Characterization of 802.11 Wireless Networks in the Home

and other associated wireless performance measurements

WPI

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Outline

- Characterization Study
  - Goals
  - Design
  - Outcome

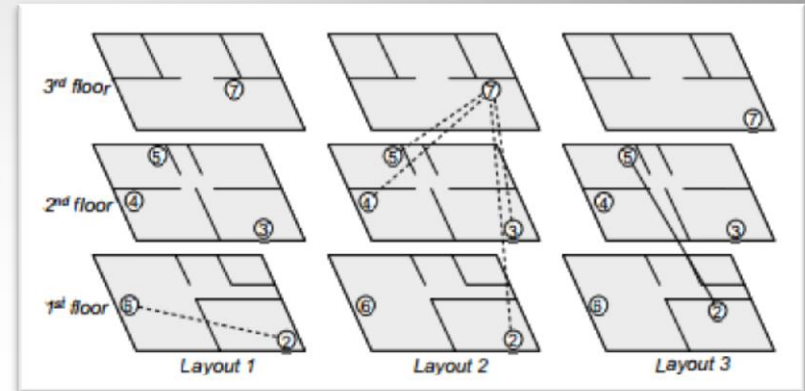- Considerations for Performance

Characterization Study

- Enterprise networks
- Characterization of home wireless

- What interferes with quality?
  - Construction materials of a house?
  - 802.11a vs 802.11b?
  - *txpower*?
  - *txrate*?
  - Node location?
  - Appliance interference?

Characterization Study (cont.)

- Three Houses (IV)

- Six WiFi Nodes (IV)

- Antenna Orientation (IV)

- Different *txpower* (IV)

- Different *txrate* (IV)

- 3 Layouts (IV)

- Node distance (IV)

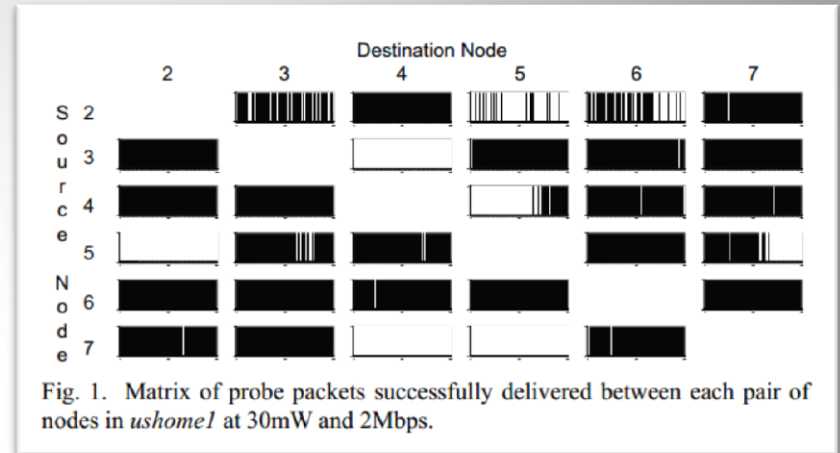- Tested during the night

- Packet Loss (DV)

ukhome1 wireless nodes

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Characterization Study (cont.)

Results

- Asymmetry of Loss

- Orientation Changes

Fig. 1. Matrix of probe packets successfully delivered between each pair of nodes in *ushome1* at 30mW and 2Mbps.

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Characterization Study (cont.)

