Spectrum sensing experiment specification ontology

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Outline

- Motivation
- Spectrum sensing ontology
- Demos
- Use case

Spectrum sensing

- core functionality of a true cognitive radio (CR)
- A CR enables operation over a broad range of frequencies and autonomously adapts transmission parameters to the operating environment.

Spectrum sensing hardware

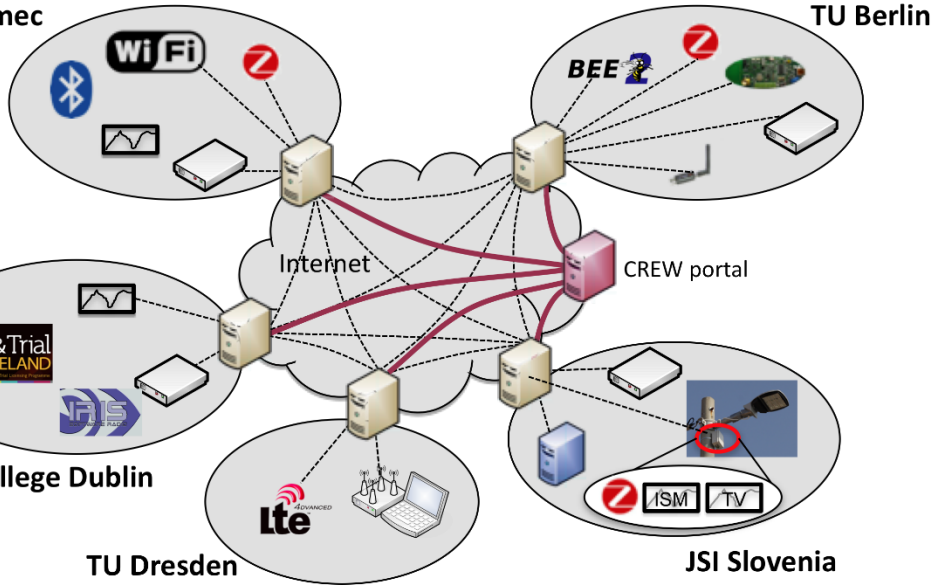
- Nutaq Radio420X FPGA mezzanine card,
- Wireless Open-Access Research Platform (WARP)
- Universal Software Radio Peripheral (USRP)

- WiSpy,
- TelosB,
- VESNA, etc.

- SS hardware is available for use in several testbeds across the world

Cognitive radio testbeds (1/2)

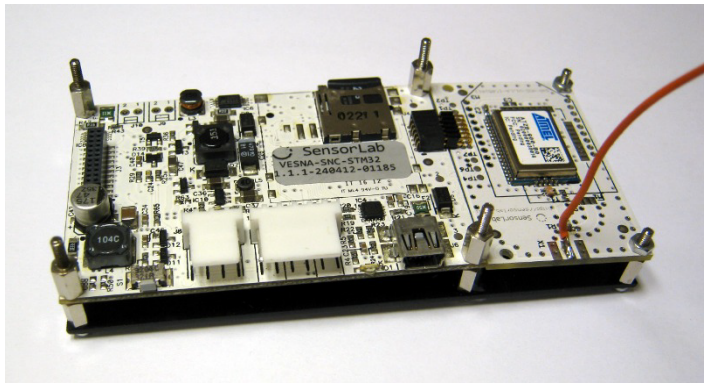
- The cognitive radio experimentation world (CREW) facilities



802.11
802.15.1
802.15.4
FX nodes
ata base

IRIS GPP-based software radio platform
Comreg spectrum licenses
BEE2 FPGA platform
USRP software radio
Versatile Sensor Node on Light pole

imec Sensing Agent
UHF/VHF TV sensing
ISM bands sensing
THALES advanced sensing platform
WiSpy Spectrum analyzer
Interconnection of portals
Interconn. between testbed elements



Cognitive radio testbeds (2/2)

- Other testbeds from Future Internet Research and Experimentation (FIRE) – European effort of setting up testbeds that enable experimentation with future internet technologies
- Testbeds from the Global Experimental Network Infrastructure (GENI) – US effort of setting up testbeds that enable experimentation with new communication technologies

- Each testbed provides a specific mechanism to define, deploy and execute experiments making it difficult to use more than one for a specific researcher.

Tools for federating experimental facilities

- In an attempt to decrease the definition and configuration overhead, a **common data format** for experiment description, specification and results have been developed within the CREW project.

- The Open-Access Research Testbed for Next-Generation Wireless Networks (ORBIT) at Rutgers University uses **the cOntrol and Management Framework (OMF)**

