboration \neq getting others to do
things **your way**

Collaboration = **We > Me**



OPEN
DAYLIGHT

Thank You

Questions?