802.11 Networks

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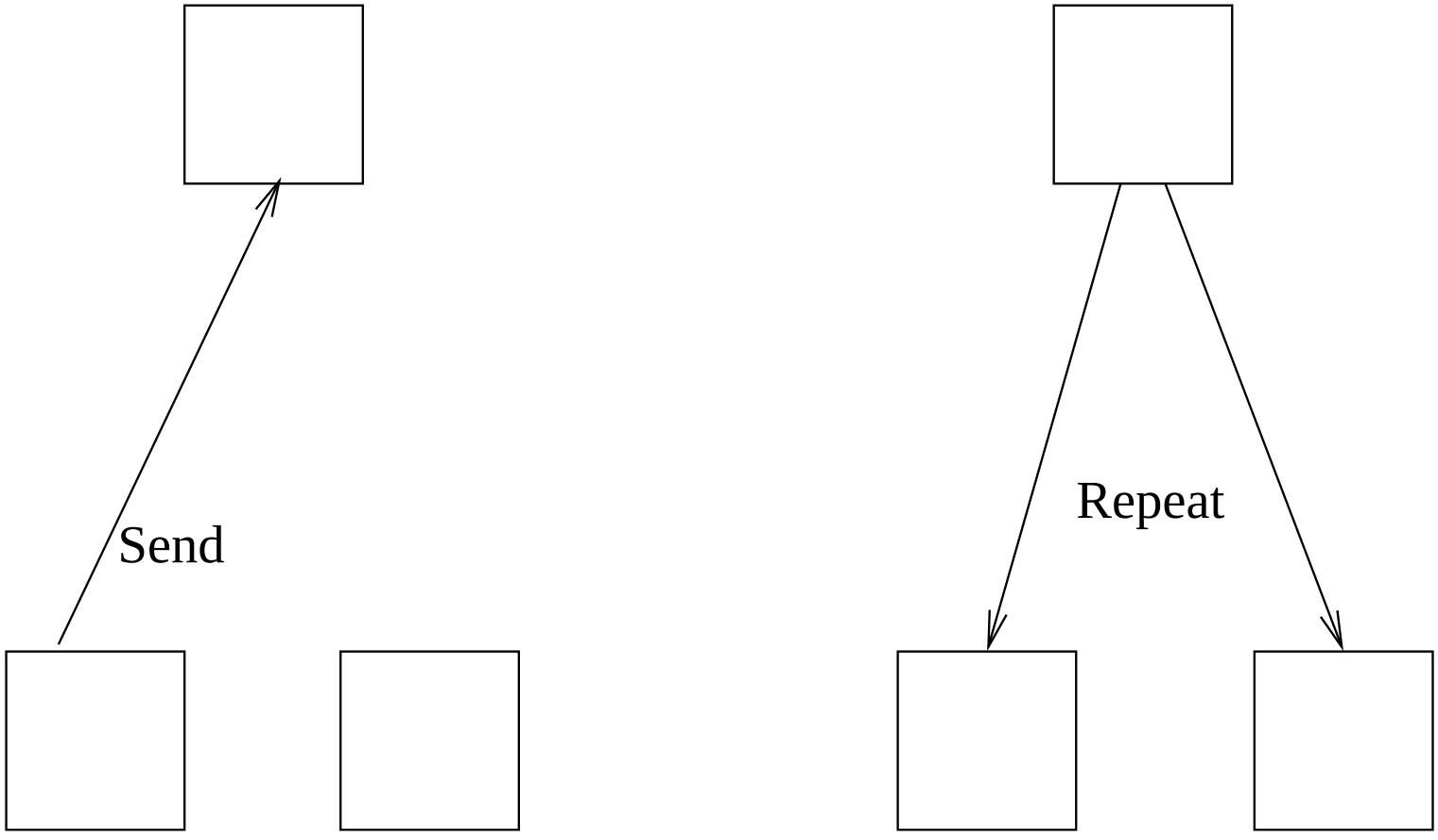
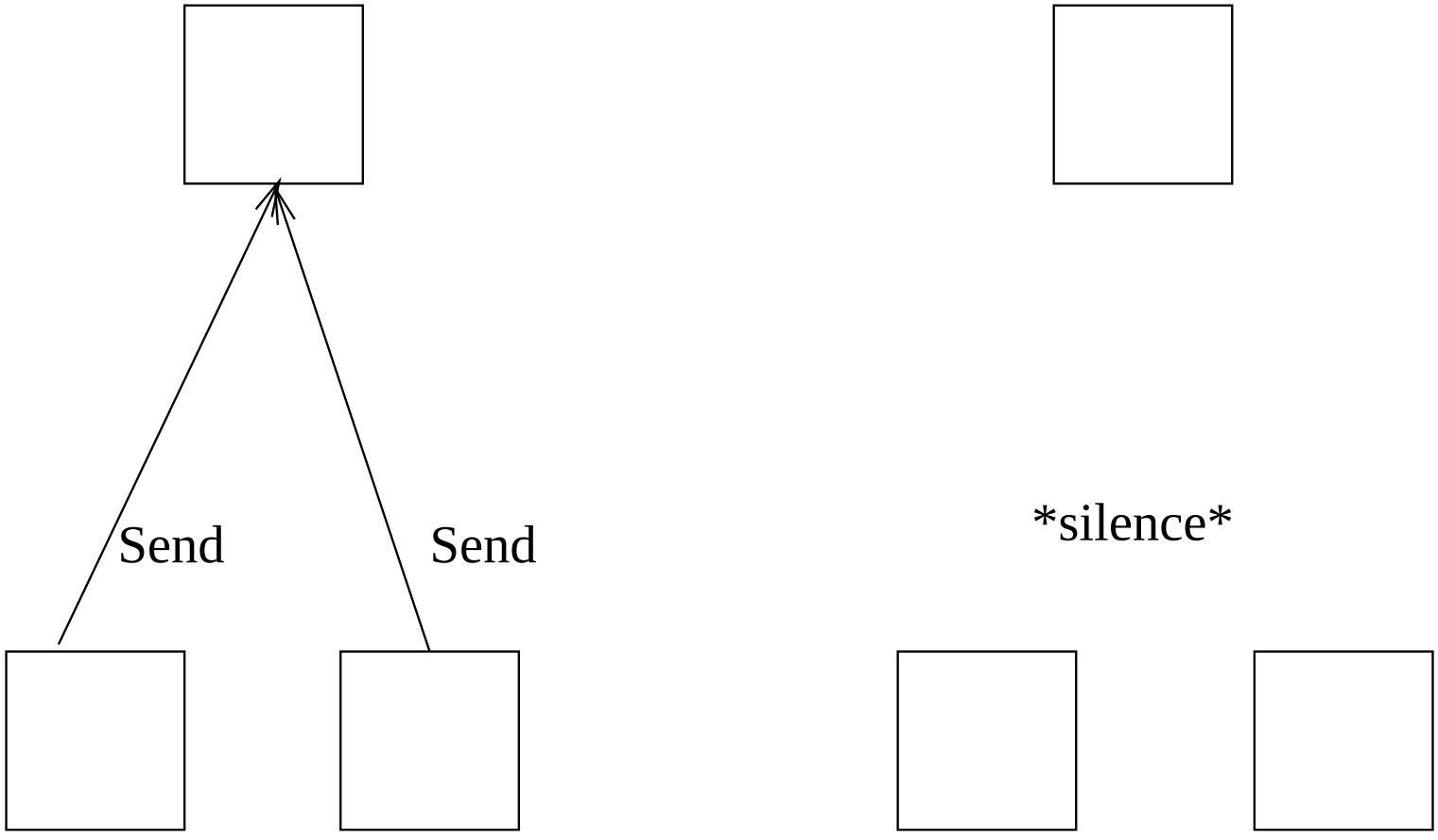
802.11 Networks

