Eluding Traffic Analysis with Multipath Spread Spectrum

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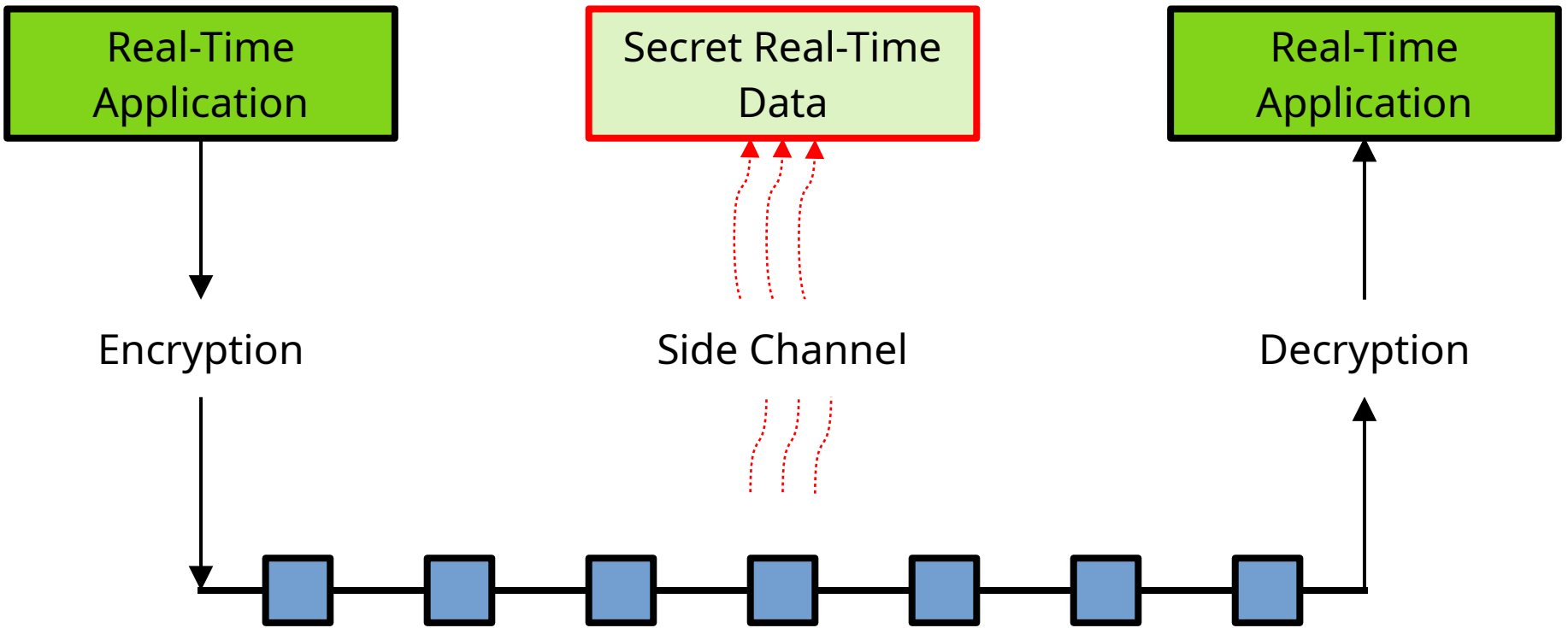
Traffic Analysis



