

# *An OpenNaaS based SDN Framework for Dynamic QoS control*



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# ***An OpenNaaS based SDN Framework for Dynamic QoS control***

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## 1. Introduction

- Rationale & Motivation
- State of the art

## 2. Network Control Layer

- Architecture and Design
- Components
- Implementation over OpenNaaS

## 3. Use Case

## 4. Conclusion

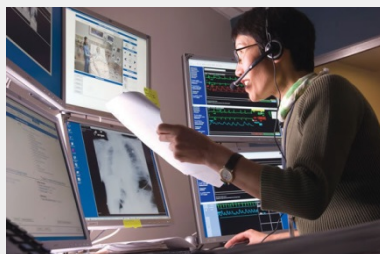
# 1 2 3 4

## INTRODUCTION

OTT services



High-consume apps



On-line gaming

REQUIRE

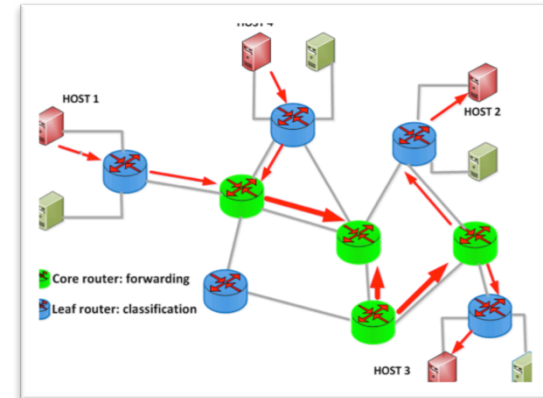
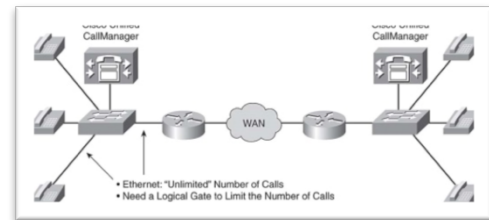
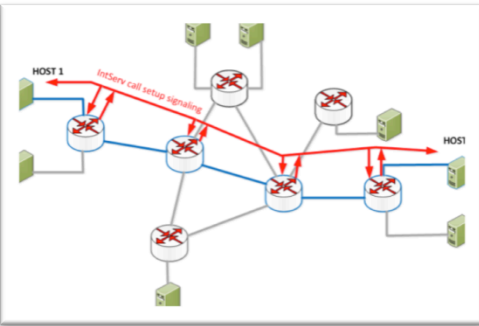
QoS provided by ISPs  
and Network operator



Dynamic and customized QoS provisioning

- Network **limitations...**
  - Lack of **strict**, and **tailored** levels of e2e QoS
  - Best-effort network
    - Unpredictability
    - Unreliability
  - No **real control** of the utilisation of the resources
    - Overprovisioning
  - Lack of flexibility
    - On-demand provisioning of resources
    - Static and non-programmable network

- **Best-effort**
  - Unpredictable behaviour
  - Poor quality
- **IntServ**
  - Many stored states: scalability
- **DiffServ**
  - Aggregated traffic
- **DiffServ over MPLS**
- **CAC**
  - VoIP applications
  - Scalability