- Standard used for home/office wireless networks,
- Branded as *WiFi*,
- Uses ISM band at 2.4GHz (802.11b/g),
- Or maybe at 5GHz (802.11a),
- Transfers packets of data like Ethernet.
- Carrier sense multiple access protocol.

Aloha: Good Transmission

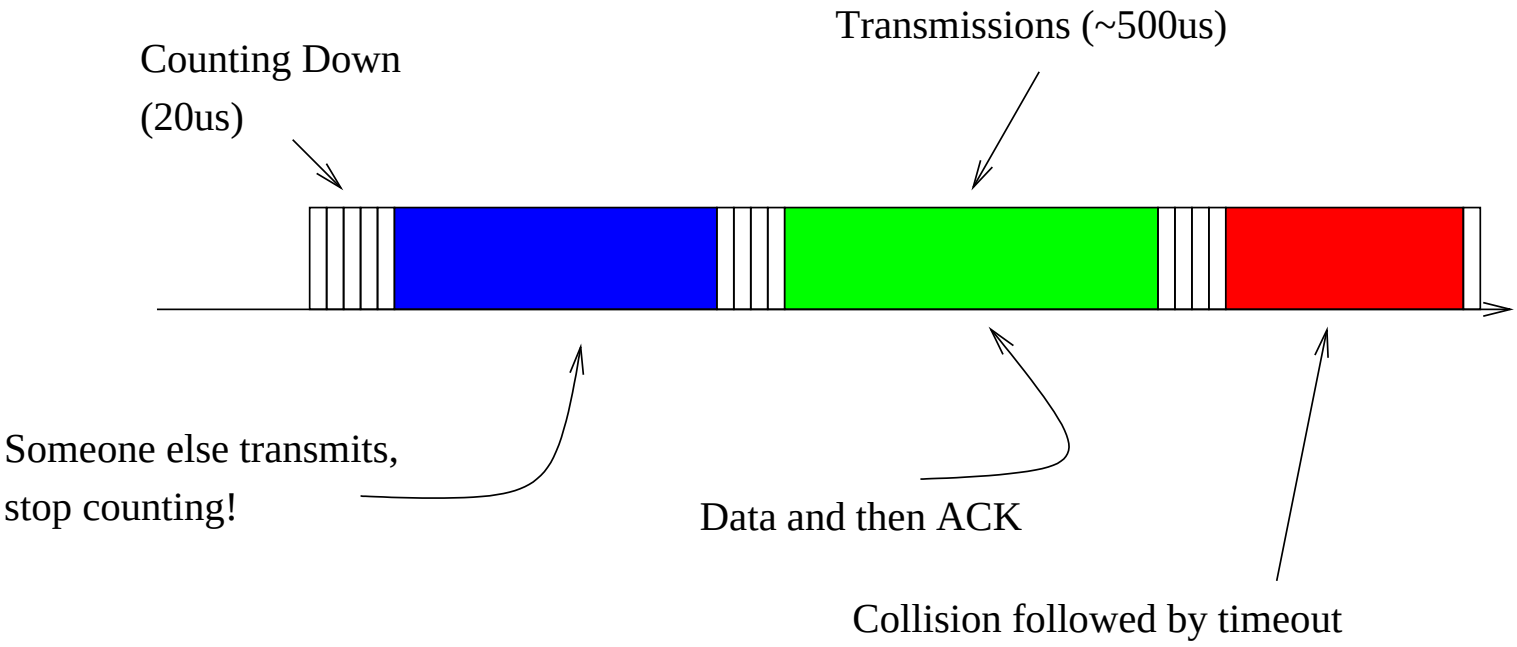


Aloha: Collision



What About WiFi?

- After transmission choose rand(0,CW-1).
- Wait until medium idle.
- Count down in slots.
- Transmit when get to 0 (if you have a packet).
- If ACK then $CW \leftarrow CW_{min}$ else $CW \leftarrow 2CW$.