Hidden Markov Models

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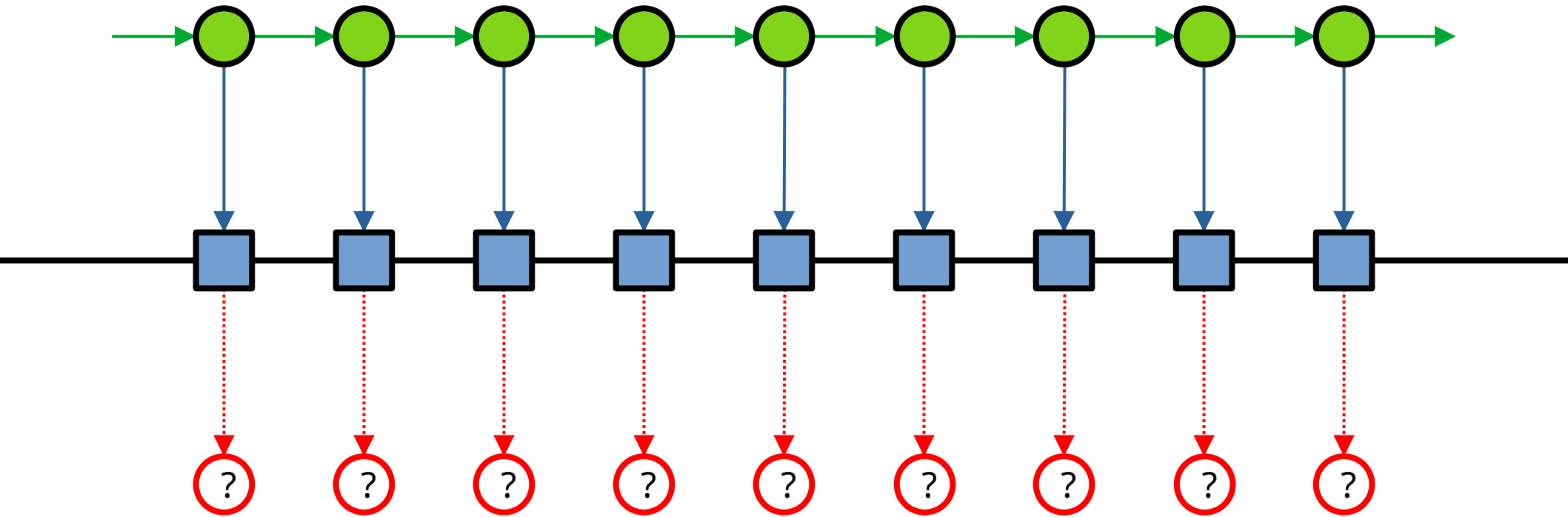

