A Wi-Fi Emulation Framework for ns-3

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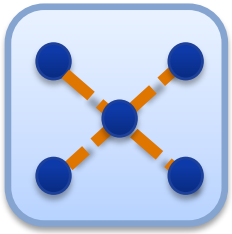
Motivation

- **Interaction of Wi-Fi with upper layers**
  - Compatible to Ethernet
  - Effects of wireless channel are propagated
  - OS provides special interfaces to access Wi-Fi functionality

- **Development of network protocols using Wi-Fi**
  - Testbeds
  - Network Simulation
  - Network Emulation
    - Exchange of Ethernet frames
    - Wi-Fi interfaces?

Wi-Fi Network Emulation

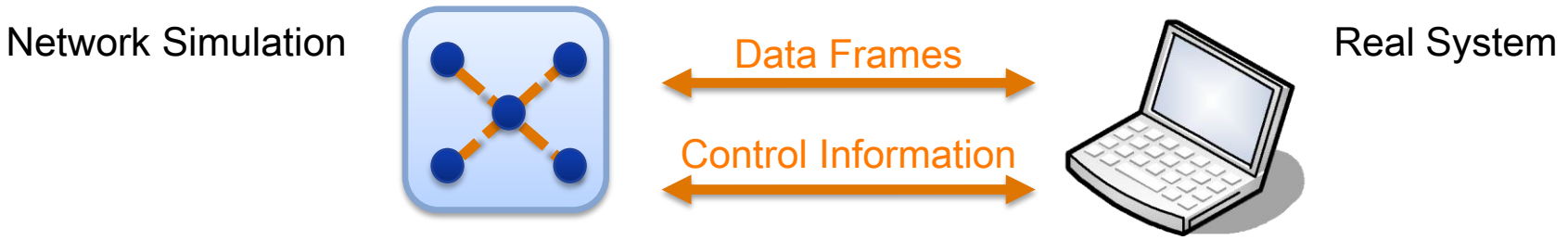
Network Simulation



Real System

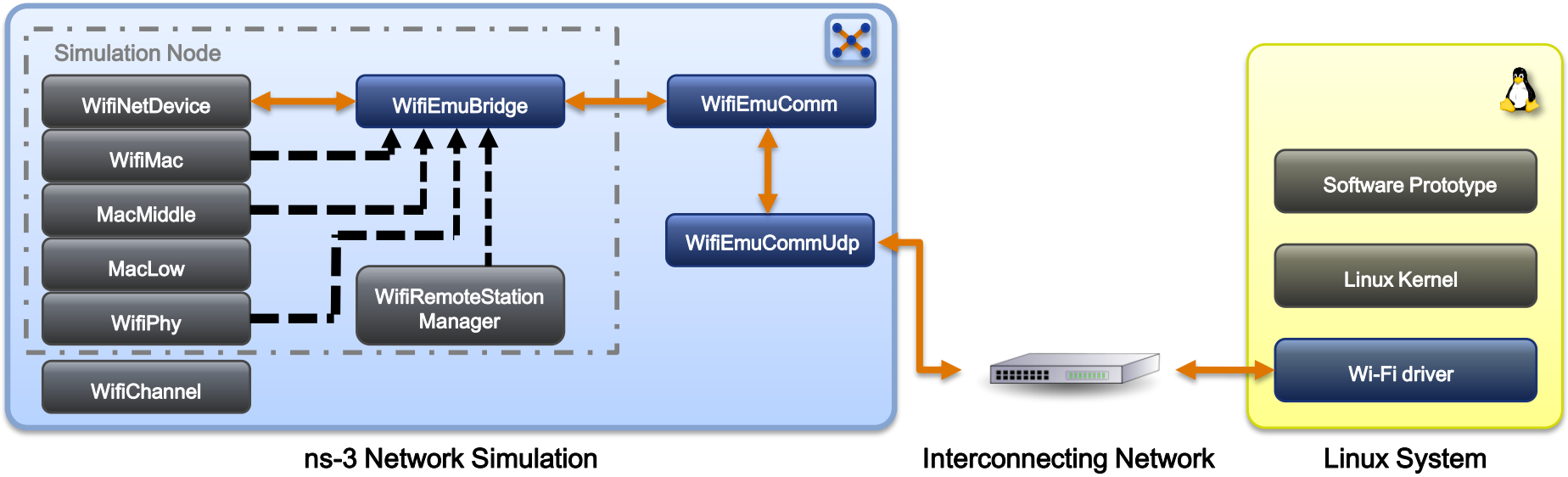
- **Network Simulation**
  - Runs simulation of wireless network
  - Some nodes represent a real system
    - Act as hardware for the real system
    - No network stack installed on these nodes
- **Real System**
  - Real hardware or virtual machine
  - Executes OS and the prototype under test
  - Special driver provides “virtual” Wi-Fi device

Wi-Fi Network Emulation



- **Message Exchange**
  - Data frames
    - Ethernet frames (regular communication)
    - Wi-Fi frames with Radiotap header (Monitor mode)
  - Control Information
    - Device status (both directions)
    - Special functionality: scanning, spy mode

Implementation



Current Status

- **Basic version completed:**
  - Supported Modes:
    - Master
    - Adhoc
    - Monitor
  - Spy Interface
  - Device status is sent to driver
  - Parameters are currently set through ns-3
  - Sending and Receiving of packets

Demo

Further Improvements

- **Adhoc mode in ns-3?**
- **Scanning**
- **Encryption**
- **Configuration through driver:**
  - Switch between Adhoc and Master mode
  - Channel selection
  - Setting of SSID and AP address
  - Bitrate selection

➔ **More extensive changes to ns-3's Wi-Fi model required**

Questions

Preliminary Results