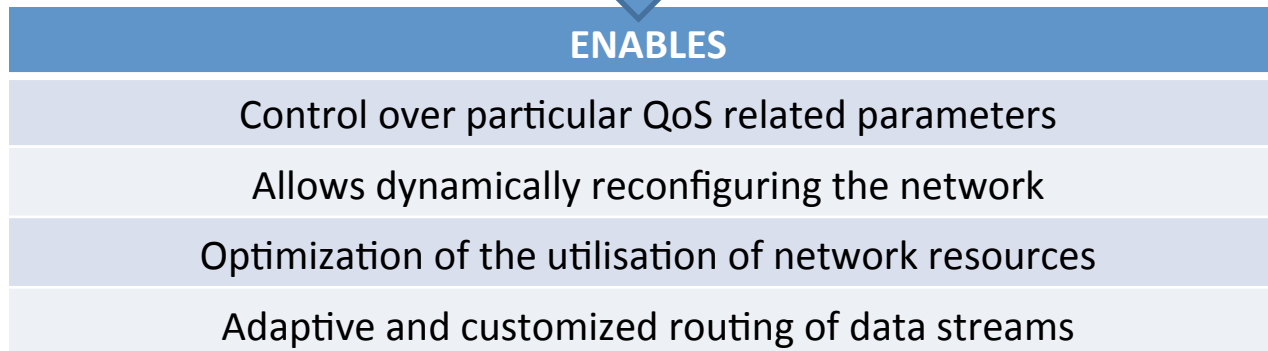
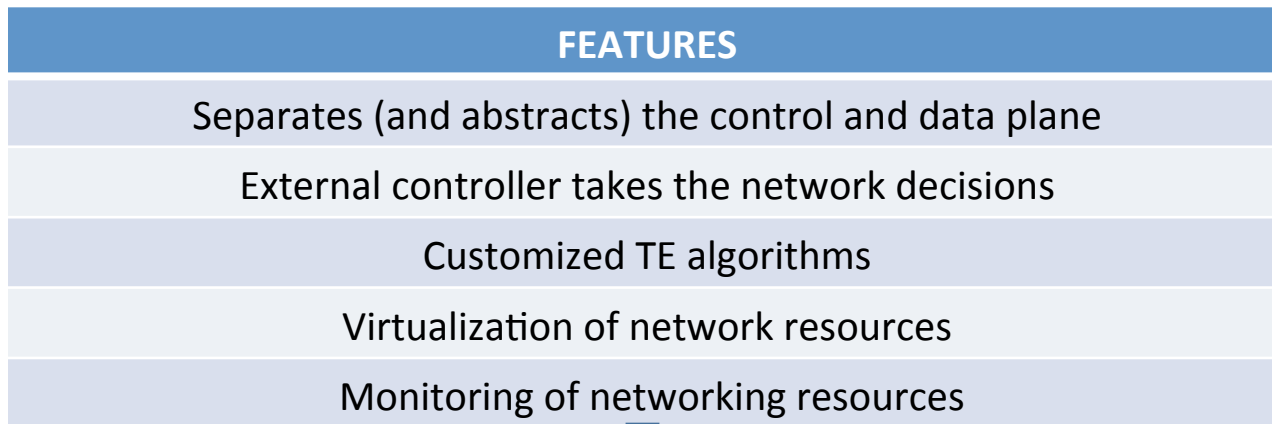


**None is completely extended to provide e2e QoS**  
**None supports dynamic on-demand QoS delivery**

- Network as a Service (NaaS)
  - Business model for delivering tailored on-demand **network services** over dedicated infrastructure (virtualized or not).
  - Management model related to network infrastructure servicing based on **resource** and **capabilities**
  - **Resource**
    - *Logical representation of a physical or virtual device*
  - **Capability**
    - *Features associated to a given resource*
- Software Defined Networking
  - Based on **data and control plane decoupling**
  - **Global knowledge** at the controller, where the decisions are taken



