# Experimentation on federated testbeds in Fed4FIRE

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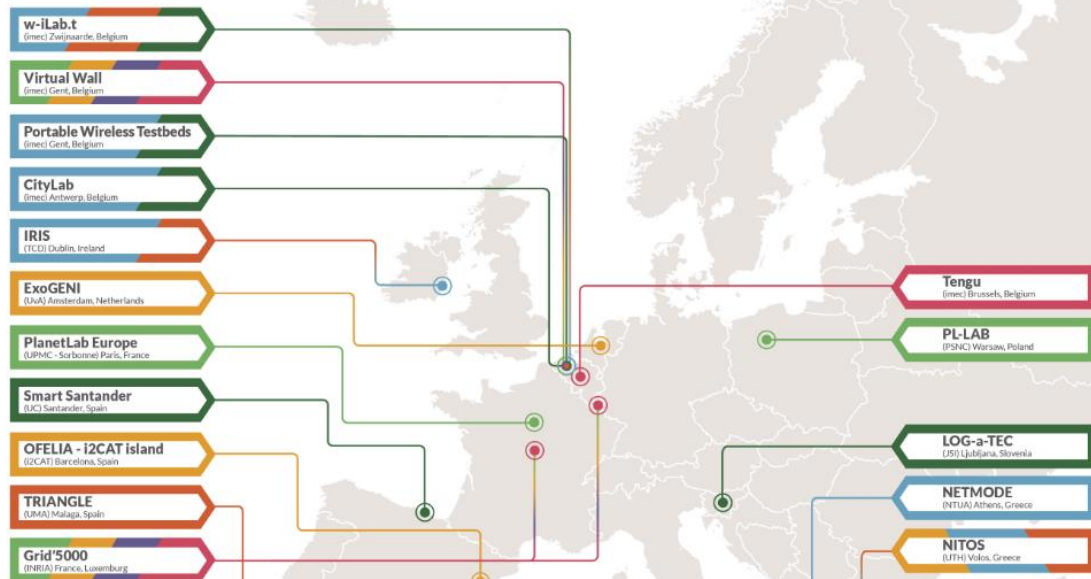
**Fed4FIRE
Federation for FIRE**

(Future Internet Research & Experimentation)

2012-2016

**Fed4FIRE+
2017-2021**

Fed4FIRE assets – facilities (doc.fed4fire.eu)

Goals of federation
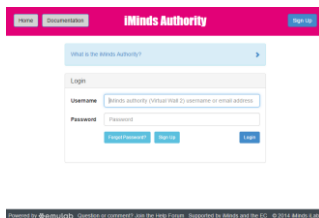
Make it easy for experimenters to use multiple testbeds

- Single account
- Single (or small number) of tools, choice of tools
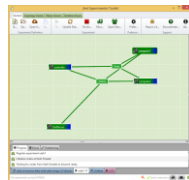
Multiple testbeds

- To scale up
- To use/combine special resources (e.g. wireless robots)
- Redundancy (e.g. testbed in maintenance)
- To re-use experiments (class exercises, scientifically, …)
- To compare environments (e.g. wireless, openflow hardware, …)

Design principles
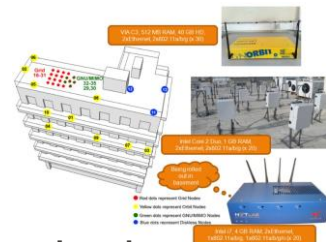
Multiple identity providers

