On the Progress of a Test Bench Development for IEEE 802.11-based WLAN Models Verification

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Problem topicality

- 802.11 (Wi-Fi) – **de-facto** standard for WLAN

- Future releases look very promising
  - 802.11ac – up to 1 Gbps
  - 802.11p – Vehicular communications
  - 802.11ah – Internet of Things

Analysis methodology

Simulation

Analysis

Measurements

Analysis methodology

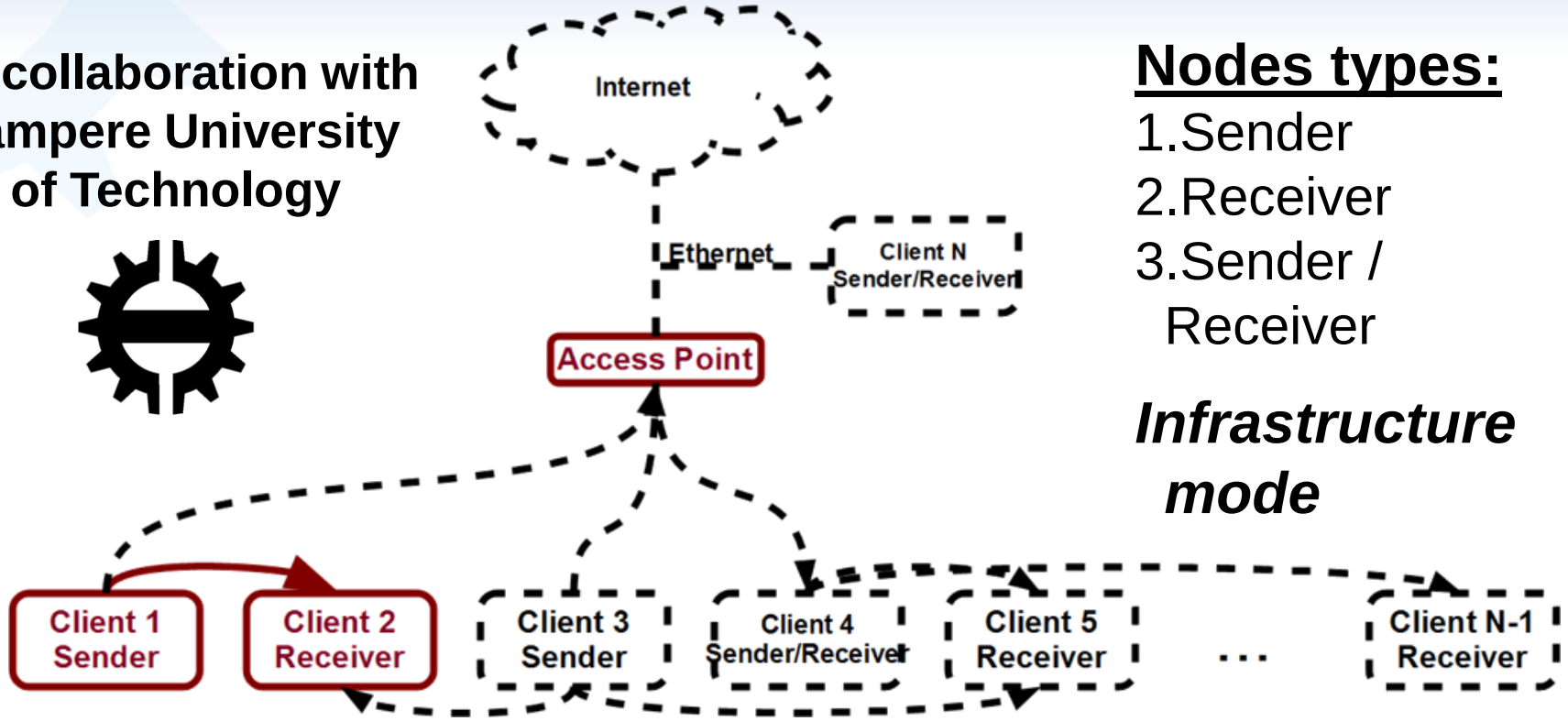
Analysis

Simulation

Measurements

Test bench structure

In collaboration with Tampere University of Technology



Nodes types:

1. Sender
2. Receiver
3. Sender / Receiver

Infrastructure mode

Technical details

- **Driver requirements**:
  - Support of the latest stable version of 802.11
  - Full control of protocol parameters
    - — Number of retries
    - — Rate (MCS usage)
    - — Transmit power

      etc…

Solution: ath9k open-source driver  proprietary extensions

Current status

- **Features**:
  - ✓ Manual rate control (802.11n)
  - ❑ Getting Packet Error Trace (PET)

