AP-Based CTS

Proposed Change to MAC Protocol

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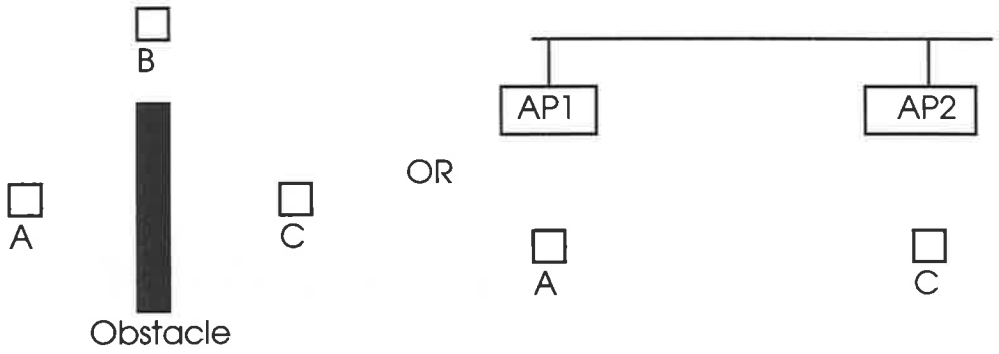
Problems:

ESS/BSS Relaying Problem



The Current Proposal does not refer to how does station A know how to reach station C

Problems (ctd)

Peer to PS-Peer Traffic.

How does a station A know that station B is in Power Saving Sleeping Mode?

Possible Solutions

1. Unconditional Relaying

Stations always send to AP, the AP decides what to do:

Retransmit to the BSS.

Retransmit to DS.

Advantages:

Easy to implement on station

Disadvantage:

Significant Performance Degradation

Possible Solutions (ctd)

Station determined Routing

The station maintains topological information, decides whether to transmit to the AP or to the peer station.

Advantages:

More effective than solution 1

Disadvantages:

How does the station handle mobility?

Complicates Station Design.

Does not solve the PS station problem

Possible Solutions (ctd)

AP CTS after Timeout

If no CTS after predefined timeout, the AP sends the CTS.

Advantages:

Simplifies Station Decision

Disadvantages:

Adds delay to traffic to the DSS.

Possible Solutions (ctd)

Unconditional CTS from AP

The AP does not wait for the timeout, but immediately sends the CTS (stations do not send CTS on infrastructure mode).

Advantages:

Solves the delay problem shown before.

The AP has lots of time (after the CTS) to decide what to do with the packet.

Others (described later).

Disadvantages:

None ?

Possible Solutions (ctd)

AP Proxy CTS.

During the Association the station decides whether to delegate the CTS to the AP or not.

Advantages:

Everybody is happy.

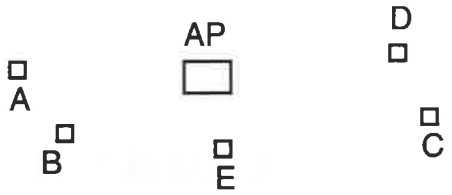
Disadvantages:

The AP has to check the Proxy Status on "real time"

Other advantages

Unique NAV domain solves the following problems:

1. Unfairness problem



A and B do not hear C and D (and viceversa)
AP and E hear all stations (A, B, C, and D)
A "talks" with B, the AP and E set the NAV Vector (C and D don't)
During A-B transaction, C and D start a new transaction, and so on.

Result: E and AP do not transmit.

Other Advantages (ctd)

2. Silenced CTS problem

A send RTS to X, Station E sets NAV.

C (who didn't set the NAV) sends RTS to E.

E cannot send CTS because of NAV.

C keeps retransmiting.

Required changes to the protocol

On Infrastructure-based networks (which is known by the station after the association procedure):

- **Stations do not send CTS to other stations (they do send to the AP)**
- **Stations do not update NAV based on other stations messages.**
- **The AP sends CTS for any valid RTS (if the medium is free)**

What happens in Ad-hoc Networks?

Stations working on ad-hoc mode, work according to the original protocol, i.e. treat all RTS/CTS the same way.

Motion:

To modify the MAC Protocol to include the changes mentioned in document IEEE P802.11-94/43:

In infrastructure mode:

- **Stations do not send CTS to other stations (they do send to the AP)**
- **Stations do not update NAV based on other stations messages.**
- **The AP sends CTS for any valid RTS (if the medium is free)**