Android MANET testbed

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Introduction

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- A lot of time cellular connection is not available
  - Emergency scenarios
  - Remote areas
  - …

MANET

- Mobile Ad-hoc Network
- Group of nodes, equal between them
- No centralized coordinator
- (*Optionally*) Routing capabilities per node, extending the network
- Difficult to test in a real scenario
  - Mobility
  - Repeatable network configuration
  - Collect logs

Mobile devices

- Open-Source operative system
  - Android
- Big range of devices to choose from
  - Some of them with GPS
- Linux like environment to execute scripts

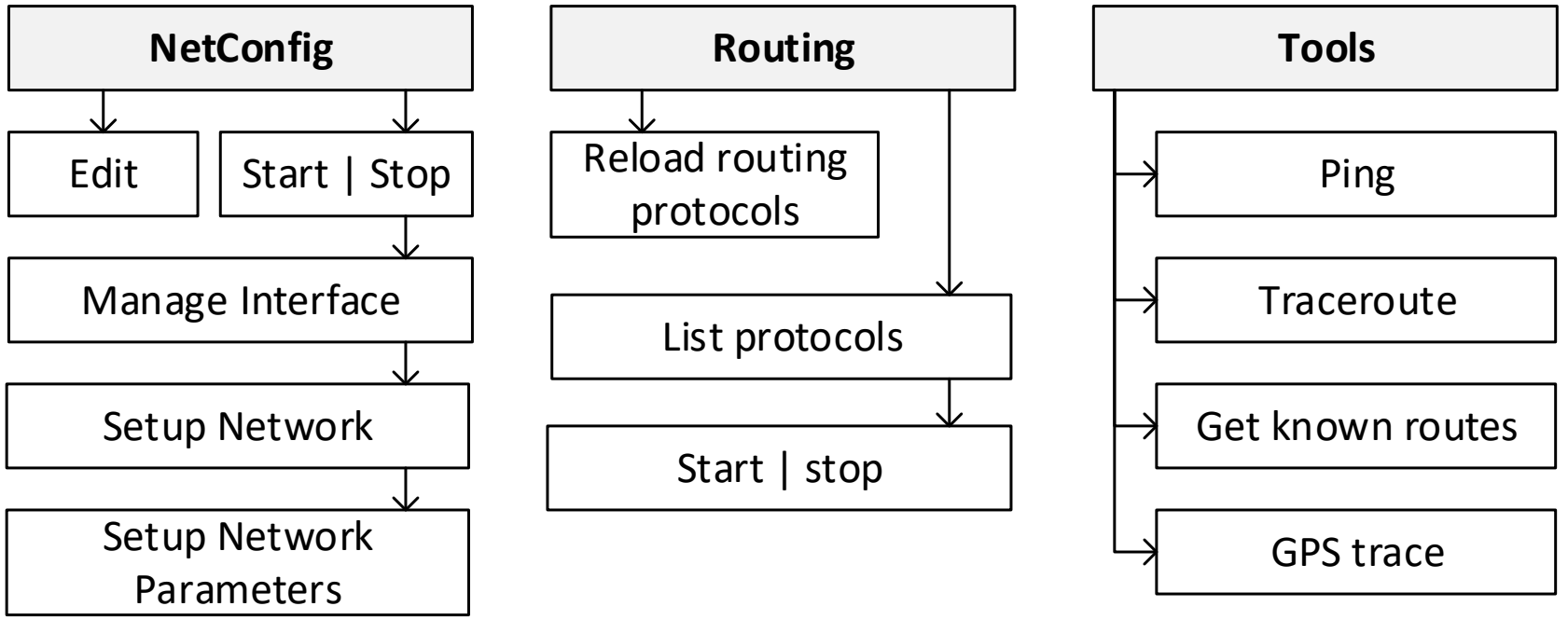
Make Android devices suitable for MANET research

