

Fair Waiting Protocol :

Achieving Isolation in Wireless Sensornets

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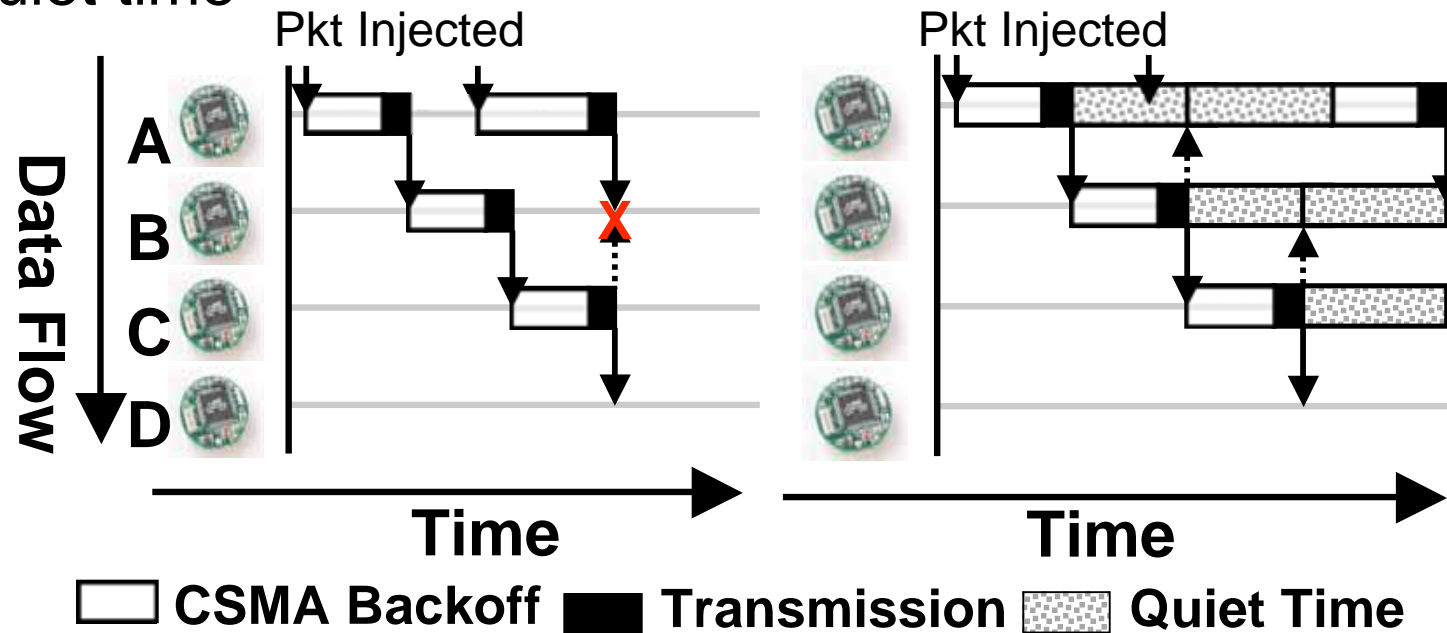
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Fair Waiting Protocol (FWP)

- Objective
 - To simplify sensornet's complicated network behavior by cutting the interactions between network protocols
 - To prevent Inter-protocol Interference
- Two properties
 - **Isolation** by Grant-to-send
 - **Fairness** by Fair Queueing