Counting Down
(20us)
Transmissions (~500us)
Someone else transmits,
stop counting!
Data and then ACK
Collision followed by timeout

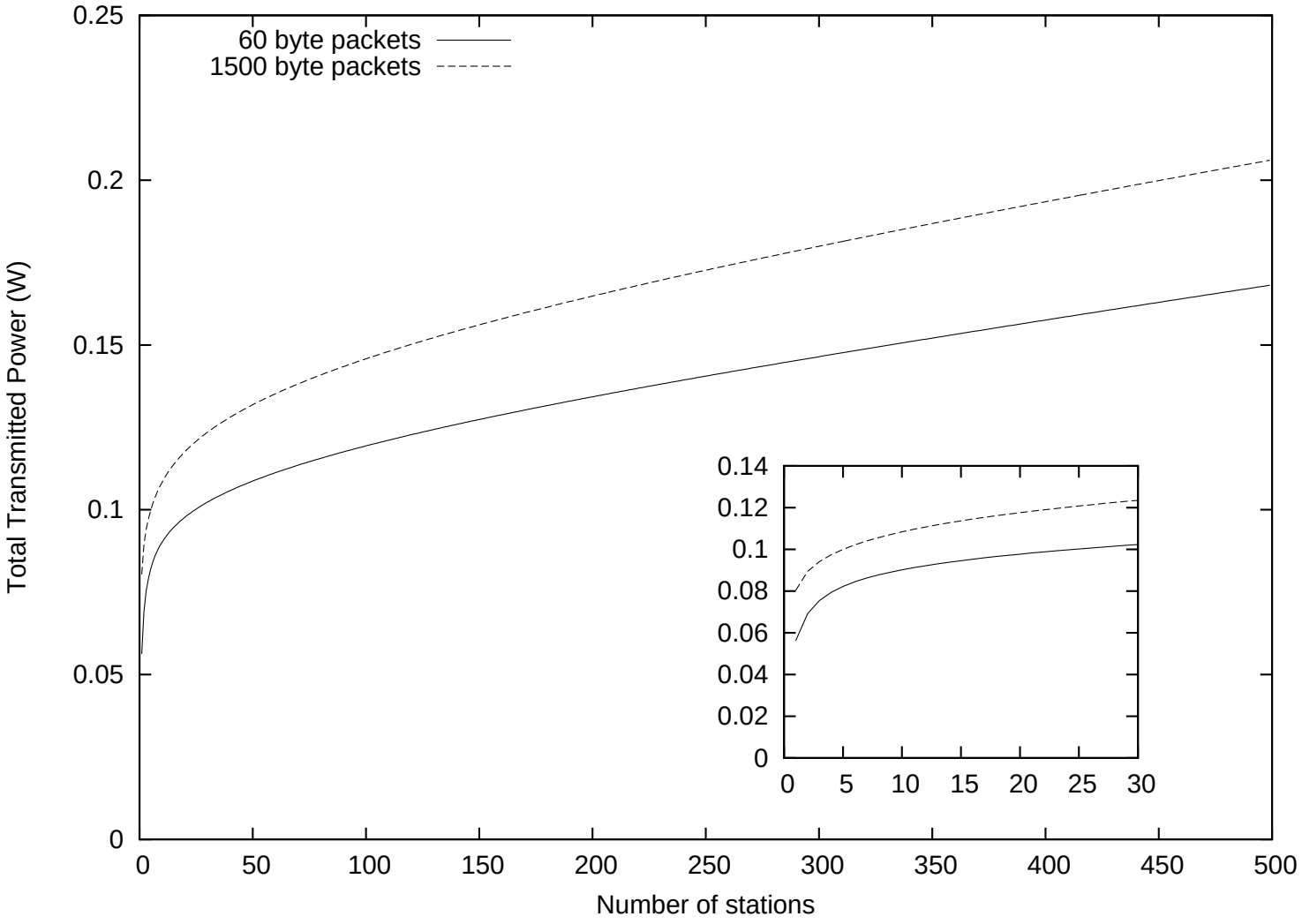
Previous work

- *Radiofrequency Exposure from Wireless LANs Utilizing Wi-Fi Technology*, Kenneth R. Foster, Health Physics, March 2007, 93(3), 280–289.
- *Exposure of the general public due to wireless LAN applications in public places*, G. Schmid et al, Radiation Protection Dosimetry, 2007, 124(1), 48–52.

