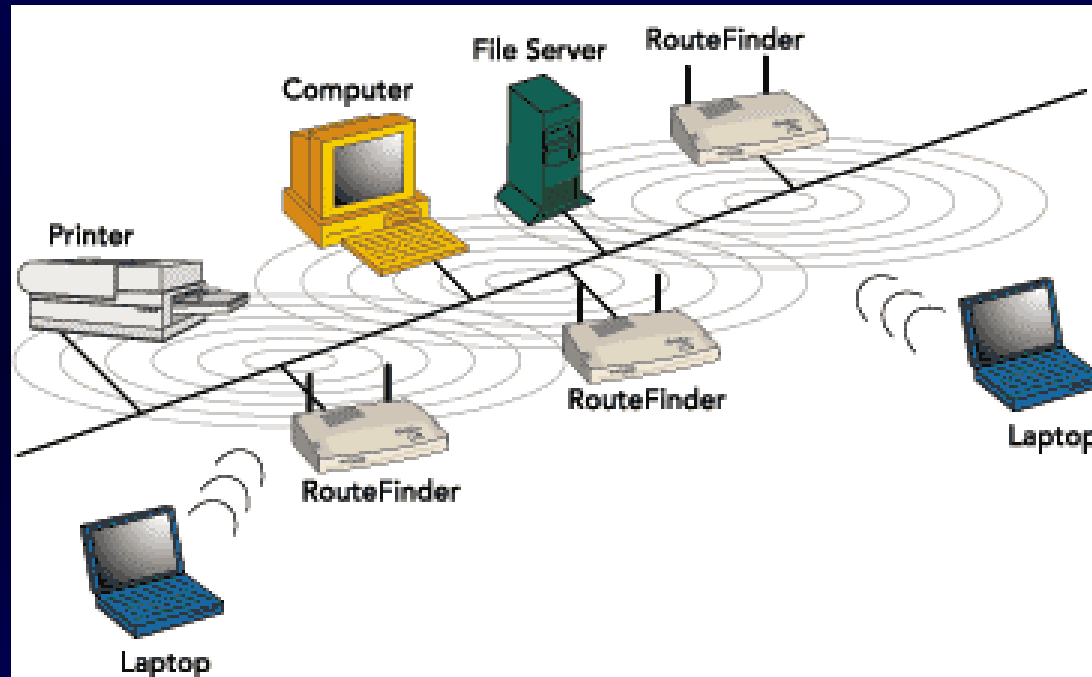


Wireless LAN Simulation

- IEEE 802.11 MAC Protocol



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Outline

- Project Description
- IEEE 802.11 MAC Protocol
- Simulation
- Performance Analysis

Project Goals

- MATLAB simulation
 - DCF (Distributed Coordination Function)
 - No Propagation Delay
- Performance Analysis
 - Number of Nodes
 - Range
 - Packet Size
 - RTS/CTS

DCF

- DCF
 - CSMA/CA is a DCF
- Salient features
 - Medium sharing through CSMA/CA
 - Allows one STA to use the medium
 - Random Back off interval before retransmission
 - Refinement – RTS/CTS packets

IEEE 802.11 MAC Protocol

- Also known as **CSMA/CA**
- **802.11 CSMA** (no collision detection)

