Protocol elements needed for:

Tx-Power Control

Presented by:

Wim Diepstraten
AT&T-GIS (NCR)

Dynamic Tx-Power control:

- Concept introduced in doc P802.11-92/76 in July 1992.
- Potential re-use efficiency simulations provide in 92/76.
- Was included in the original WMAC proposal but not in DFWMAC proposal, because it was concentrating on the Access scheme and mobility provisions.

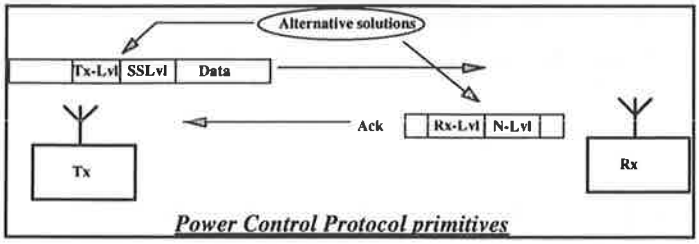
Why Tx-Power Control:

- Purpose is medium re-use efficiency improvement, and reducing interference potential.
- PHY's specify requirement for Tx-Power Control above 100 mWatt.
- The use of it should be optional as long as Tx -Power is lower then the 100 mWatt boundary.
- Mixed use should be possible.
- The algorithm needed does not need to be specified.

Dynamic Tx-Power Control:

- MAC maintains attenuation list per station
  - List is build from reception history.
  - Tx-Level indication in the frame.
  - Rx-Lvl of the received frame in the returning Ack.
  - Noise/Interference level at destination is usefull input for the Power Control algorithm.
- MAC need to control the PHY per frame.
  - Tx-Power level.
  - CCA-Threshold level.
- CCA-Threshold relates to the Tx-Level
  - For every dB the Tx-Level drops, the CCA-threshold can be made 1 dB less sensitive.

Protocol elements:



Power Control Protocol primitives

- Two possible methods
- Rx-Lvl in Ack is preferable because it eliminates need for absolute accuracy.
- N-Lvl is long term average of background.

Tx Procedure:

- MAC determines "Tx-Lvl" and "CCA-Thresh" and sets the PHY accordingly, and put "Tx-Lvl" also in the frame.
- MAC will follow the CSMA/CA access mechanism (CCA inactive for at least xIFS).
- MAC / PHY to Xmit the frame.
- MAC or PHY to reset "CCA-Thresh" to nominal sensitivity level.
- MAC will receive the Ack and the "Rx-Lvl" and maintains the "Attenuation History" for that station.

PHY Functionality required:

Functions to support Tx-Power Control:

- Tx-Power level control on a per frame basis by the MAC.
  - granularity TBD. Not only above 100 mWatt.
- CCA threshold / sensitivity under MAC control.
  - granularity at least equal to Tx-Control granularity.
- Receive level (Signal Quality) indication per frame.
  - granularity TBD (1 dB expected to be sufficient)

Motion:

Move:

That the 802.11 MAC should support the necessary protocol elements to allow *"Tx-Power control"* on a per frame basis.

Motion:

Move:

To accept the protocol mechanisms that are proposed in doc. P802.11-94/59 for inclusion in the 802.11 MAC.