WiFi 802.11 IBSS in Android

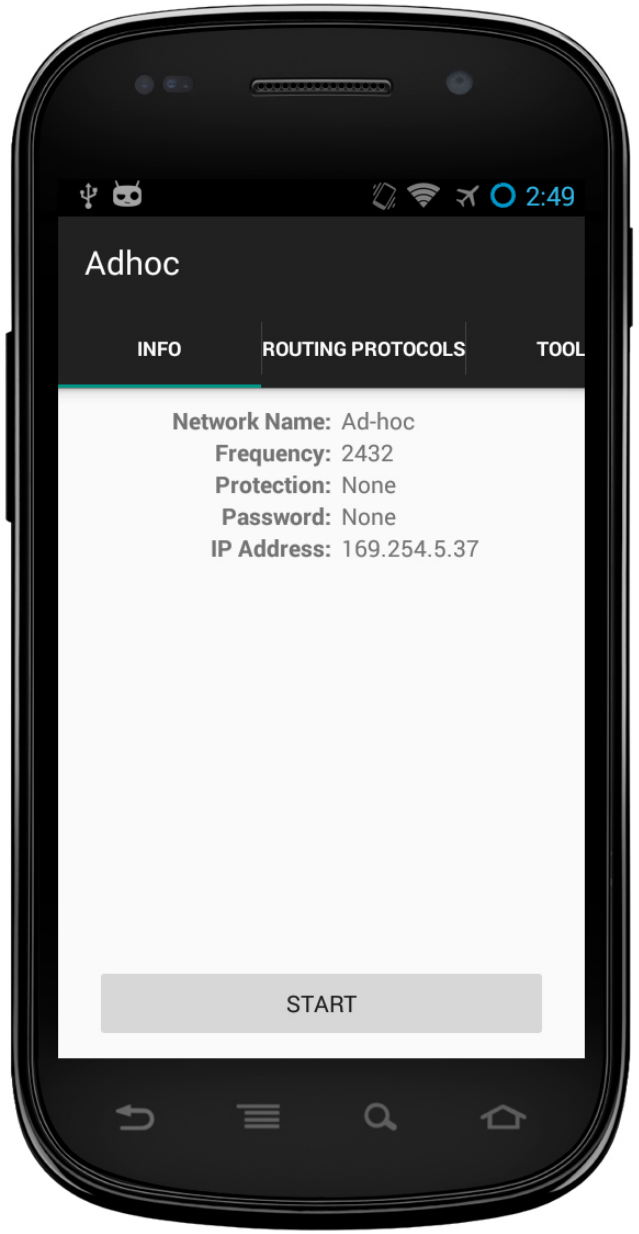
- No API to configure this type of networks
- No API to configure IP addresses
  - Removed in 4.0
- No routing protocol
- Some drivers don't support them

