Performance Comparison of DAMA MAC Schemes over Satellite Networks
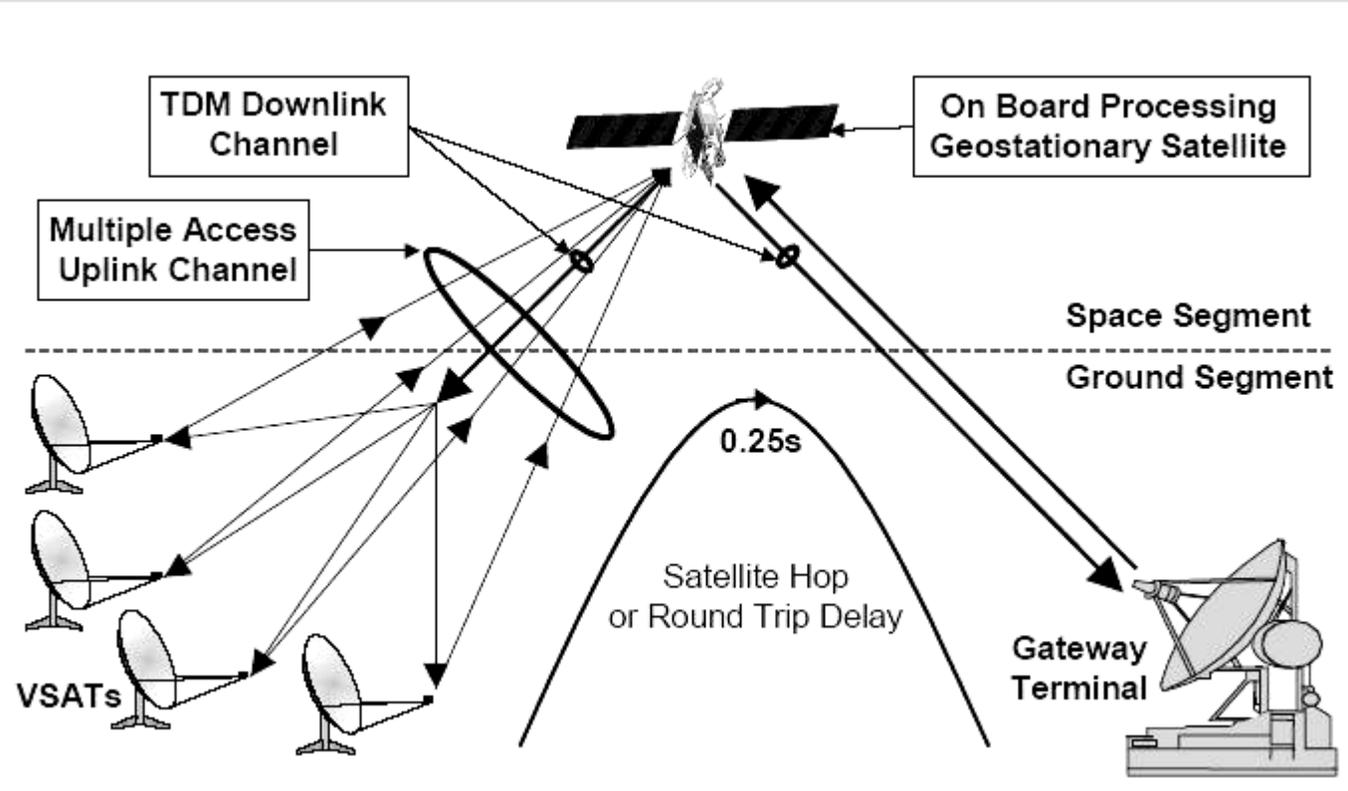
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Motivation

- ☐ Different DAMA MAC schemes have been proposed.

- ☐ Present DAMA MAC schemes for satellite networks treats all terminals equally.

- ☐ Satellite Network with video broadcast and data traffic.

Satellite Scenario

Capacity Assignment Strategies

- ☐ Fixed Assignment
- ☐ Demand Assignment
  - ■ Fixed Rate
  - ■ Variable Rate
- ☐ Free Assignment
- ☐ Random Access
- ☐ Hybrid Schemes

Combined Free DAMA Schemes

- ☐ Different variants according to request strategy,
  - ■ CFDAMA–FA, CFDAMA-PB, CFDAMA-RA and CFDAMA-RR

- ☐ Capacity is first assigned based on terminals demands.

- ☐ Remaining capacity is freely allocated to all terminals.

- ☐ Free assignment provides fast transmission.