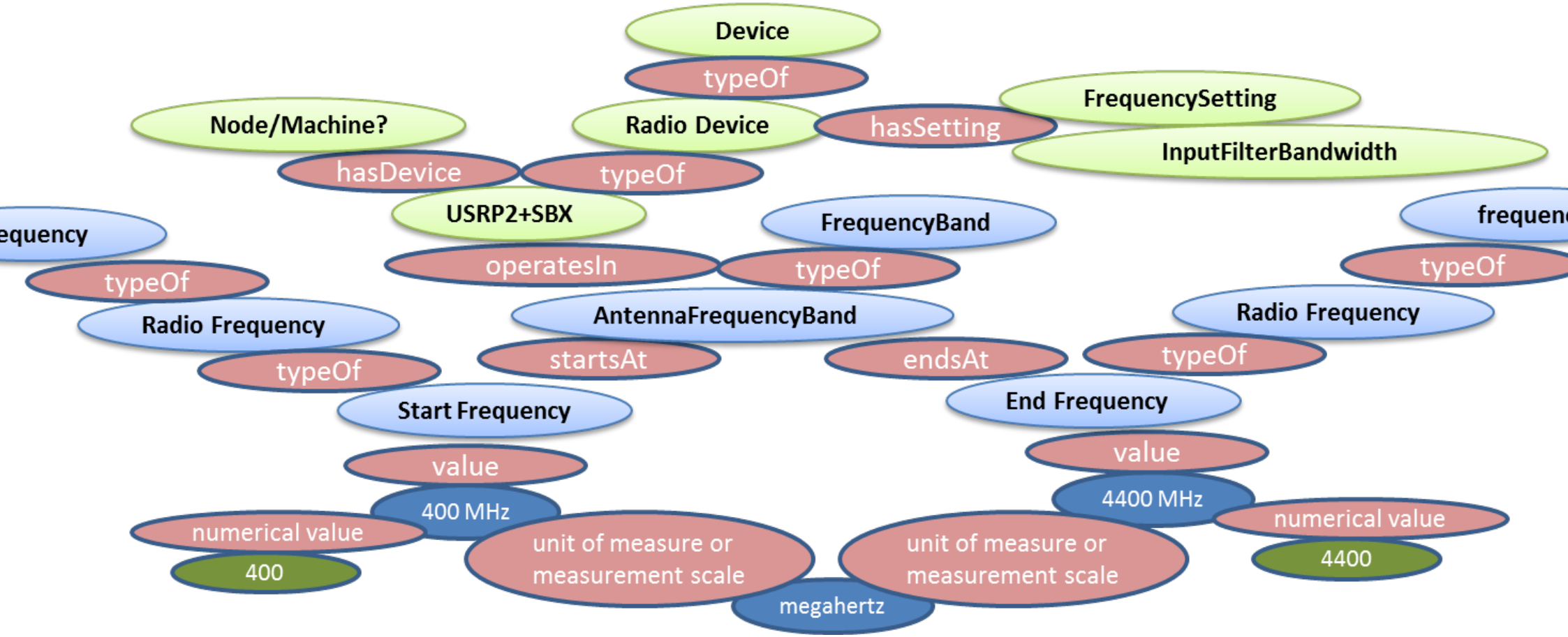
- For describing spectrum sensing experiments, a joined CREW-GENI (Rutgers) effort lead to the development of the **Spectrum Sensing Ontology** to be used for device capability description and experiment description

The Spectrum Sensing Ontology (1/2)

- The ontology has three orthogonal parts are that allow the description of:
  - spectrum related theoretical aspects,
  - device spectrum sensing capabilities and
  - ranges of values for each

- Basic device capability description: base band and RF capabilities described
- Description of the processing for base band is under development

The Spectrum Sensing Ontology (2/2)



387-464 MHz frequency band description

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<j.8:endsAt rdf:resource="http://www.orbit-lab.org:8080/tsc/resources/OrbitInventory/464MHz"/>

<rdfs:label>387-464 MHz band</rdfs:label>

<rdf:type rdf:resource="http://sensorlab.ijs.si/2013/v0/SpectrumSensingExperimentSpecification.owl#FrequencyBand"/>

<rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Resource"/>

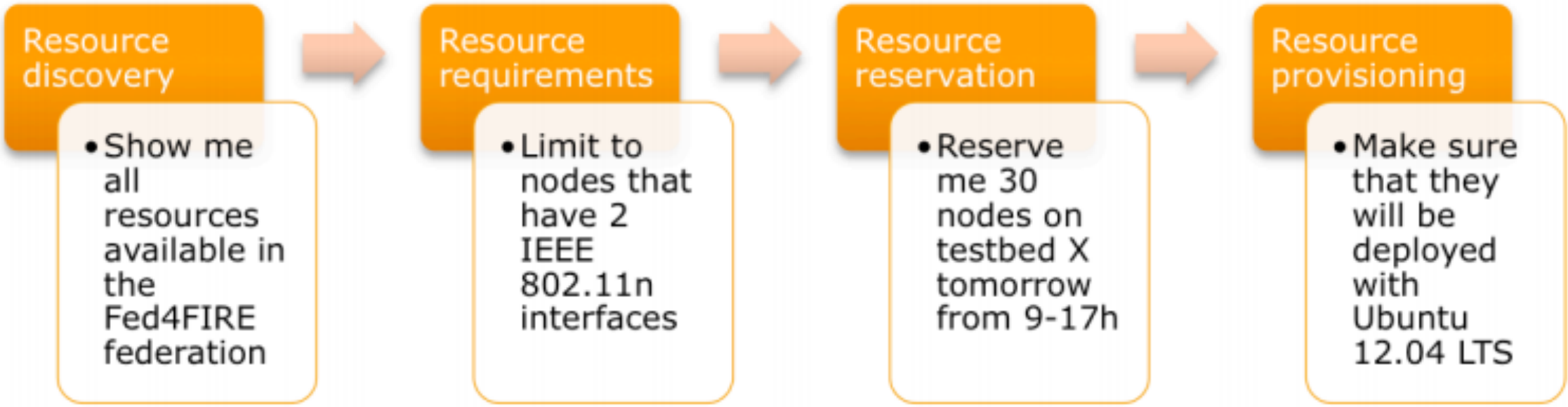
</rdf:Description>

Demo

- Protégé – local

- Tasor ORBIT Inventory
  http://www.orbit-lab.org:8080/tasor/#OrbitInventory:USRP2+SBX

Example Usage Scenario



Thank you! Questions?

- https://github.com/cfortuna/CROntology
- http://www.log-a-tec.eu/cr.html
- http://sensorlab.ijs.si/