What’s New and Hot in OpenDaylight Beryllium

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2016 ODL User Survey: Demographics

Organization Type:
- Research/ Education: 25%
- Service Provider: 30%
- Enterprise End User: 28%
- Ecosystem: 17%

Industry Segments:
- Telecom: 62%
- Academic/Research: 36%
- Information Tech: 31%
- Finance: 4%
- Energy: 3%
- Other: 6%

Organization Size:
- 1 to 9 employees
- 10-99 employees
- 100 to 999 employees
- 1,000 to 9,999 employees
- 10,000 to 99,999 employees
- 100,000 employees
- Don't know / not sure
2016 ODL User Survey: Deployment Insights

Use Cases

- NFV and Cloud: 28%
- Traffic Engineering: 19%
- Network Monitoring, Management and Analytics: 27%
- New Service Creation: 26%

Deployments Jan. 2016 and Jul. 2015

- Jul. 2015: Using/Testing: 75, Next 12 Months: 25, After 12 Months: 0, Research Phase: 0, Other: 0

ODL User Survey, Being Published February 22, 2016
New Capability
• Improve performance, scalability, and robustness to support mission critical deployments

Challenges
• Production deployments driving significantly higher demand from ODL than early POCs
• Explosive growth of OpenDaylight contributions

OpenDaylight Features
• Enhanced clustering
• Workload placement on hosts with DPDK-accelerated virtual switches
• Code developed using Best in Class Continuous Integration environment - over $1M spent per year on testing & integration

Benefits
• Enable distributed controller deployments to improve scalability and availability
OpenDaylight Performance Report

- Real network scenarios
- Uniform, dedicated test environments
- Multiple test environments to compare results
- Tests documented and step-by-step reproducible
- Other SDN controller results for reference
- Recommendations for best OpenDaylight performance

https://www.opendaylight.org/resources/odl-performance
OpenDaylight Performance Report

OpenFlow REST Programming
- One flow at a time: 2,000 flows/sec
- 200 flows at a time: 10,000 flows/sec
- Floodlight: 2,000 flows/sec
- ONOS: 2,400 flows/sec

Flow Reinstall on Switch Reboot
- OpenDaylight: 10,000-20,000 flows/sec
- Floodlight: 10,000-20,000 flows/sec
- ONOS: 1,000-14,000 flows/sec

See full report for more: Performance and scale results for scenarios involving OpenFlow, NETCONF, OVSDB, BGP, and PCEP

One key discovery: OpenDaylight Performance is heavily affected by disk speed. AKA “Use an SSD”

https://www.opendaylight.org/resources/odl-performance
Continuous Performance Testing

Performance regression tests run on every patch in relevant projects

Enhanced OpenStack Integration

New Capability
• New capabilities to extend OpenDaylight-OpenStack integration

Challenges
• Integrating with Cloud platform that was designed pre-SDN
• Cloud deployments demand high availability and redundancy
• Emerging needs of NFV go beyond those of pure cloud

OpenDaylight Features
• Neutron API enhancements to enable use of ML2 Plug-in
• Full support for OpenStack HA and Clustering
• Improved security with HW-VTEP and efficient security group configuration via OF
• OpenStack BGP-VPN support

Benefits
• Enhanced robustness and security for OpenStack over OpenDaylight deployments
Enhanced Tooling

**New Capability**
- New tools to enhance the OpenDaylight software lifecycle

**Challenges**
- Dozen of companies building solutions on ODL
- Many apps already written to 1st generation controllers
- Network management is increasingly complex in virtual and physical environment

**OpenDaylight Features**
- NeXt UI Toolkit to enable network visualization
- NetIDE enables apps written for other SDN controllers (Ryu, Floodlight, and Pyretic) to work with OpenDaylight
- TSDR and Centinel enable Big Data Analytics for streaming data

**Benefits**
- Improved efficiency and cost reduction
ODL Platform: Broadest Set of Use Cases

- Automated Service Delivery
- Network Resource Optimization
- Visibility and Control
- Cloud and NFV
- Research, Education & Government

https://www.opendaylight.org/use-cases/
ODL Be: Automated Service Delivery

Key Challenge: Instantiate new service to customer across multiple HW

ODL Use Cases
- Telco enabling new subscribers
- Provisioning MEO satellite based communications to mining customers

ODL Case Studies
- AT&T Bandwidth on Demand
- Serro Solutions
- Telstra
- Orange
- Large Hadron Collider (Caltech)

https://www.opendaylight.org/user-stories/
ODL Be: Network Resource Optimization

**Key Challenge**: Exponential growth in traffic requirements and increased costs due to suboptimal network utilization efficiency.