CFDAMA Implementation in NS-2

- ☐ CFDAMA-RR have been implemented.
- ☐ Different MAC for node and scheduler.
- ☐ Request strategy
  - ■ Using current MAC queue length, No.of required request slots calculated as,
    - ☐ No.of Pkts Queued – No.of Outstanding Req.
- ☐ Round Robin scheduling.

Burst Targeted DAMA Schemes

- Different variants according to scheduling strategy:
    - BTDAMA-PD and BTDAMA-FD.

- At any instant in time each terminal exists in one of two possible states:
    - ON if there is a requirement for capacity.
    - OFF if there is no requirement for capacity.

- Request strategy
    - Terminals send request only if there is change in state.

- Scheduling strategy
    - Two separate lists:
        - ON signaled Terminals and OFF signaled Terminals
    - Round Robin scheduling

BTDAMA Implementation in NS-2

- ☐ BTDAMA-PD and BTDAMA-FD have been implemented.
- ☐ Different MAC for node and scheduler.
- ☐ Request strategy
  - ■ If MAC queue length is empty then signals ON or else OFF.
- ☐ Scheduling strategy
  - ■ Round Robin scheduling.
  - ■ BTDAMA-PD – Slots allocated for only nodes in ON List.
  - ■ BTDAMA-FD – If ON list is empty then slots freely assigned to nodes in OFF list.
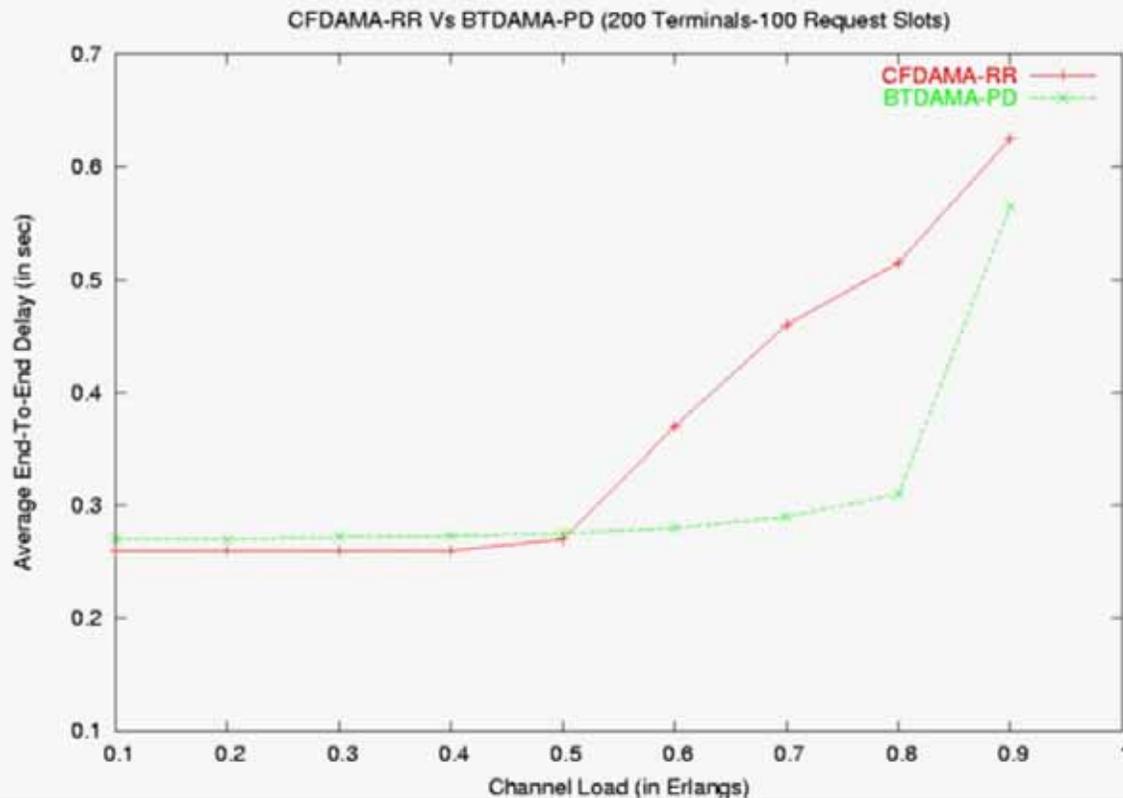
BTDAMA-UP

