Track 2: Cloud and Wired networking

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Porto Roadshow

Porto - Feburary 18, 2020

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CLOUD

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WIRED NETWORKING

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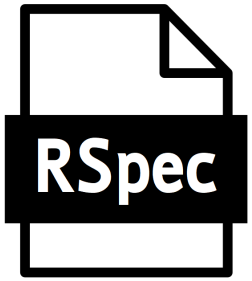
The Experiment Specification

What is an Experiment Specification?

Espec bundles:



Resource Specification

Files to be uploaded

Commands to be executed

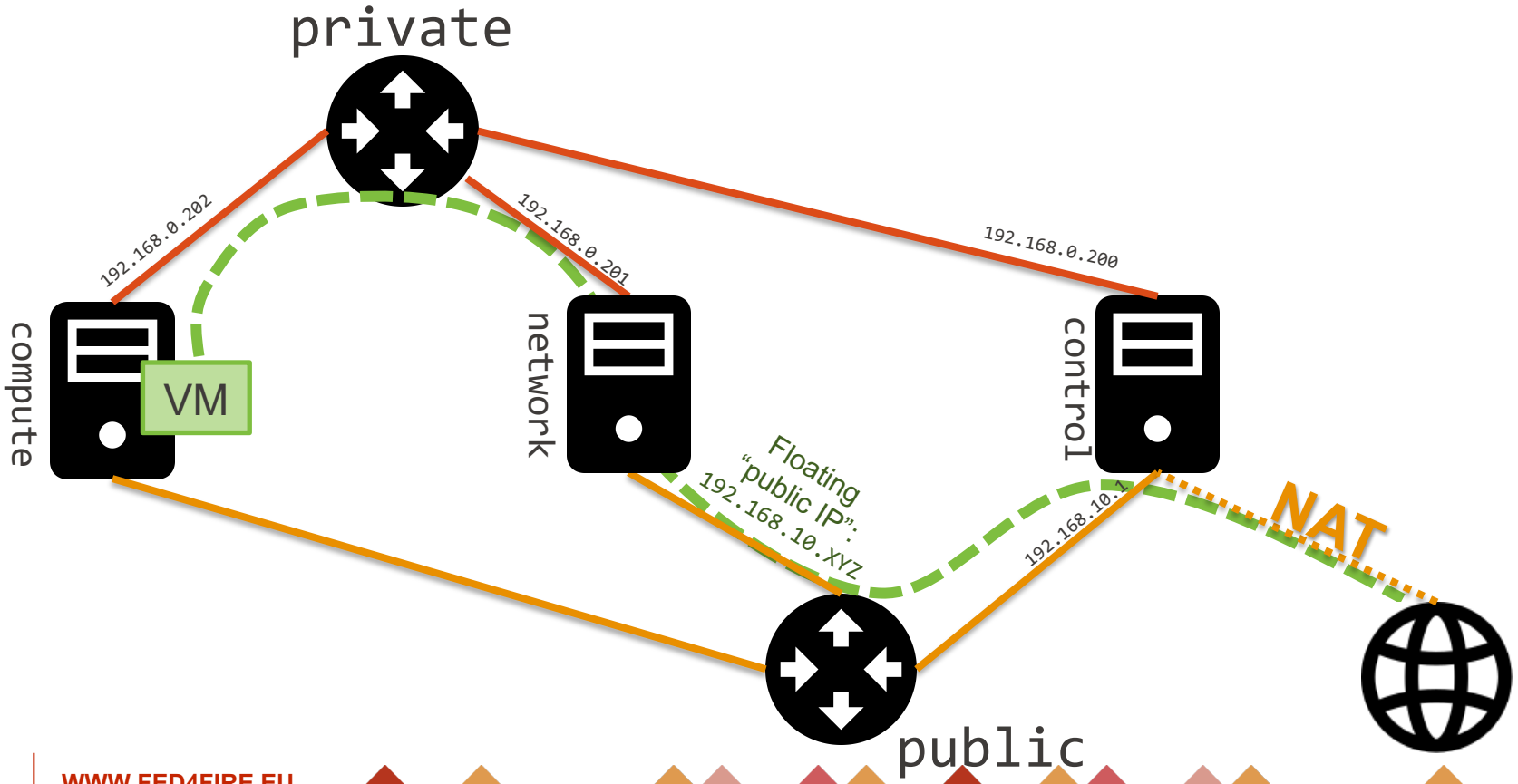
Deploying OpenStack with EnOS

Deploying OpenStack with EnOS

EnOS allows you to **Deploy**, **Customize** and **Benchmark** OpenStack

- Developed by Inria
- Wrapper around **Kolla-Ansible**
- Deploys all OS-services as Docker containers
- ESpec generates the EnOS config file for bootstrapping the deployment

