

*Wireless Network
Dynamic Rate Adaptation
and
SS and DS mode
in MIMO*



WPI

Advanced Computer Networks

Rate Adaptation Algorithms

1997 ARF

1998

1999

2000

2001 RBAR

2002 MPDU

OAR

PER

2003 LA

MiSer

SwissRA

2004 AARF

AMRR

HRC

MultiRateRetry

2005 Fast-LA

LD-ARF

RFT

SampleRate

2006 CARA

CROAR

DOFRA

RRAA

2007

Sample Rate

- Sample Rate [Bickett] is based on transmission statistics over a **sliding window**.
- It adjusts to the bit rate that would achieve the smallest **average transmission time** in the last sampling period.
- Transmission time for a frame :: time to send a frame successfully (until ACKed) which includes backoff times and retransmissions.
- Sample Rate starts at the highest rate and decreases the rate immediately if it experiences four consecutive transmission failures.

Sample Rate

- Sample Rate calculates the average transmission time per frame for different rates every ten seconds.
- It randomly selects one rate from the set of all other rates whose average transmission time is less than the average lossless transmission time of the rate in use for every tenth frame.

RRAA

- Robust Rate Adaptation Algorithm (RRAA) requires the use of RTS/CTS after a frame loss to eliminate further collisions due to hidden terminals.
- RRRA has two elements:
 - Rate adaptation (loss ratio estimation and rate selection)
 - Collision elimination

RRAA

- RRAA measures the loss ratio from recent transmissions statistics over a window.
- RRAA begins transmissions at the maximum rate. In each short cycle, RRAA transmits a window of frames at a selected rate.
- The window size can vary per rate.

RRAA

- At the end of each window, the frame loss rate p for the corresponding rate is available for rate adjustment.
- RRAA uses two thresholds P_{MTL} and P_{ORI} .
- If $p > P_{MTL}$, the next lower rate is chosen for the next window transmission.
- If $p < P_{ORI}$, the rate is increased.

RRAA

- If $P_{\text{ORI}} \leq p \leq P_{\text{MTL}}$, the rate remains unchanged and the window slides forward
- Additionally RRAA uses a strategy called Adaptive RTS (A-RTS) to reduce collisions caused by hidden terminals.

MIMO Modes

- Both transmitter and receiver devices allow for diversity single stream (SS).
- DS is spatial multiplexing double streams which are independent and separately encoded spatial streams from multiple chains.