**ODL Use Cases**
- Rearranging Label Switched Paths
- Reconfiguring interior (e.g., OSPF) or exterior (e.g., BGP) routing protocols
- Dynamically reprovisioning Carrier Ethernet Services (e.g., E-LAN)
- Adjusting OpenFlow forwarding rules
- Multilayer WAN controller (e.g., Ericsson)

**ODL Case Studies**
- KT Corporation
- Orange
- Tencent
- Tata Consultancy Services (TCS)

[https://www.opendaylight.org/user-stories/](https://www.opendaylight.org/user-stories/)
ODL Be: Visibility and Control

Key Challenge: Provide single dashboard view and basic control of physical and physical network topology, configuration and performance

ODL Use Cases

- Gather Network Statistics (e.g. SNMP / S-Flow data) across multi-vendor environment
- Monitor application performance (e.g. Skype for Business - Meru Network)

ODL Case Studies

- Telefonica
- Brocade Flow Optimizer
- Tata Consultancy Services (TCS) - Flow-Aware Real Time Analytics

https://www.opendaylight.org/user-stories/
ODL Be: Cloud and NFV

**Key Challenge:** OpenStack Neutron by itself provides a tenant-facing cloud networking API but is limited in what it exposes to cloud operators. NFV requires significant new functionality (e.g., Service Function Chaining).

**ODL Use Cases**
- Network Virtualization for OpenStack
- Multi-tenant Network
- NFV Telco Services
- Policy and Intent
- OVS Virtualization for Software Switches
- SFC Support with a Virtualized Environment

**ODL Case Studies**
- China Mobile
- Orange
- Massachusetts Open Cloud

[https://www.opendaylight.org/user-stories/](https://www.opendaylight.org/user-stories/)
Key Challenge: Flexible/Agile network that support new and future innovations

ODL Use Cases
- High perf campus for research
- SmartGrid/SmartCity
- Research w/ flow level control, Bandwidth on Demand

ODL Case Studies
- Cornell University
- City of Bristol, England
- SURFNet / GEANT

https://www.opendaylight.org/user-stories/
Apache Karaf
Provides a lightweight runtime to install the Karaf features you want to implement and is included in the OpenDaylight platform software. By default, OpenDaylight has no pre-installed features.

DLUX
A web-based interface that OpenDaylight provides for you to manage your network. Its Karaf feature installation name is “odl-dlux-core”.

NeXt
A developer toolkit that provides tools to draw network-centric topology UI elements that offer visualizations large complex network topologies, aggregated network nodes, visualizations and more.

MD-SAL
The OpenDaylight framework that allows developers to create new Karaf features in the form of services and protocol drivers and connects them to one another.
We are in the process of creating automatically generated API documentation for all of OpenDaylight. The following are links to the preliminary documentation that you can reference. We will continue to add more API documentation as it becomes available.

**odlparent**
https://nexus.opendaylight.org/content/sites/site/org.opendaylight.odlparent/beryllium/apidocs/index.html

**yangtools**
https://nexus.opendaylight.org/content/sites/site/org.opendaylight.yangtools/beryllium/apidocs/index.html

**mdsal**
https://nexus.opendaylight.org/content/sites/site/org.opendaylight.mdsal/beryllium/apidocs/
How to Get Started with OpenDaylight

**Download**
People can download directly from OpenDaylight.org.

**Find a Solution or Provider**
ODL is the only open source SDN platform with a robust ecosystem of products, solutions, distributions, and other providers who can help you deploy open SDN in your network.

**Getting Started Guide**
A comprehensive guide for newbies and advanced users to learn about, install and deploy OpenDaylight.

http://www.opendaylight.org/start
Thank You

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