TCP Download with Early Binding Updates Preliminary Simulation Results

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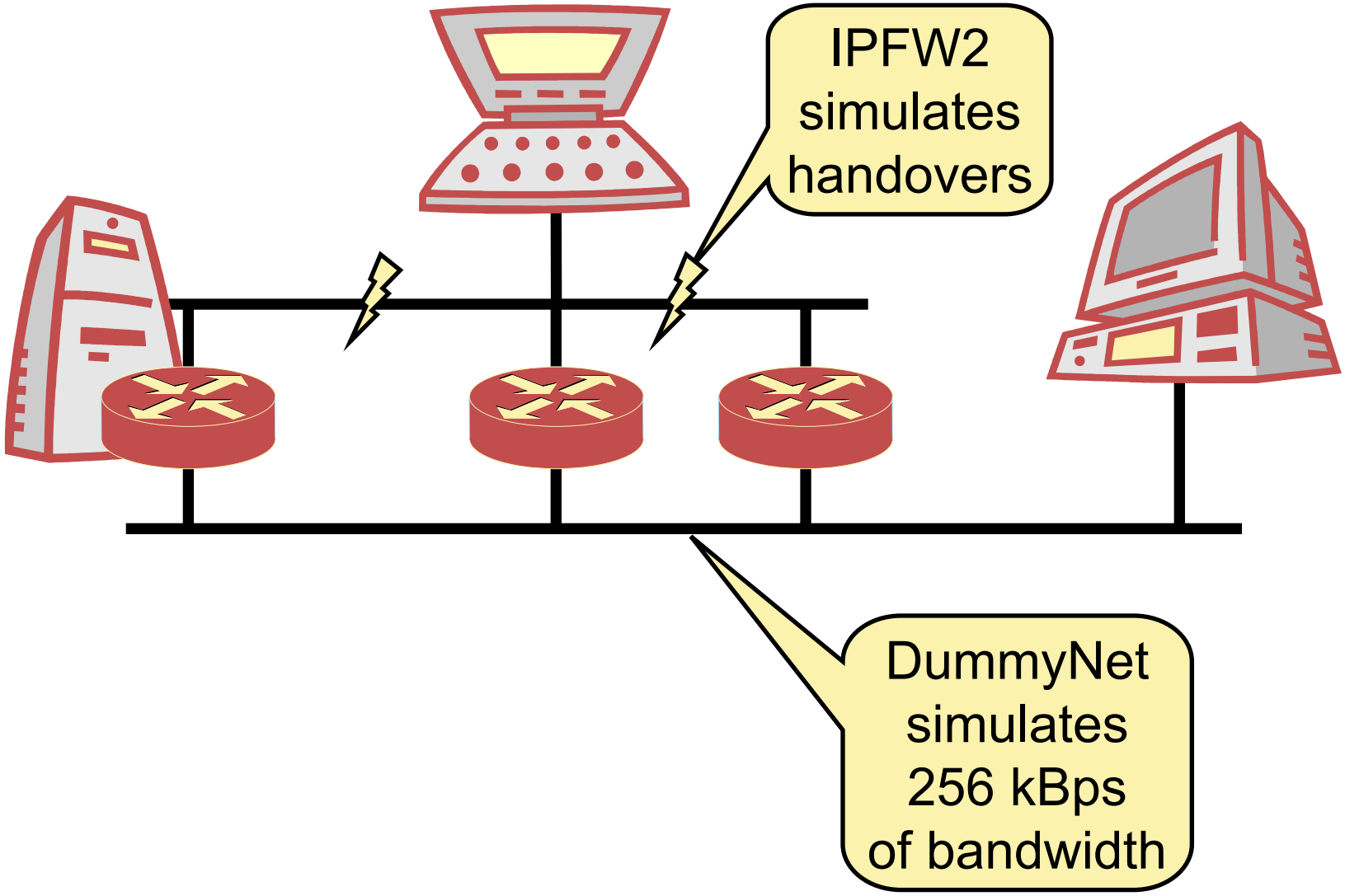
Implementation

- FreeBSD 5.3
- Kame-Shisa Mobile IPv6
- Userland modifications at Mobile Node and Correspondent Node for Early Binding Updates
- Kernel modifications for Credit-Based Authorization
- Thanks to Keiichi Shima and colleagues