Developed solution

Structure

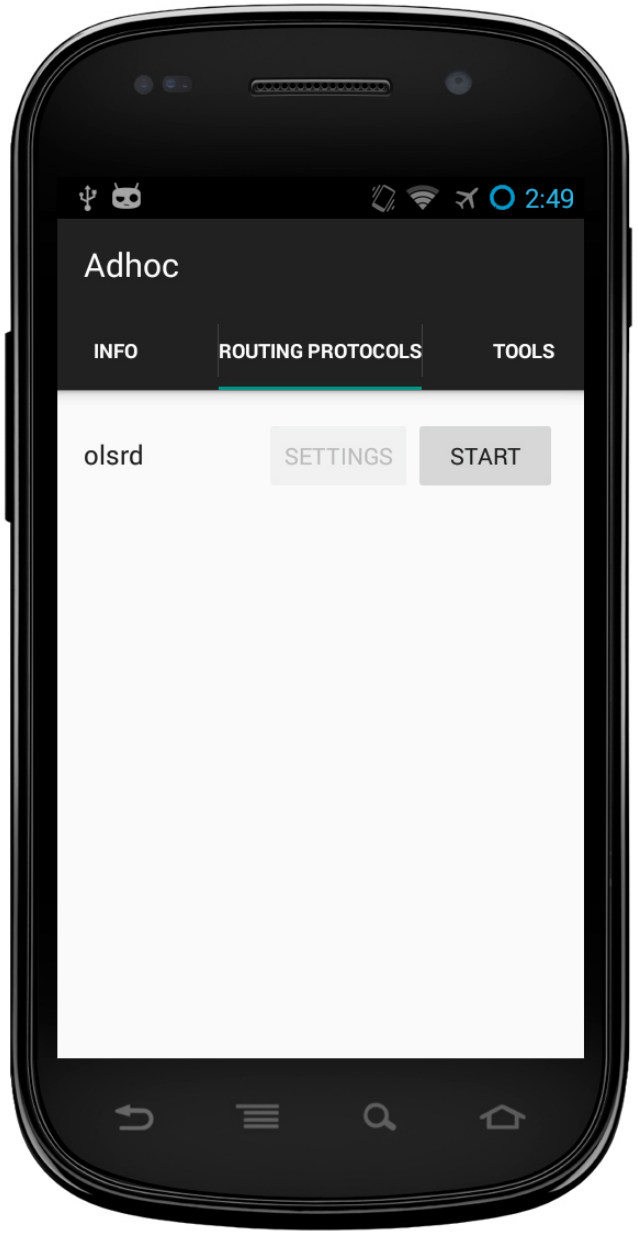


Developed solution



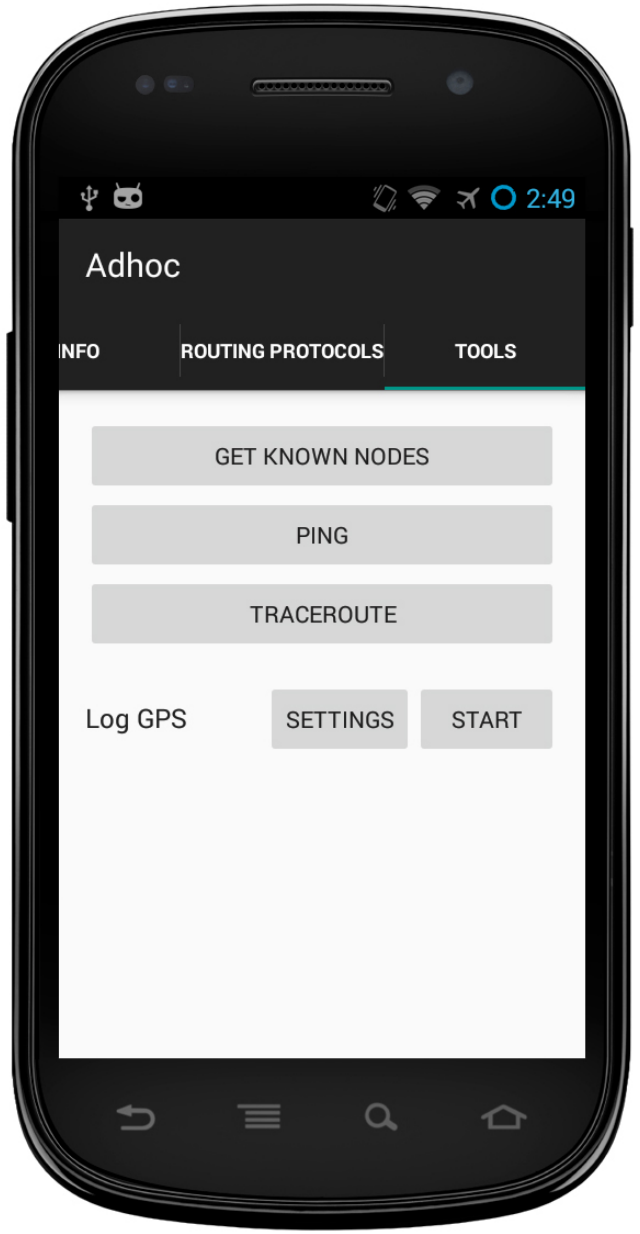
- Smart defaults
  - IP address and network from auto-configuration space
- Option to edit network parameters
- One click start/stop

