An Energy Efficient MAC Reliable Multicast Protocol For Wlans

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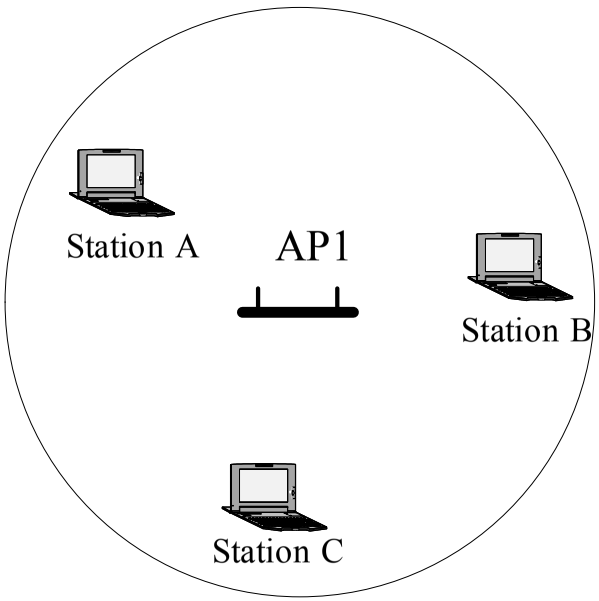
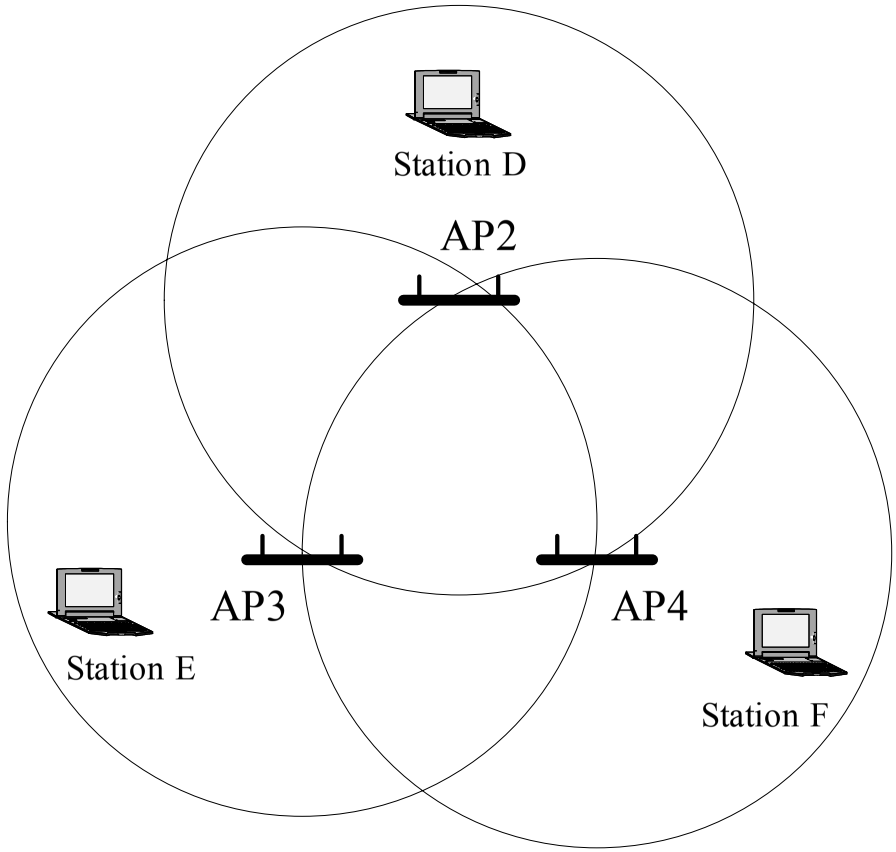
In the BSS, station A, B, and C are associated with AP1.In the ESS, station D,E, and F is associated with AP2, AP3, and AP4 respectively. Station D, E, and F hidden to each other.



A BSS



An ESS

- How multicast packets are transmitted

In an ESS, the multicast sender sends a multicast packet to its AP. The AP sends the packet to the rest of stations inside the BSS. If the packet is also for stations inside other BSSs, the AP needs to send it to the APs inside the ESS. Then, each AP sends the packet to its stations.

- Multicast collisions occur between

1) multicast packets and multicast packets
2) multicast packets and unicast packets

- Motivation

When collisions occur, unicast packets will be retransmitted. However, the multicast packets will be lost for ever.