Standardized APIs

Multiple tools

Testbeds
trust IdPs
in federation

Multiple testbeds
**All of them can appear and disappear !**
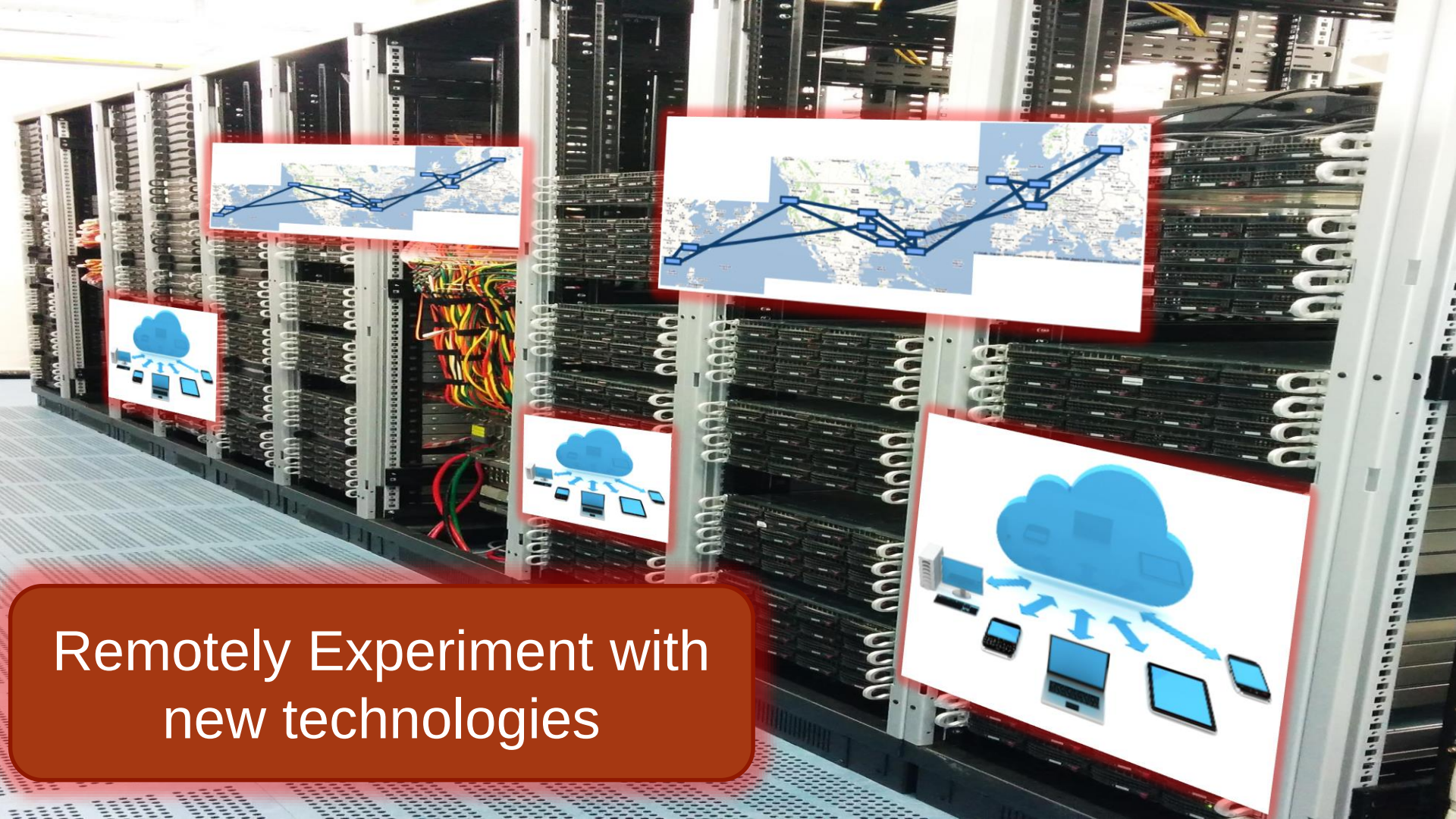
#Testbeds usable with Fed4FIRE account: +65 https://fedmon.fed4fire.eu (October 2019)