Testbed Setup



Simulation Parameters

- Bandwidth: 256 kBps
- Propagation latencies: 50ms, 75ms, 100ms (one-way)
- Router Advertisement interval: 30ms~70ms (RFC 3775)
- DAD: assuming ODAD (NS timeout: 10ms)
- Application: Chargen over TCP
- Movement: between foreign networks
- Focus of this presentation: signaling, no Credit-Based Authorization

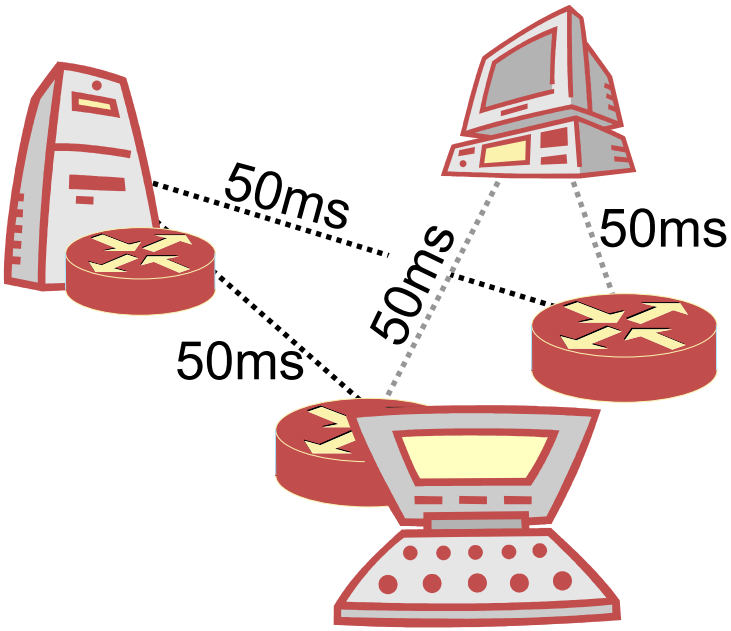
Scenario 1: RFC 3775

Home registration

- Binding Update
  MN→HA→MN = 100ms

Correspondent registration

- HoA test dominates CoA test
  MN→HA→CN→HA→MN = 200ms
- Binding Update
  MN→CN→MN = 100ms



One-Way Times

Measured total signaling latency: 416.5ms

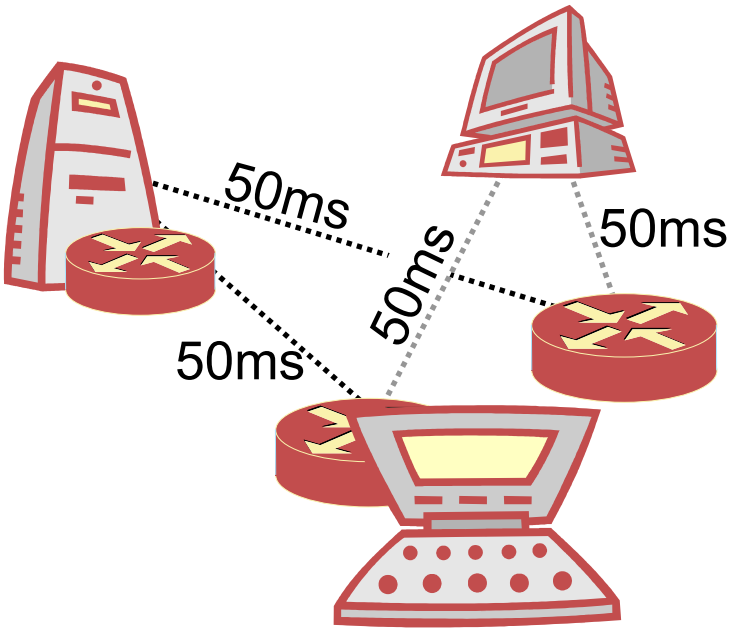
Scenario 1: Early Binding Updates

Home registration

non-critical

Correspondent registration

- Early Binding Update
  MN→CN→MN = 100ms
- HoA and CoA tests non-critical
- Std. Binding Update non-critical