OpenStack experiment architecture



Resources on EnOS

Tutorial

https://doc.ilabt.imec.be/ilabt/virtualwall/tutorials/openstack.html

EnOS documentation

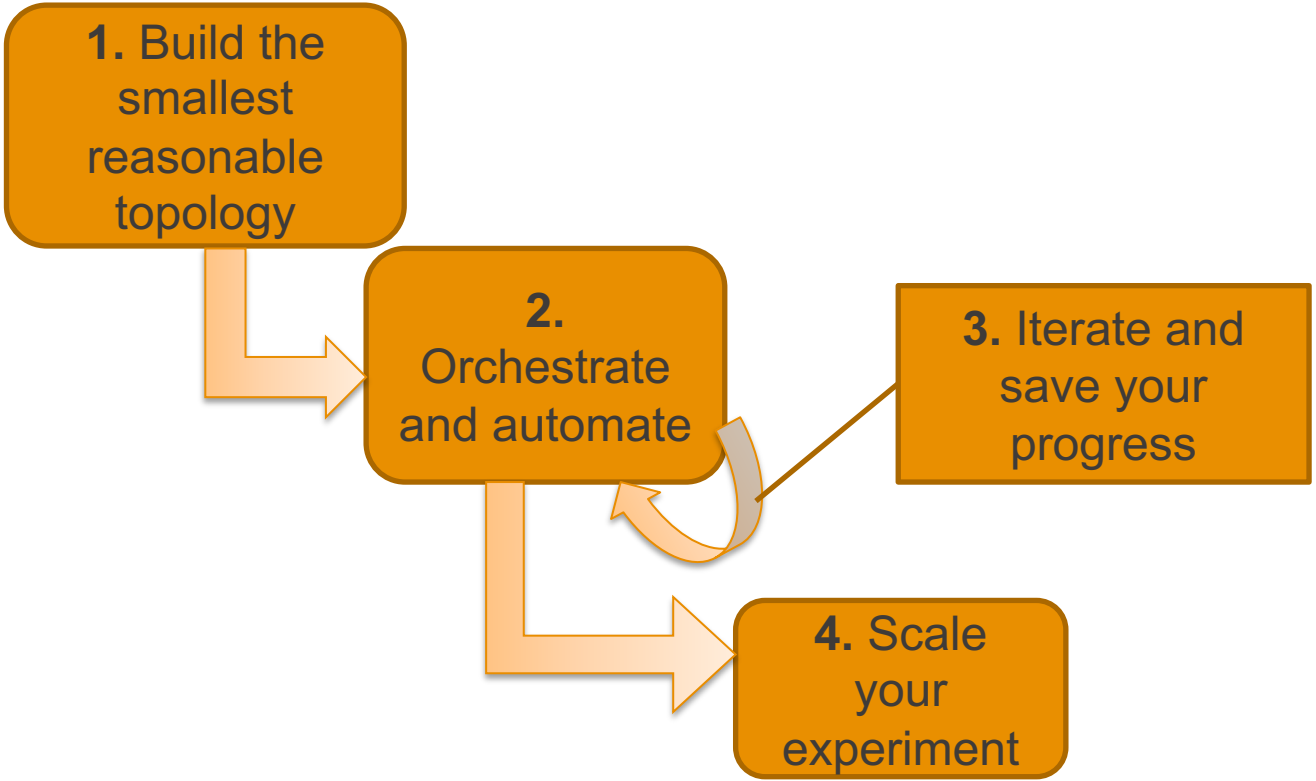
https://enos.readthedocs.io/

EnOS ESpec repository

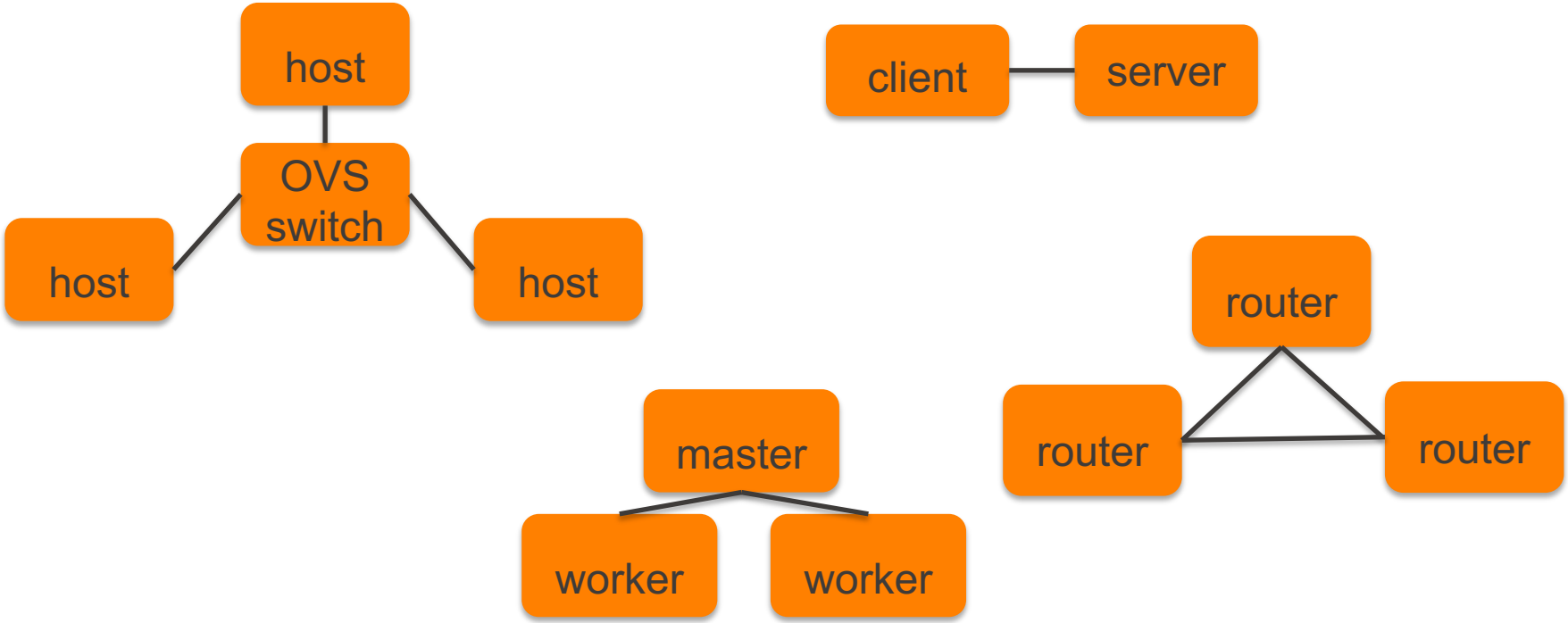
https://gitlab.ilabt.imec.be/ilabt/enos-espec/

Workflow for creating and scaling up experiments

Recommended workflow



1. Build the smallest reasonable topology



2. Automate as you go

Use Configuration Management Systems to automate installation and configuration of software