Spread Spectrum Defence

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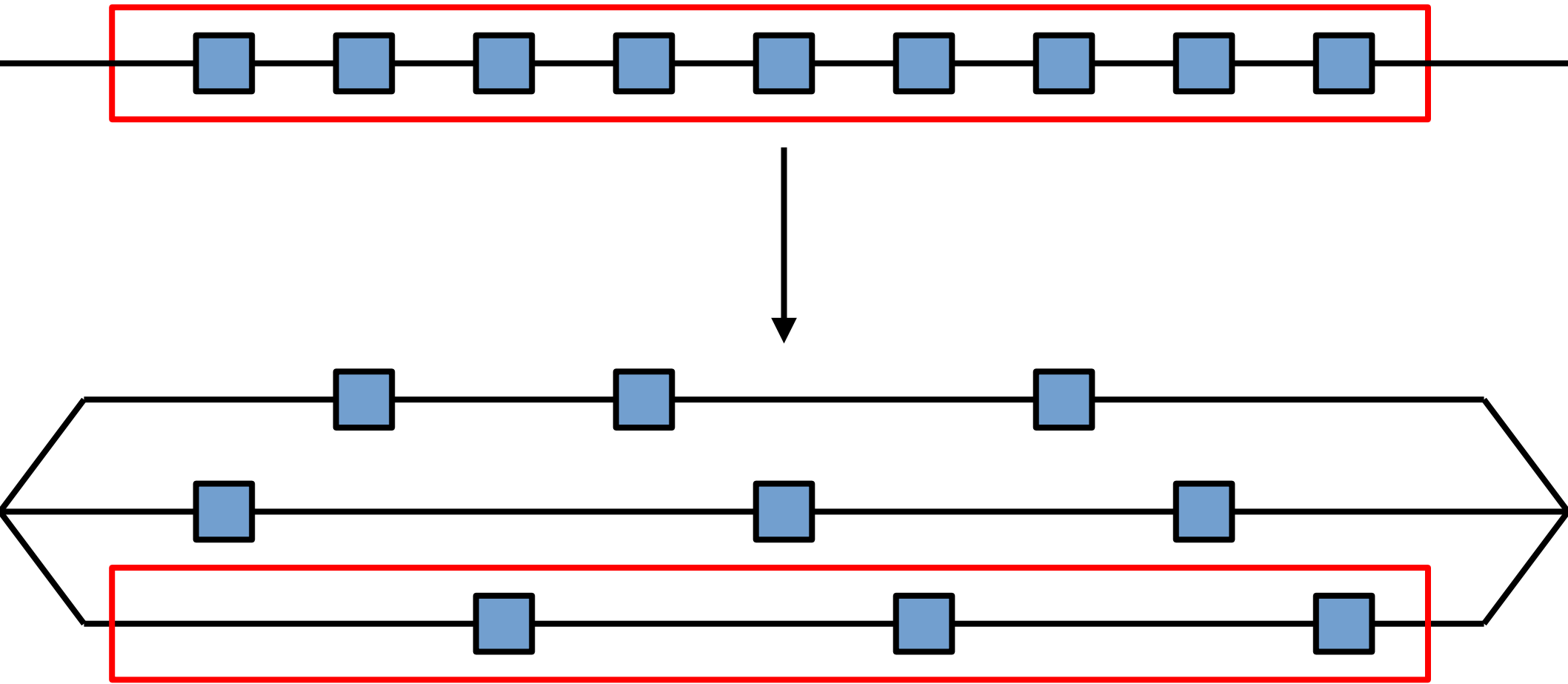