Grant-To-Send

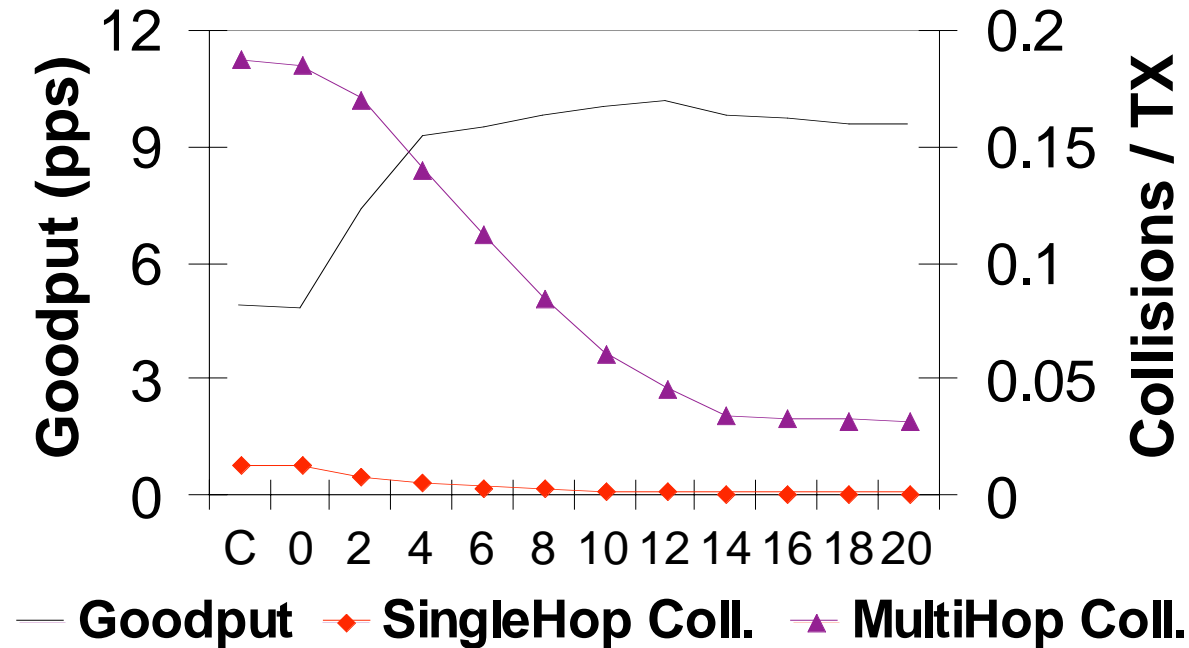
- Puts a quiet time(1B) on every packet
 - Transmitter and overhearders should be quiet during the quiet time
- quiet time



Fair Queueing

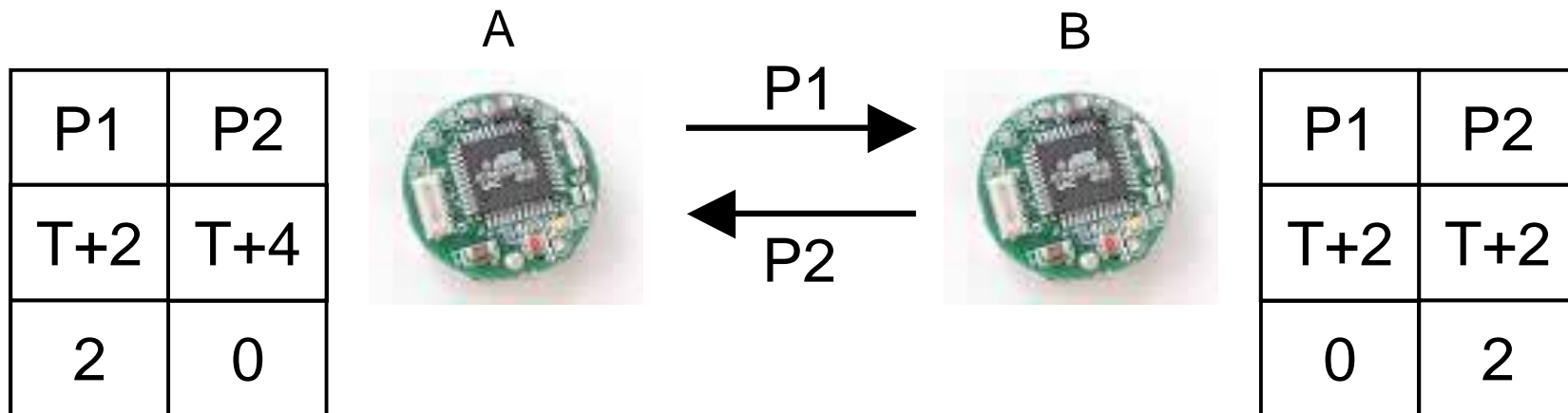
- Channel Occupancy of protocol P (T_P)
 - + = Quiet Time (Q) + TX Time
- When multiple packets are pending, transmits a packet from the protocol with minimum T
- Protocol Penalty
 - CSMA enforces fairness across nodes
 - favors protocols with more senders
 - Small penalty wait before starting CSMA according to $T_P/\min\{T\}$

Issues on Grant-To-Send



- How bad links will change performance of FWP and the optimal quiet time?
- Different topologies, e.g. star topology, with multiple flows

Ping-Pong Effect



- Can be caused by packet losses
- Solution : Periodically decaying channel usage values
 - Experiments shows different optimal decaying period for different traffic patterns, but not sure why
 - Need to understand which factors decides the optimal period and how

Bigger Picture

- What we want :
 - independently reliable operation of co-existing multiple protocols
- What we need :
 - Adaptive quiet time selection mechanism
 - Depends on topology, traffic patterns, link qualities, radio chips, CSMA parameters, etc.
 - Network protocols must adjust the quiet times
 - Improvements on Grant-to-send