IT.3503 Virtualized architectures

General information

Title: Virtualized Architectures
Code: IT.3503
Responsible: Saad EL JAOUHARI
ECTS: 5
Average amount of work per student: from 80h to 120h, including 42h supervised.
Teamwork: yes

Presentation

This module introduces major new evolutions and converged services in computer networks: (1) network function virtualization (NFV) and software-defined networking (SDN), as well as (2) converged services (360/VR video streaming, DASH, MOOC, broadcast optimization etc). In order to make network management more agile and programmable, today's wired and wireless IT networks are evolving into software defined networks (SDN). In addition, Network Function and Service Virtualization (NFV) is very promising to improve network performance while solving the network orchestration problem. In the second part of the module, thanks to the evolution of the network, some convergent services will be more particularly highlighted, such as video streaming (360, VR, DASH), VoIP, MOOC, or Cloud Computing. To this end, Quality of Service (QoS) and Quality of Experience (QoE) as well as service deployment and broadcast tree optimization will also be studied.

Content/program

skills
The skills to be acquired at the end of this module include:
- Know the evolution of current networks towards software defined networks (SDN)
- Understand the virtualization of services and network functions (NFV)
- Study the video streaming, DASH, VoIP and MOOC systems
- Master the optimization of the broadcast tree
- Edit 360 video and video streaming systems (360)
- Evaluate QoS and QoE

Concepts
The following concepts, which are the objectives of the module, will be discussed:
- Network orchestration
- Network Functions Virtualization (NFV), Open Stack, Opendaylight
- Software Defined Networks (SDN)
- Systems and protocols for converged services
- 360 and VR video streaming, VoIP

- Dynamic video streaming via http (DASH),
- Quality of Service (QoS) and Quality of Experience (QoE)
- Optimization: Optimal placement and provisioning of virtual infrastructures, broadcast tree

Software tools
- VLC media player, Wireshark, Samsung 360 camera and VR headset

Teaching methods Learning Methods
- The activities in this course are divided into lectures and a 360 video streaming project.
- This module is taught in part by Orange Labs lecturers.
- Basic and fundamental concepts will be taught in face-to-face classes.

Assessment procedures
The evaluation of this module is based on 2 individual exams plus a project:
- Exam on the concepts of network virtualization and SDN: 50% (1st part)
- Examination on the application courses: 25% (2nd part)
- Project (in groups of 3-5 students) on 360 video editing and 360 video streaming system: 25%.

Working language
The courses in this module are taught in English. Students can work on their project in the language of their choice.

- Course material on moodle: https://moodle.isep.fr/moodle/course/view.php?id=111
- https://www.opendaylight.org
- https://www.openstack.org