- **Priority Ring Based Multicast Protocol**

  Multicast transmitters on the same channel avoid collisions by waiting a time interval (which we call Multicast Collision Detection Interval) after sending a RTS, and they need to use the Sense Channel Operation (SCO) to detect an idle channel. If the channel is idle, multicast transmitters send a RTS to reserve the channel after. Finally, the multicast packets are transmitted.

  Each AP has a unique MCDI which forms a priority ring. The MCDI gives APs different priority to send multicast packets. To be fair, low priority AP can request a high priority MCDI if no AP has the priority or an AP agrees to give up the priority.

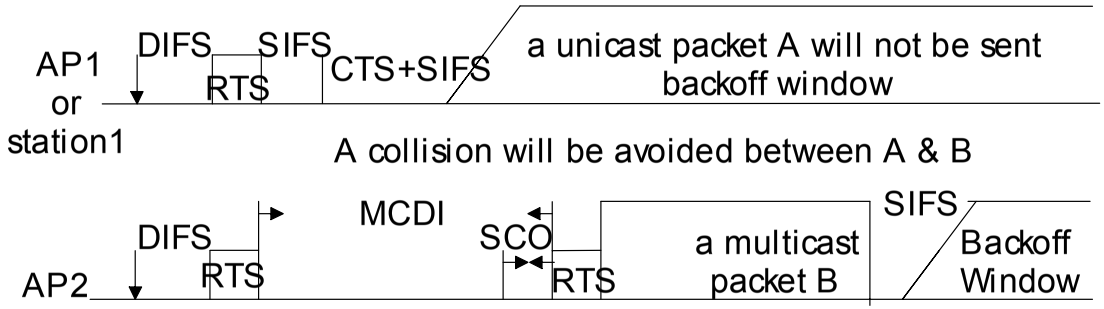
- The first RTS is used to inform other stations the duration of the unicast packet, which is 2* RTS+MCDI+multicast packet. It is also used to: 1)give priority to the multicast sender, 2) prevent the transmission of the hidden station.

- The second RTS is also used to inform other stations the duration of the multicast packet, which is RTS+ multicast packet. It is also used by AP2 to prevent any additional unicast sender, a hidden station or not.

- The SCO lasts 15μs which performs a Clean channel assessment.

Collision Avoiding

A collision between a multicast packet and a unicast packet



- No hidden stations exist

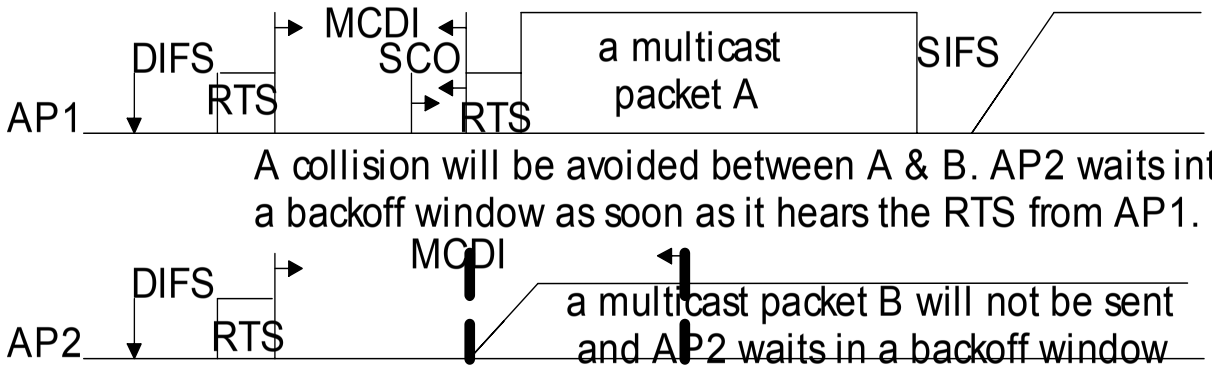
  No collisions will occur.

- Hidden stations exist

  Collisions occur when hidden stations start during MCDI and send RTS before AP2 starts to send RTS.

