Tutorial: Efficient Scheduling Overlay for 802.11b MAC

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What is Scheduling?

Scheduling can be defined as an organized way of sharing the channel by the STAs for real time data transmission with little bandwidth overhead

- Ability of a coordinator to send beacon without having to contend for the channel each time

- Ability of a coordinator to balance between the CFP and CP operation of a network

- Ability of a STA to transmit its stream at certain interval without having to contend for the channel each time.

- Ability to cater to different priority and retransmission requirements of different streams

- Ability of a network to provide all the above without additional bandwidth overhead

- Ability of a coordinator to efficiently share CFP with other coordinators

Is Coordination Needed?

- Coordination based scheduling requires only one STA in the BSS to be able to perform scheduling. Pure distributed scheduling requires that all STAs to be able to perform scheduling.

- Coordinated scheduling can easily identify the differences between two types of data with different transmission requirements (like Voice and Video) unlike the distributed scheduling.

- Distributed scheduling is prone to be easily de-synchronized than the coordinated scheduling. One example is when two or more STA's wants to make use of the distributed scheduling and the first STA's scheduling is disturbed by interference or a frame from a DCF STA.

- Coordinated scheduling provides lot more control for scheduling

- Good neighbor policies are easy to implement in coordinated scheduling than in distributed scheduling.

What is Required for Efficient Scheduling?

- Collision free operation

- Peer-peer communication during CFP for best throughput

- Ability of the coordinator to synchronize transmissions of STAs taking into account the type of stream transmitted

- Ability of the coordinator to limit the transmission of an STA to a particular time duration

- Ability of an STA to transmit only during certain time duration within CFP as dictated by the coordinator.

- Ability of coordinator and STAs to negotiate the transmission duration and intervals between such transmission opportunities

- Ability to indicate the end of transmission by STA and end of CFP by coordinator so as to be a GOOD neighbors to other STAs/BSSs

Is Scheduling Feasible?

YES,

- CFP already exists in 802.11.

- Peer-peer communication exists in 802.11. Needs to be extended to CFP

- Transmission synchronization can be easily achieved by extending the concept of NAV within CFP

- Negotiations between STA and the coordinator can be easily achieved by exchanging control information between them at the beginning of the session.