Many tools available for this job: Ansible, Chef, Puppet, …

3. Save your progress

Log all of your experimental artifacts for every experiment that works

- RSpec
- image
- install script
- custom software
- measurements
- etc.

Use version control to store your artifacts

Always know the **last configuration that worked**

4. Scale your experiment

Only scale up when your smallest reasonable experiment is working

Adapt your request RSpec to add more nodes

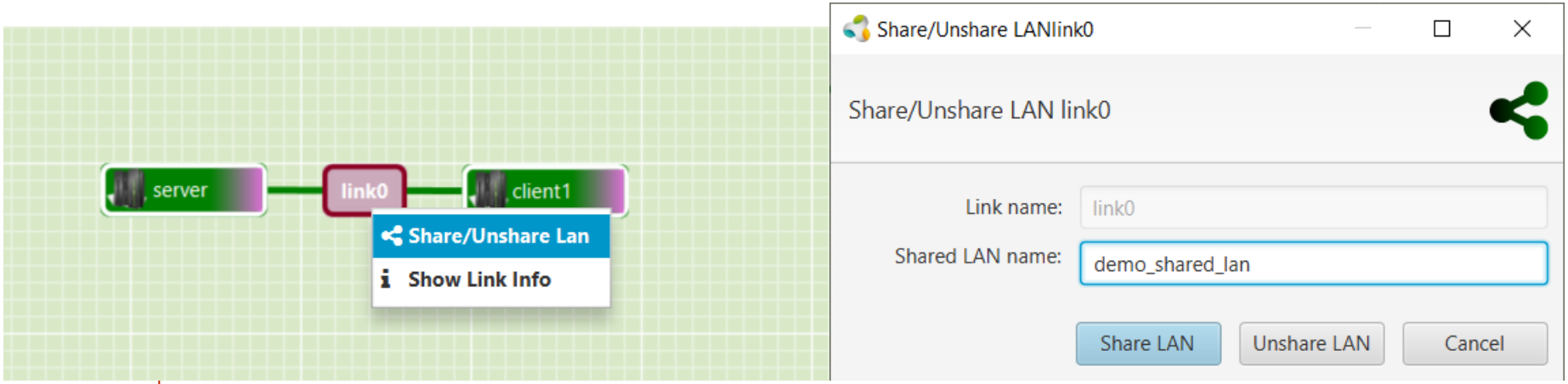
- Roll your own scaling script: mostly copy/pasting with minimal editing required
- Use geni-lib