HMM Impact

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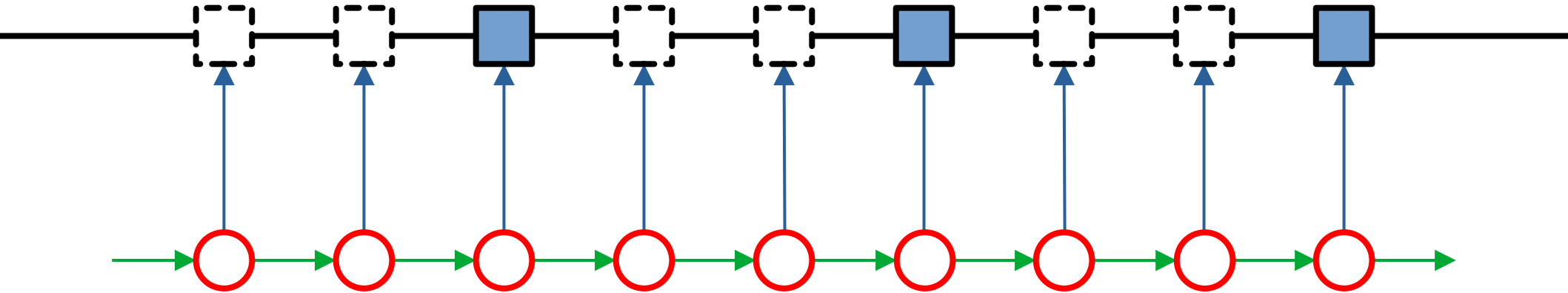
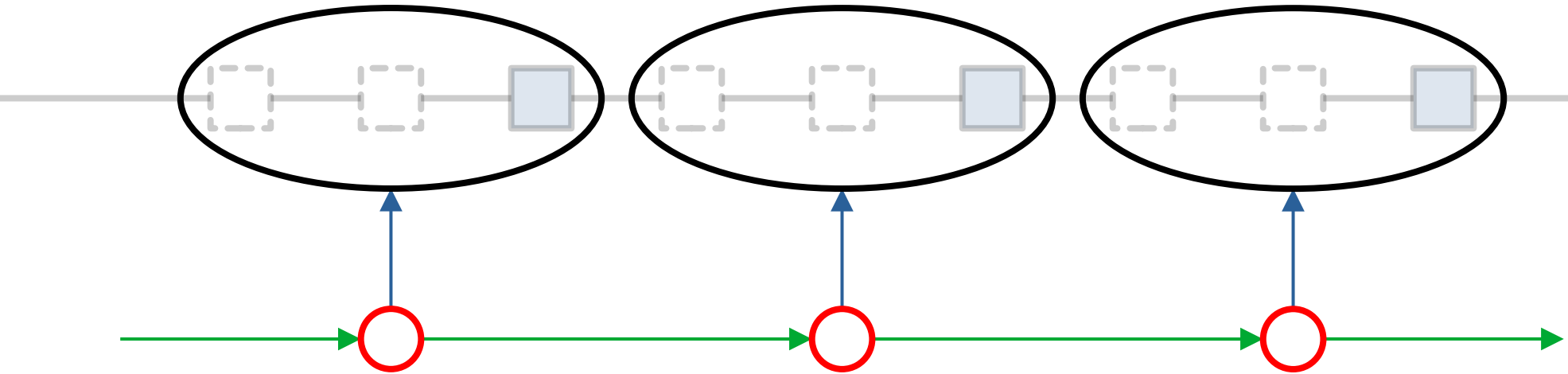
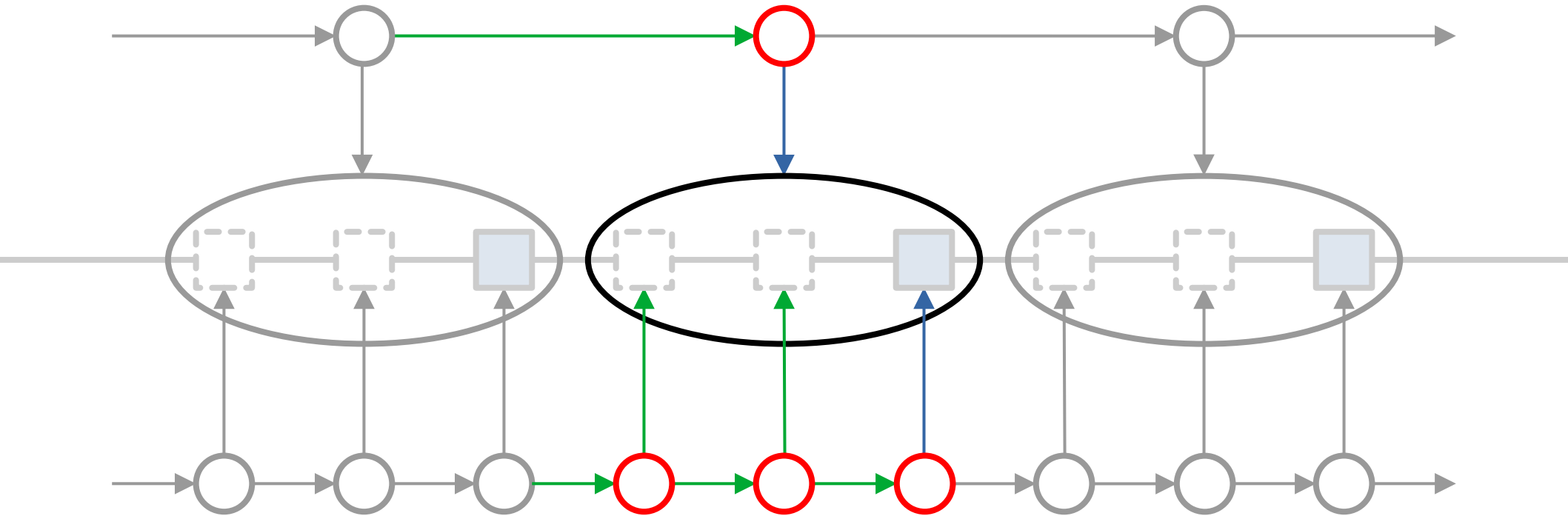


