CREW

Cognitive Radio Experimentation World

The Wireless MAC Processor over CREW: enabling Cognitive Access BenchmarkINg (CABIN-CREW)

- Provisional results of one out of four experiments of 'Open Call 2' -

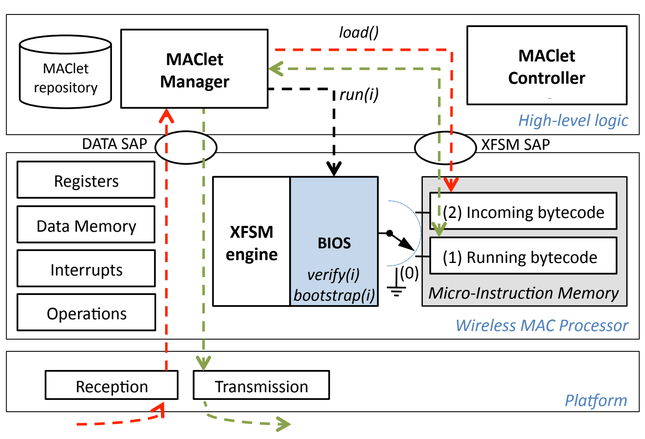
Testing context-dependent flexible MAC protocols

Problem: Current platforms are too limited for flexible MAC testing

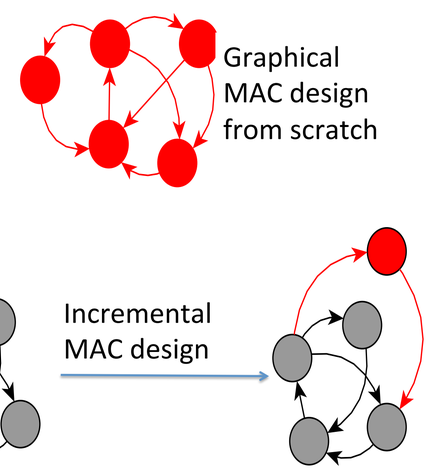
- SDR or FPGA are complex low-level and hardware-dependent
- high level configuration interfaces are limited to pre-defined solutions
- high-level languages are limited to non critical operations

Solution: **The Wireless MAC Processor (WMP) Architecture**

- **powerful API** for composing or correcting MAC rules ("MAClet") in terms of high-level state machines or hierarchical state machines
- towards **self-programmable systems**



The Wireless MAC Processor (WMP) Architecture



The MAClet design process allows incremental design as well as design from scratch via a GUI

Experiments: MAC Cognitive Cycle

In a network, consisting of a WMP controller at the Access Point (AP) and a set of WMP-enabled nodes, we enable a MAC dynamic workflow:

1. The AP **monitors** some key parameters (collisions, idle times, greedy direct traffic among nodes, etc).
2. The AP **decides** what is the best access policy for each station. (e.g. a direct link mode, a multi-channel hopping scheme, a periodic channel access grant.)
3. the AP **distributes and enforces** to some/all nodes a new MAC program or tunes some MAC parameters.

Cognitive MAClet selection and injection

Online Monitoring of Spectrum Sensing Delay and Energy Consumption in the CREW Benchmarking Framework

- Provisional results of one out of four experiments of 'Open Call 2' -

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Advancing CREW experimentation tools

✓ *Problem*: Experimental validation in the field of Cognitive Radio research lags behind in terms of:

- **sensing delay** and
- **energy consumed** during spectrum monitoring.

✓ *Solution*: Our innovative hardware and software solutions will advance the CREW experimentation tools to enable consideration of the above factors.

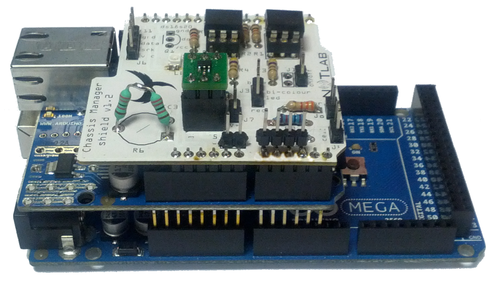
NITOS advanced Chassis Manager card

✓ Based on Arduino Mega board

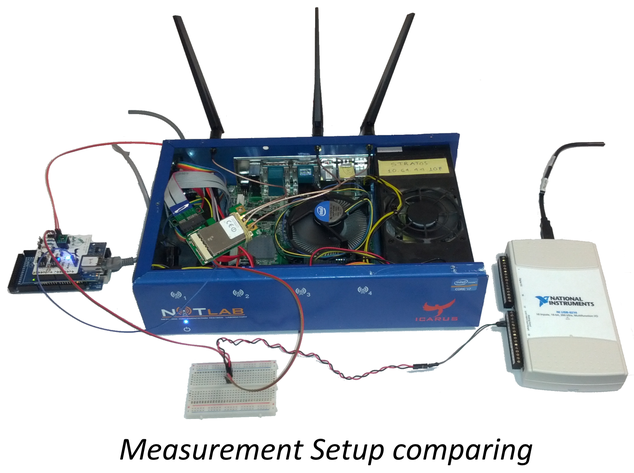
✓ Ethernet Shield provides for **distributed energy measurements**

✓ Custom Shield extended through the INA139 Current Shunt Monitor **increases the Voltage Output Gain**

✓ **65,000 samples/s of 10-bit accuracy**



NITOS CM card advanced with Energy Monitoring extensions

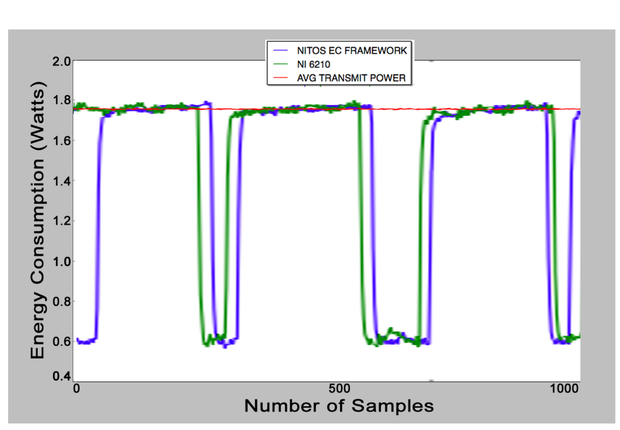


Measurement Setup comparing the developed framework with NI-6210

Initial tests and results

✓ **Promising results in comparison with the high-end commercial device NI-6210**

✓ Ready to be deployed in iMinds' w-iLab.t testbed



Realistic monitoring of MIMO 3x3 Transmissions (max 1.8 W)

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Future Internet Research and Experimentation – FIRE