Scaling up experiments with shared LAN’s

Shared LAN

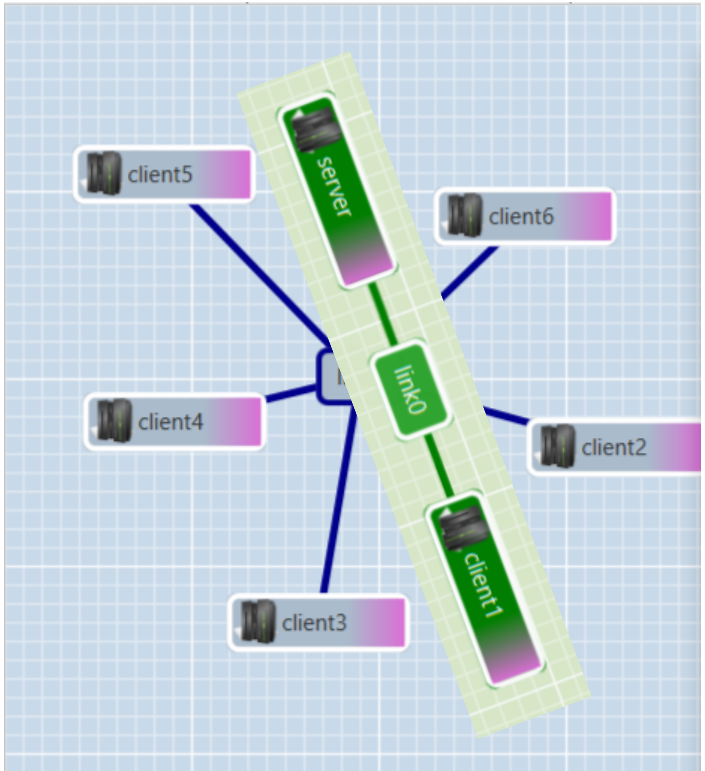
Shared LAN's allow you to add extra servers to an existing network in an experiment

Step 1: Right click on network and choose "Share/Unshare Lan"