- ☐ Previous protocols treats all stations equally.
- ☐ Different users may have different needs.
- ☐ Request strategy
  - ◼ Terminals divided into groups.
  - ◼ Each group has static priority.
  - ◼ Each group has different ON and OFF List.
- ☐ Scheduling strategy
  - ◼ Multiple Round Robin assignment queues.
  - ◼ Each queue have different allocation rate.
  - ◼ Free assignment done from high priority group queue.
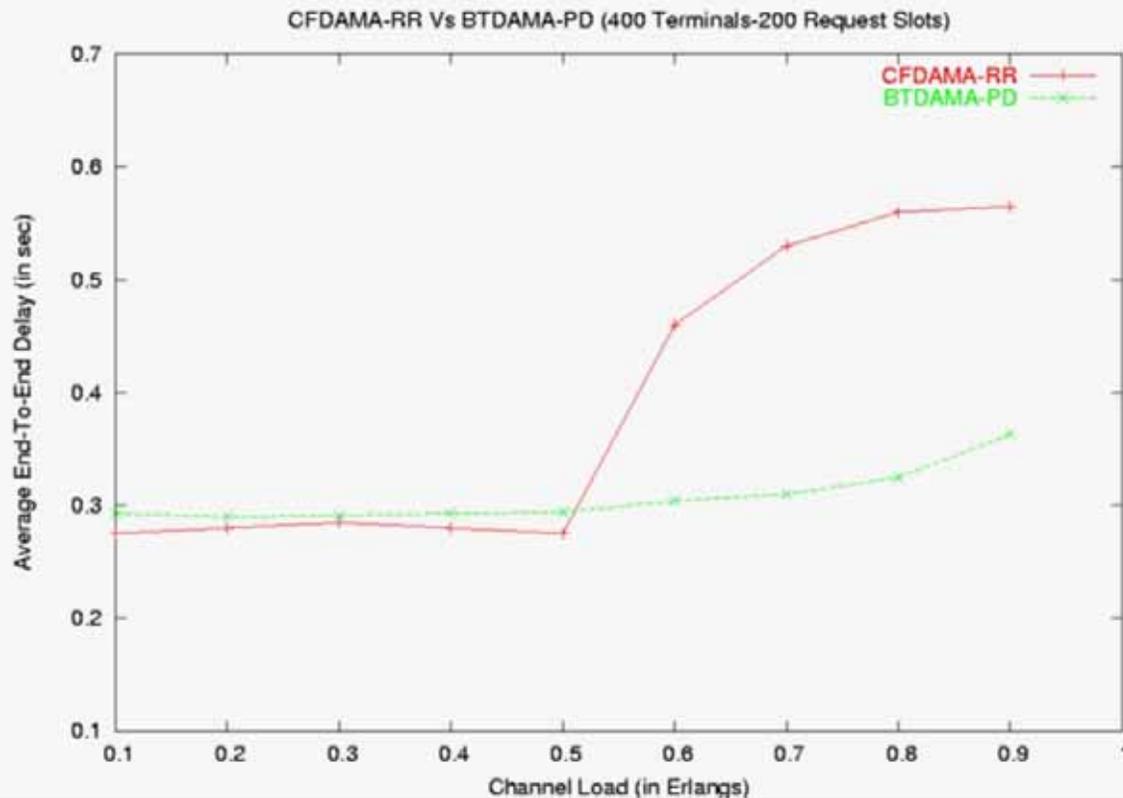
Simulation and Results