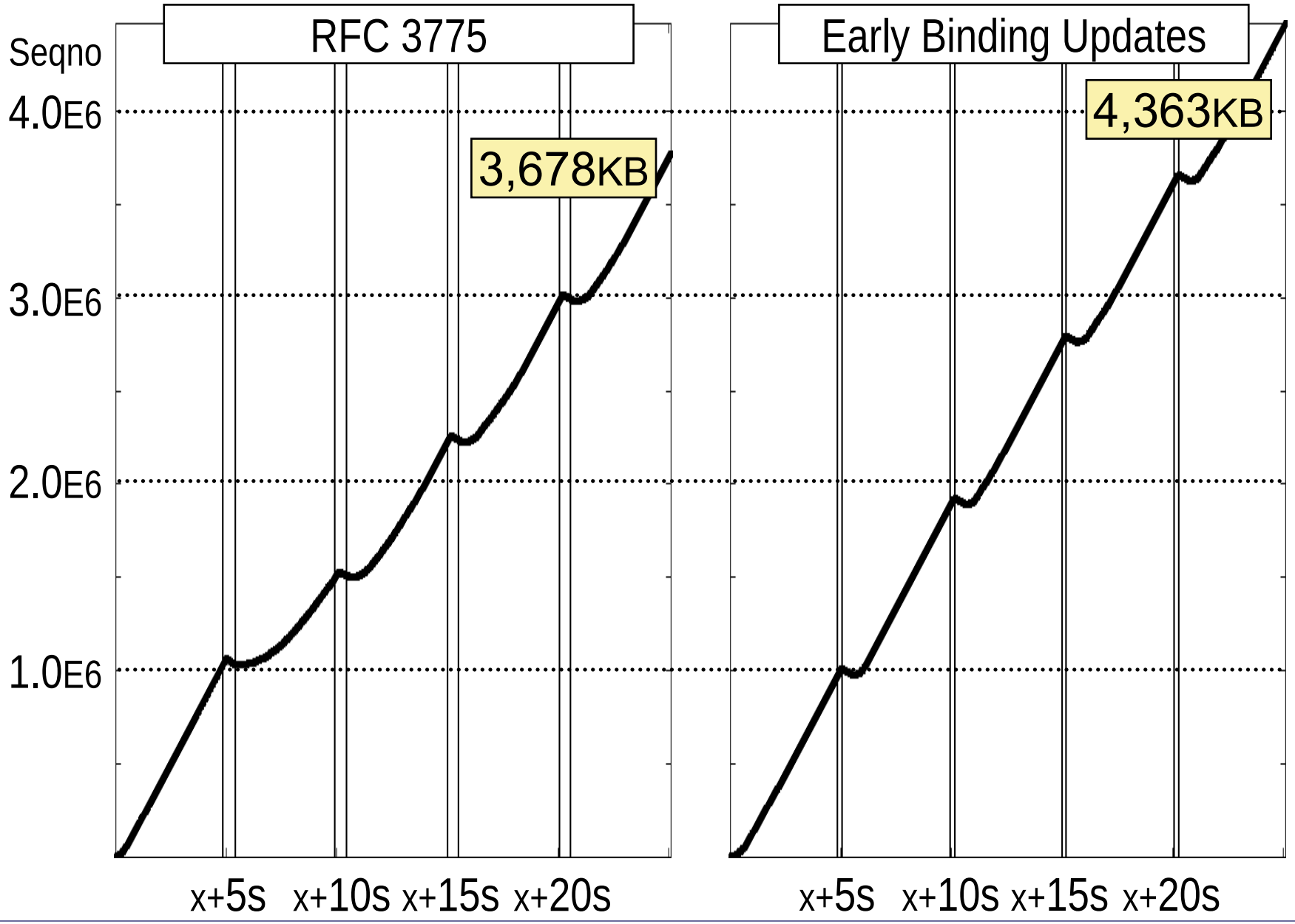


One-Way Times

Measured total signaling latency: 107.3ms

(compared to 416.5ms)

