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# WiFIX

## A solution for IEEE 802.11 Stub Wireless Mesh Networks


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Battlemesh v6, Aalborg, April 19, 2013

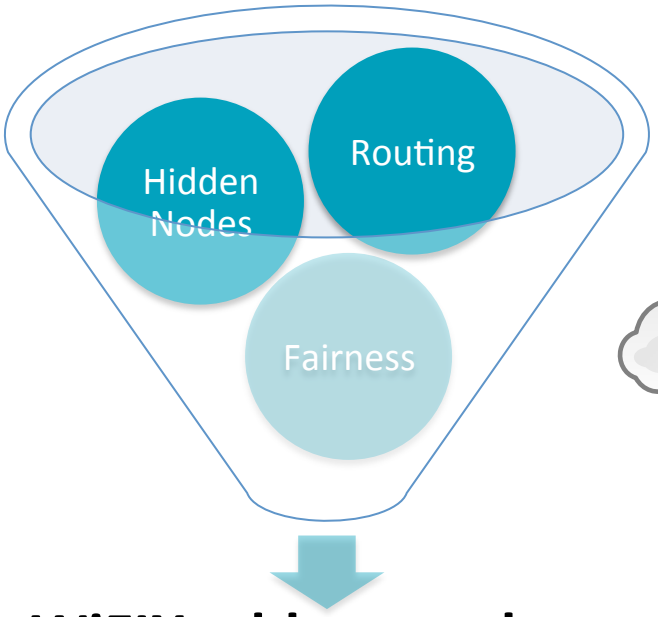
# Outline

- Introduction
- WMN challenges
- WiFIX
- Conclusions

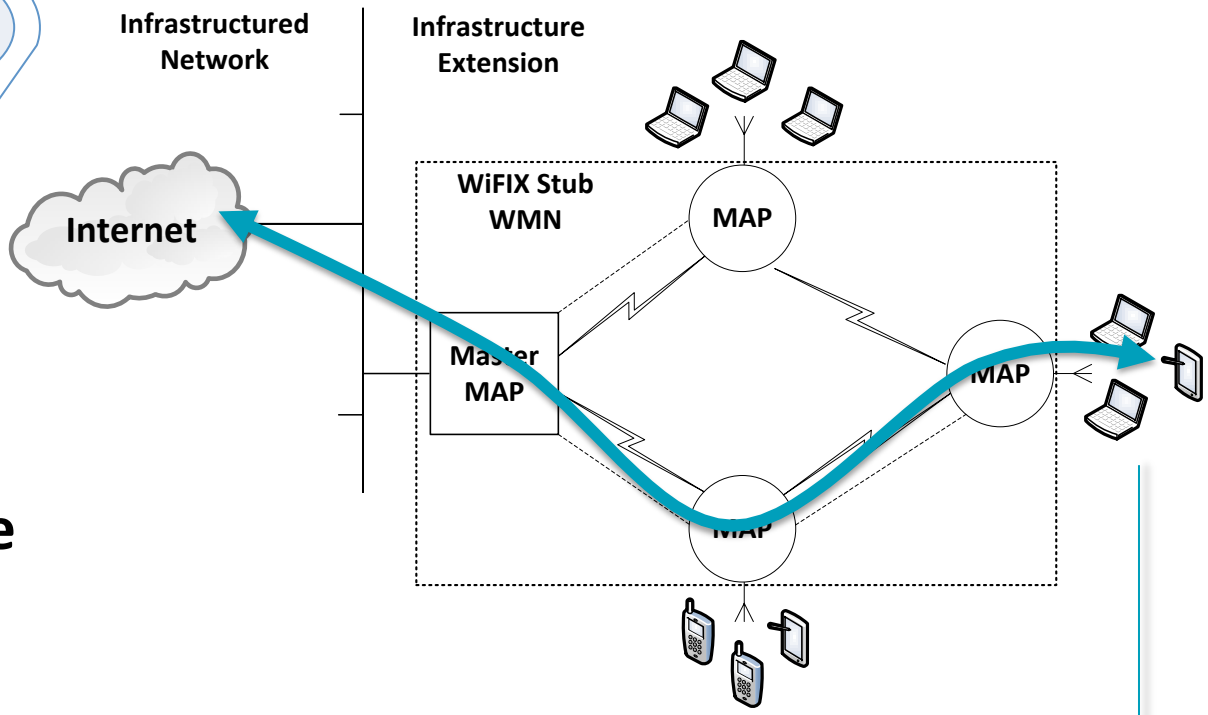
# Introduction

**Internet playing central role**

# WMN - Challenges

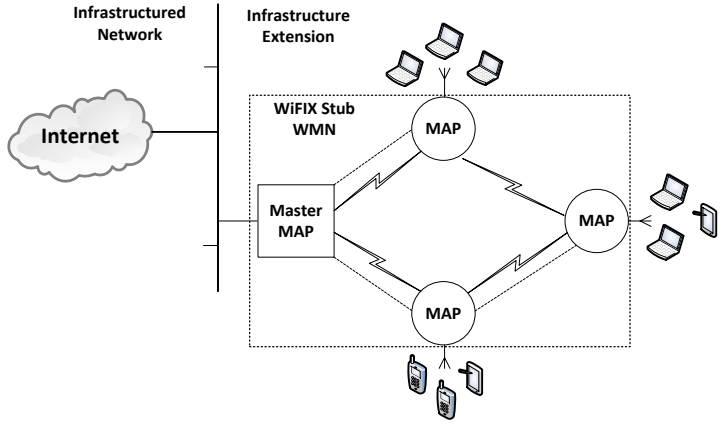



**WiFIX addresses these challenges**



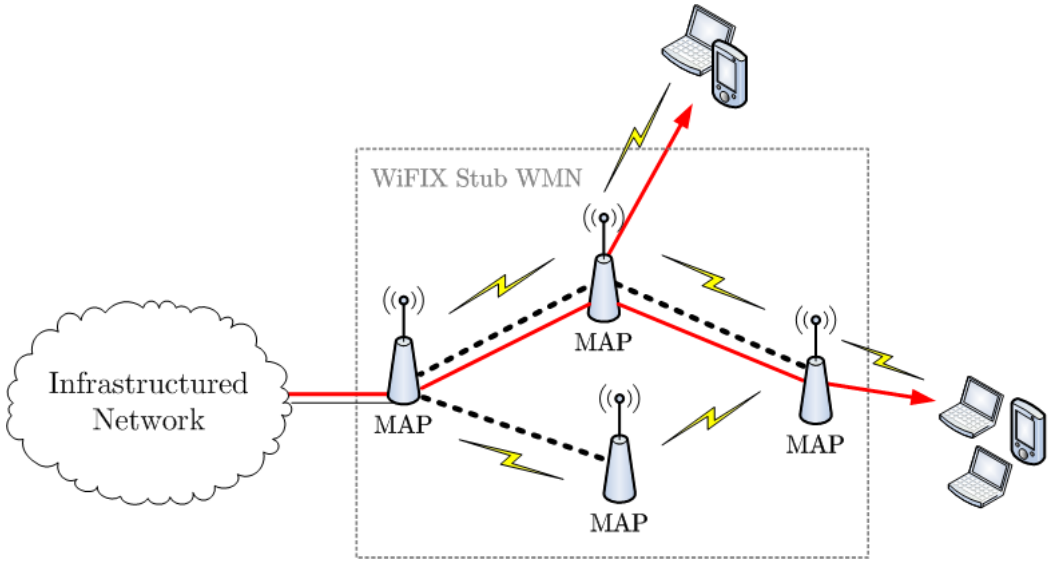
# WiFIX unicast routing

- ATCM mechanism
  - Active tree topology creation/maintenance
- Layer-2 routing based on IEEE 802.1D bridges
  - No explicit signaling required to establish paths
