



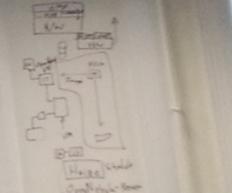
IRIS Software Defined Radio Testbed

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Trinity College Dublin
15th of October 2019

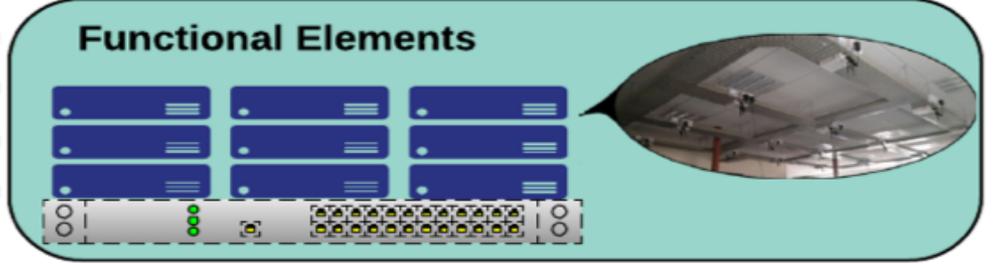
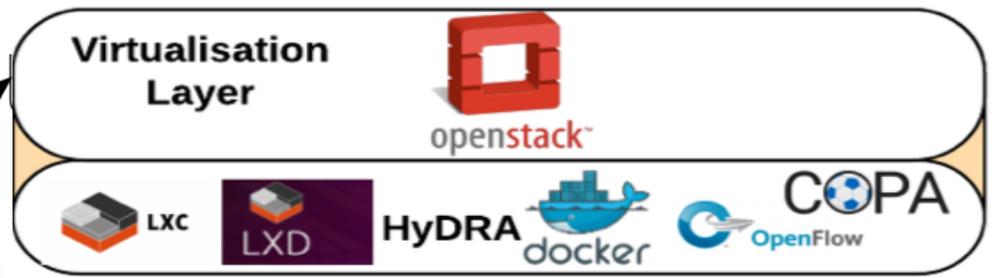
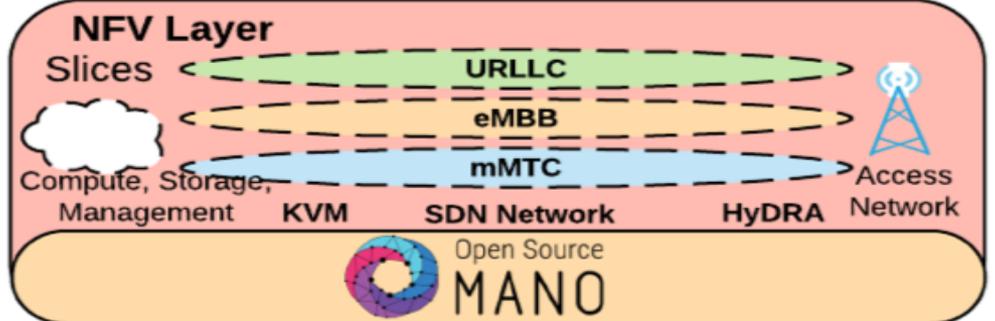
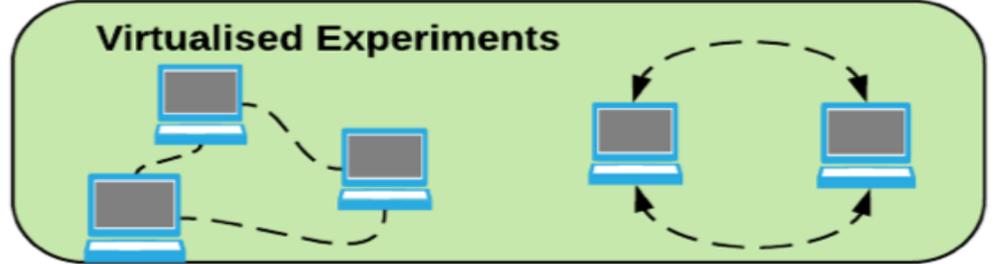
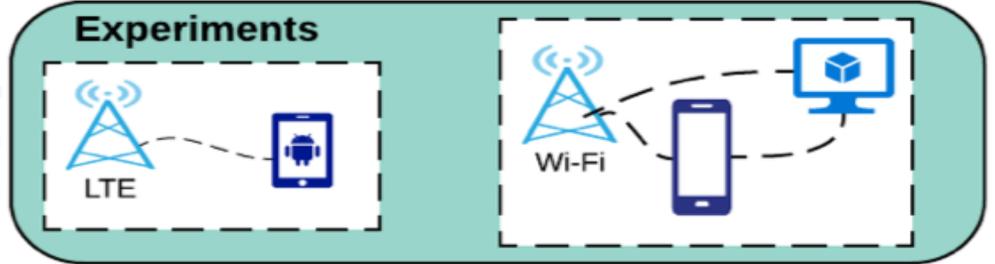
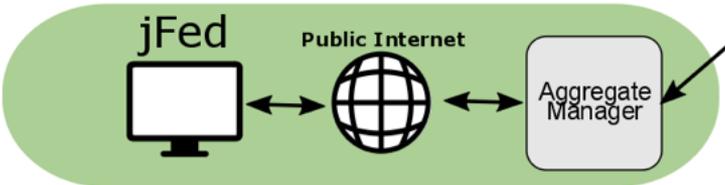




