Exploring OpenDaylight

David Brockus
dbrockus@ou.edu
Why SDN?

• New architecture with separate Control and Data planes
• Open Programmable Networks and APIs
• New business models and revenue opportunities
• Efficiency in both capital and operational expenses
SDN Architecture Characteristics

• Directly programmable
• Agile
• Centrally managed
• Programmatically configure
• Open standards-based and vendor-neutral
SDN Overview

SDN northbound interfaces (NBIs)
- A-CPI: Application-controller plane interface
- D-CPI: Data-controller plane interface

SDN controller

SDN application

Application layer
- Application plane

Control layer
- Controller plane

Infrastructure layer
- Data plane

Network element

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What is OpenDaylight?

• Open source project
• Modular, pluggable, and flexible controller at its core
• Implemented strictly in software
  • Contained within its own Java Virtual Machine (JVM)
• Deployable on any hardware and OS that supports Java
Who is the OpenDaylight Project?

Platinum

Gold

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Who is the OpenDaylight Project? (cont.)

Silver
Who makes products based on Open Daylight?
Legend

AAA: Authentication, Authorization & Accounting  
AuthN: Authentication  
BGP: Border Gateway Protocol  
COPS: Common Open Policy Service  
DLUX: OpenDaylight User Experience  
DDoS: Distributed Denial Of Service  
DOCSIS: Data Over Cable Service Interface Specification  
FRM: Forwarding Rules Manager  
GBP: Group Based Policy  
LISP: Locator/Identifier Separation Protocol  
OVSDB: Open vSwitch DataBase Protocol  
PCEP: Path Computation Element Communication Protocol  
PCMM: Packet Cable MultiMedia  
Plugin2OC: Plugin To OpenContrail  
SDNI: SDN Interface (Cross-Controller Federation)  
SFC: Service Function Chaining  
SNBI: Secure Network Bootstrapping Infrastructure  
SNMP: Simple Network Management Protocol  
TTP: Table Type Patterns  
VTN: Virtual Tenant Network

OpenDaylight APIs (REST)

Base Network Service Functions  
Controller Platform  
GBP Renderers  
Controller Platform

Service Abstraction Layer (SAL)  
(Plugin Manager, Capability Abstractions, Flow Programming, Inventory, etc.)  
AAA- AuthN Filter  
Southbound Interfaces & Protocol Plugins  
Data Plane Elements (Virtual Switches, Physical Device Interfaces)  
Open vSwitches  
Additional Virtual & Physical Devices  
Open vSwitches

ACI-Excellency Workshop 2015
OpenDaylight Tools and Paradigms

• Java interfaces
  • for event listening, specifications and forming patterns

• Maven -
  • Build and dependency management

• OSGi -
  • Backend container framework that allows dynamically loading bundles

• Karaf -
  • OSGi based runtime
What is an Application Programming Interface (API)?

- set of rules ('code') and specifications that software programs can follow to communicate with each other.
What is a **Representational State Transfer (REST)** API?

- A REST API is an API in a specific architectural style
  - originally communicated by Roy Fielding in his doctoral dissertation
What defines a ‘RESTful’ API?

- Six constraints
  - Start with Null Style
  - Client-Server
  - Stateless (Server)
  - Cache
  - Uniform Interface
  - Layered System
What distinguishes REST?

• Emphasis on uniform interface between components
  • Four constraints
    • identification of resources
    • manipulation of resources through representations
    • self-descriptive messages
    • hypermedia as the engine of application state.
Why a ‘RESTful’ API

• Principle of generality
  • Simplifies overall system architecture
  • Visibility of interactions improved
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Questions? Thoughts?

David Brockus
dbrockus@ou.edu
Extra Slides
Legend

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Legend

AAA- AuthN Filter

OpenDaylight APIs (REST)

Base Network Service Functions
- Topology Manager
- Stats Manager
- Switch Manager
- FRM
- Host Tracker
- VTN Manager
- OVSDB Neutron
- Plugin20 C
- LISP Service
- L2 Switch
- SDNI Aggregator

Service Abstraction Layer (SAL)
(Plugin Manager, Capability Abstractions, Flow Programming, Inventory, etc.)

GBP Renderers
- OpenFlow
- OVSDB
- NETCONF
- PCMM/COPS
- SNBI
- LISP
- BGP
- PCEP
- SNMP
- Plugin20C

OpenFlow Enabled Devices

Open vSwitches

Additional Virtual & Physical Devices

Controller Platform

Network Applications Orchestration & Services

OVSDB: Open vSwitch Database Protocol
PCEP: Path Computation Element Communication Protocol
PCMM: Packet Cable MultiMedia
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Data Plane Elements
(Virtual Switches, Physical Device Interfaces)
What is Karaf?

- Small OSGi based runtime
- Lightweight container
  - various components and applications can be deployed
What is OSGi (Open Service Gateway Initiative)?

• Java framework for developing and deploying modular software programs and libraries
• Two components
  • Specification for modular components called bundles
  • Java Virtual Machine (JVM)-level service registry
What are the drawbacks of REST?

- Uniform interface degrades efficiency
  - information transferred in a standardized form rather than form specific to an application's needs