  - Paths discovered using learning bridge algorithm
- Eo11 encapsulation
  - Multi-hop frame transportation across WMN
  - Virtual Ethernet links between neighbors



# WiFIX multicast/broadcast routing

- Traffic is transported over 802.11 unicast frames
  - Higher throughputs with inherent reliability
  - Multicast traffic only sent to terminals associated to a specific multicast group
- Mobility support
  - Multicast flow is maintained when terminal moves to other MAP



# WiFIX multi-hop scheduling

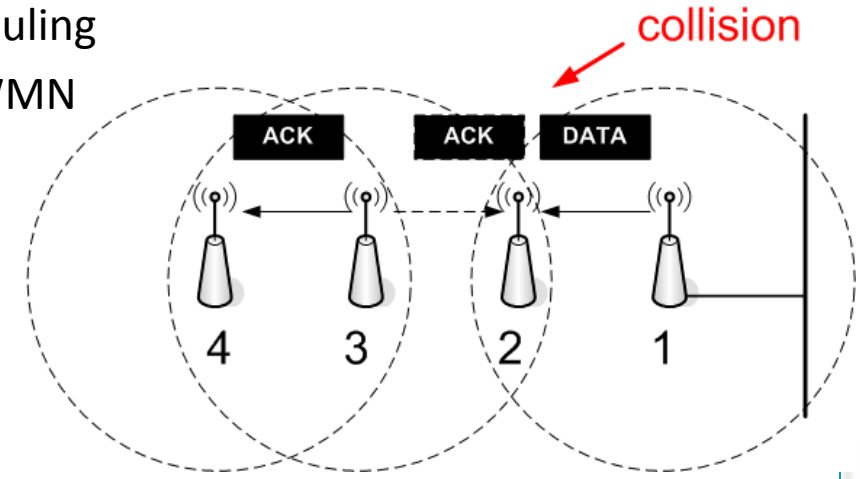
- Collision free operation
  - Master controls multi-hop scheduling
  - Single packet traveling in Stub WMN
  - Suitable for high offered loads
- Advantages
  - Predictable capacity