A Framework for Enhanced Control Aggregation using
Dynamic Control Selection



Functional Layers



IRIS Hardware Resources

Fed4FIRE+ Federated

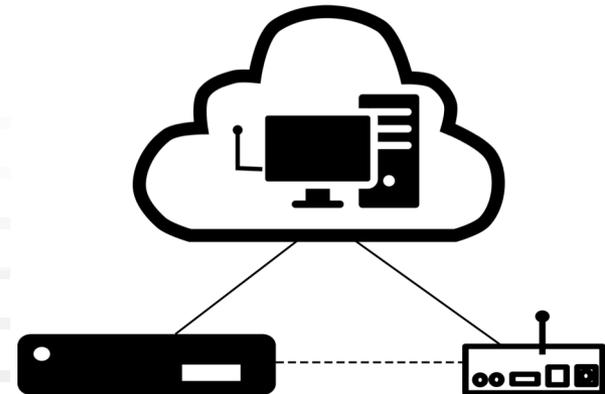


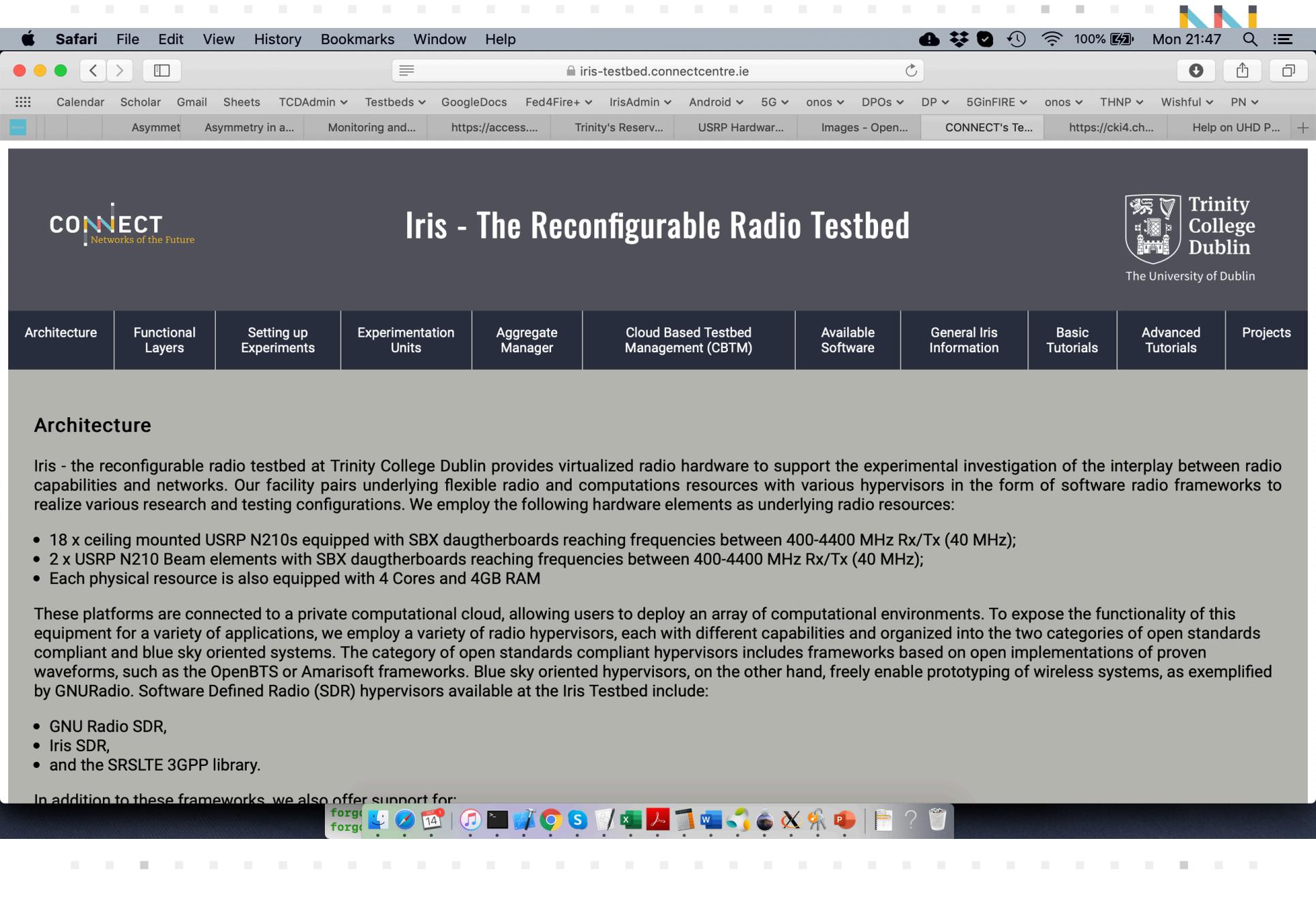
- 24 x N210 USRPs with SBX120 - Carrier frequency from 400 MHz to 4.4 GHz (Ceiling mounted)
- 5 x X310 USRPs with SBX120 and CBX120 Carrier frequency 40 MHz to 6GHz (Ceiling mounted)
- Dell Networking S4048T-ON high performance SDN/OpenFlow 1.3 Switch (New)
- OpenStack Cloud Platform with 100+ Virtual Machines
- Support srsLTE, GNU Radio, OAI, Handsets (with Sims), etc.
- Future Internet Experimentation (NFV, SDN, SDR, ICN, etc.,)



Experimentation Units

- Enable Software Defined Radio experimentation
- Virtual Machine + USRP (N210 or X310)
 - 4 cores and 4GB RAM
 - USRP + SBX120
 - Up to 10 MHz of Bandwidth per endpoint





Iris - The Reconfigurable Radio Testbed



Architecture	Functional Layers	Setting up Experiments	Experimentation Units	Aggregate Manager	Cloud Based Testbed Management (CBTM)	Available Software	General Iris Information	Basic Tutorials	Advanced Tutorials	Projects
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Architecture

Iris - the reconfigurable radio testbed at Trinity College Dublin provides virtualized radio hardware to support the experimental investigation of the interplay between radio capabilities and networks. Our facility pairs underlying flexible radio and computations resources with various hypervisors in the form of software radio frameworks to realize various research and testing configurations. We employ the following hardware elements as underlying radio resources:

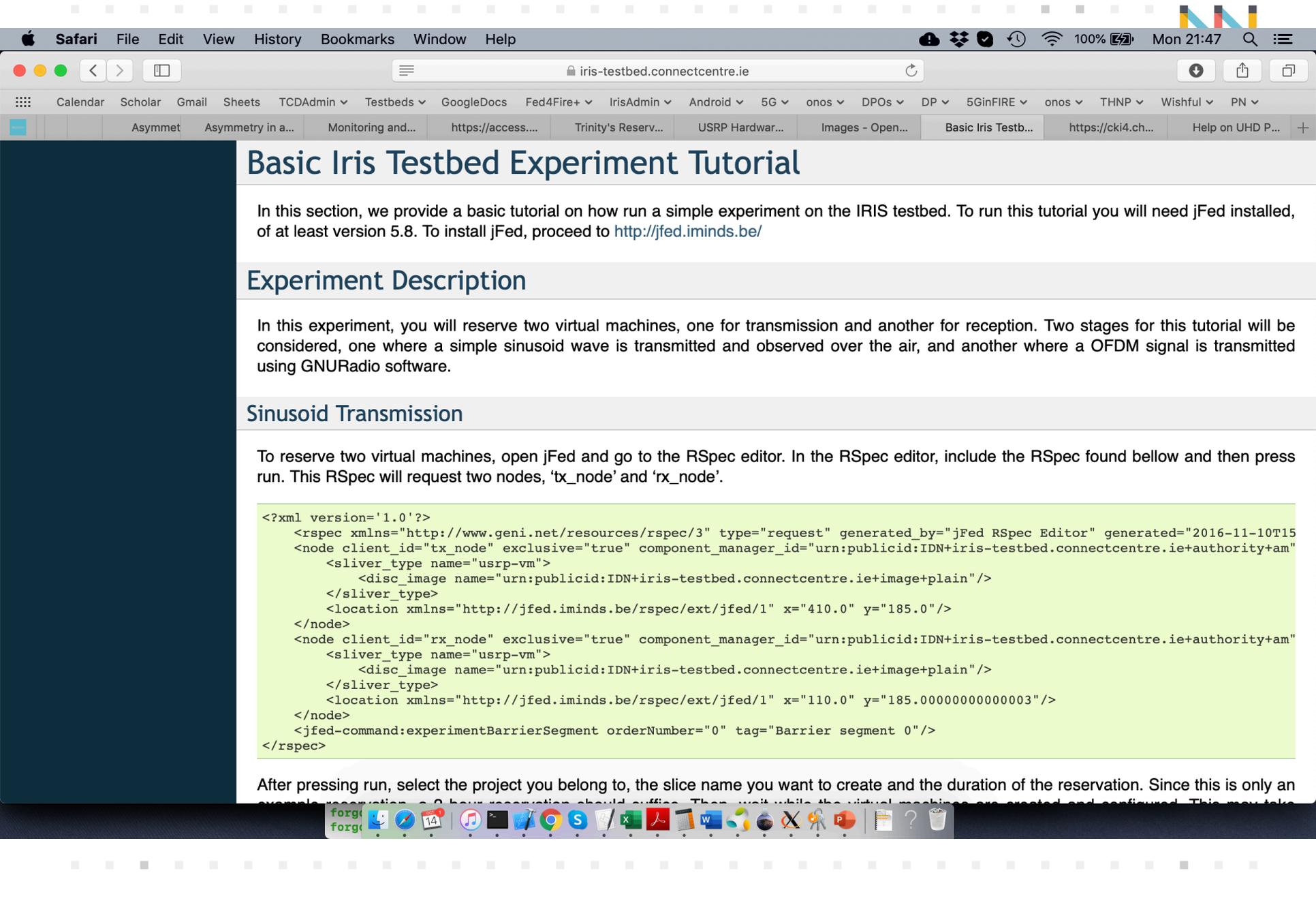
- 18 x ceiling mounted USRP N210s equipped with SBX daughterboards reaching frequencies between 400-4400 MHz Rx/Tx (40 MHz);
- 2 x USRP N210 Beam elements with SBX daughterboards reaching frequencies between 400-4400 MHz Rx/Tx (40 MHz);
- Each physical resource is also equipped with 4 Cores and 4GB RAM

