The Programmable Network - Software Defined Infrastructure

Paul Horrocks - December 2013
A quick recap on the why ..
The Business Requirements

TIME to VALUE

REduced COST

CUSTOMER CENTRIC

Business Solutions

- CLOUD: Private – Public - Hybrid
- Self-Service
- Programmable

User CENTRIC

- Policy Driven
- Efficient

Infrastructure
Applications are placing new demands on Infrastructure ..
Application Delivery: Assumptions and Realities

ONE Admin
Homogenous
Latency is ZERO
Cost is ZERO

INFINITE bandwidth
Reliable

TOPOLOGY does not change
Secure
The Rise of DevOps

I Want Change
DEVELOPMENT

I Want Stability
OPERATIONS
The Rise of DevOps
“Compute, storage, memory and I/O components joined through a fabric interconnect, and the software to configure and manage them”

- **Fabric-Based Infrastructure - Gartner**
Move to a Programmable Infrastructure

Policy
Application + Network Security

Network Intelligence, Guidance
Analytic
Statistics, States, Objects & Events
Programmability
Services Orchestration
Workflow and Intent
Applications

Move to a Programmable Infrastructure
Move to a Programmable Infrastructure
We're all clear on SDN .. ??
Software Defined Networking
Software Defined Networking

SDN

Controllers & Agents  Virtual Overlays  Programmatic
Cisco Open Network Environment (ONE)

Deep programmatic access to Cisco devices and software
- onePK
- Openstack
- REST
- ACI

Centralize control, configuration & policy monitoring
- Cisco XNC
- Open Daylight
- OpenFlow
- Puppet/Chef
- ACI

Scalable multi-tenant cloud infrastructures across physical & virtual
- Vxlan
- NVGRE
- ACI
Evolving interaction with the Network

Large Toolset
Protocols Techniques
CLI XML Special Purpose

Capabilities
Not Programmatic
Real-time difficult
Inconsistencies

CLI, Span, HTML, XML, AAA, CDP, Routing Protocols…

SNMP, Syslog, Netflow…

Monitoring Routing
QoS Discovery
Security Interfaces

Data Plane

Rich Actions Consistency
Data Plane Interaction
Programmatic

API’s / Innovation

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Base Service Sets

Rich set of API’s exposed

Significant set of capabilities supported

Across multiple Service Sets
Programmatic Network Access

Applications

Resource Orchestration and Management (Unified Platform APIs)

- **API**
  - **Infrastructure Services**
    - Path-Comp., Analytics, Policy, Identity, Placement
  - **Orchestration**
    - Network-Compute-Storage-Overlay-Chaining
  - **Management**
    - Network-Appliances-Servers-Storage

- **Controller Layer**
  - Multi-protocol – device discovery, programming; topology

APIs and Protocols

Physical Infrastructure

Virtual Infrastructure
Programmatic Network Access

Application Frameworks, Management Systems, Controllers ...

onePK, OpenFlow, I2RS, PCEP, Neutron, OMI, Puppet, Netconf, ...

Management
Orchestration
Network Services
Control
Forwarding

Device

onePK API & Agent Infrastructure

IOS / XE
NX-OS
IOS-XR
Deployment Models

C, JAVA, Python, REST, Programmatic Interfaces

Process Hosting

Blade Hosting

End-Point Hosting
Cisco eXtensible Network Controller (XNC)

Northbound API for applications to be written towards

Network Service and Orchestration functions

Southbound protocol plugin framework to communicate with network infrastructure
Open Daylight is an open source project formed by industry leaders and others under the Linux Foundation with the mutual goal of furthering the adoption and innovation of Software Defined Networking (SDN) through the creation of a common vendor supported framework.
Becoming part of the community ..
Software Development Kit
Real Status

Hyperglance, a Visual SDN and cloud management product (Cambridge UK)

Hyperglance is a creation of IT experts with a leading games graphics company

Product Vision: End-to-end visual management of the hybrid cloud and the Software Defined Data Centre

Started 2009, legacy focus; Re-focus on SDN and Cloud Feb 2013
What is Hyperglance

Hyperglance gives customers a comprehensive, 3D view of their entire network infrastructure.

Faults or issues within the entire framework of a firm’s computing network can be immediately pinpointed with this novel 3D visual software.

Hyperglance cuts through the complexity of modern IT systems, simplifying the entire set-up & applications of any computing software.

See, monitor & manage your IT architecture in one view.
Possibilities

- Don’t just look at the network perspective
- The end to end service
- Visibility into applications and data
- Analytics, audit, telemetry, security, etc