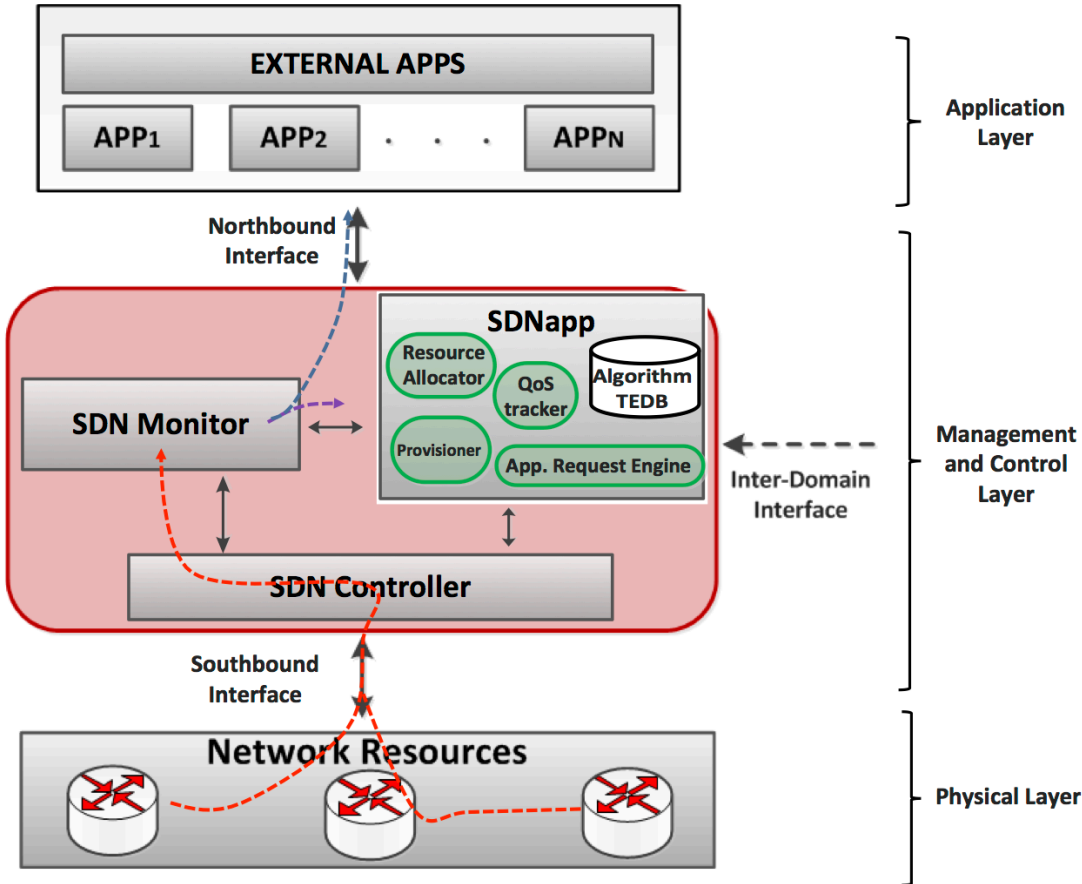
# What do we propose...?