These platforms are connected to a private computational cloud, allowing users to deploy an array of computational environments. To expose the functionality of this equipment for a variety of applications, we employ a variety of radio hypervisors, each with different capabilities and organized into the two categories of open standards compliant and blue sky oriented systems. The category of open standards compliant hypervisors includes frameworks based on open implementations of proven waveforms, such as the OpenBTS or Amarisoft frameworks. Blue sky oriented hypervisors, on the other hand, freely enable prototyping of wireless systems, as exemplified by GNURadio. Software Defined Radio (SDR) hypervisors available at the Iris Testbed include:

- GNU Radio SDR,
- Iris SDR,
- and the SRS LTE 3GPP library.

In addition to these frameworks, we also offer support for:





Basic Iris Testbed Experiment Tutorial

In this section, we provide a basic tutorial on how run a simple experiment on the IRIS testbed. To run this tutorial you will need jFed installed, of at least version 5.8. To install jFed, proceed to <http://jfed.iminds.be/>

Experiment Description

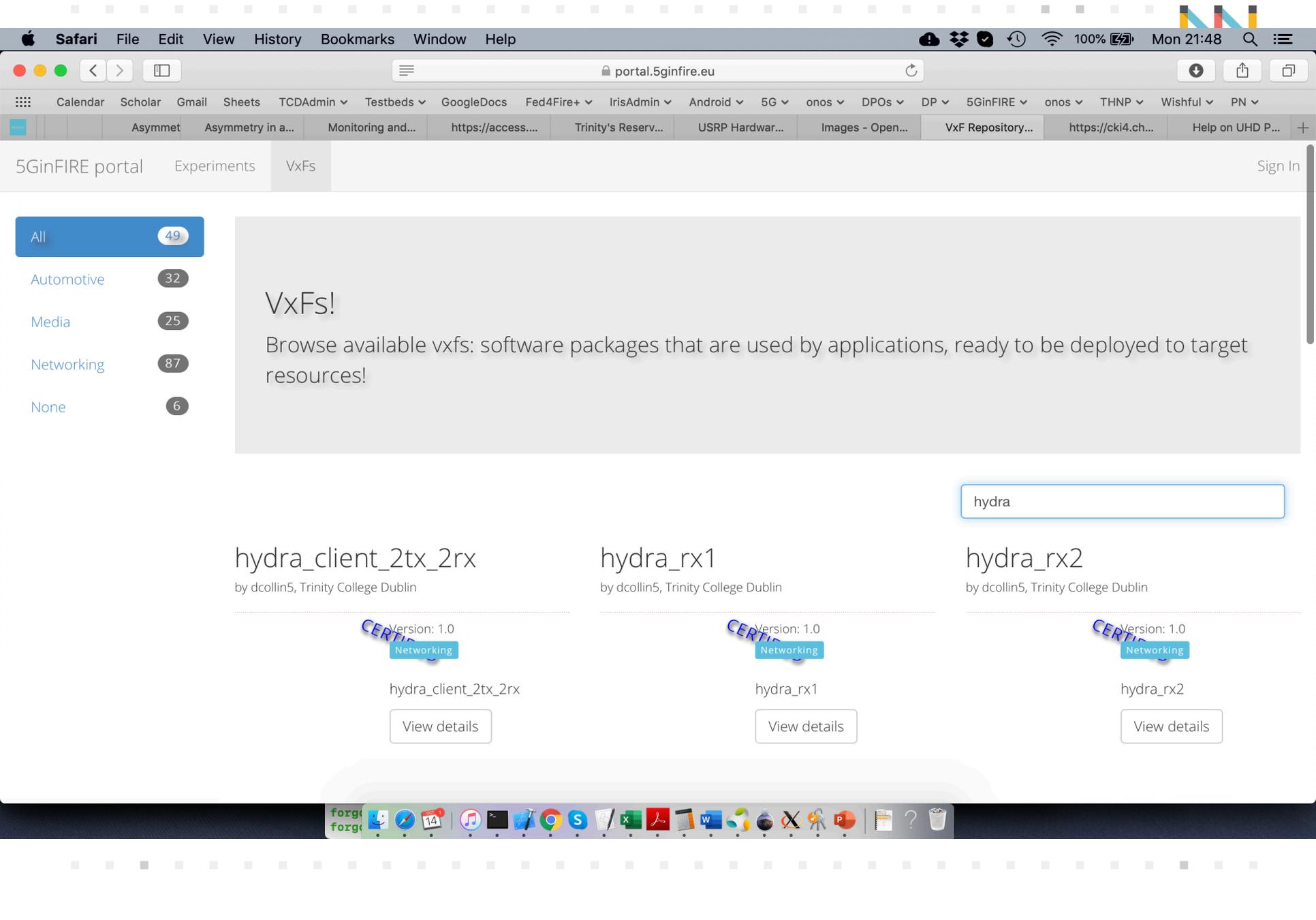
In this experiment, you will reserve two virtual machines, one for transmission and another for reception. Two stages for this tutorial will be considered, one where a simple sinusoid wave is transmitted and observed over the air, and another where a OFDM signal is transmitted using GNURadio software.

