Unifying the Programmability of Cloud and Carrier Infrastructure

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We might only have to knit the future.

Future

Operator
+ Agility
+ Flexibility
+ Automation
+ Scalability

User
+ Rich, elastic services
+ Quality of experience
+ Rapid provisioning
+ Self-service
Knit the Unified Production Environment.

Unified Production Environment with dynamic service creation platform, leveraging a fine-granular service chaining architecture.
Focus on seamless integration

Invocation of Dynamic Service Chains
UNIFY Control Plane (Programmability)

Joint Orchestration in Network and Clouds
UNIFY Control Plane (Abstractions)

Data performance optimized infrastructure virtualization
(x86 based architecture)
UNIFY Universal Node

Service Graph
Orchestration & Management
Network Service / Application

Business customer
Service Provider
Infrastructure Provider
Residential customer

Network Device
NF1 NF2 VNF3

Server Cluster
VNF4

Carrier Network
Data Center
Layering the Architecture.

UNIFY Control Plane
- **Services** decomposition and abstraction
- **Orchestration** for Network Function Forwarding Graphs (NF-FG)
- **Combined Compute, Storage & Network** abstraction over all resources
  - forwarding elements,
  - compute host capabilities,
  - hardware based network function capabilities,
  - data plane links
Slicing the elephant – Separation of problems

User understandable information
Virtualisation (!!!)
Service Graph

Decomposition into smaller components / network functions
Key Performance Indicators

Adaptation to individual controller understandable information for configuration, monitoring, troubleshooting, etc.
Abstraction – an example of magic

- Service Graph
- Abstract *Network Function*
  - *Forwarding Graph*
- Abstract Resource Mapping
- Physical Infrastructure
  - Compute, Storage, Network and topology
  - Instantiated Service Graph
Example for realisation
Universal Node Concept

Different VM types

Local mapping

Intel DPDK
UN integrated in UNIFY Architecture.

- **Global Orchestration Layer**
  - Resource Orchestration (RO)
  - Controller Adaptation (CA)

- **Universal Node**
  - Unified Resource Manager
    - Local Orchestrator
      - Adaptation
      - VNF Management
      - VSE Management
  - Networking
    - VNF Execution Environment
    - Virtual Switching Engine

**Ca-Co (implemented as SI-Or)**
Proof of concepts – here at EWSDN

• Mininet based prototyping framework – VNF container
• Click router environment – Click Service Function Graph
• OpenDaylight and OpenStack – Legacy SDN and Cloud
Propose a definition for integrating developer and operator roles in telecommunication service provider networks

Build a set of tools with dual developer-operator audience, based on research challenges identified in the following areas:

- **Observability** for Software-Defined Infrastructure
- **Verification** for Software-Defined Networks, in particular OpenFlow
- **Troubleshooting** of performance degradations in a distributed Network Function Virtualization environment
- **VNF Development support** for sandboxing prototypes
Does UNIFY fit into the world?

- Enablers for Network Function Virtualization
- Core Functions: Orchestration & Control for Network & DC
- Data Centers added to the resource view
- Universal Node is defined
- DevOps Services: Troubleshooting, Verification, Monitoring
- UNIFY’s View on Orchestration Layer
Summary

• Harmonization of control & orchestration of Compute and Network resources
• Filling the gap between ETSI NFV and ONF SDN
• Proof of Concept demonstrations
• Next steps:
  – More details in the architecture
  – Get down to the details
  – More implementations
Thank you very much. Questions?