☐ Simulation setup

- ■ Number of VSAT Terminals (N) – 200, 400
- ■ Uplink Bandwidth - 4MBPS
- ■ Number of Round Robin request slots (R) – 100, 200
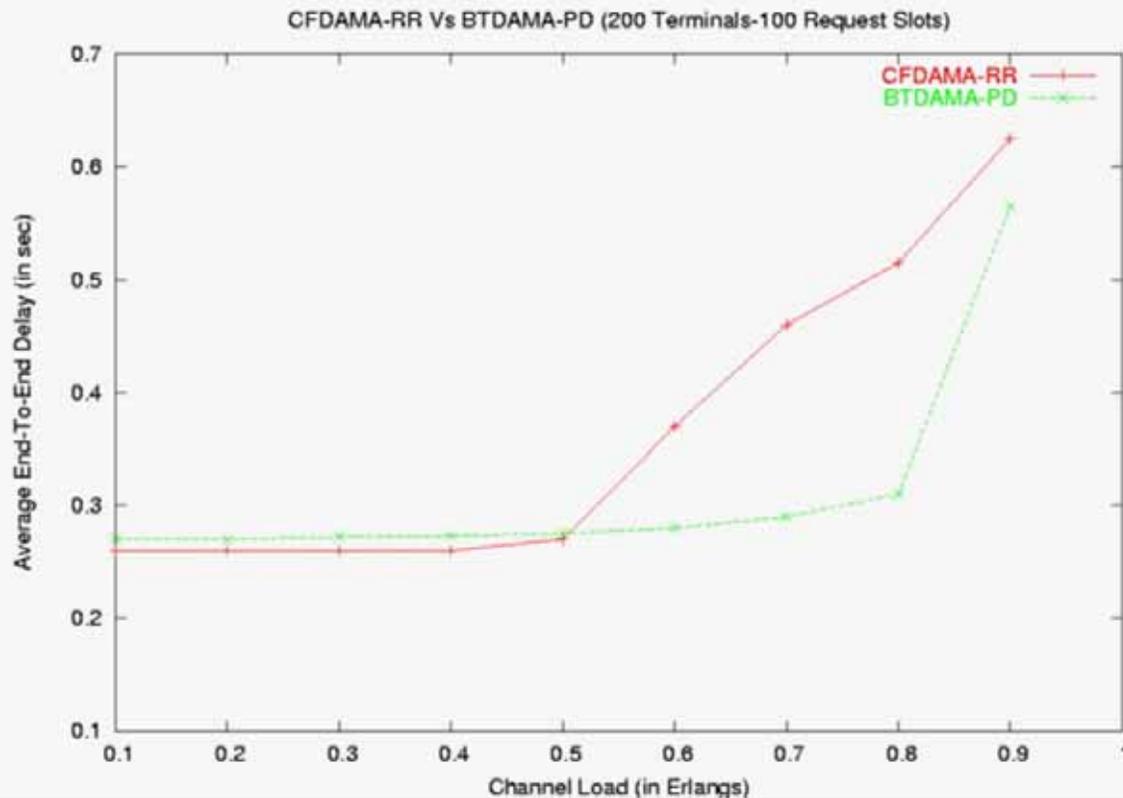- ■ Number of data slots in the uplink frame (S) – 256
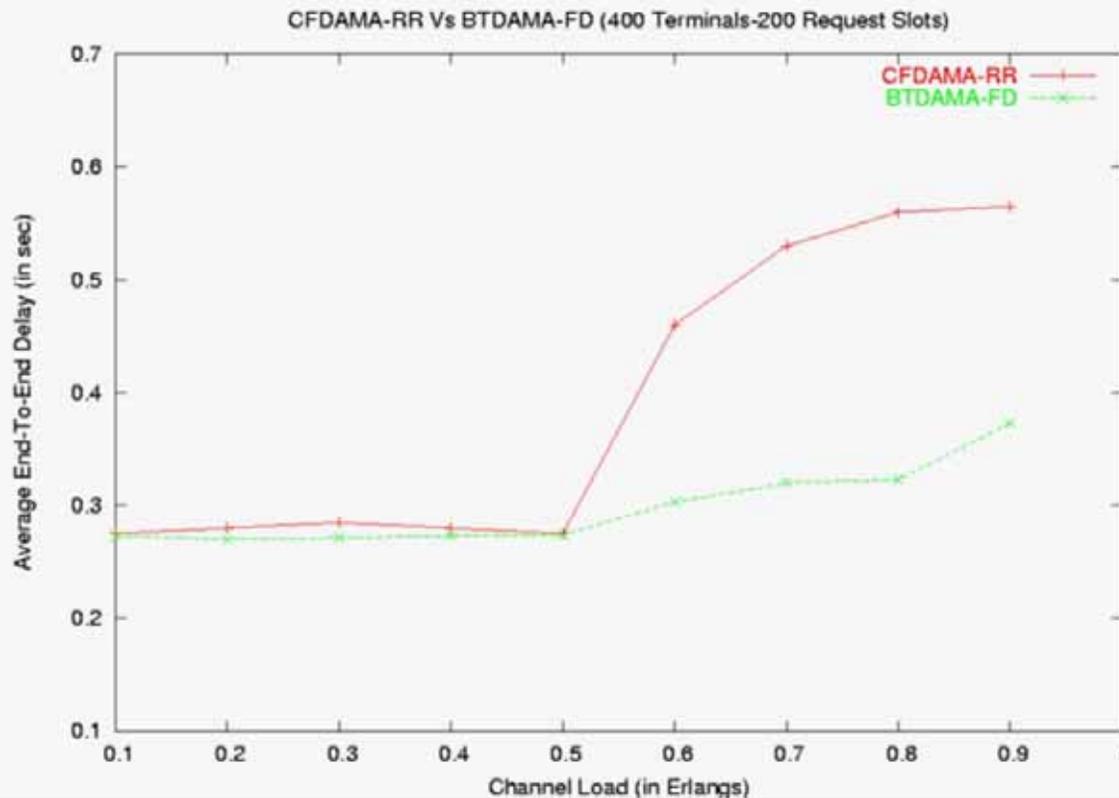
Results – BTDAMA-PD Vs CFDAMA-RR