Developed solution



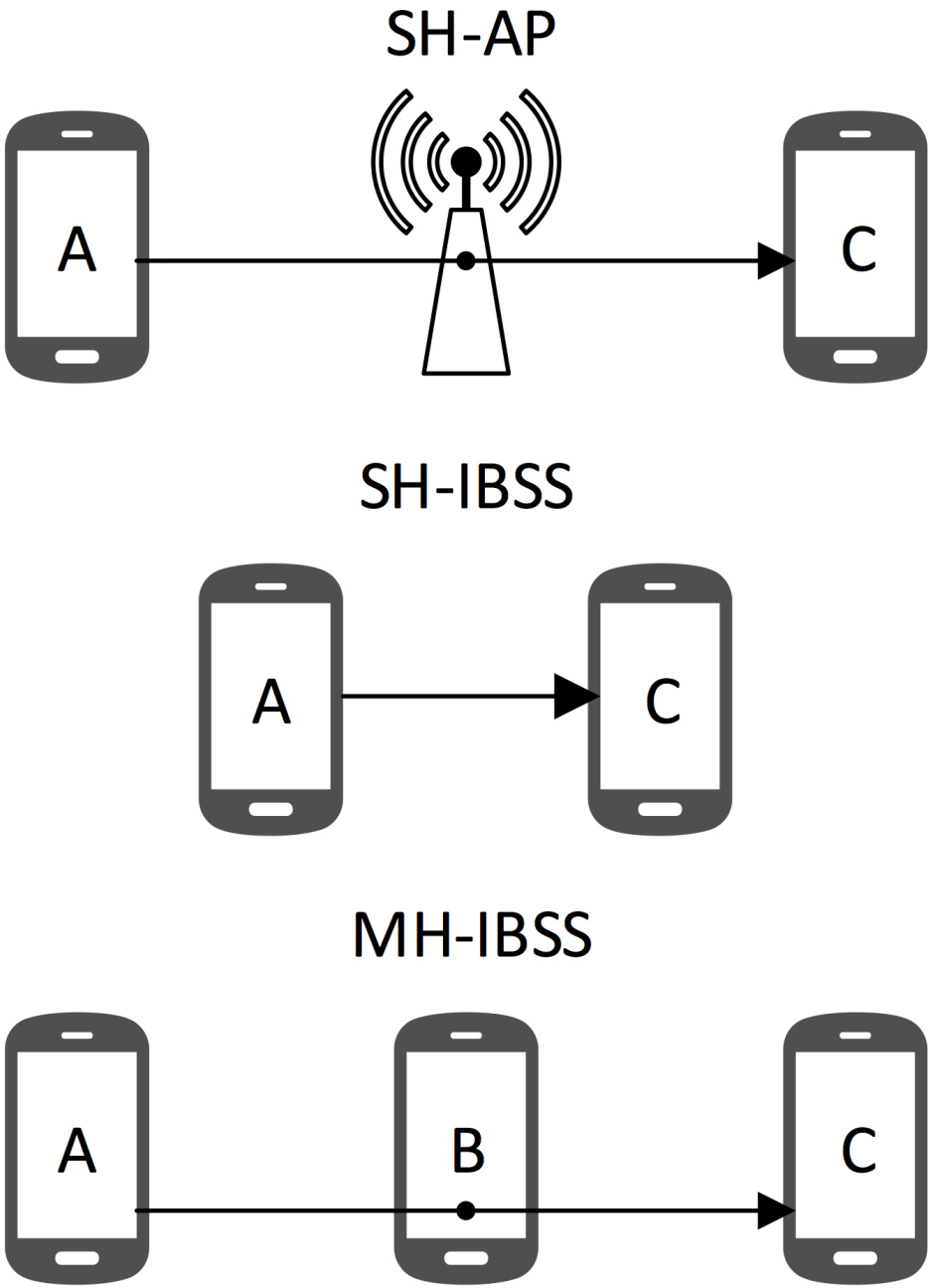
- Support for multiple routing protocols
  - Loadable from SD Card
  - Scripts to start/stop
  - Parameter settings