Results

- Asymmetry of Loss

- Orientation Changes

- Distance not a factor*

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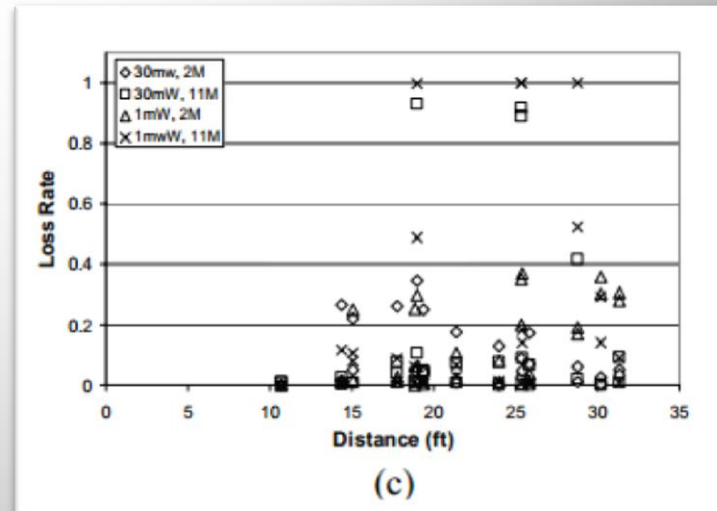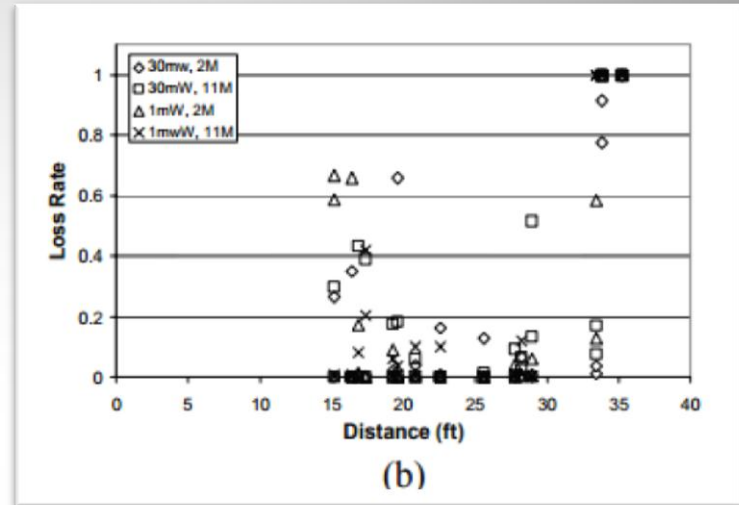
Characterization Study (cont.)

Results

- Asymmetry of Loss
- Orientation Changes
- Distance not a factor*
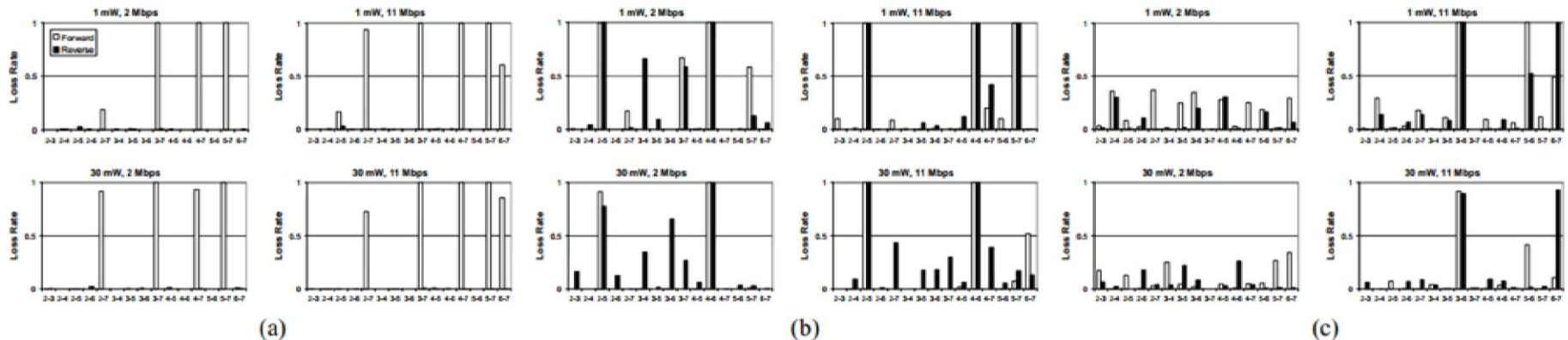
- *txpower & txrate*

Fig. 6. Loss rate for each pair of nodes for *layout2* in (a) *ukhome1*, (b) *ushome1*, and (c) *ushome2*.

Characterization Study (cont.)