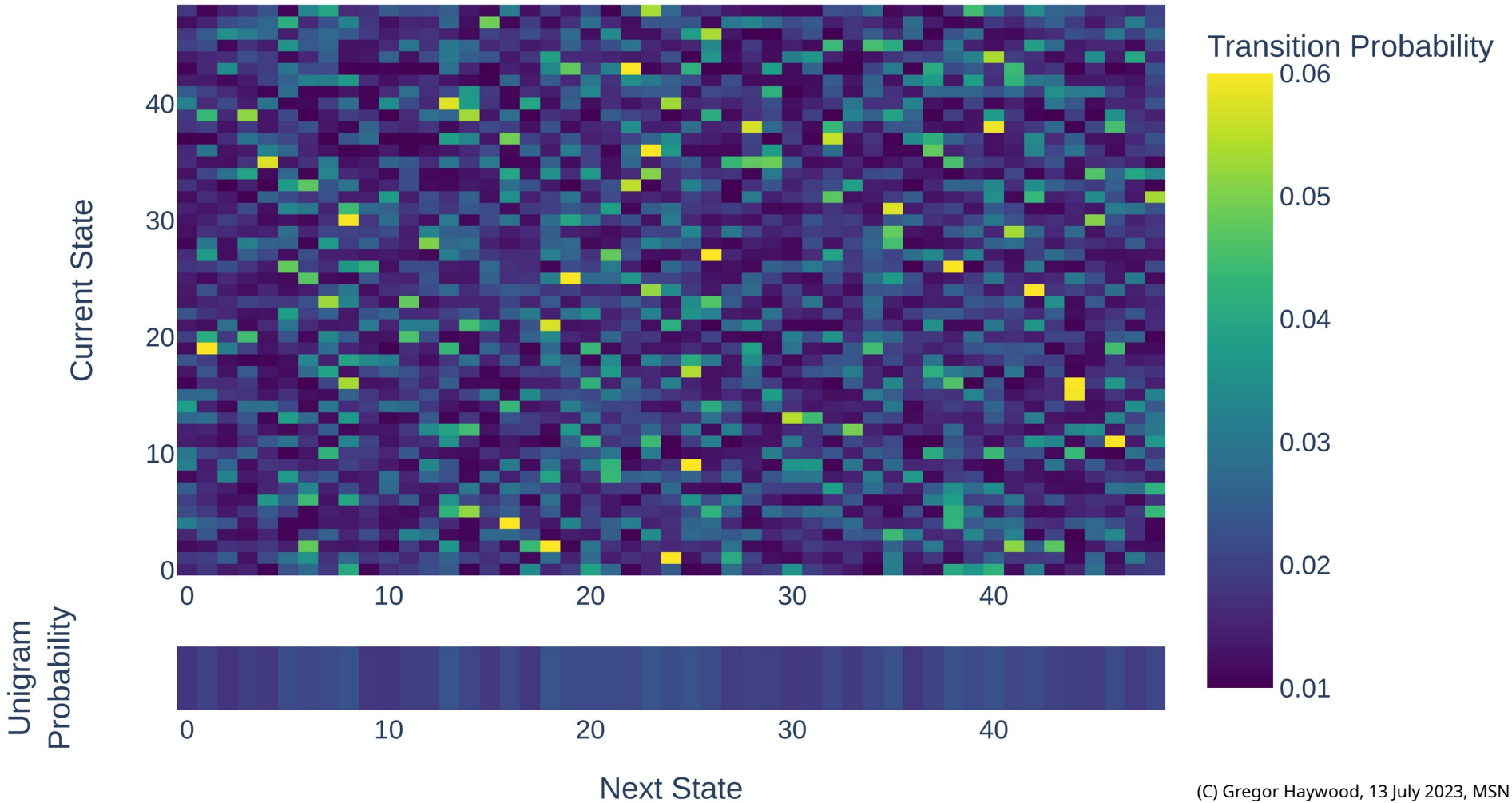
HMM Impact



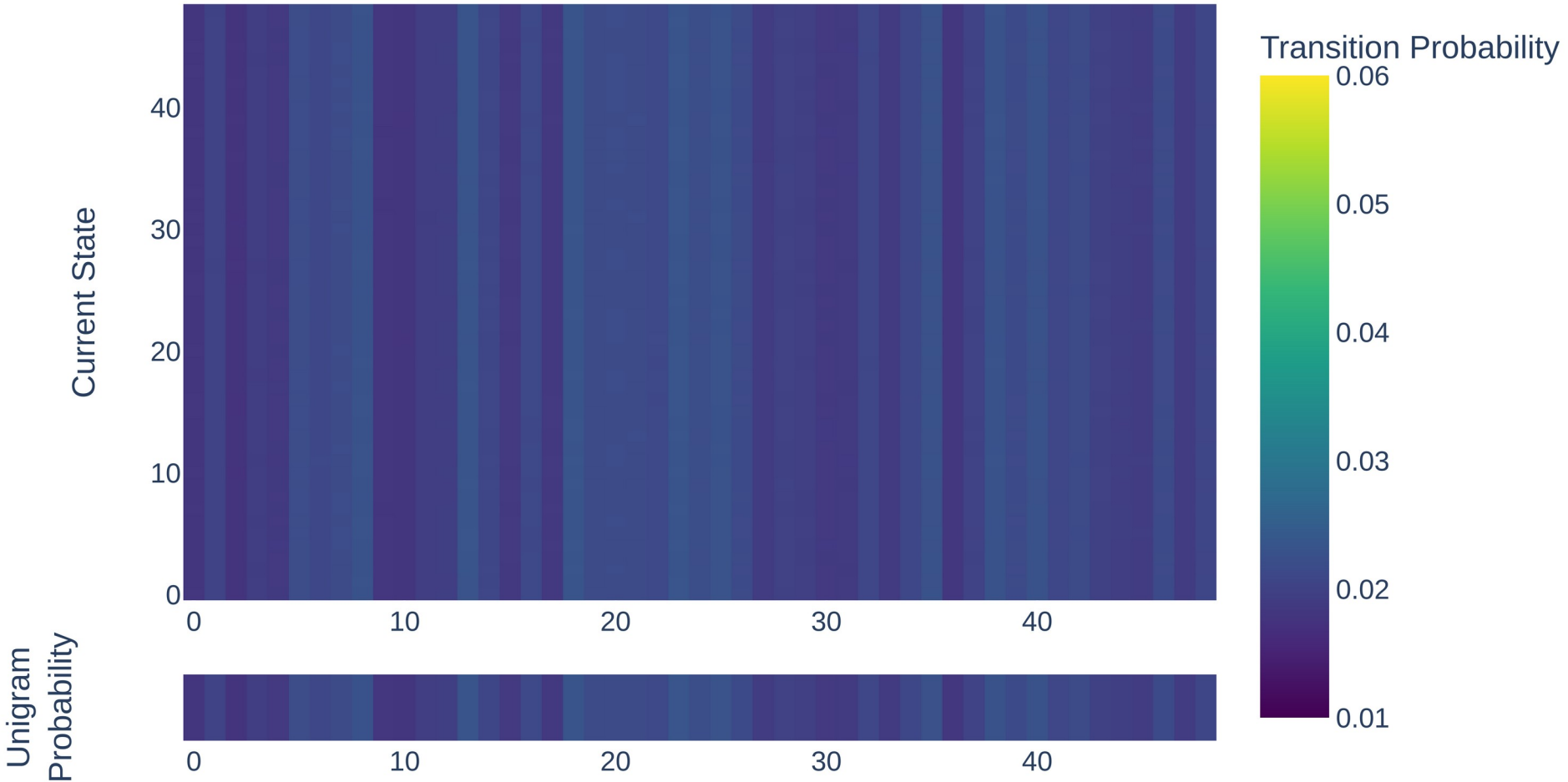
HMM Impact



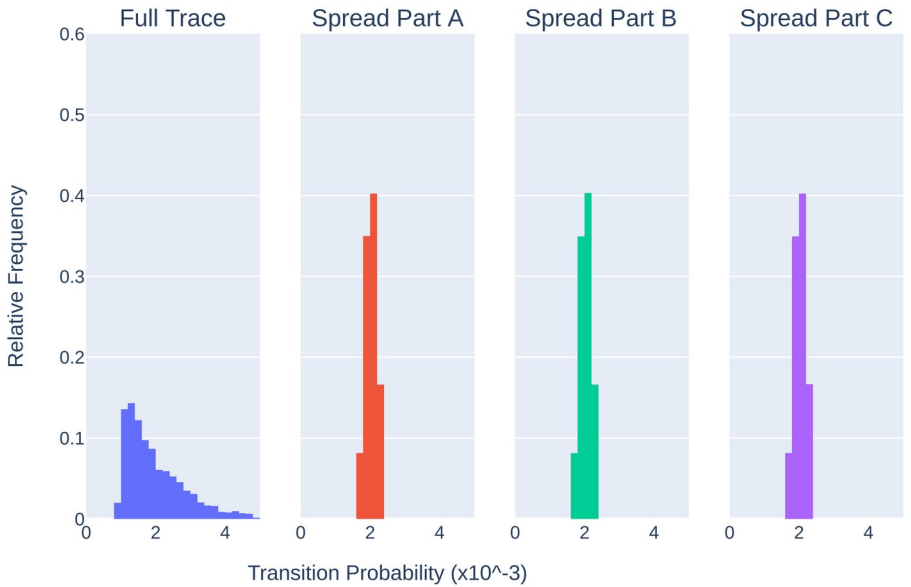
Single Path Probabilities



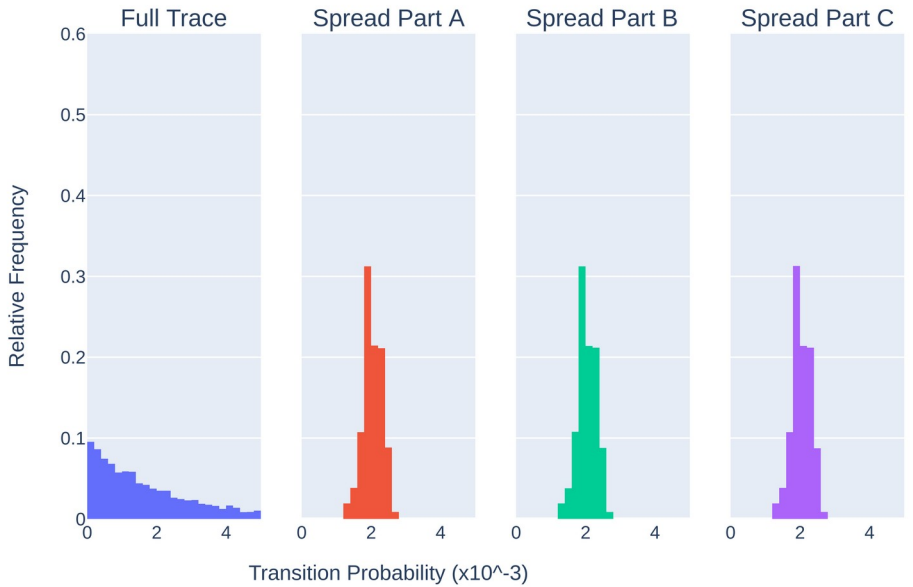
Multi-Path Probabilities