Developed solution



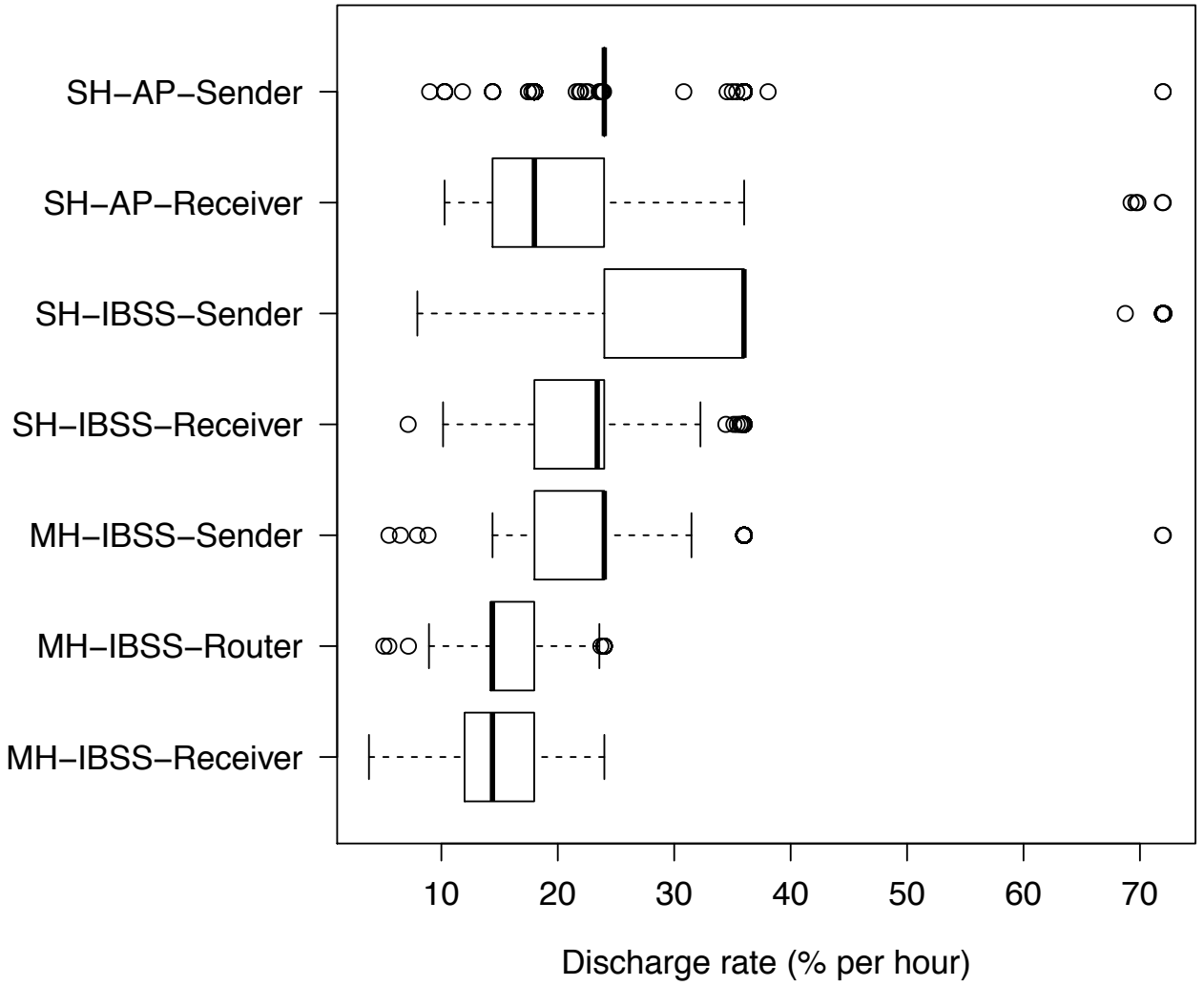
- Tools for evaluate the network
  - Get route table
  - Ping other devices
  - Traceroute
  - Log position

