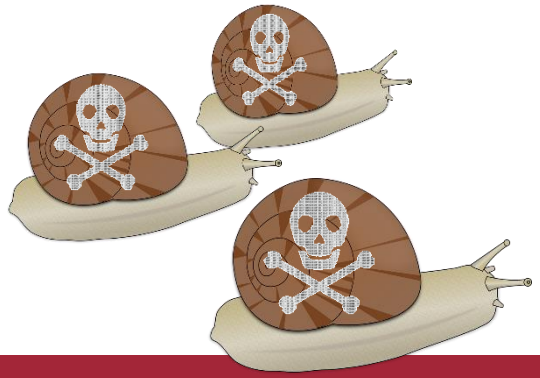

SDN-Assisted Network-Based Mitigation of Slow HTTP Attacks

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Slow HTTP attacks

- Attack Goal: Reach maximum amount of server connections
- No malformed requests
- Low data rate and few packets
- Highly efficient, one attacker is sufficient

Slowloris

GET / HTTP/1.1 CRLF

Host: www.xy.de CRLF

Connection: keep-alive CRLF

User-Agent: Mozilla/5.0 CRLF

Referer: http://www.xy.com/x/ CRLF

…

Overview

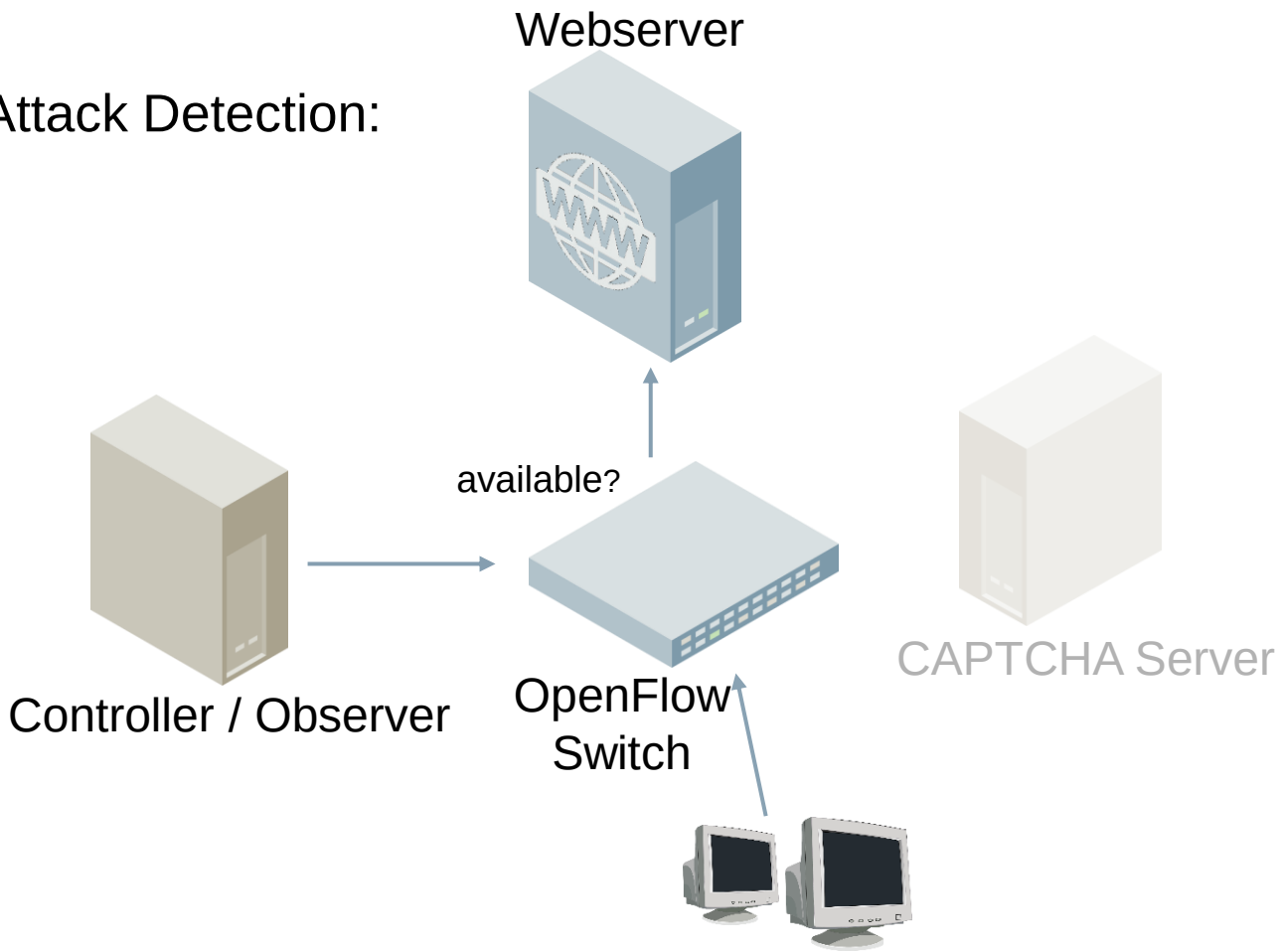
- Mitigation: reduce and limit timeouts
  - also blocks slow normal clients
- Bots: special behavior like constant packet rate