Results

- Asymmetry of Loss

- Orientation Changes

- Distance not a factor*
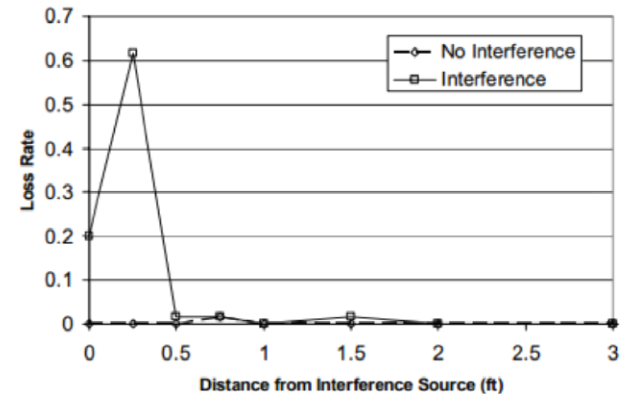
- *txpower & txrate*

- Appliances

Fig. 10. The impact of a 600W microwave on a receiver at varying distance from the interference source and a distance of 15 feet from the sending node.

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Characterization Study (cont.)

Results

- Asymmetry of Loss
- Orientation Changes
- Distance not a factor*
- *txpower & txrate*
- Appliances
- 802.11a

Loss rate for each pair of nodes for *ushome2* using IEEE 802.11a, for

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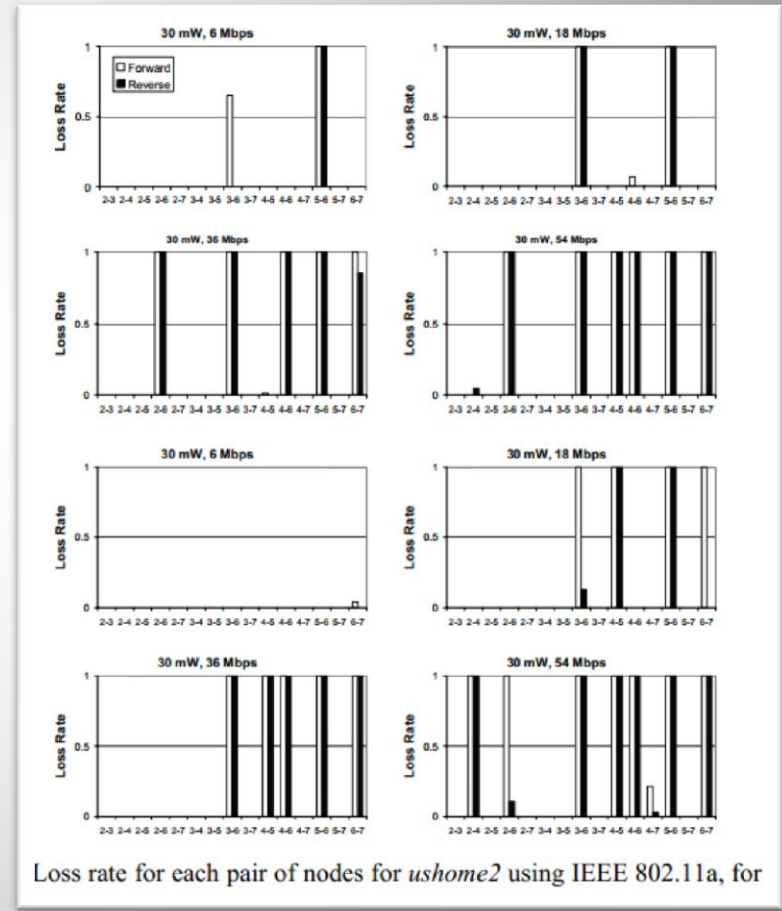
Performance Considerations

- DFC & CSMA/CA
  - Lowest Machine
  - Collision Delays
- Testing applications (examples)
  - netperf
  - tcpperf
  - udpping
- Location
  - Physical
  - Antenna Positioning

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Performance Considerations

- Transmissions
  - Power
  - Rate
- Other Layers
  - UDP vs TCP
  - Applications
  - Delays in Datalink Layer
- Care about:
  - Packet Loss
  - "handling" of slow-clients
  - What happens when many clients join?

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