Tests



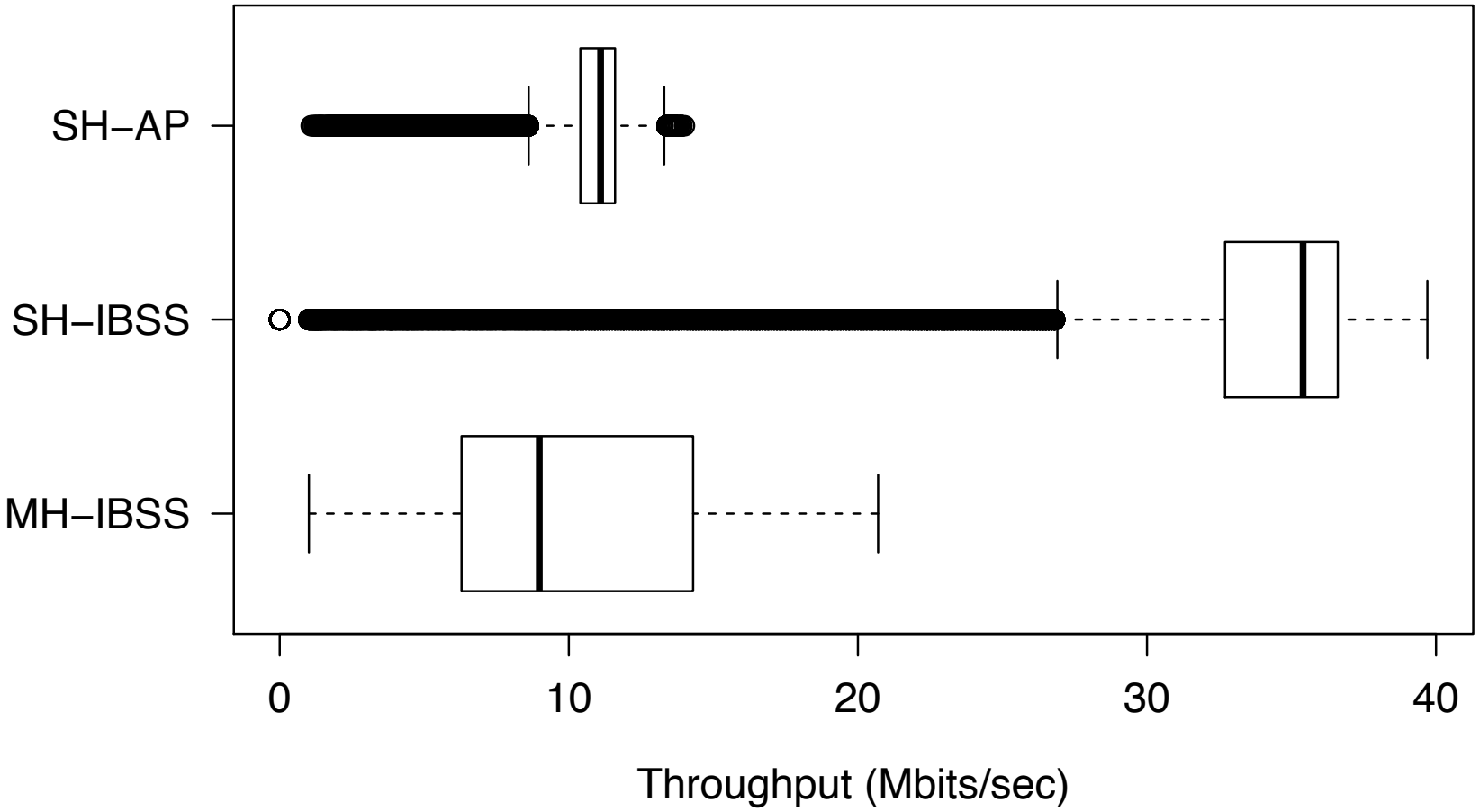
Tests

Discharge rate with traffic sent from A to C at maximum rate (54Mbps)