# Monitoring federation is key (https://fedmon.fed4fire.eu)
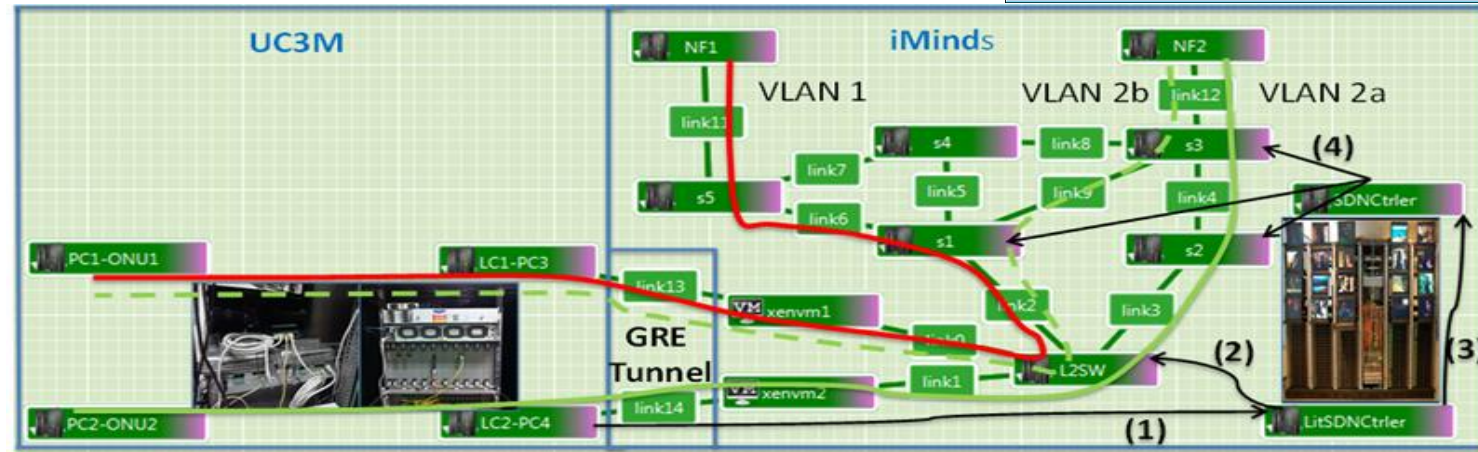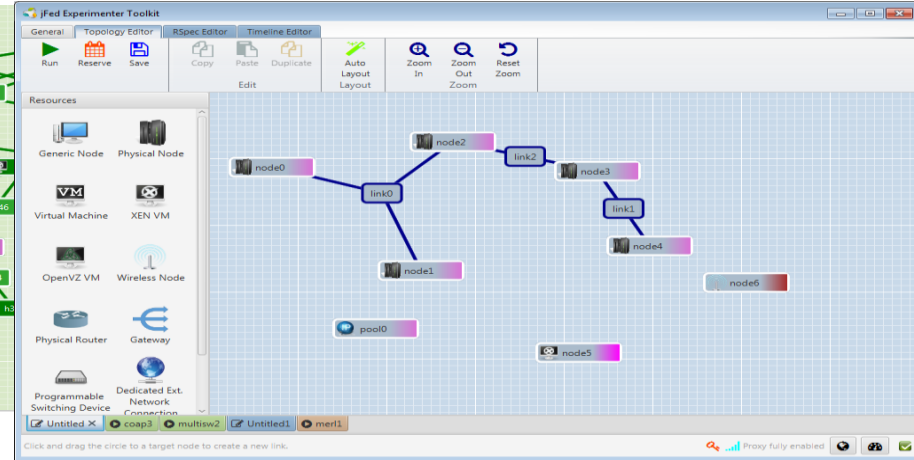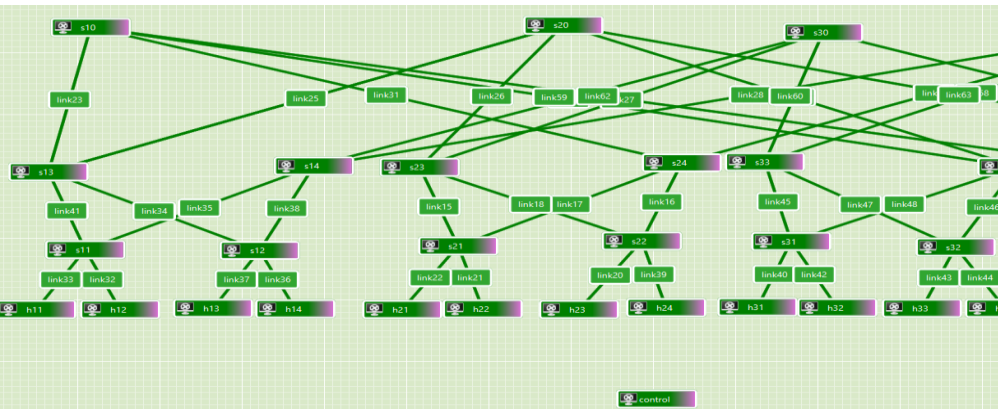
Fed4FIRE as a meta-testbed