Scenario 1: TCP Throughput



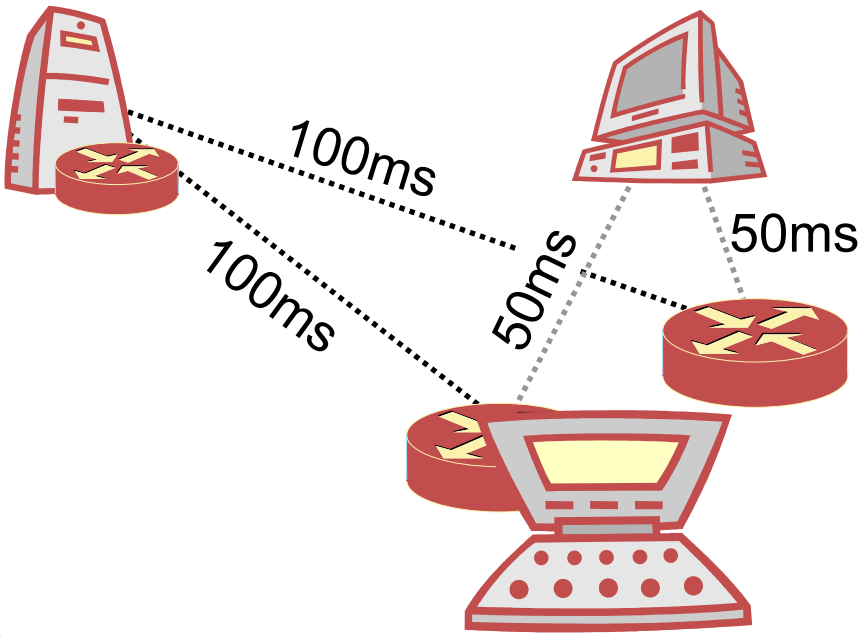
Scenario 2: RFC 3775

Home registration

- Binding Update
  MN→HA→MN = 200ms

Correspondent registration

- HoA test dominates CoA test
  MN→HA→CN→HA→MN = 400ms
- Binding Update
  MN→CN→MN = 100ms



One-Way Times

Measured total signaling latency: 716.5ms

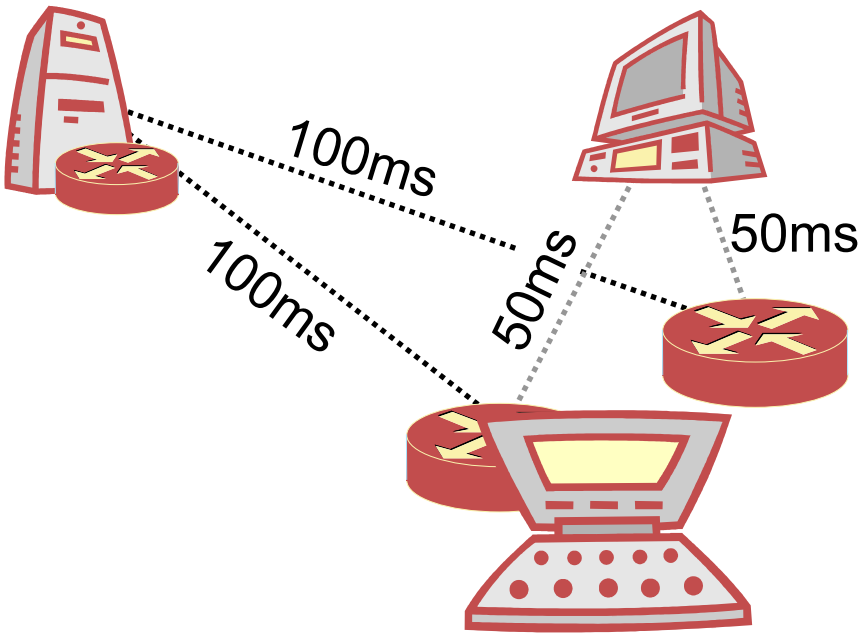
Scenario 2: Early Binding Updates

Home registration

non-critical

Correspondent registration

- Early Binding Update
  MN→CN→MN = 100ms
- HoA and CoA tests non-critical
- Std. Binding Update non-critical