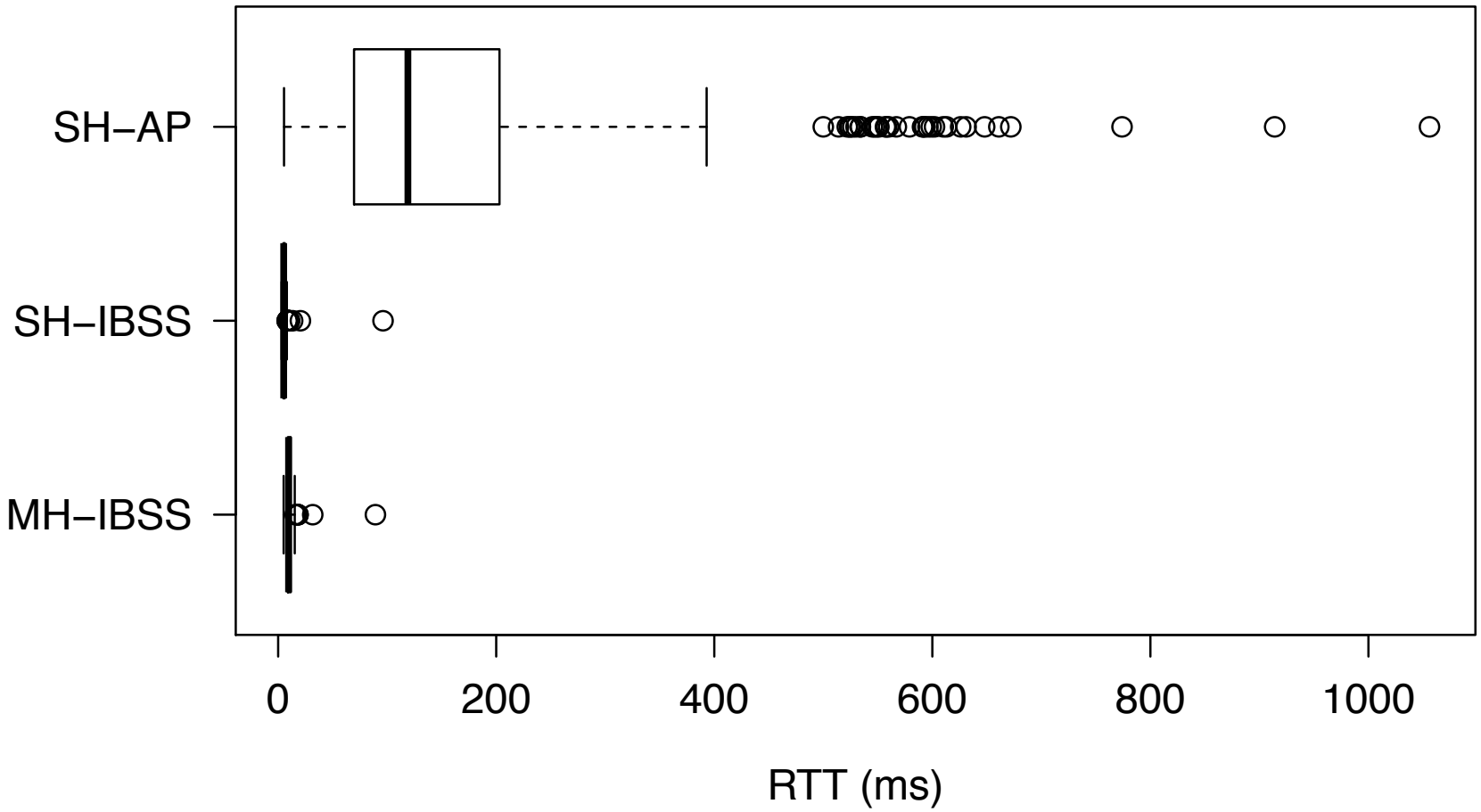
Tests

Throughput received, traffic sent at maximum rate (54Mbps)



Tests

RTT



Problems

- Needs root access
  - Insecure
- Range of supported devices
  - Most of chipsets don't correctly support IBSS networks
  - Tested working:
    - Google Nexus S
    - Samsung Galaxy Tab 10.1
  - Tested not working:
    - Google Nexus 4
    - Google Nexus 5
    - Motorola Moto G (2013)

What's next

- WiFi 802.11s
  - Mesh at MAC layer
  - Path discovery protocol included
    - But can be replaced ☺
- Problems
  - Drivers/chipset support
    - Overcome with mac80211

What's next

- WiFi 802.11s
  - Tested with mac80211 in Google Nexus 4
    - How to: http://static.pt/androidmesh/
  - But a bit problematic:
    - Needs custom kernel compiled
    - Open-source driver
      - Not well developed and supported

Questions?