On the Implementation of NFV over an OpenFlow infrastructure: Routing Function Virtualization
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1. Introduction
2. Routing Function Virtualization
   - Design
   - Implementation
3. Performance Evaluation
4. Conclusion & Future work
INTRODUCTION
Nowadays...
Nowadays…

Network Management System
What can be done?

- Network Functions Virtualisation
  - Promoted by European Telecommunications Standards Institute (ETSI)
  - **Externalization of specific network functions** from the hardware device and implement it over industry standard high volume servers
    - Any network function can be deployed in any server
      - Migration, replication, instantiation

- Several use cases
  - CDN
  - Forwarding intelligence
  - Mobile base station
  - Fixed access network function virtualization
Key benefits

- Reduced equipment and management costs
- Resource sharing, agility
- Enhance reuse of existing infrastructure
- Enhance performance
- Simplify compatibility
- Facilitate operations
- Faster time-to-market of any service

What about actual implementations and deployments?
ROUTING FUNCTION VIRTUALIZATION
Virtual Network Function: routing

- Implementation of **virtualized routing function** over an OpenFlow Infrastructure
  - **Combination between** NFV and SDN (OpenFlow)
  - **Externalization** of the local routing of the OpenFlow controllers and implements the routing through an open source platform
  - **Design** of a new protocol for communication between the elements
  - Pro-active and Re-active

- **Two use cases**
  - IPv4 – IPv6 migration
  - Multi-domain routing
Virtual Network Function: routing

Control Plane
- Controller
- Controller
- Controller

Data Plane
- Control Channel
- Flow Table
- Control Channel
- Flow Table
- Control Channel
- Flow Table

Virtualized Routing Function

SDN for Future Network Services, Trento, Nov. 2013
VNF: How do we implement it?

- Open Source platforms as environment for implementation
  - OpenFlow Controller: **Floodlight**
  - Network as a Service platform: **OpenNaaS**
  - Simulation OpenFlow network: **Mininet with Open vSwitch**

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SDN for Future Network Services, Trento, Nov. 2013
VNF: How do we implement it?
PERFORMANCE EVALUATION
Evaluation

• There is one important weakness...
  – Latency

• Two approaches
  – Pro-active
  – Re-active

• Tested in defined scenarios
  – Each scenario includes the RTT of the first successful packet
  – Different number of loads at the switches in terms of current flows
SDN for Future Network Services, Trento, Nov. 2013
CONCLUSION
Conclusion

- Network Functions Virtualisation emerged as a **promising approach** to address network management challenges
- Routing function virtualization over **OpenNaaS**
  - Not suitable for all scenarios
  - Reduction of the signaling overhead
  - Reduction of the number of rules at the switch
- Future work...
  - Convergence time...
  - Packet loss...
  - Where to locate my VNF...
  - Dynamic routing...
  - I2RS...
  - QoS routing...
Where to see this implementation?

Athens, March 2014

NFV: from hype to actual implementation and deployment

SDN for Future Network Services, Trento, Nov. 2013
Thanks!
Moltes Gràcies!

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Questions?