Remotely Experiment with new technologies

jFed tool: easy access for testbeds (jfed.ilabt.imec.be)
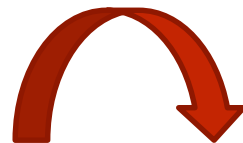
Fed4FIRE as Meta-testbed

Enables all kind of experimentation because of bare metal hardware of all kinds of equipment
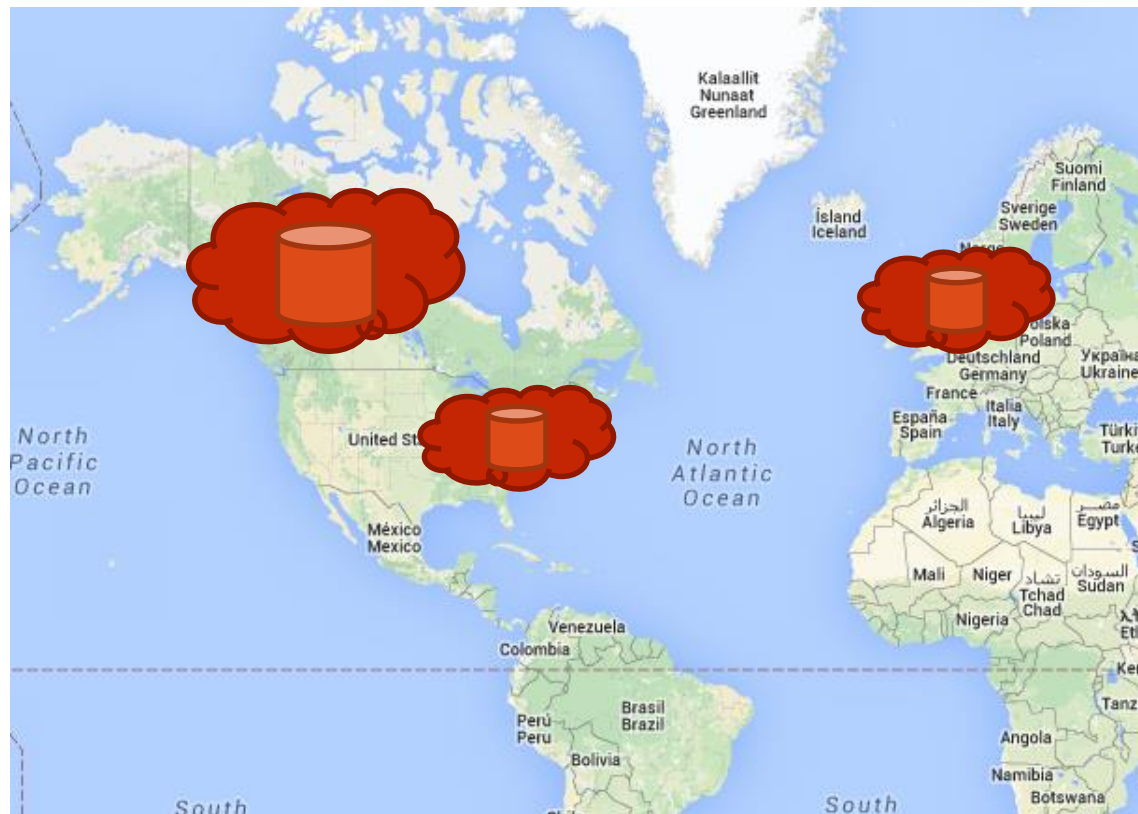
Including creation of new platforms, testbeds, …