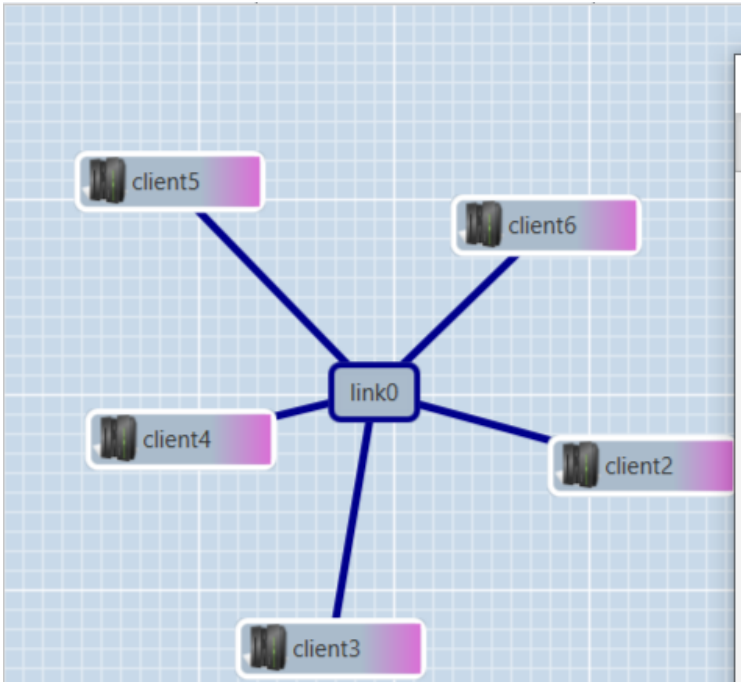
Shared LAN

Step 2: Design a new experiment with extra servers



Shared LAN

Step 3: Fix duplicate IP-addresses



Properties of link0

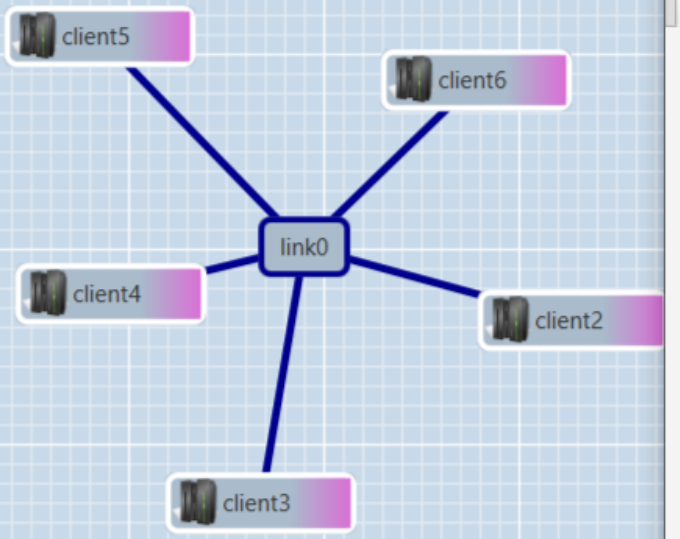
General | Impairment | Link Type

Link name: link0

Configuration type: Automatic IPv4 IPv6

IP addresses:

Interface ID	IP Address	Netmask
client2:if0	192.168.0.3	255.255.255.0
client3:if0	192.168.0.4	255.255.255.0
client4:if0	192.168.0.5	255.255.255.0
client5:if0	192.168.0.6	255.255.255.0
client6:if0	192.168.0.7	255.255.255.0



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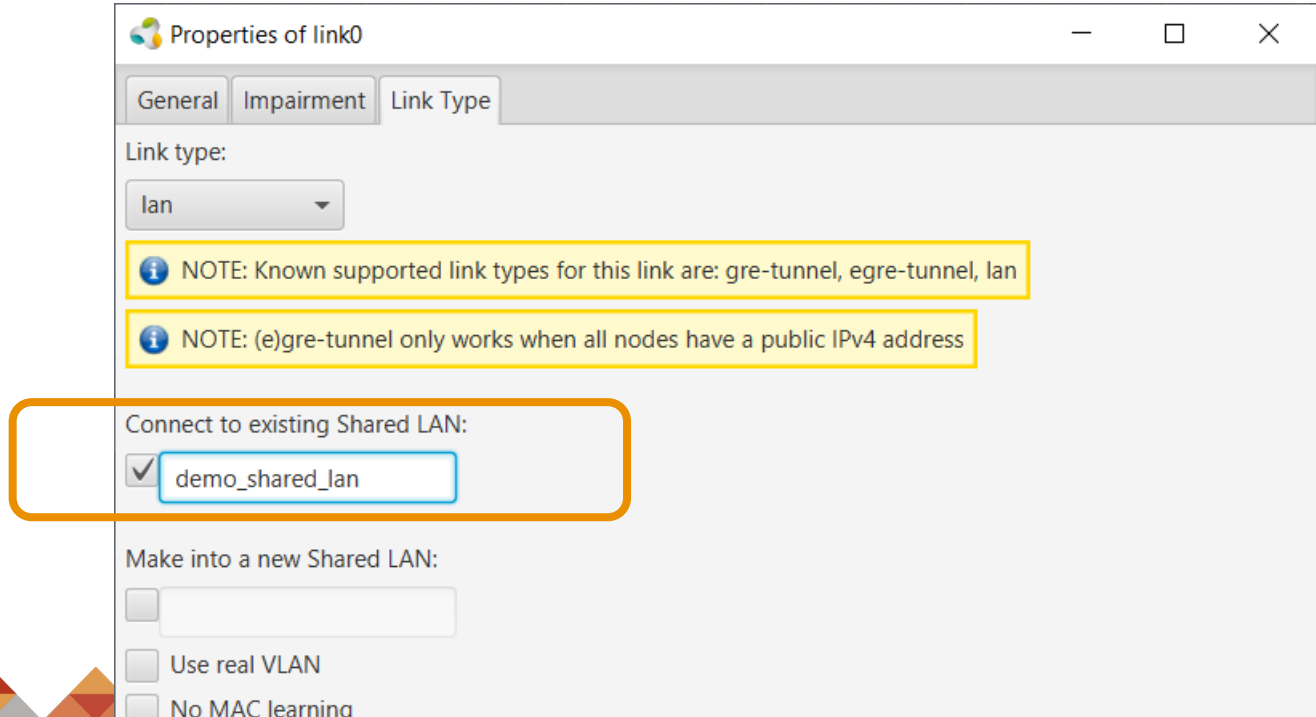
client3:if0	192.168.0.4	255.255.255.0
client4:if0	192.168.0.5	255.255.255.0
client5:if0	192.168.0.6	255.255.255.0
client6:if0	192.168.0.7	255.255.255.0