Collision Avoiding

A collision between a multicast packet and a multicast packet



- No hidden stations exist

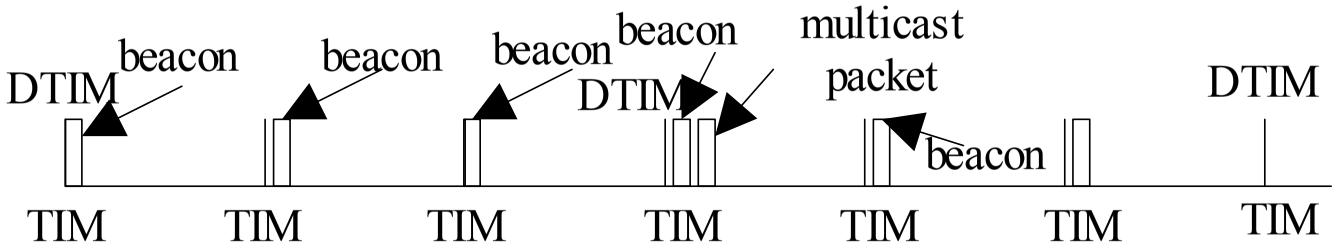
No collisions will occur.

- Hidden stations exist

Collisions occur when hidden stations start during MCDI and send RTS before AP2 starts to send RTS. However, the collision probability is reduced.

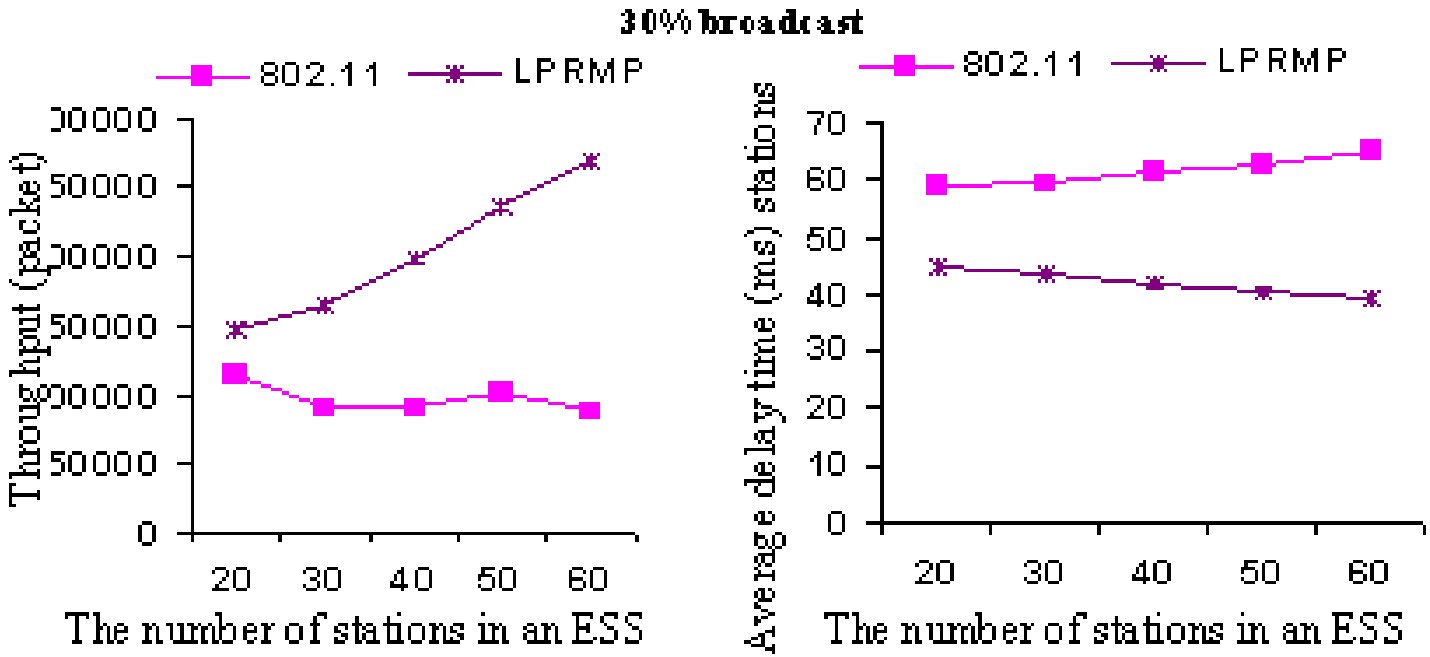
Energy Efficiency

When AP wants to send a multicast packets , AP checks the multicast receivers energy mode. If some stations in power save mode. AP informs these stations in beacon and send the multicast packet at next DTIM.



The signal inside multicast packet will show more multicast packets coming or not. If the packet lost, the multicast receivers have to keep in active mode until next TIM. Thus, the loss of multicast packets cause energy waste. PRMP solves the the problem, stations can change their energy by per -multicast packet basis.

Simulation Results



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