The OpenDaylight Project

London ODLUG, November 3rd, 2014 @OpenDaylightSDN

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TSC Chair, OpenDaylight
Principal Engineer, Brocade
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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Acceptance</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>To create a robust, extensible, open source code base that covers the major common components required to build an SDN solution</td>
<td>To get broad industry acceptance amongst vendors and users</td>
<td></td>
</tr>
<tr>
<td>• Using OpenDaylight code directly or through vendor products</td>
<td>• Vendors using OpenDaylight code as part of commercial products</td>
<td></td>
</tr>
<tr>
<td>• Vendors using OpenDaylight code as part of commercial products</td>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>
Traditional Networking

Data Plane

- Very fast, e.g., 10+ Gbps
- Implemented in h/w
- Mostly table lookups, e.g., dest addr == 10 ⇒ send out port 7

Per-switch Control Plane

Data Plane

- Implemented in s/w on commodity chips (x86)
- Much slower,
- Programs h/w tables
- One copy per device

Per-switch Control Plane

Data Plane

Per-switch Control Plane

Data Plane

Per-switch Control Plane

Data Plane

www.opendaylight.org
Software-Defined Networking

Commodity (x86) Server

SDN Application

Data Plane

SDN Application

Data Plane

SDN Application

Data Plane

Software-defined Network (SDN) Controller

Control Plane

Data Plane

Per-switch Control Plane

Data Plane

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Data Plane


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Software-Defined Networking

Commodity (x86) Server

Network Virt.  Monitoring/Visibility  Traffic Eng. e.g. Google

Software-defined Network (SDN) Controller

Data Plane  Data Plane  Data Plane  Data Plane

Why Open Source?

- **Short version:** this is how modern infrastructure is built
- **Long version:**
  - Build more, better code faster via collaboration
  - Make better decisions with devs and users at the table
  - Spend more time on the code that matters
    - 80/20 rule: 80% of code is non-differentiating
Released October, 2014
1.87M+ lines of code, 28 Projects, 256 Contributors
Developer Community/Activity

Projects
- Hydrogen: 13
- Helium: 23

Contributors
- Hydrogen: 154
- Helium: 291

Commits
- Total: 10,411

1.9M lines of code since projects launch
Adoption
EIG/Bluehost User Story

- Successfully utilizing SDN in data center for more than a year
- OpenStack and OpenDaylight embedded in 20,000 custom nodes for custom SDN solution

*Image from Jun Park, Sr. Systems Architect of EIG/Bluehost, slideware from OpenDaylight Summit 2014*
What People are Saying

“OpenDaylight is quickly evolving into something formidable with good potential for mainstream relevancy.” – Andrew Lerner, Gartner

“OpenDaylight is making steady progress cultivating a growing community of developers and users interested in adopting an open, common SDN controller platform.” – Brad Casemore, IDC Research Director for Datacenter Networks

An open source approach to software-defined networking (SDN) moved several steps closer this week to becoming a de facto standard. – Mike Vizard, IT Business Edge
## Continuous Growth to 41 Members

### PLATINUM MEMBERS
- Brocade
- Cisco
- Citrix
- Dell
- Ericsson
- HP
- IBM
- Juniper Networks
- Microsoft
- Red Hat

### GOLD MEMBERS
- NEC
- VMware

### SILVER MEMBERS
- ZTE
- Arista
- Avaya
- Ciena
- Avago
- Adva
- Coriant
- Cyan
- Extreme Networks
- Infinera
- Inocybe Technologies
- Intel
- KEMP
- Midokura
- Nuage Networks
- Oracle
- Pantheon Technologies
- Plexxi
- Plumgrid
- QOSmos
- Radware
- Versa Networks

[OpenDaylight](https://www.opendaylight.org)
Get Involved

A community-led and industry-supported open source platform to advance Software-Defined Networking (SDN) and Network Functions Virtualization (NFV).

- Pull the code and review documentation at wiki.opendaylight.org
- Connect with active developers in the community on the #.opendaylight IRC channel at freenode.net webchat.freenode.net
- Join the conversation through lists.opendaylight.org and ask.opendaylight.org
- Propose a new project at wiki.opendaylight.org/view/Project_Proposals:Main
Backup Slides
Key Learnings

• **Community building** is a core objective
  • In fact, innovation through collaboration is one of the most powerful features of open source development

• **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/
Factories vs. Babies

- “Most vendors **develop product like an overly anxious parents making a baby**. There is a lot preparation and planning and once the baby is “born” the product requires ongoing attention to reach maximum potential.”

- “By comparison, … has **organized itself as a product factory**. Each product is the result of a unified production line and the next product or feature is just a year or two away. Each product builds on the previous product.”

- Even faster in open source software.
- Networking hasn’t seen this yet.

http://etherealmind.com/difference-arista-competitors-factories-babies/
Factories vs. Babies

- “Most vendors develop product like an overly anxious parents making a baby. There is a lot of preparation and planning and once the baby is "born", the product requires ongoing attention to reach its maximum potential.”
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Transparency

- Transparency matters

- When there are disagreements in the community
  - Transparency makes everyone feel heard
  - Transparency makes sure the community does not fracture

- OpenDaylight is transparent to the extreme
  - Calls, mailing lists, wikis… are open to anyone
  - Even the technical steering committee calls
Software Defined Networks
Migrate the Control Plane to a Separate Controller

- Modern switches:
  - Control plane populates forwarding tables
  - Data plane acts based on table entries
  - *Both run locally on the switch*
- SDN
  - Decouple control plane from the data plane
  - Data plane on the switch
  - *Control plane elsewhere (typically separate controller)*
  - Example: OpenFlow

![Diagram of SDN and switch](image)

- **Install table entry, send packet**
- **SDN Controller**
- **Control Plane CPU**
- **Switch Chip**

<table>
<thead>
<tr>
<th>dst</th>
<th>port</th>
</tr>
</thead>
<tbody>
<tr>
<td>0E</td>
<td>5</td>
</tr>
<tr>
<td>0A</td>
<td>1</td>
</tr>
<tr>
<td>0C</td>
<td>3</td>
</tr>
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</table>

This gets smaller, turns into controller to switch chip translator

Most features go here

Ports, 1-6
www.opendaylight.org
Software Defined Networks
What’s the big deal?

Potential Benefits:
- Enables innovation
- Exploit global ntwk view
  - Traffic engineering
  - Traffic steering
  - Security enforcement
- ... 
- Simpler switches
- Co-manage virtual compute, storage, and network
  - Software-defined environments

Potential Drawbacks:
- Overheads / scalability
- Potential bottleneck
- Potential single point of failure
- Interoperability issues
  - OpenFlow and ONF help