# Company wants to deliver global video service
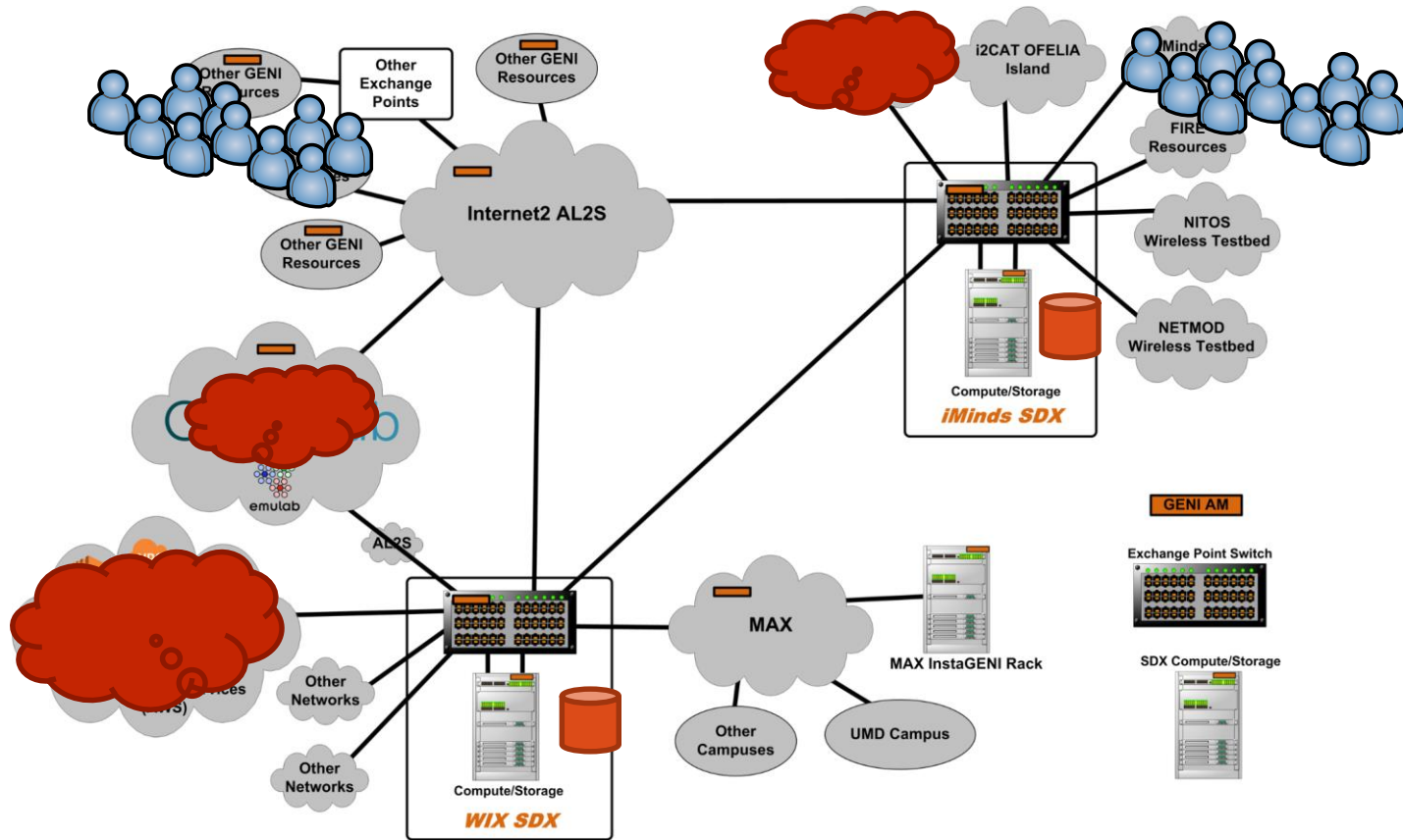
- Cost efficient
- Redundant