Save Cancel

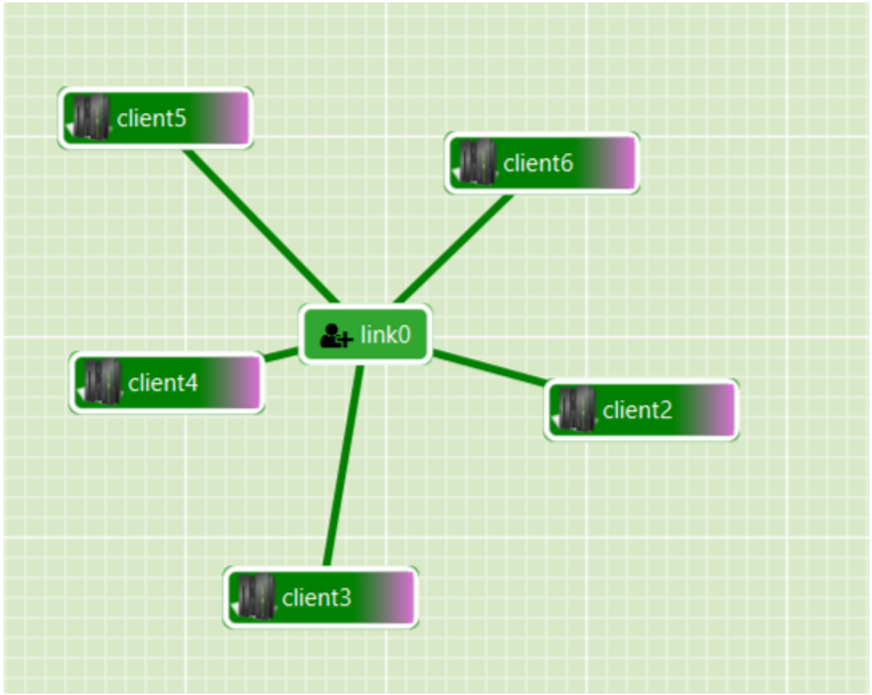
Shared LAN

Step 5: Configure link in new experiment to connect to existing Shared LAN

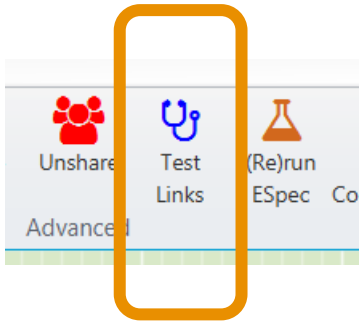


Shared LAN

Step 6: Start the new experiment



Test your links!



Link Test Results

Link Test Results

Link Test Results:

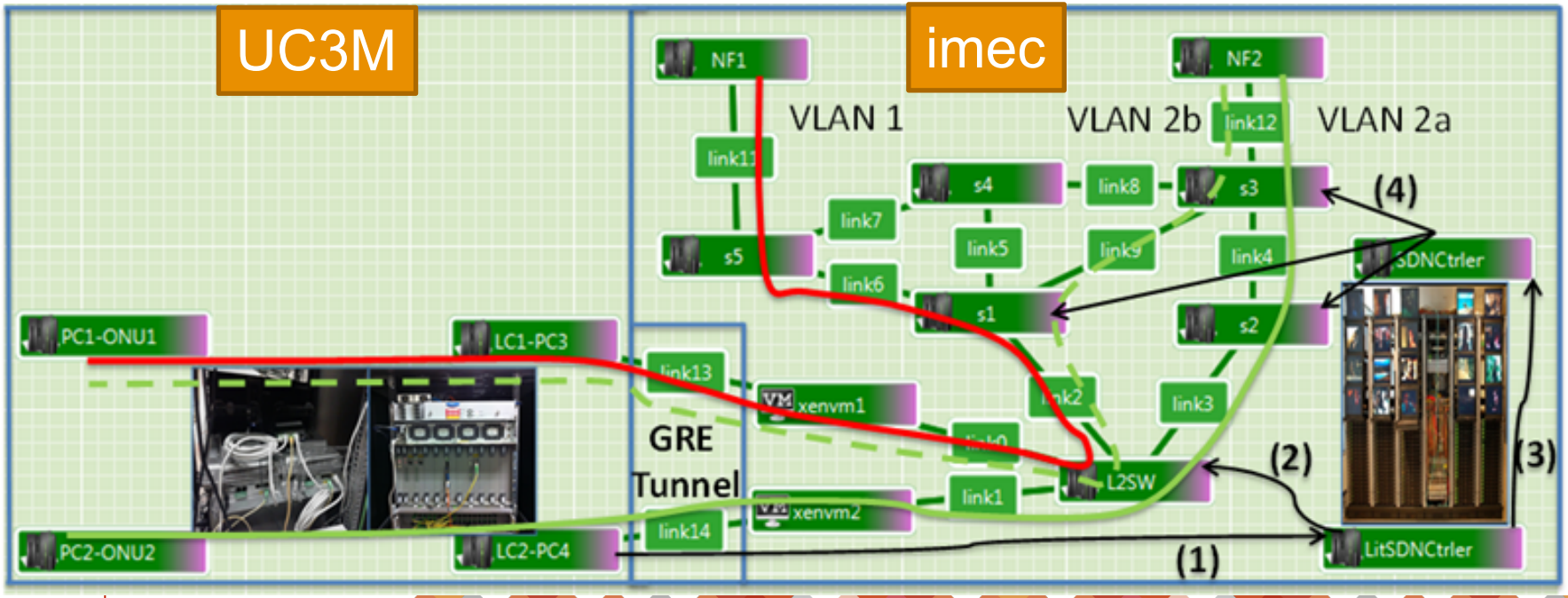
Node	Linked Node	Iface	Ping	Speed (Mbps)		
				Expected	Configured	Measured
client1	server	eth5		1000	1000	-1.0
server	client1	eth5		1000	1000	-1.0
client5	client3	vlan111		1000	1000	489.746646712
client5	client4	vlan111		1000	1000	492.140587152
client5	client6	vlan111		1000	1000	488.040384463
client4	client2	vlan111		1000	1000	522.419180941
client4	client3	vlan111		1000	1000	557.23429412
client4	client5	vlan111		1000	1000	477.703914703
client4	client6	vlan111		1000	1000	481.068355329
client2	client3	vlan111		1000	1000	507.138970557

Close

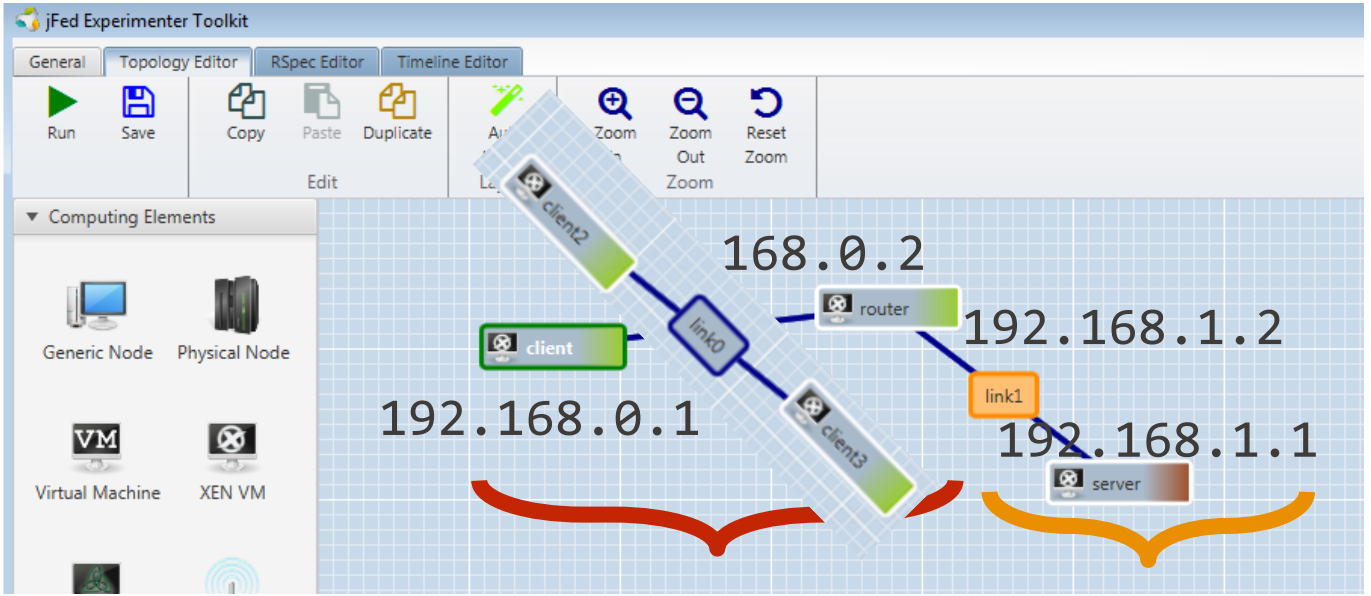
Examples of advanced networking experiments