    $C = C_{\text{Wi-Fi link}} / \text{AvgHopCount}$
  - Fairness

    Network capacity equally divided

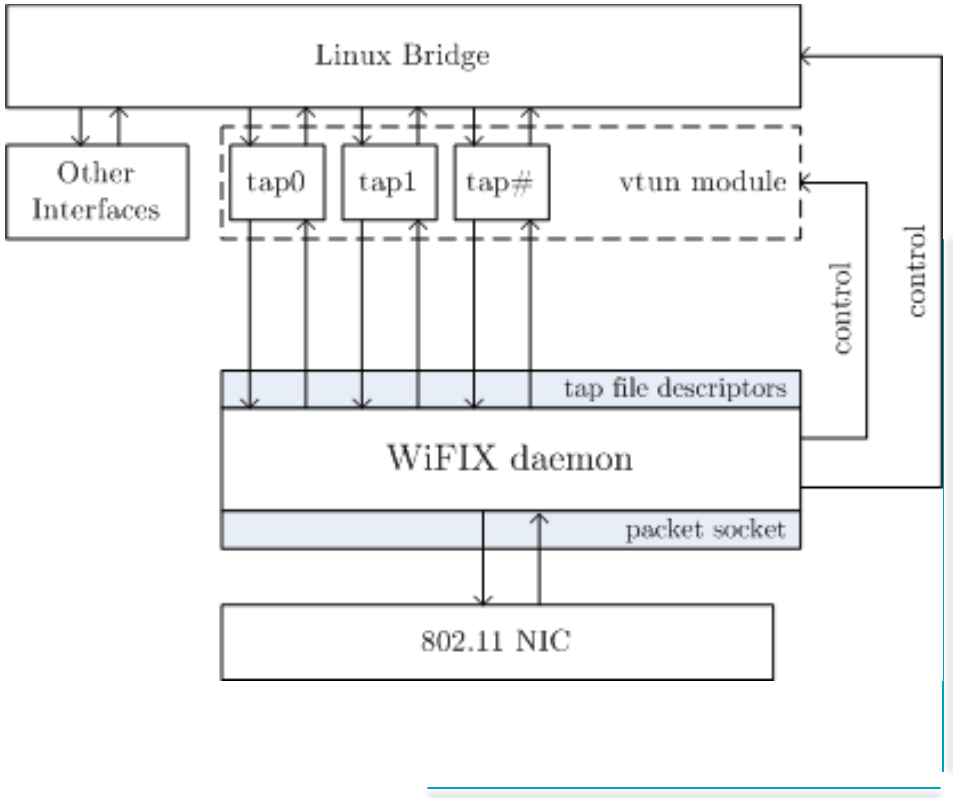
    No starvation in MAPs far from the gateway
  - QoS easily implementable

    Managed by the master
- Main disadvantage
  - Exposed nodes as number of hops increases



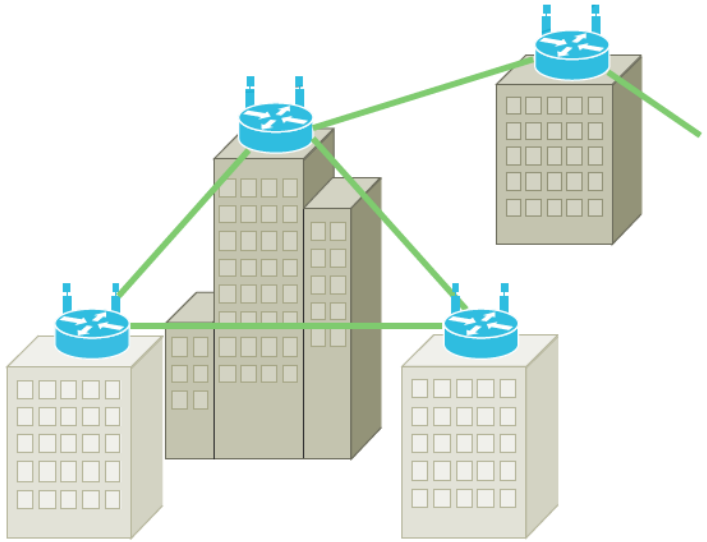
# Implementation

- Linux implementation
  - User-space daemon
  - Runs between the Wireless NIC and the Linux Bridge
  - Easy and fast deployment
  - Tested in Ubuntu, Debian and OpenWRT



# Conclusions

- Routing, hidden nodes and fairness are major challenges in Stub WMNs
- WiFIX simple and efficient approach to address them
  - No explicit signalling for path establishment
  - Fairness and predictable Stub WMN capacity
  - Easy and fast deployment
- Ongoing work
  - Multi channel multigateway support
  - Stub WMN in real world deployments



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