**Flexibility, reliability and adaptability to the QoS requirements of applications and services**

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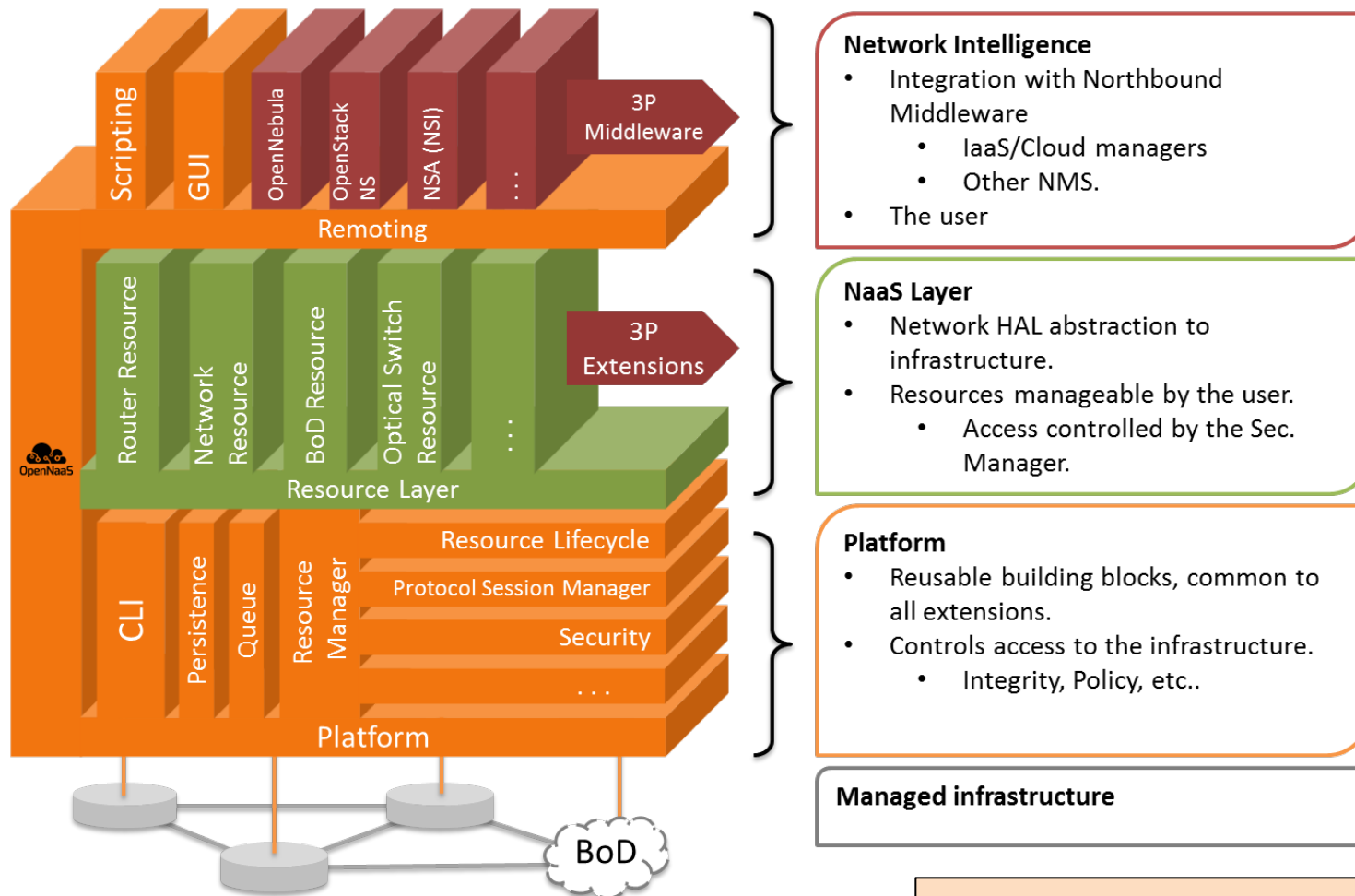
**NETWORK CONTROL LAYER**



- **SDNApp** Set of generic modular functions over an OF network. It adapts control plane to fit service requirements
- **SDNMonitor** Monitoring tools to measure the status of the network and retrieve information
- **SDNController** Responsible for the configuration of the actual devices
- **Three interfaces**

