Extending and Deploying Ofelia in BRAzil (EDOBRA)

Carlos Guimarães
cguimaraes@av.it.pt
Team

Instituto de Telecomunicações (IT Aveiro)
- Rui L. Aguiar, Augusto José Venâncio Neto, Daniel Corujo, Carlos Guimarães

Universidade Federal de Uberlândia (UFU)
- Pedro Frosi Rosa, Flávio de Oliveira Silva, Lásaro Camargos, Rafael Pasquini, Alex Dias, Mauricio Amaral Gonçalves, Caio César Ferreira

Universidade de São Paulo (USP)
- Sérgio Takeo Kofuji, Tereza Cristina Melo de Brito Carvalho, João Henrique de Souza Pereira, Flávio de Oliveira Silva
OFELIA overview (1/4)

European Project
- Start date: September 2010
- Project duration: 3 years
- Total Cost: 6.3M€

Offers a Pan-European experimental facility
- Allows to (not only) experiment on a test network
- (but also) to control and to extend the network precisely and dynamically
- Users control their own network and can create an “Internet of their own”

Provides the tools to create innovations for the future Internet
- Enabling revolutionary Internet research
  - Allows deployment and testing of new protocols without deploying a new network
OFELIA overview (2/4)

Based on OpenFlow

- Emerging technology that allows virtualization and control of the network through secure and standardized interfaces
- Separates the control-plane from the data-plane
- Proposes a centralized controller that communicates with the network nodes
- Allows to program network behavior directly by the network operator
OFELIA overview (3/4)

New way of thinking
- Communication between endpoints create a flow

If switch does not have an entry for the flow, it asks somebody who knows
- Asks the controller which action may take

Any type of network path is possible
OFELIA overview (4/4)

Controller (Intelligence)

1. I wanna see this great video

2. Request streaming the video

3. Start streaming the video

4. Ups, new flow ... Where shall I send the video to?

network with OpenFlow switches

Content Store
OFELIA overview (4/4)

Controller (Intelligence)

1. I wanna see this great video
2. Request streaming the video
3. Start streaming the video
4. Ups, new flow ... Where shall I send the video to?
5. This way please

network with OpenFlow switches

Content Store
OFELIA overview (4/4)

Controller (Intelligence)

The video stream flows the set-up way without bothering the controller any more

Ups, new flow... Where shall I send the video to?

network with OpenFlow switches

streaming the video

Content Store

This way please

I love this video!!

Request streaming the video
EDOBRA overview

Created from an open call aiming for defining new scenarios and use cases that use SDN technology

One of the 4 accepted projects from a total of 17 proposals

Compose a new workpackage in OFELIA project

- Start date: September 2012
- Project duration: 1 years
Objectives

Deploy a New OFELIA Island at Brazil
- Increasing the physical extension of OFELIA, deploying news accesses in Brazil

Entity Title Architecture
- Providing a new network architecture, called Entity Title Architecture (ETArch) where multicast and mobility are seamlessly supported, based on an OpenFlow substrate and fully integrated with 802.21 protocol, thus enabling this new network architecture in interacting seamlessly with different access networks

Mobility-aware Control Mechanisms for OpenFlow OpenWRT Equipment
- Extending the capacity of OpenFlow based switches to handle mobility by providing a new OpenFlow OpenWRT with integrated support for the IEEE 802.21 protocol using ODTONE

Carry out Future Internet Research and Experimentation
- Deploying and carrying out multicast, mobility and energy efficiency experiments at scale under OFELIA, thus collaborating to shape a Future Internet that would meet actual and future requirements of users and applications
Deploying a New OFELIA Island at Brazil

Located at Uberlândia, Minas Gerais state at the Federal University of Uberlândia (UFU)
Deploying a New OFELIA Island at Brazil

The experimentation equipment include NEC IP8800 switches and TP-Link TL-WR1043ND.

The physical connection between Brazil and Europe will help through the interconnection point of RedCLARA and GEANT (USP)

UFU will be connected to USP by a partnership connection to the national research backbone provided by the Rede Nacional de Pesquisa, the Brazilian National Research and Education Network
Entity Title Architecture

Concepts and Components

- Entity, Title, Workspace, DTSA
Entity Title Architecture
Entity Title Architecture

16º Seminário RTCM

Covilhã, 15 de Fevereiro de 2013
Entity Title Architecture
Entity Title Architecture

NTSA1
DTS
NE – OpenFlow Switch

Application1
Application
HOST

Application2
Application
HOST

Workspace-2014_World_Football_Final

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Entity Title Architecture
Mobile Openflow OpenWRT Equipment

ODTONE (http://atnog.av.it.pt/odtone)

- Open-source IEEE 802.21 implementation
- Media Independent access link control
  - Provides abstract link events
  - Provides abstract link commands
  - Provides abstract Informational Elements

Objective:

- Leverage Media Independent information and control to:
  - Optimize and assist mobility and handover procedures
  - Detect handover candidates
  - Obtain pre-configuration information to optimize and accelerate the handover process
  - Allow other kinds of heterogeneous link control procedures:
    - Load balancing, policing, etc.
Mobile Openflow OpenWRT Equipment

802.21 Model
Mobile Openflow OpenWRT Equipment

ODTONE and OpenFlow integration: Control Plane

DTSA

FloodLight OpenFlow Controller

MIIS

MIHF

NEC IP8800

OpenFlow Switch

Access Point with modified OpenFlow OpenWRT implementation

Modified OpenFlow OpenWRT implementation

OpenFlow Switch

Access Point with modified OpenFlow OpenWRT implementation

Modified OpenFlow OpenWRT implementation
Carry out Future Internet Research and Experimentation

Multicast-related networking experiments and measurements
- Entity/Domain Title-supported multi-island multicast traffic experiments (i.e., sources and listeners at different OFELIA islands)
- Comparison with current multicast mechanisms and strategies

Mobility-related networking experiments and measurements
- ODTONE-supported media independent mobility optimization of Network Entity control mechanisms

Energy Efficient related experiments and measurements
- Smart Network-Assisted optimal access interface activation
Thank you for your attention!

http://atnog.av.it.pt