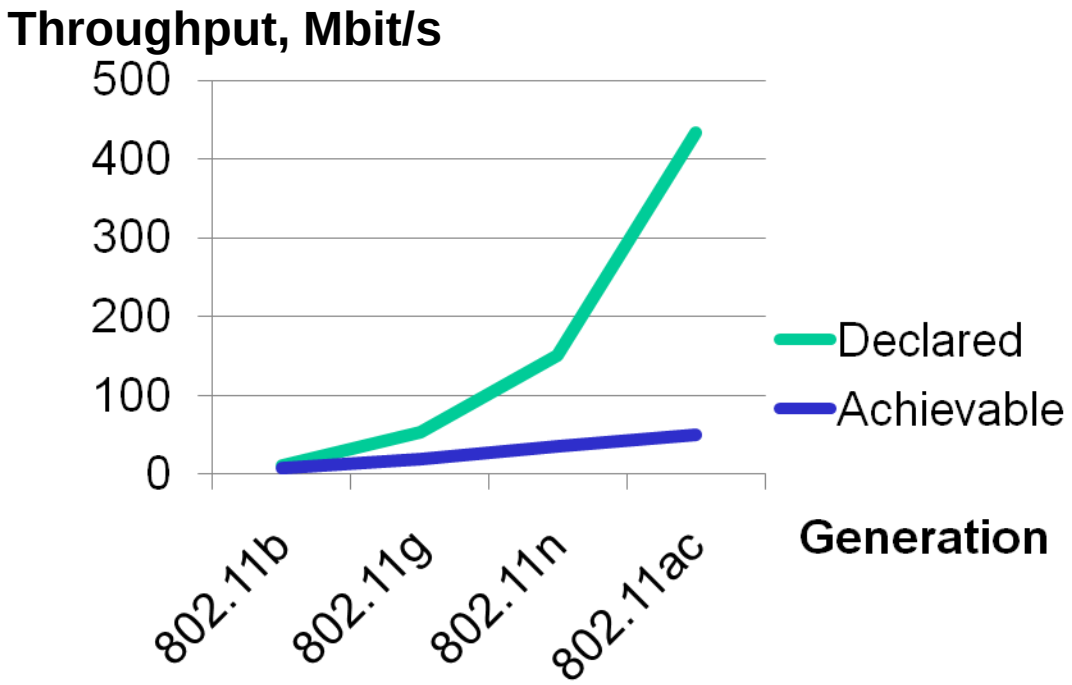
- **Research directions**:
  1. Performance benchmarking
  2. Channel model establishment

Performance benchmarking

- Goodput ⇒ one of the key metrics
- Real goodput << theoretical limit

- 11 Mbps (802.11b)
- 54 Mbps (802.11g)
- 150 Mbps (802.11n)
- 1 Gbps (802.11ac)

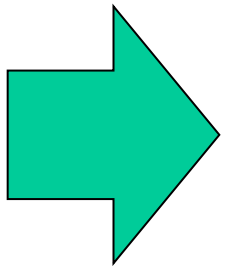
unattainable



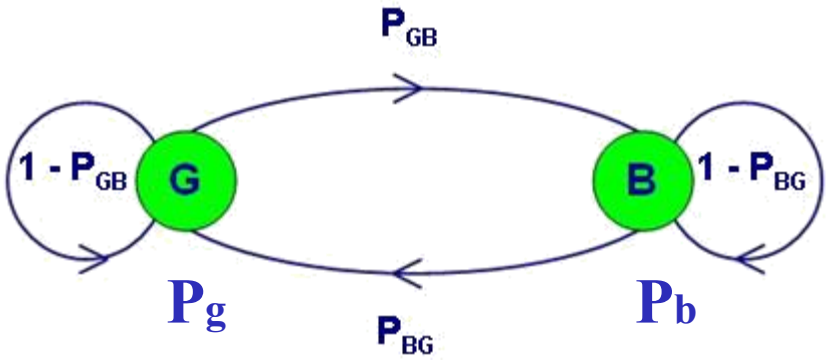
Channel model establishment

Packet Error Trace

1000101010110101 1
0001010101010101 0
1010100010101010 1
0111010101101001 0
0000010101010101 0…



Gilbert-Elliott model

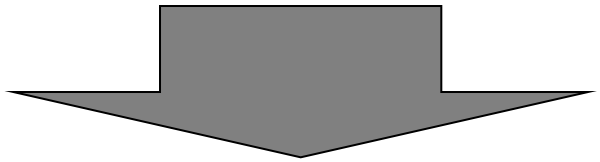


$$P = \begin{bmatrix} p_{gg} & p_{bg} \\ p_{gb} & p_{bb} \end{bmatrix}$$

Conclusions

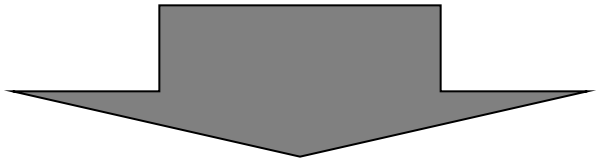
Solving engineering tasks

- Manual rate control implementation
- Getting of Packet Error Trace



Solving research tasks

- Performance Benchmarking
- Channel Model establishment



802.11 models verification

We are open for collaboration!

Thank you!