



Packet Aggregation for Voice over IP in Wireless Mesh Networks

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Outline

- ❑ Introduction to Packet Aggregation
- ❑ Experimental Evaluation
- ❑ Results
- ❑ Conclusion and Open Questions



Packet Aggregation – Motivation

- ❑ Voice over IP generates many small packets
- ❑ IEEE 802.11 MAC has large overhead for small packets
- ❑ In wireless mesh networks is situation even worse

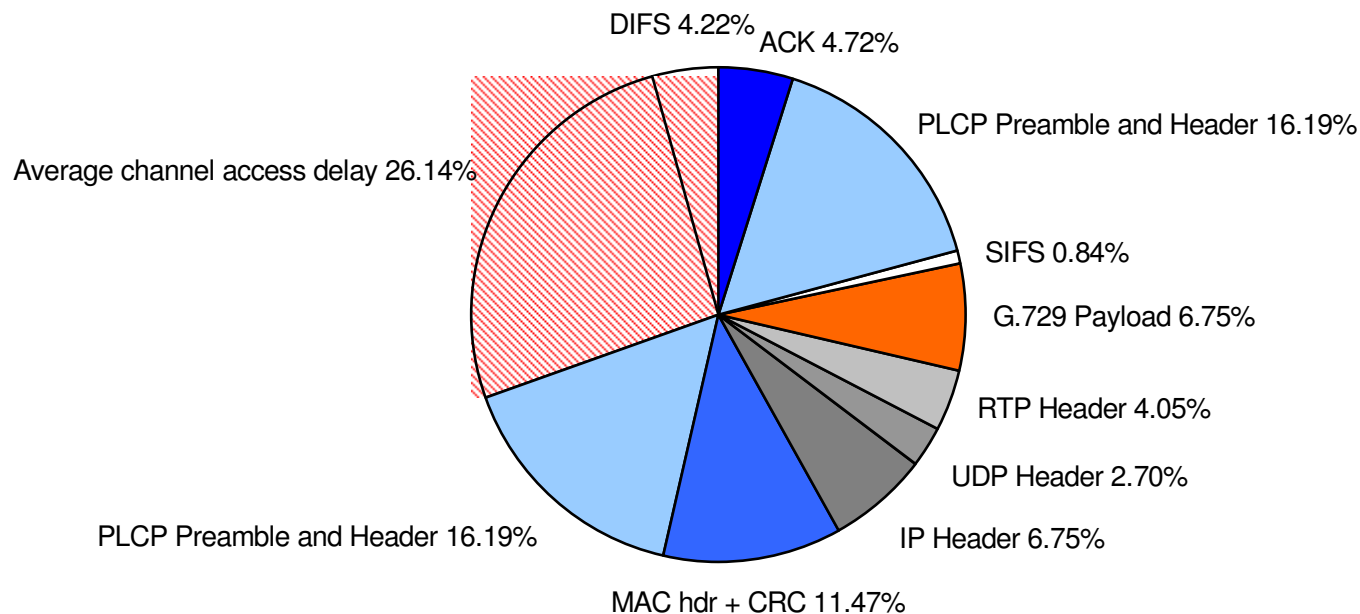


Fig. 1: Transmission Times of a G.729 frame over IEEE 802.11 2MBit/s

Packet Aggregation

- ❑ Reduce overhead by sending multiple packets at once
- ❑ Packet aggregation can be done on IP or MAC level, hop-by-hop or end-to-end (IP only)
- ❑ Optimum aggregation strategy is influenced by
 - *Channel quality*
 - Traffic pattern
 - Traffic type
 - Network load
 - Network density