Sender

If the channel is idle for DIFS seconds

- Transmit DATA packet

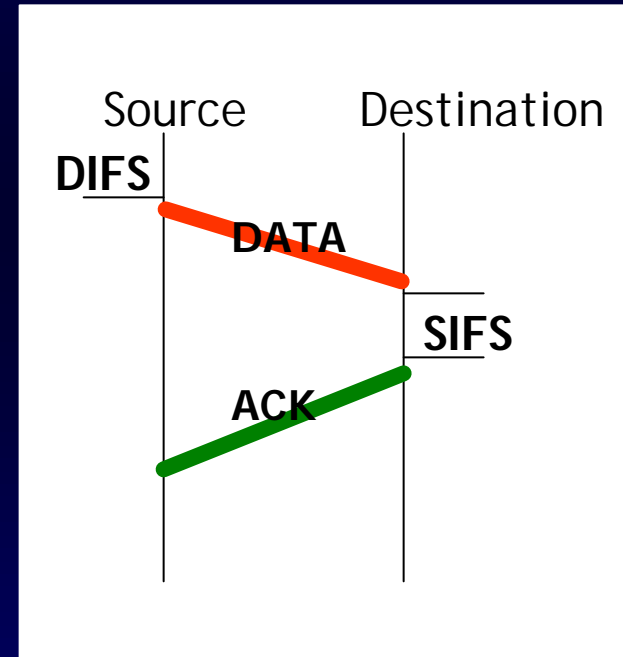
If the channel is busy

- Backoff

Receiver

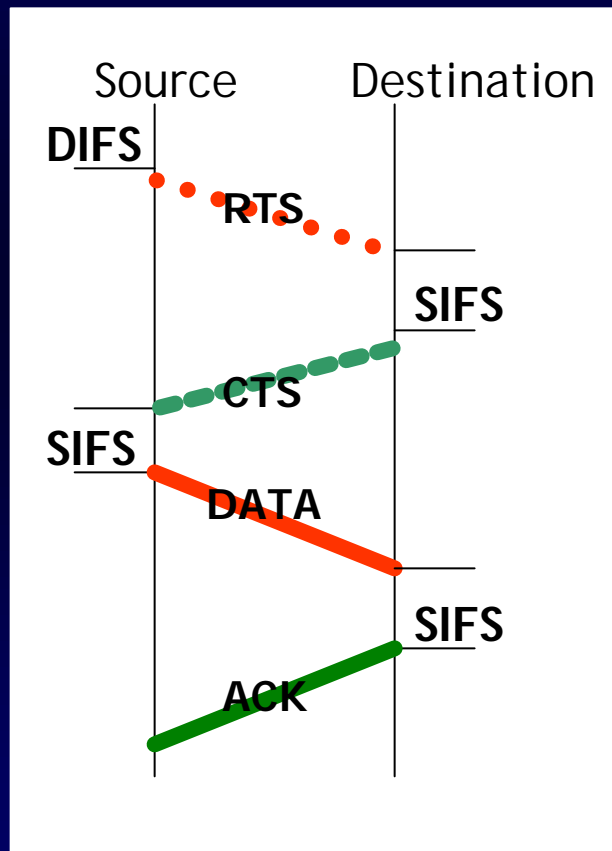
If DATA packet received

- Return ACK after SIFS seconds



IEEE 802.11 MAC Protocol

CSMA/CA (Collision Avoidance) - RTS/CTS Implementation



- Sender transmits an RTS packet
- Receiver responds with a CTS packet
- Purpose of CTS packet
 - Reserves channel for sender
 - Notify other stations

Goal – Avoid “Hidden Node” collisions

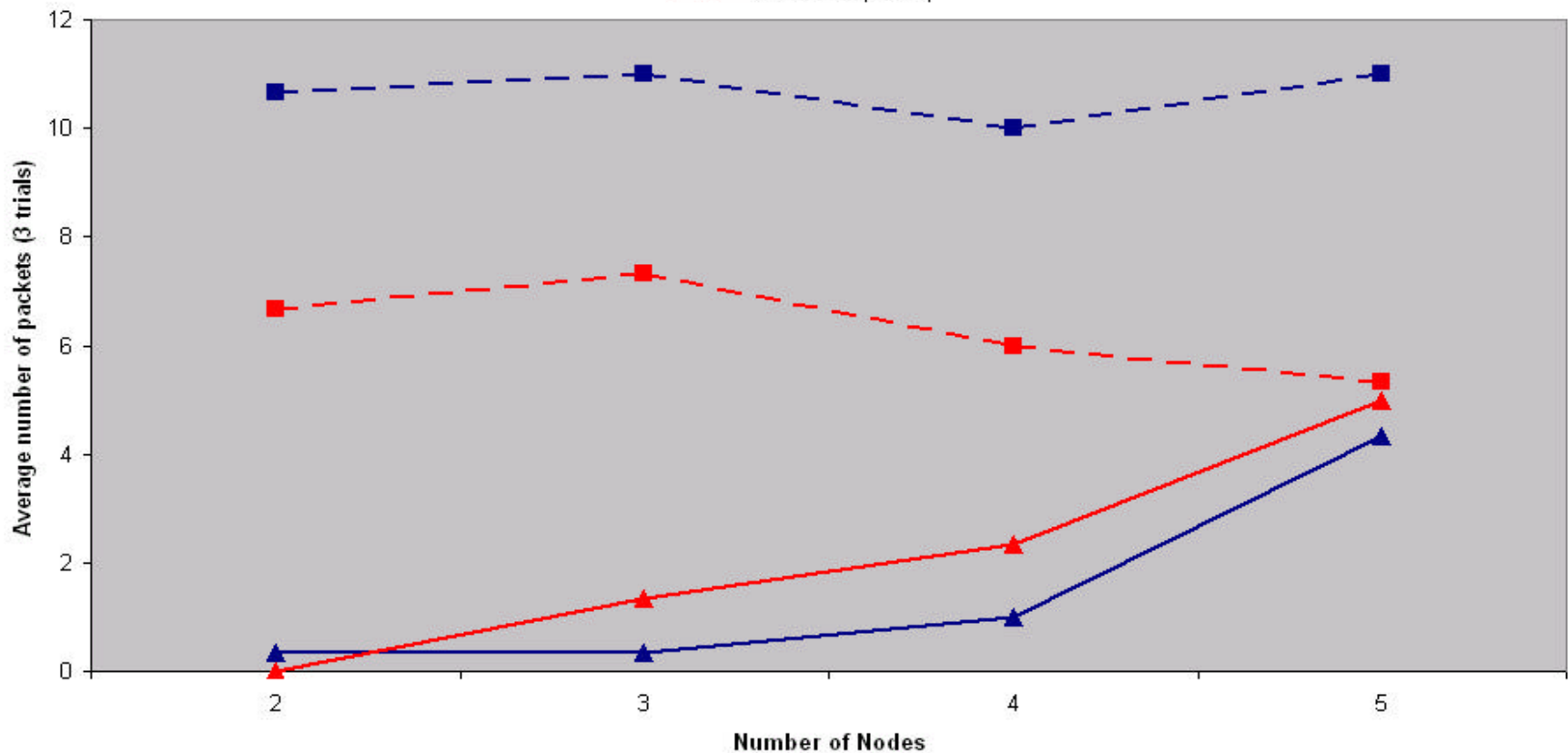
MATLAB Simulation

- Old Simulation
 - Implemented CSMA (No RTS/CTS)
- New Simulation
 - Includes RTS/CTS exchange
 - Simulates CSMA/CA

Analysis

Performance Analysis

- Successful Transmissions (CSMA/CA)
- ▲— Collisions (CSMA/CA)
- Successful Transmissions (CSMA)
- ▲— Collisions (CSMA)



Strengths/Weaknesses

- Strengths
 - Fairly accurate simulation of CSMA/CA
 - Fewer packet collisions and more successful transmissions evident
- Drawbacks of our simulation
 - Cluttered simulation window
 - Deadlocks increase with more nodes

Any Questions?