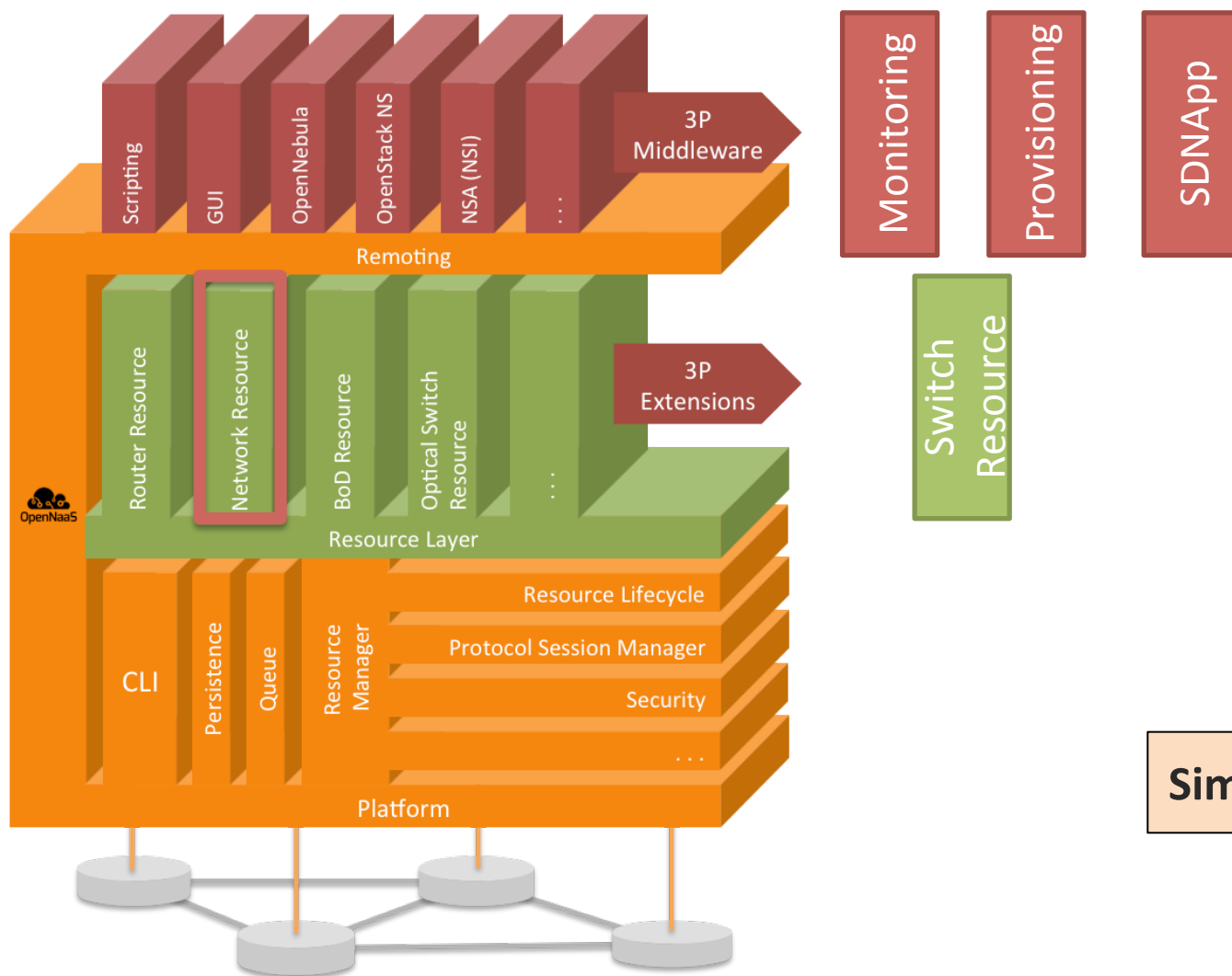
- SDNApp
  - Builds an updated topology map, which reflects status of the network resources and the QoS levels of the different running apps
    - Resource allocator
    - Provisioning
    - QoS tracker
    - Application request engine
    - Alogirthm TEDB
- SDNMonitor
  - Retrieve network state information and statistics through OpenFlow counters
  - Deliver network statistics to the SDNApp
- NCL External Interfaces
  - Northbound (service request + monitor statistics)
  - Inter-Domain (NCL to NCL)
  - Southbound (device config + monitor status)

