Iterative Demodulation and Turbo Decoding for Distributed Radio Receivers*

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HPEC 2005

23 September 2005

*This work is sponsored by the Navy under Air Force Contract FA8721-05-C-0002. Opinions, interpretations, conclusions, and recommendations are those of the authors and are not necessarily endorsed by the United States Government.
Baseline Receiver Chain

- Turbo Decoding is the most taxing component in the receiver
- For example, a 802.11g-like receiver with a 16 Kb packet would require:
  - Operations: 1424 Ops/bit  
  - Throughput: 24 MOps per packet, 77 GOps per sec  
  - Minimum Latency: 6 msec (on 4 GOPS GPU)
- And, for a 1 Kb packet
  - Operations: 1424 Ops/bit  
  - Throughput: 1.4 MOps per packet, 77 GOps per sec  
  - Minimum Latency: 0.4 msec a 16 x improvement (on 4 GOPS GPU)
- However, 1 Kb packets do not provide an acceptable BER
Iterative Receiver Chain

- At sufficient SNRs, iterative processing reduces BER with a minimal increase in computation.

- On a parallel computer with iterative processing, latency is reduced with the shorter packet length while maintaining similar BER performance.
Study Questions

• How does packet length affect latency, throughput, and BER?
• How does iterative demodulation and decoding affect latency, throughput, and BER?

We performed parametric study which varied:
  – Iterations
  – Packet Length
  – Signal to noise ratio
  – Coder strength

The answers to these questions can be seen on the poster.