IntServ State Aggregation using Parameter-based Admission Control

(draft-greis-aggregation-with-pbac-00.txt)

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Aggregation

- Goal: Reduce RSVP state size
- "draft-berson-rsvp-aggregation-00.txt":
  - Ingress routers tag packets from RSVP flows
  - ADREQ and ADREP messages used to query admission control in the aggregation region
  - Measurement-based admission control used in the aggregating region $\rightarrow$ no RSVP state needed

Measurement-based Admission Control

- Routers measure how much traffic they are receiving to determine how much more they can admit

- MBAC can fail in cases where traffic is very bursty (audio, video, . . .) or unpredictable

- Possible result in the worst case: packet losses for reserved traffic

- Question: Is it possible to use aggregation with parameter-based admission control?

Aggregation with PBAC

- One possible solution:
  - Each router in an aggregating region keeps track of the amount of bandwidth reserved on the path to each "edge router"
  - Per-edge-router state with fixed size
  - →Predictability
  - Routers gather the information from the ADREQ and additional ADSTAT messages

ADSTAT messages

- Message Format

```
<ADSTAT> ::= <Common Header> <AC status list>
<AC status list> ::= <RSVP_HOP> <FLOWSPEC> |
                     <RSVP_HOP> <FLOWSPEC> <AC status list>
```

- One RSVP_HOP/FLOWSPEC pair for each edge router towards which the message is sent

- Also addition of AC status to ADREQ messages to make ADSTAT messages smaller and to make the system in general less "sluggish"

Advantages/Disadvantages

- – Limited to "small" aggregating regions
- – Higher overhead than MBAC
- ? Possible problems with Multicast and SE/WF
- ? Possibly more "conservative" than classic RSVP
- + Same reliability as classic RSVP
- + High predictability
- + Could coexist with MBAC
- + Still no per-flow classifier/scheduler state

Simulations

- ns-2 as environment for simulations
  - (reduced) RSVP: ~ 5000 lines of code
  - (reduced) Aggregation with MBAC: ~ 400 lines of code
  - Aggregation with PBAC: ~ 200 lines of code
- Topology: German Research Network (DFN)
  - 10 interior routers
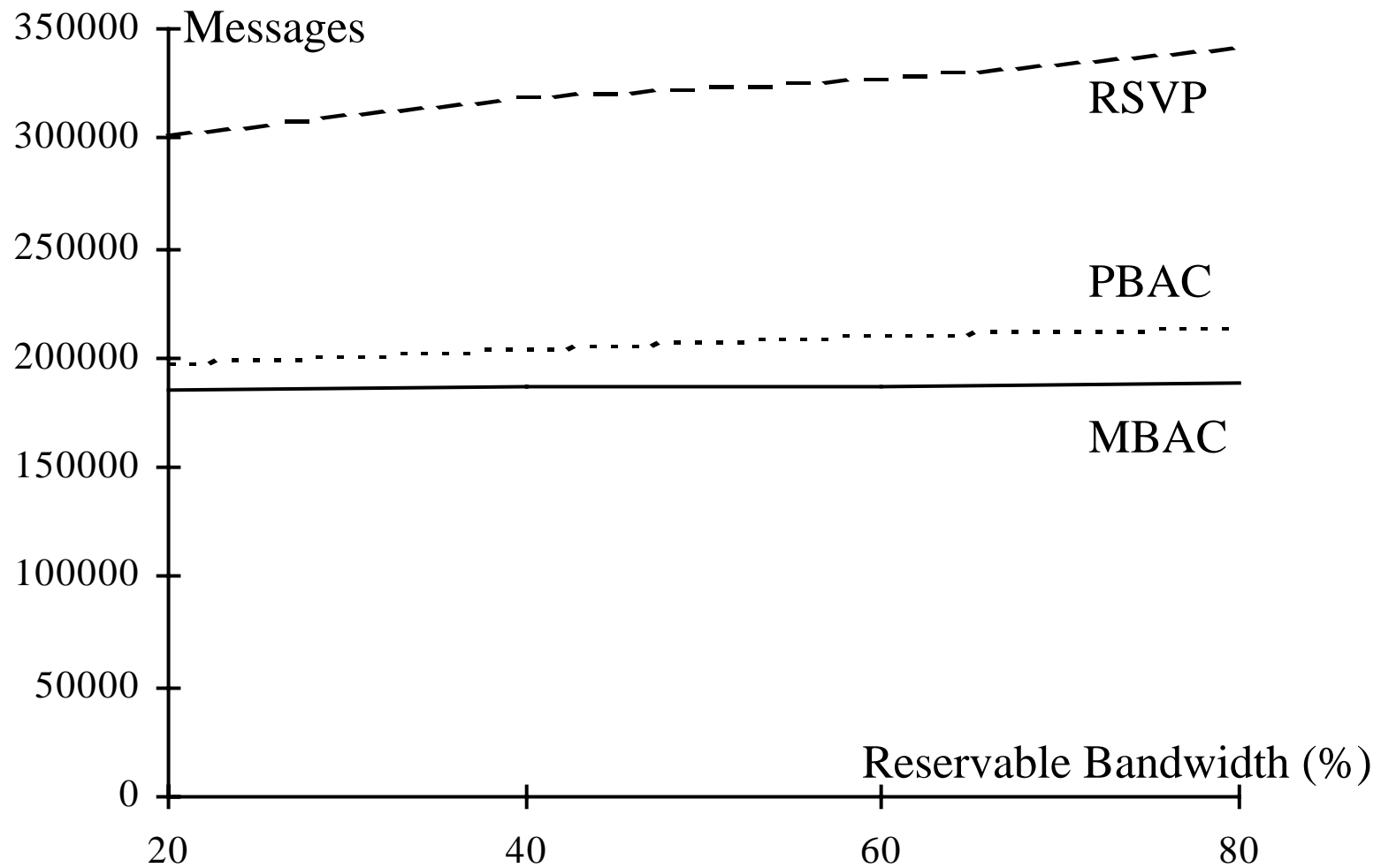 - 44 edge routers