Impact of Collisions

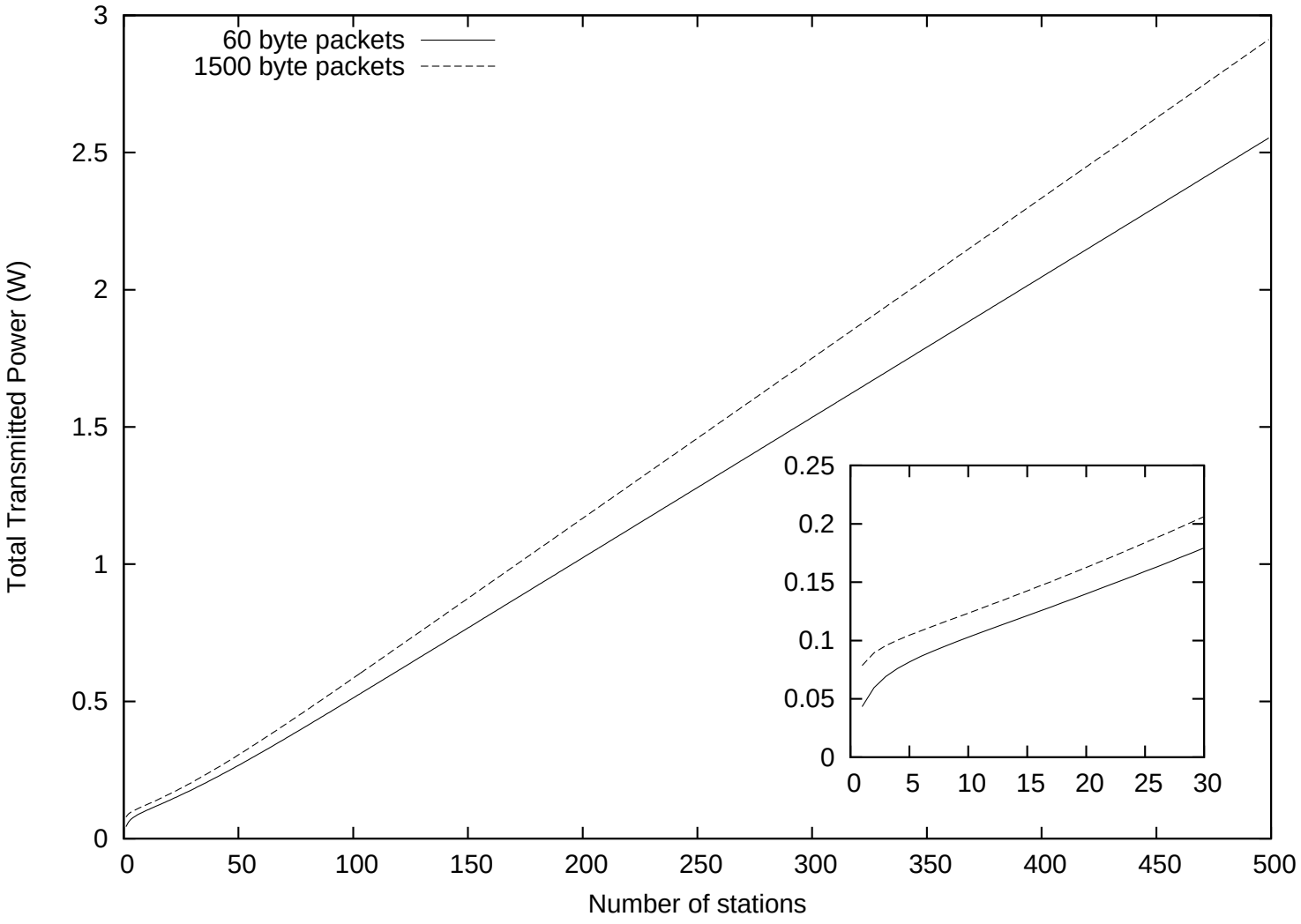
- MAC is not perfect.
- For saturated network have Bianchi model.
- Use this to find probability of transmission.
- Then have binomial distribution of number transmitting.
- Use this to average energy per slot.
- Divide by average slot time to get power.
- Gives estimate of total network output.

Power for saturated network of n



Nominal power is 100mW.

Power for saturated broadcast network of n



Nominal power is 100mW.

Thanks!

Questions?