# How do we implement it...?

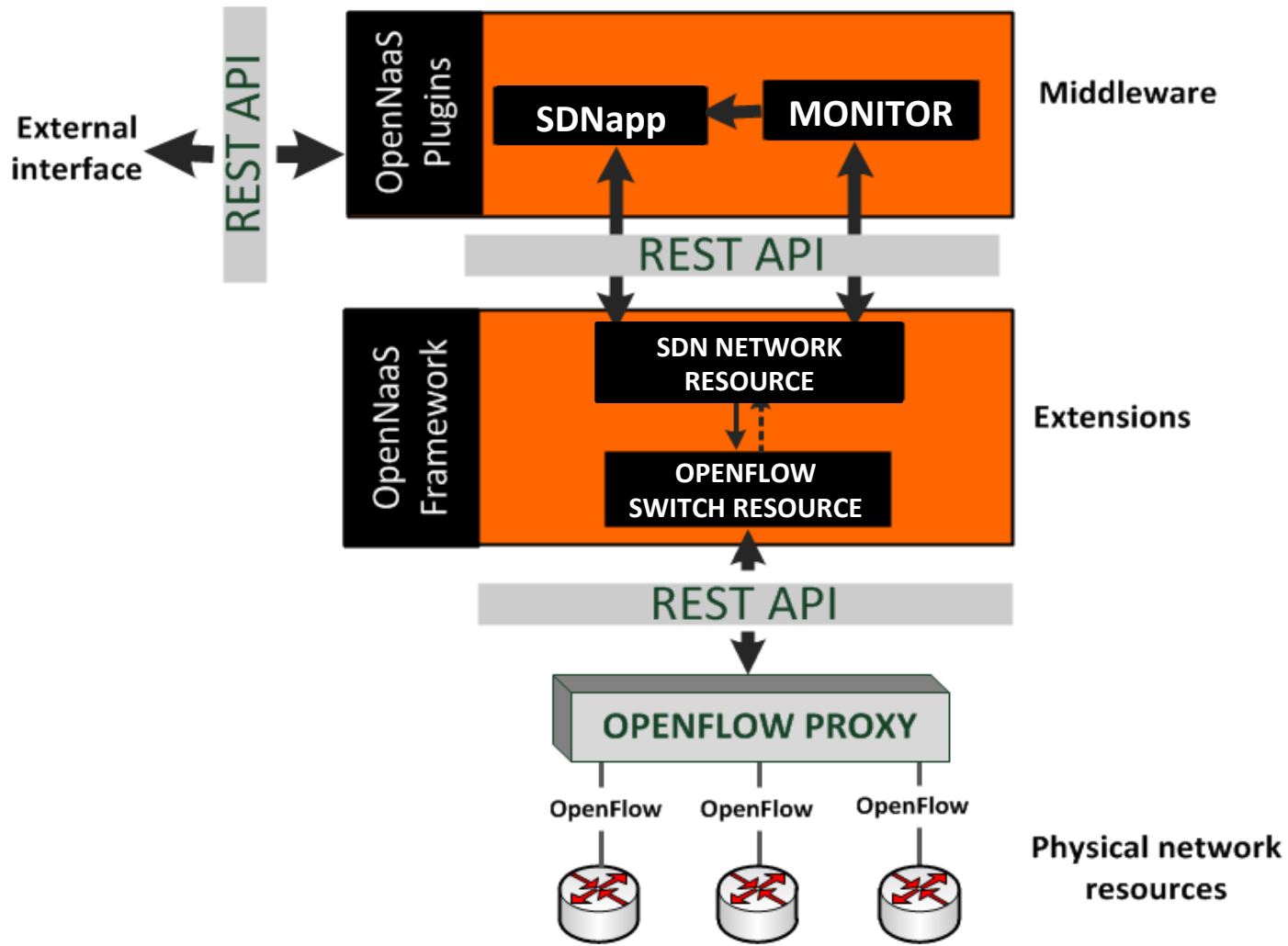


Visit <http://www.opennaas.org>

# How do we implement it...?



Simple extensions...!