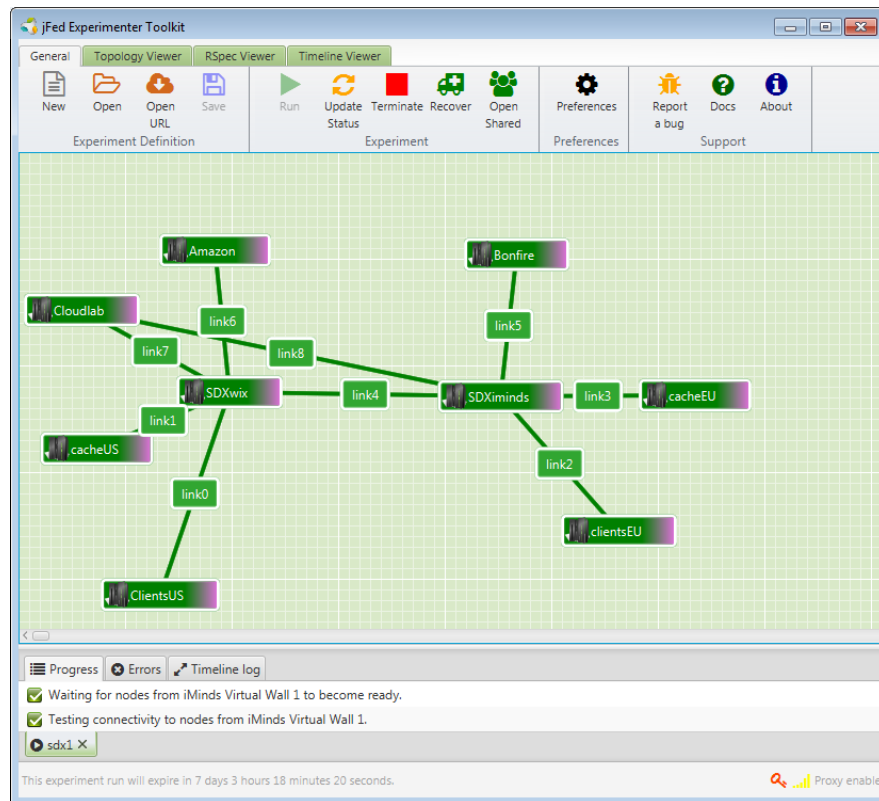
Design: start with US and EU users
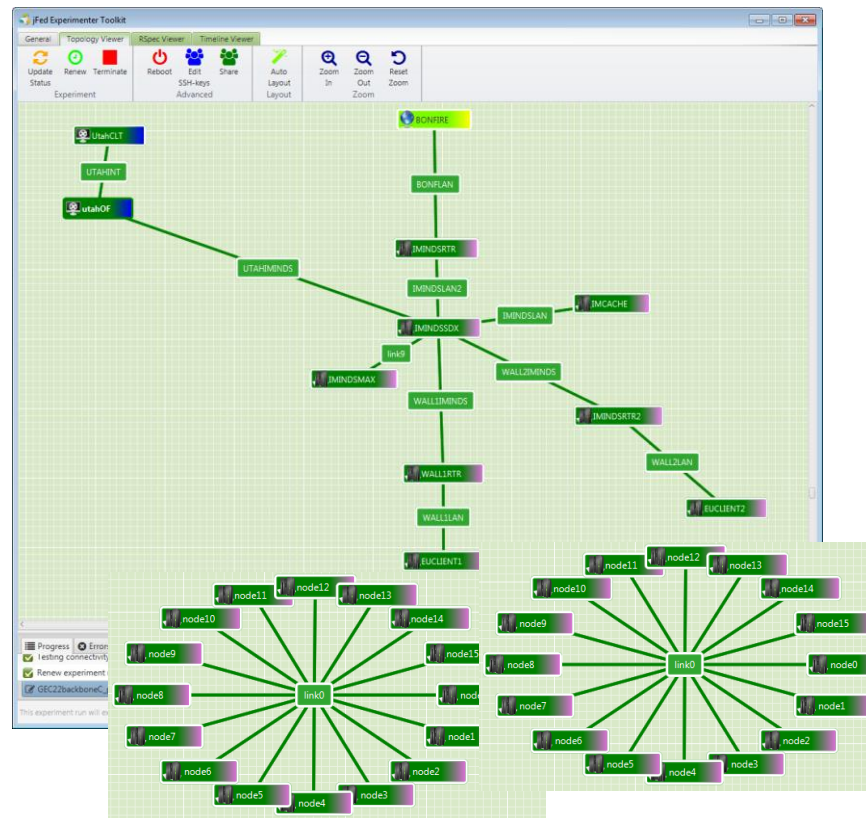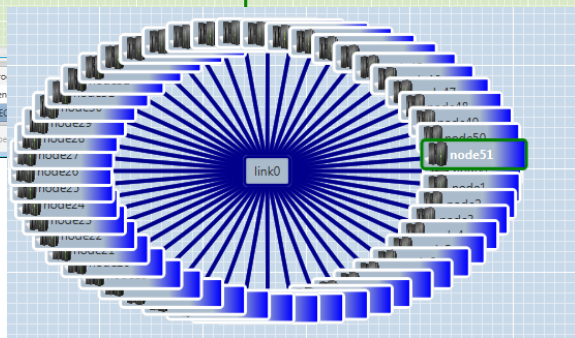