Creating multi-testbed experiments

1. Start with creating a backbone
2. Scale up with shared LAN's on each site after that



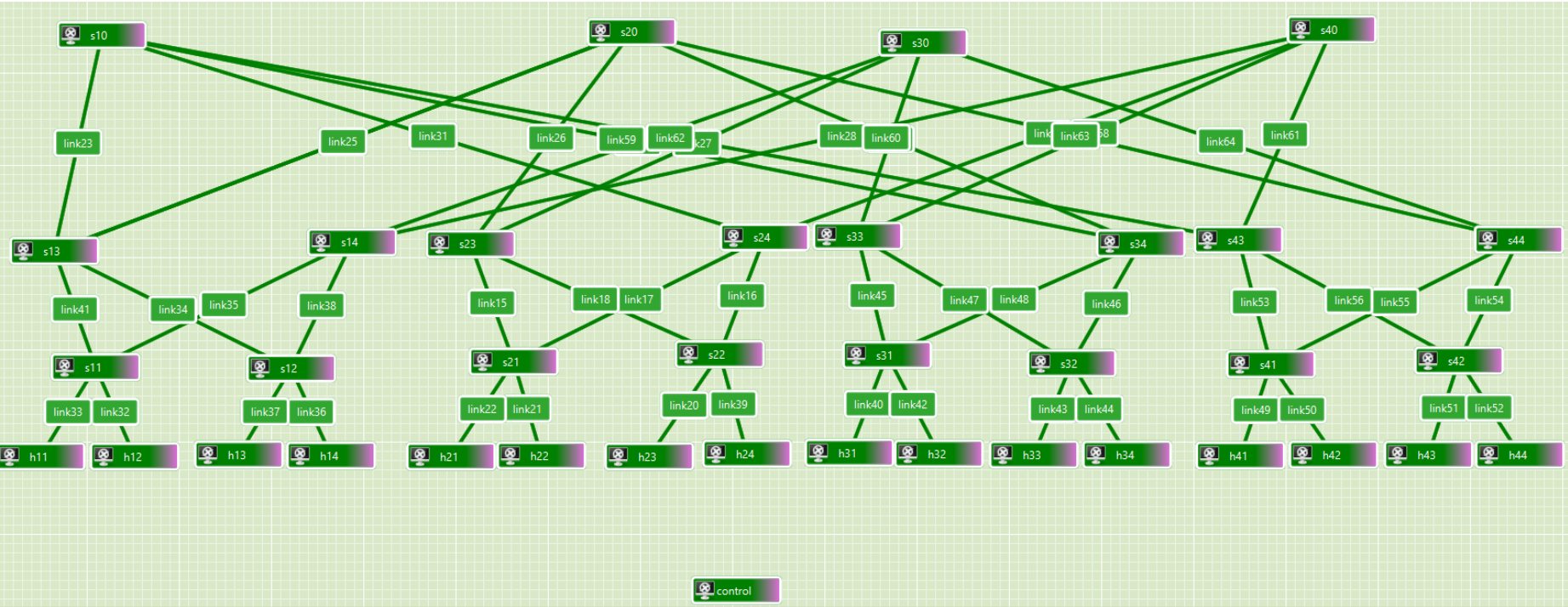
Topology



RACK 1 RACK 2

```
route add -net 192.168.1.0/24 gw 192.168.0.2
```

Advanced SDN experiment



Documentation

FED4FIRE+

Testbeds Overview

https://www.fed4fire.eu/testbeds/

Technical Documentation

https://doc.fed4fire.eu/


Co-funded by the European Union


Co-funded by the Swiss Confederation

This project has received funding from the European Union's Horizon 2020 research and innovation programme, which is co-funded by the European Commission and the Swiss State Secretariat for Education, Research and Innovation, under grant agreement No 732638.

WWW.FED4FIRE.EU