# Using the Wired Internet as a Control Channel for Residential Wireless LANs

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## Enterprise Spatial Reuse

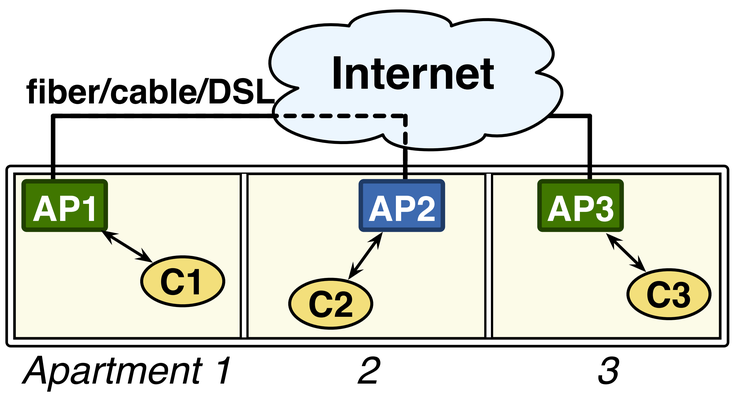
- Carrier sense is conservative, misses concurrency opportunities
- Enterprise solutions have utilized wired backbones and **centralized scheduling** for reduced hidden/exposed terminals
- Can we apply these techniques to residential deployments?

## Residential WLANs

- Residential WLANs (RWLANs) do not share a common low-latency LAN
- No centralized infrastructure in which to deploy a central controller

## Proposed Architecture

- Exploit the **wired Internet** for distributed, AP-to-AP out-of-band coordination!




## Versatile Platform

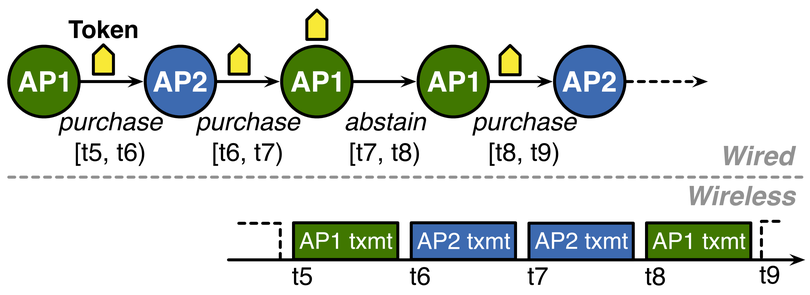
- Internet-based AP-to-AP messaging can enable innovative coordination
  - Smart association
  - Fault diagnosis and recovery
  - Dynamic spectral allocations
  - ⇨ *We implement:* **TDMA**

## Partnership Formation

- APs detect each other on wireless channel**, exchange routable IP addr**
- If both APs agree, partnership is formed

## Distributed TDMA

- APs disable carrier sense, only transmit during allowed timeslots (TDMA)
- Schedule timeslots with **token exchanges** between partner APs
- Timeslots scheduled slightly in advance to absorb AP-to-AP Internet latency



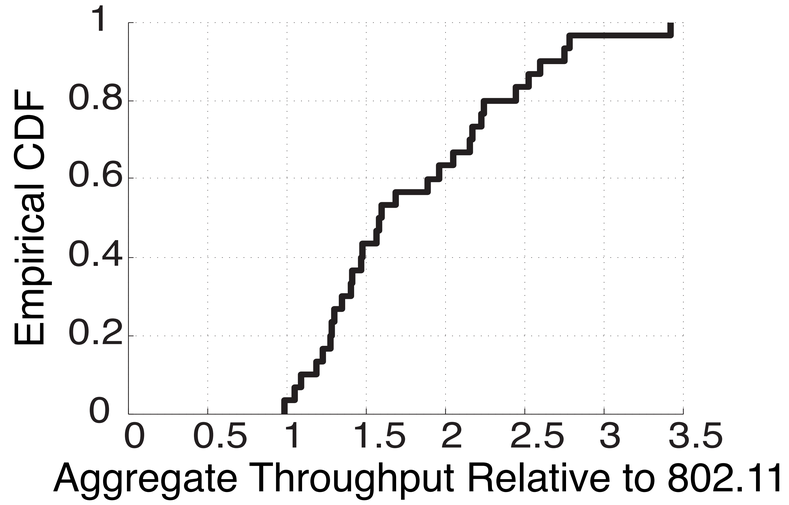

## Incentives

- Partnerships form only by **consensus**
- APs are **free to create new and break** existing partnerships on demand

## Evaluation

- **12-node testbed** of laptops and Soekris embedded PCs
- System implemented in MadWiFi & Click
- Performance testing using Iperf

CDF of Aggregate Throughput Gain Across 30 6-AP, 6-client Topologies




## Future Work

- Rate control, bidirectional traffic, TCP
- Misbehavior detection and punishment