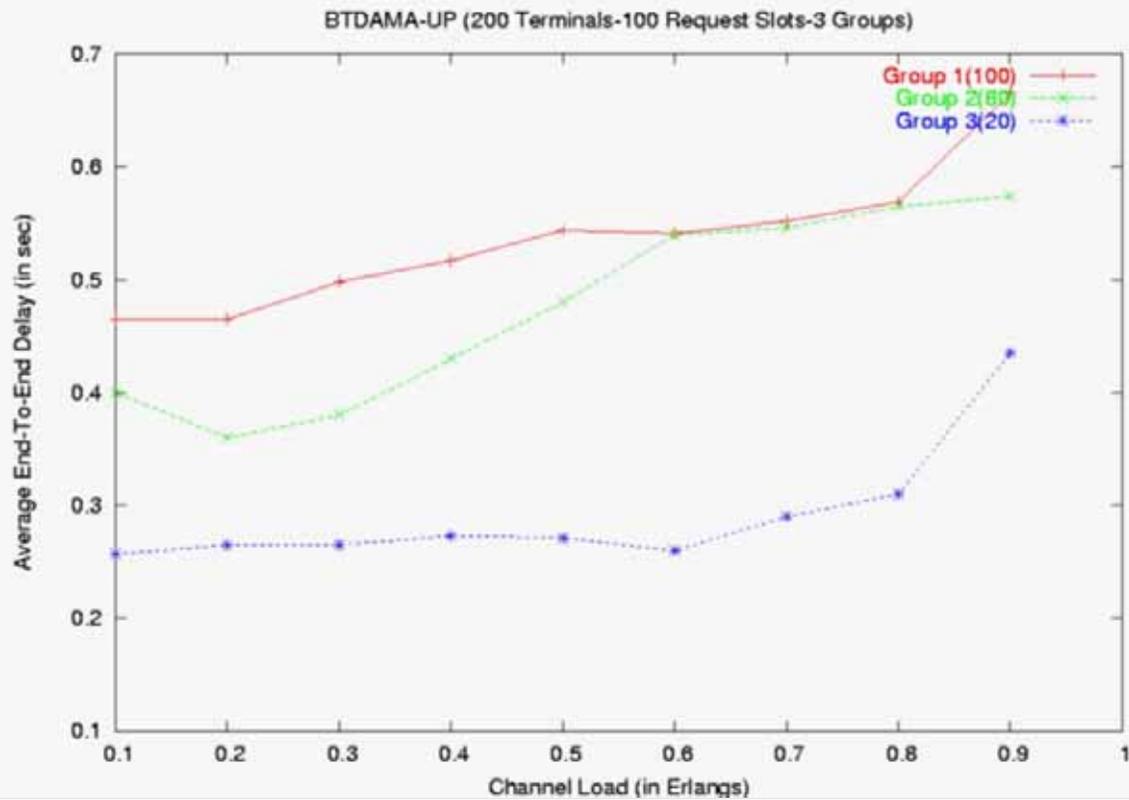CFDAMA-RR Vs BTDAMA-PD (200 Terminals-100 Request Slots)

Results – BTDAMA-PD Vs CFDAMA-RR

CFDAMA-RR Vs BTDAMA-PD (400 Terminals-200 Request Slots)

Results – BTDAMA-FD Vs CFDAMA-RR

CFDAMA-RR Vs BTDAMA-PD (200 Terminals-100 Request Slots)

Results – BTDAMA-PD Vs CFDAMA-RR

CFDAMA-RR Vs BTDAMA-FD (400 Terminals-200 Request Slots)

Results- BTDAMA-UP

BTDAMA-UP (200 Terminals-100 Request Slots-3 Groups)

Conclusion

- ☐ Performance of CFDAMA-RR, BTDAMA-PD and BTDAMA-FD have been compared.
- ☐ BTDAMA-FD performs well in low and high channel loads.
- ☐ BTDAMA-UP provides different packet end-to-end delay to different groups.

Thank You