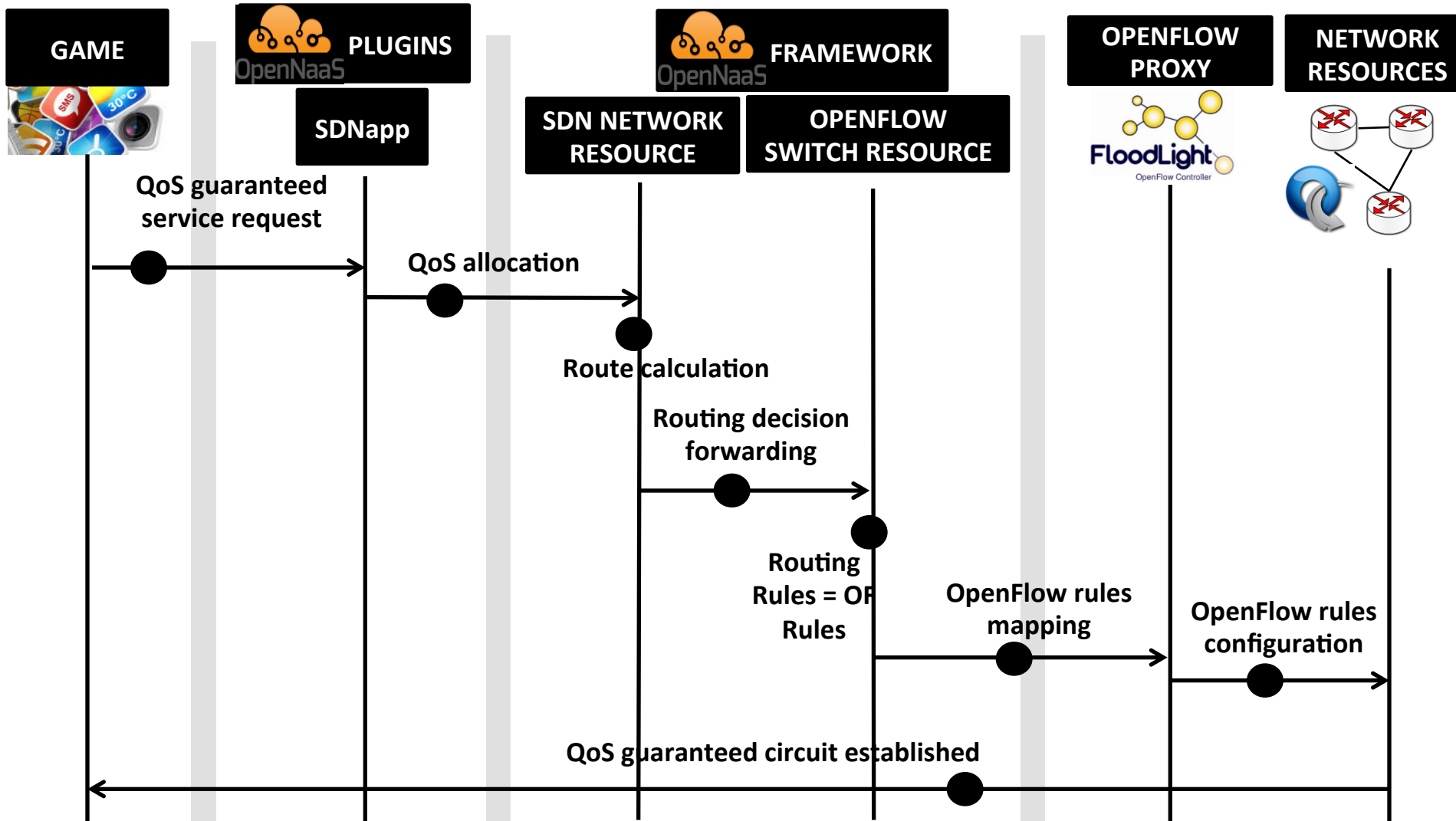


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**USE CASE**



- OpenFlow Experiment in Real-Time Internet Edutainment (OFERTIE) FP7 project
  - <http://www.ofertie.org> <http://vimeo.com/78808742>
  - OFERTIE aims to use software-defined networking approaches to improve delivery of an emerging class of distributed applications for the Future Internet known as Real-Time Online Interactive Applications (ROIA).
  - OFERTIE aims to enhance and use the OFELIA Test-bed for OpenFlow Programmable Networking to run experiments
  - Duration: 24M
  - Partners: University of Southampton, University of Munster, i2CAT, Spinor, Turk Telekom, Sobee, Interoute



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## CONCLUSION

- There is a gap between the QoS level required by current applications (e.g. online real-time gaming) and the QoS offered by the ISPs
  - Several QoS schemes proposed
- Network Control Layer
  - SDNApp responsible for QoS
  - SDN Controller
  - SDN Monitor
- OpenNaaS as the key enabler for SDNApp implementation
- Developments on-going within FP7 OFERTIE project

*Thanks!*  
*Moltes Gràcies!*



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*Questions?*



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