

Position statement

FIRE Preparatory Group meeting

14-15 February 2007

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Experimentally driven long-term research in future internet:

Provides validation ground of cutting edge theoretical advances

Inspires new research directions to address unexpected experimental outcomes

Wireless network testbeds: Two approaches



MAC layer implementation using Open Source Drivers

Open Source Drivers Testbed



**MAC layer implementation
using software defined radio**

**PHY layer implementation
using software defined radio**

**Cross layer
implementation using
software defined radio**

Software Defined Radio Testbed

Open source drivers Testbed

Pros

- ✓ Linux based: modification of the network layer – study of new routing algorithms
- ✓ Open source drivers: modification of the MAC layer
- ✓ Implementation of MAC/Network cross layer algorithms
- ✓ 802.11 cards: implementation is backward compatible with current WiFi products
- ✓ The performance of the implemented protocols can be directly compared with the commercial 802.11 solutions

Cons

- ✓ Fixed PHY layer

Software Defined Radio Testbed

Pros

- ✓ Implementation of PHY layer mechanisms from scratch
 - ✓ Cooperative coding, Network coding
- ✓ Implementation of MAC layer from scratch
- ✓ Implementation of MAC-PHY cross layer approaches
- ✓ Implementation of protocols that are fundamentally different than the 802.11 standard

Cons

- ✓ Simplified versions of MAC since the implementation is from scratch
- ✓ The hardware places specific limitations in the implementation of MAC/PHY layer protocols
- ✓ In order to provide comparisons with standard MAC protocols such as 802.11, we need to build emulations of the standards based on the same hardware architecture.

Open source drivers Testbed

ORBIT at Rutgers (<http://www.orbit-lab.org/>)

(Open-Access Research Testbed for Next-Generation Wireless Networks)

- ✓ Based on Atheros/Intel 802.11 cards.
- ✓ 400 nodes
- ✓ Focused on MAC/routing algorithms.
- ✓ The testbed is hosted into a lad.
- ✓ The testbed is open to the community for running experiments.

Roofnet at MIT (<http://pdos.csail.mit.edu/roofnet/>)

- ✓ Based on Atheros 802.11 cards.
- ✓ Focused on routing, rate adaptation algorithms.
- ✓ Nodes are spread in a public area.
- ✓ The testbed is not open to the community for running experiments.

Software Defined Radio Testbed

WARP at Rice warp.rice.edu/trac

- ✓ FPGA approach.
- ✓ Four radio interfaces per node.
- ✓ Focus on PHY/MAC layer implementation.
- ✓ The testbed will soon be open to the community for running experiments