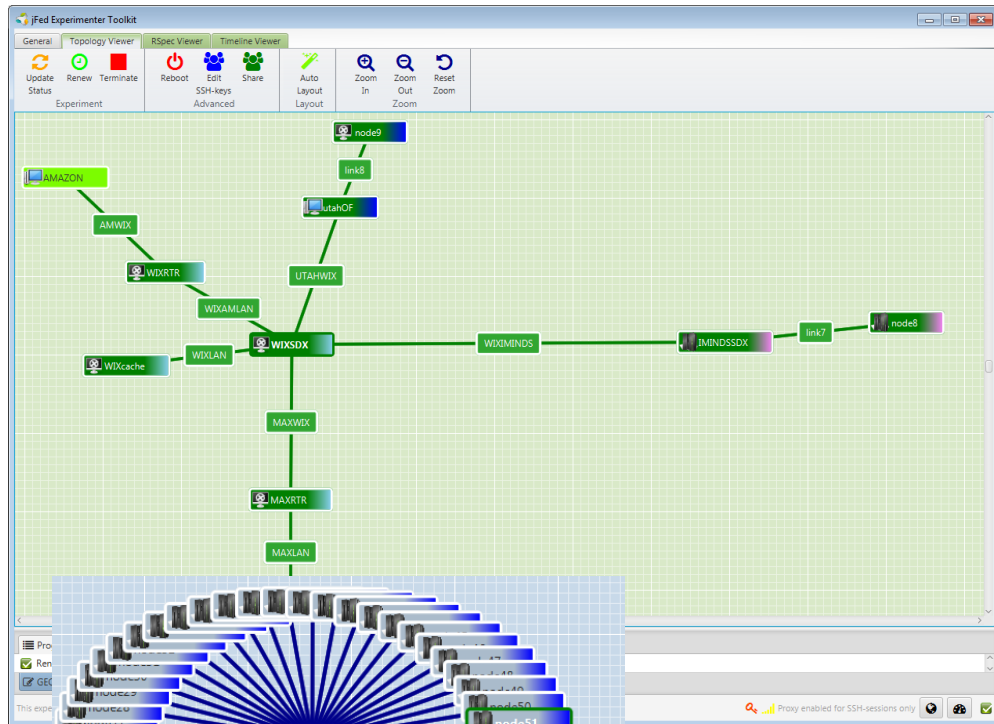
Demo Deployment
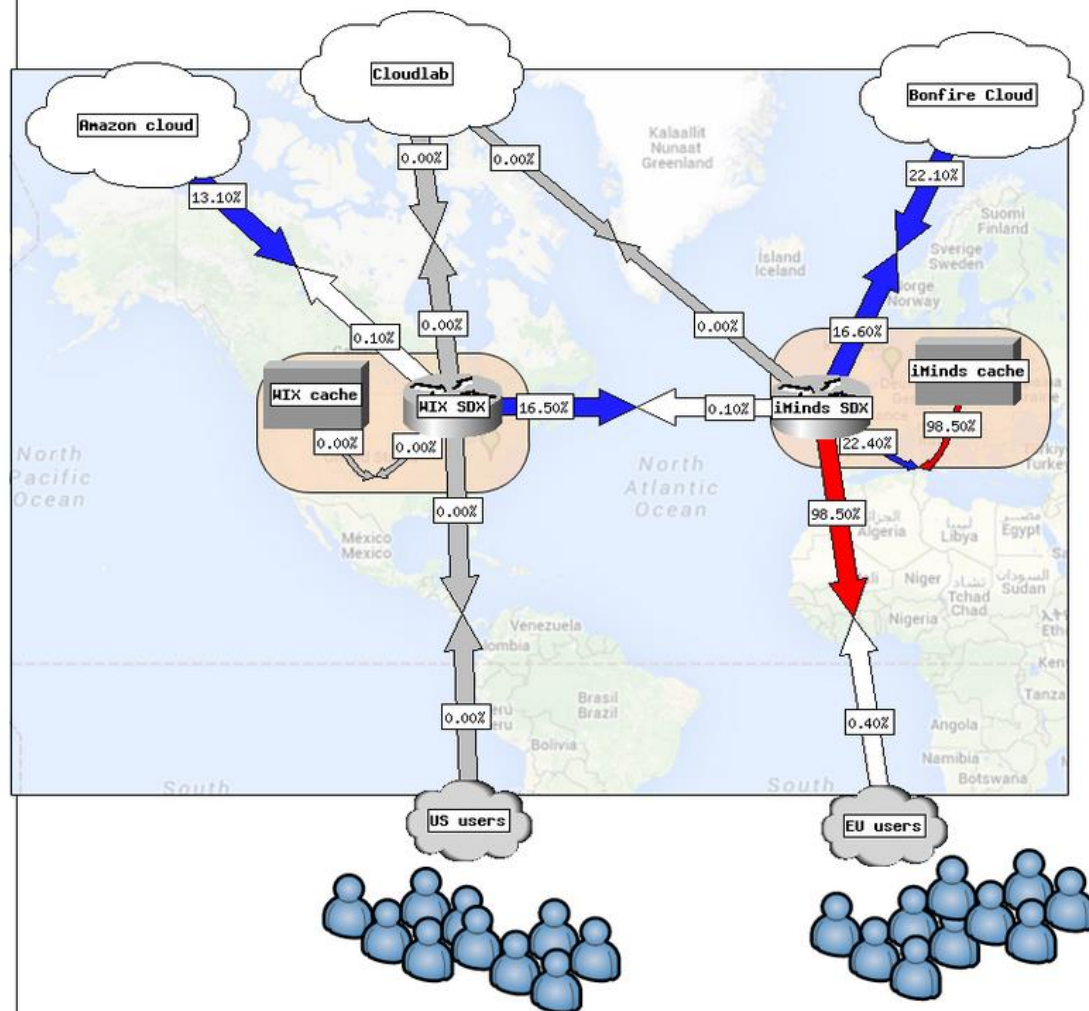
Single testbed prototype