Transition Probability Distributions

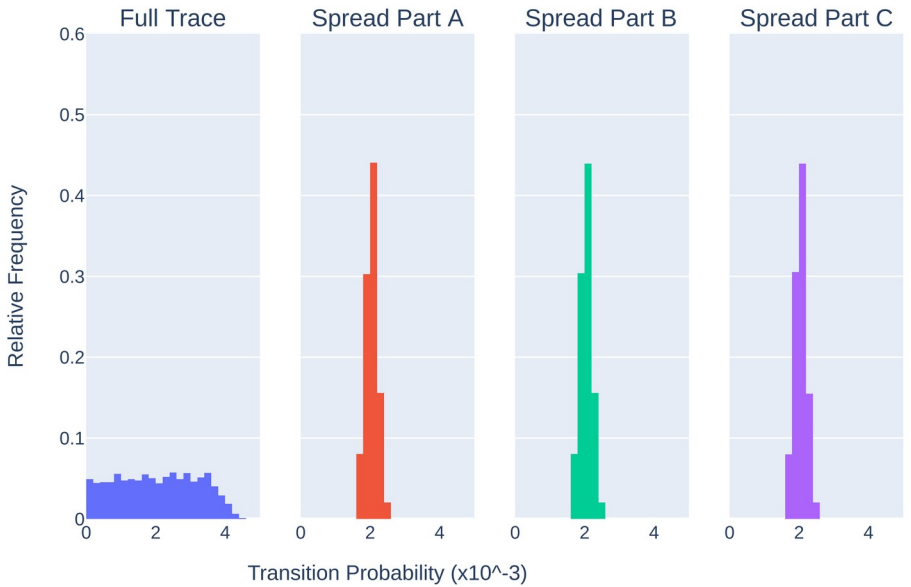


Non-Zero Exponential Markov Process

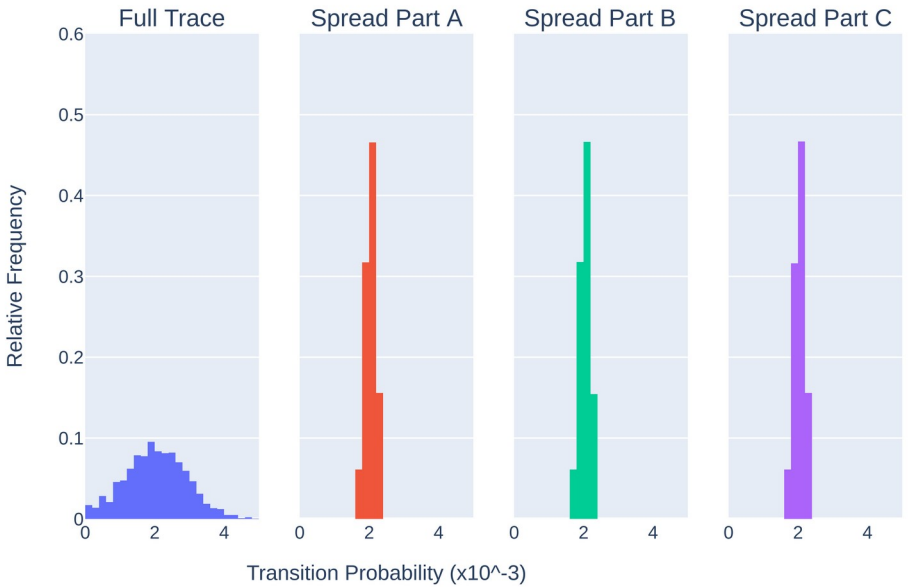


Exponential Markov Process

Transition Probability Distributions



Uniform Markov Process



Normal Markov Process

Summary

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- **Multi-path communication can make side channel attacks harder**
- Round-Robin Spread Spectrum: Network Layer
  - Using ILNP
  - General Solution (no matter what happens above the network layer)
- Multipath congestion control: Transport Layer
  - MPTCP, QUIC, etc.
  - Competing goals!
- Future work:
  - New Congestion Controls
  - Performance Impact
  - Real Applications