Simulations (2)

- Average size of ADSTAT messages:
  - Edge Routers: ~ 2000 bytes
  - Interior Routers: ~ 360 bytes
- Scenario: "bad-case" scenario for MBAC with very bursty flows, only simple MBAC algorithm
- Result so far: Overhead for aggregation with PBAC would be acceptable in an aggregating region of that size

Number of Admitted Flows
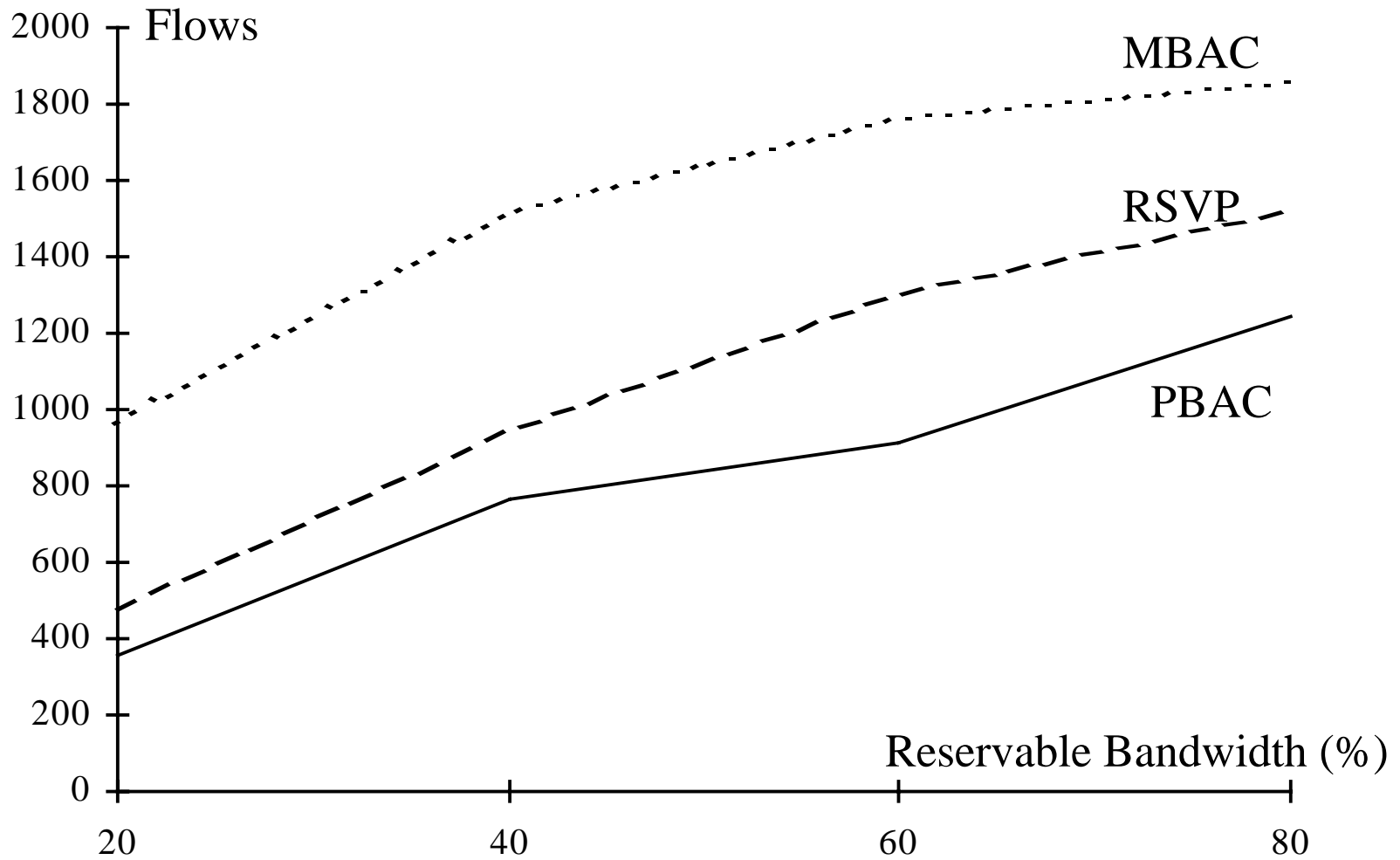
Processed RSVP messages

Conclusion

- Providing 100% reliable RSVP services is possible in a (much more) scalable way

- Scalability and reliability are not mutually exclusive