Upscaling

Amazon cloud

Cloudlab

Bonfire Cloud

FED4FIRE

13.10%

0.00%   0.00%

22.10%

Kalaallit
Nunaat
Greenland

Island
Iceland

Sverige
Sweden

Norge
Norway

0.10%   0.00%

0.00%

16.60%

Suomi
Finland

WIX cache

WIX SDX   16.50%   0.10%   iMinds SDX

iMinds cache

0.00%   0.00%

98.50%

22.40%

North
Pacific
Ocean

North
Atlantic
Ocean

0.00%

98.50%

México
Mexico

Venezuela
Colombia

Brasil
Brazil

Perú
Peru

Bolivia

Algeria   Libya   Egypt

Niger   Tchad
Chad   Sudan

Nigeria

Angola
Namibia
Botswana

Turkey

0.00%

0.40%

South

South

US users

EU users

Traffic Load
0-1%
1-10%
10-25%
25-40%
40-55%
55-70%
70-85%
85-100%

Day night emulation

Network Function Virtualization experiments on Fed4FIRE

Virtual Network Infrastructure Topology

Automating with Experiment Specification (eSpec)

What is an Experiment Specification?
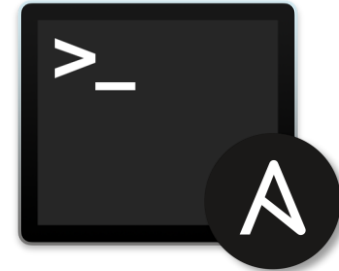
Espec bundles:
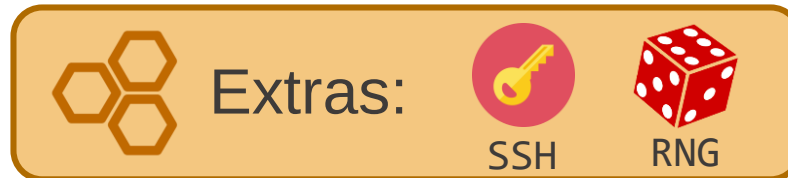
Resource
Specification

Files to be
uploaded

Commands
to be executed

Extras: SSH   RNG

Fed4FIRE as meta-testbed

Combine computing, networking and storage for all your needs (SDN/NFV/SDX/5G/machine learning/IoT/cloud)

QUESTIONS ?

WWW.FED4FIRE.EU

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