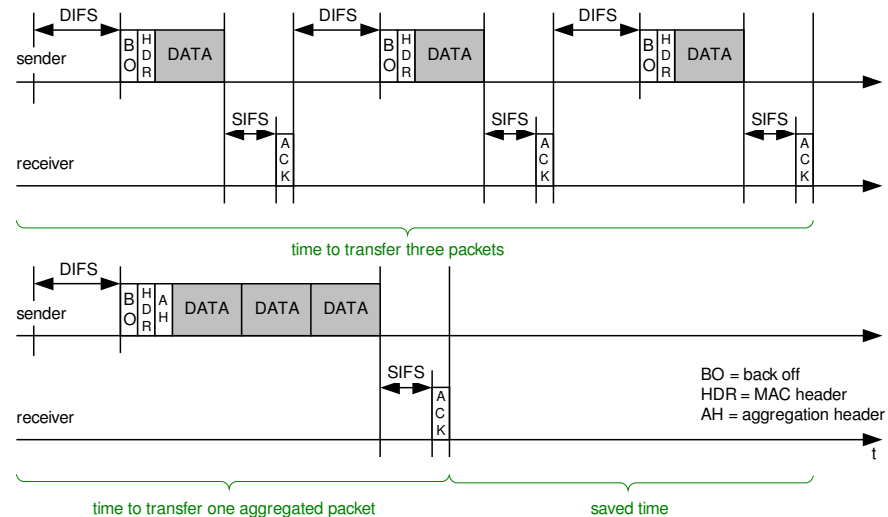


Fig. 2: Principle of Packet Aggregation

Experimental Evaluation

□ Simulation with ns-2

- Evaluation of perceptual quality with E-model
- Significant improvement of the capacity and reduction of channel usage

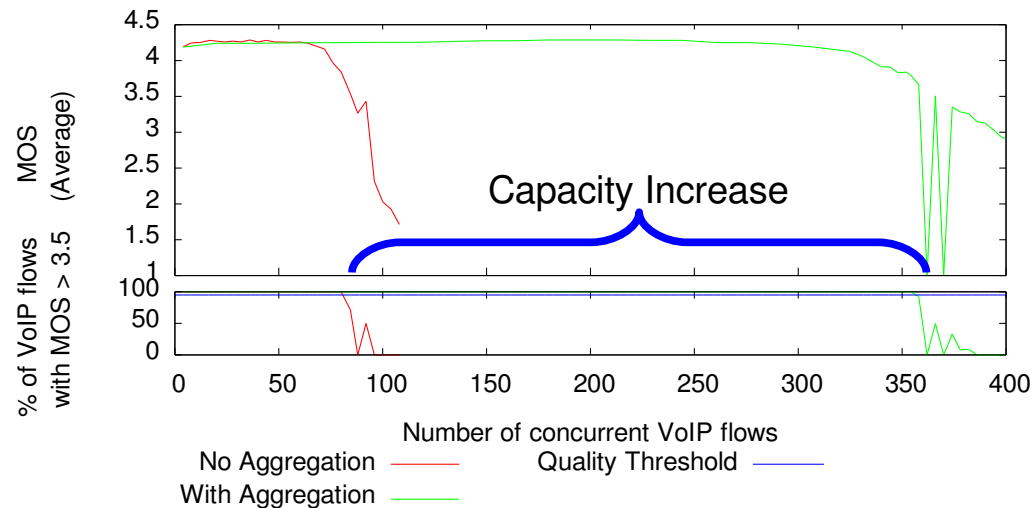


Fig. 3: Performance comparison, 3 hops, arrow topology, IEEE 802.11a 54MBit/s

□ Test Bed

- Packet aggregation is implemented as a set of modules for the Linux kernel and configuration tools
- Aggregation takes place in the outbound queue
- Preliminary results show similar trends as the simulation



Conclusion and Open Questions

- ❑ Conclusion
 - Packet aggregation improves VoIP capacity significantly
 - Aggregation should adapt to network condition
- ❑ Open Points
 - Analytical Evaluation for multi-hop case
 - Distributed optimization of aggregation parameters
 - Traffic mix and QoS constraints



Thank you!

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