

How to stimulate use and populate facilities?

Hagen Woesner
Project OFELIA



5 minute view on a non-trivial problem

Population and use is necessary but not sufficient.



How to stimulate use and populate facilities?

1. Have a facility
2. Provide low entry barriers to it
3. Give incentives for extensions

How to turn a populated facility into a sustainable one?

- Provide advantages to community
- Provide advantages to individual testbed providers

1. Have a facility

- Facilities (here: testbeds) have to be
 - **Attractive.**
 - Published results that everyone can repeat on the facility give credibility to your research.
 - New hardware that is in difficult to get
 - Volumes of standard hardware that are difficult to repeat
 - Specific software installations that are difficult to replicate
 - **Available.**
 - Owners have to see benefit in supporting new users on their facility
 - Increased reputation translates into financial benefit!
 - **Accessible.**
 - Bandwidth still *is* a problem in network research
 - Expensive to get from Gent (Belnet) to Brussels (GEANT)
 - Similar for Germany

2. Provide low entry barriers to it.

- **Web access** is useful in the first place.
- Being compatible to **PlanetLab** and/or **GENI (SFA)** immediately gives higher visibility and potentially user groups
 - Work with the GENI folks rather than against them
 - In a globalized Internet, competition is rather on the level of research groups than on national (or EU vs. US) level.
 - Exploitation of research results is a different game.

3. Give incentives for extensions

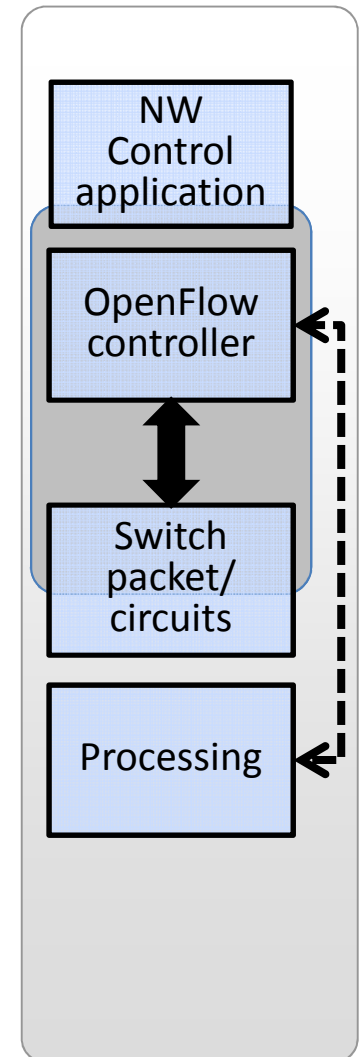
- **Open Calls** may be a good idea
 - We will find out, no experience so far in OFELIA
- **Privileged access** to specific parts of the facility may be an incentive, as well
 - External users get a slice, internal get access to the slicing mechanism

What is OpenFlow

- OpenFlow is a standardized interface between switch controller and hardware.
 - Plus some protocol that transports the frames over ssl/tcp
 - Allows flexible control down to individual flows
 - Is protocol agnostic, programmable, scalable
 - Allows deployment & test of new controllers & control apps
- OpenFlow testbeds are underway in the US (GENI) & Japan

Advances beyond state of the art. Priorities w.r.t. scientific challenges.

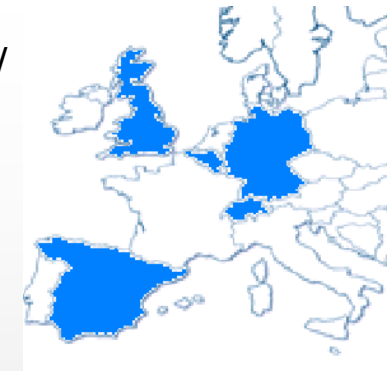
- OF extensions needed for multi-layer, multi-domain
Any domain or layer borders require flow processing; Interface between controller and processing plug-ins needs to be developed & tested
- Extend filter format description to generic labels (CarrierEther, IPv6, opt. circuits, so-called OF v2.0 (?))
 - non-IP experiments such as content-based addressing
 - Multi-domain OpenFlow requires controller/controller communication



Federation of five islands

- Three years project, started Oct 2010
- 5 OpenFlow-enabled islands at academic institutions:
 - Berlin (TUB) – partial replacement of existing campus network with OF-switches
 - Gent (IBBT) – central hub, large-scale emulation
 - Zürich (ETH) – connection to OneLab and GpENI
 - Barcelona (i2CAT) – experience with facility projects (IaaS, DRAGON)
 - Essex (UEssex) – national hub for UK optical community; L2 (Extreme) switches, FPGA testbed
- NEC provides homogeneous L2 hardware platform (OF-enabled Ethernet switches)
- ADVA as major vendor of optical access and data center equipment
- Different external vendors (Juniper, Extreme)
- Explore extensions of OpenFlow towards wireless and optical transmission

Partners with complementary technological strengths and user groups from five countries with strong research communities in networking.



partner	L2	L1/optics	L3	Wireless	emulation	Control SW	processing	US connections	MM source
iBBT	X				X		X		X
TUB	X			X					
I2cat	X		X			X			
UEssex	X	X				X	X		X
ETH	X							X	

Additional partners and European manufacturers will be involved through Open Calls

OFELIA - Operation and extension of the facility.

From isolated islands to centralized resource management – two phases of open calls.

Timeframe of project phases

Operation of the individual islands, one partner per island has the lead

- Phase i: OF controllers and switches in place, first local experiments concluded
- Phase ii: Connect islands and extend OF experimentation to wireless and optics
- Phase iii: Automate resource assignment and provide connections to other FIRE and non-European research facilities

Gradual expansion of early operative facility

Open Calls to extend facility & consortium will be published after M6 & M18

- Total budget €830,000 max. 200 K€ funding per experiment

Promotion/ implementation of open calls

Open Calls will be promoted through www.fp7-ofelia.eu and

- FIRE Station
- Standard communication channels (mailing lists, IEEE ComMag)
- Industry fora: Metro Ethernet Forum, Optical Internetworking Forum, Open Grid Forum

i: Create islands on L2

ii: Connect islands and extend to wireless/optics

iii: Ressource assignment automization and connection to other facilities

▲ M6

▲ M18