Sinusoid Transmission

To reserve two virtual machines, open jFed and go to the RSpec editor. In the RSpec editor, include the RSpec found bellow and then press run. This RSpec will request two nodes, 'tx_node' and 'rx_node'.

```
<?xml version='1.0'?>
  <rspec xmlns="http://www.geni.net/resources/rspec/3" type="request" generated_by="jFed RSpec Editor" generated="2016-11-10T15
  <node client_id="tx_node" exclusive="true" component_manager_id="urn:publicid:IDN+iris-testbed.connectcentre.ie+authority+am"
    <sliver_type name="usrp-vm">
      <disc_image name="urn:publicid:IDN+iris-testbed.connectcentre.ie+image+plain"/>
    </sliver_type>
    <location xmlns="http://jfed.iminds.be/rspec/ext/jfed/1" x="410.0" y="185.0"/>
  </node>
  <node client_id="rx_node" exclusive="true" component_manager_id="urn:publicid:IDN+iris-testbed.connectcentre.ie+authority+am"
    <sliver_type name="usrp-vm">
      <disc_image name="urn:publicid:IDN+iris-testbed.connectcentre.ie+image+plain"/>
    </sliver_type>
    <location xmlns="http://jfed.iminds.be/rspec/ext/jfed/1" x="110.0" y="185.00000000000003"/>
  </node>
  <jfed-command:experimentBarrierSegment orderNumber="0" tag="Barrier segment 0"/>
</rspec>
```

After pressing run, select the project you belong to, the slice name you want to create and the duration of the reservation. Since this is only an example reservation a 2 hour reservation should suffice. Then wait while the virtual machines are created and configured. This may take



- All 49
- Automotive 32
- Media 25
- Networking 87
- None 6

VxFs!

Browse available vxfs: software packages that are used by applications, ready to be deployed to target resources!

hydra

hydra_client_2tx_2rx

by dcollin5, Trinity College Dublin

CERT Version: 1.0 Networking

hydra_client_2tx_2rx

View details

hydra_rx1

by dcollin5, Trinity College Dublin

CERT Version: 1.0 Networking

hydra_rx1

View details

hydra_rx2

by dcollin5, Trinity College Dublin

CERT Version: 1.0 Networking

hydra_rx2

View details

Questions???