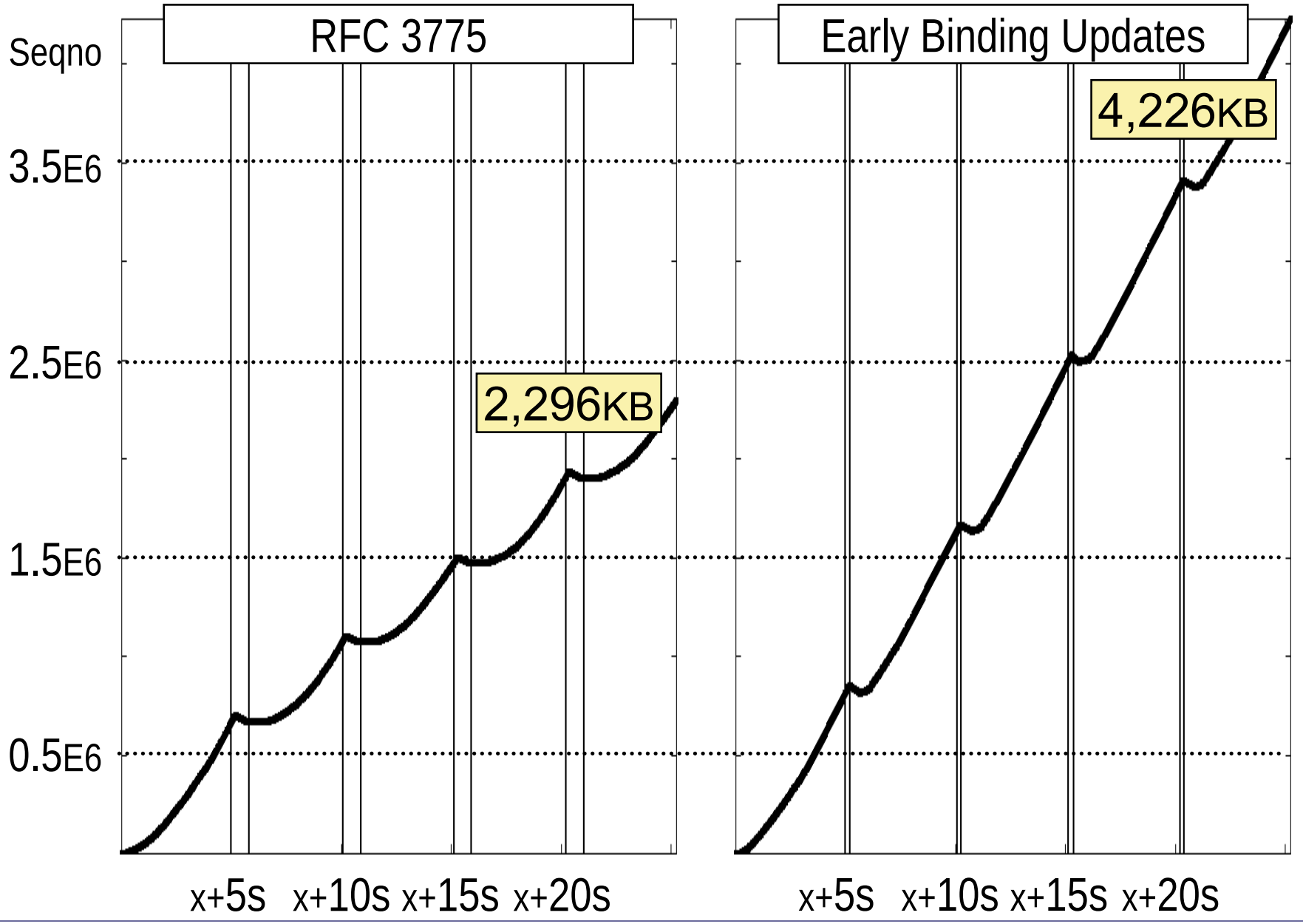


One-Way Times

Measured total signaling latency: 104.7ms

(compared to 716.5ms)

Scenario 2: TCP Throughput



Conclusions

Evaluated optimizations

- Early Binding Updates vs. RFC 3775
- Simultaneous Home and Correspondent Registrations (Optimistic behavior, also a stand-alone optimization)
- Extreme conditions, though not unrealistic

High signaling latencies…

- have grave impact on throughput
- cause longer TCP adjustment times

Conclusions

Future work includes…

- Deeper analysis of TCP behavior
- Different applications (e.g., voice)
- Impact of Credit-Based Authorization