Our Solution

- DDoS mitigation framework
- No action from the admin required
- Mitigate attacks without support of the server operators
- Based on SDN

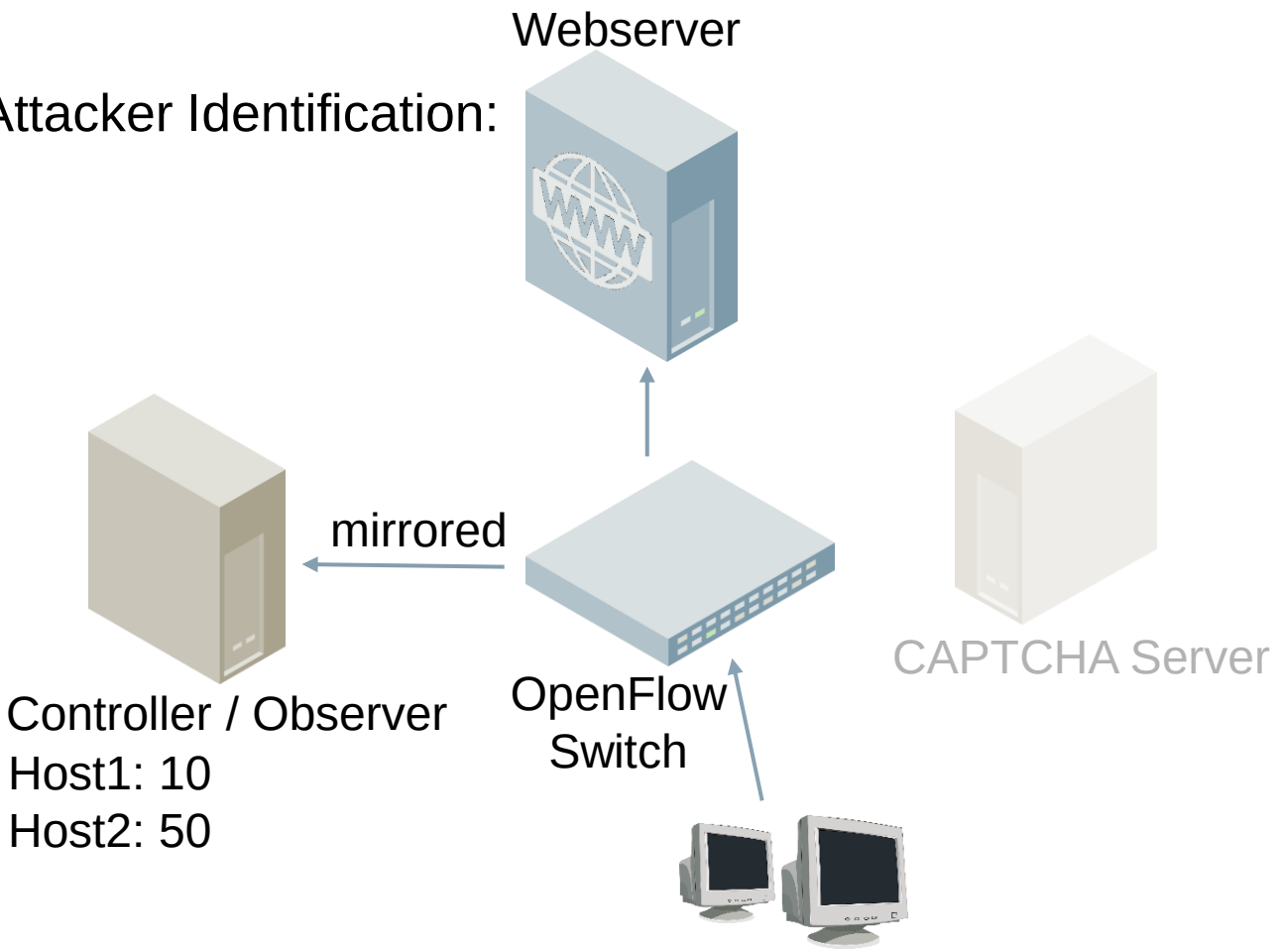
The Framework

Phase 1 – Attack Detection:



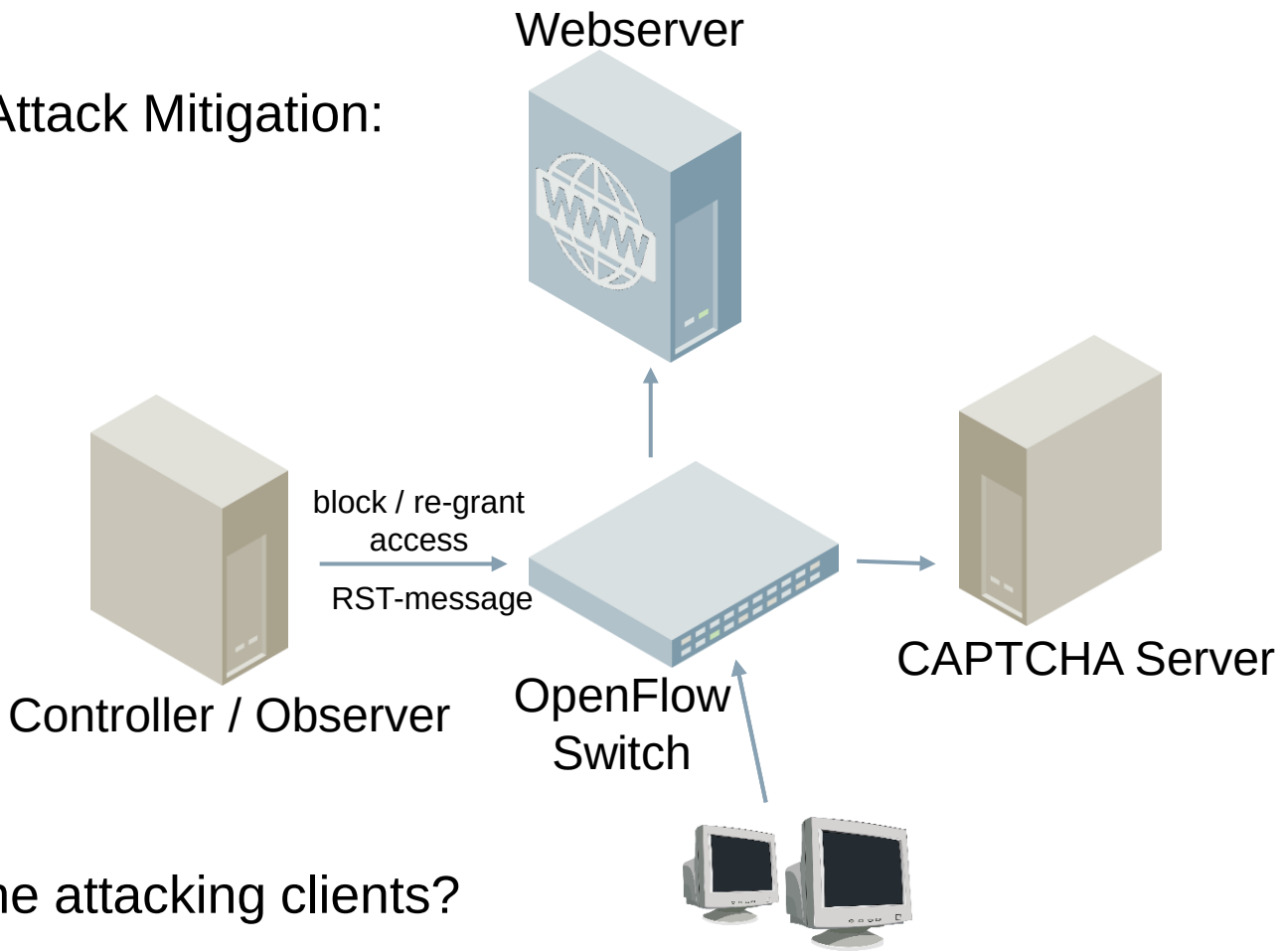
The Framework

Phase 2 – Attacker Identification:



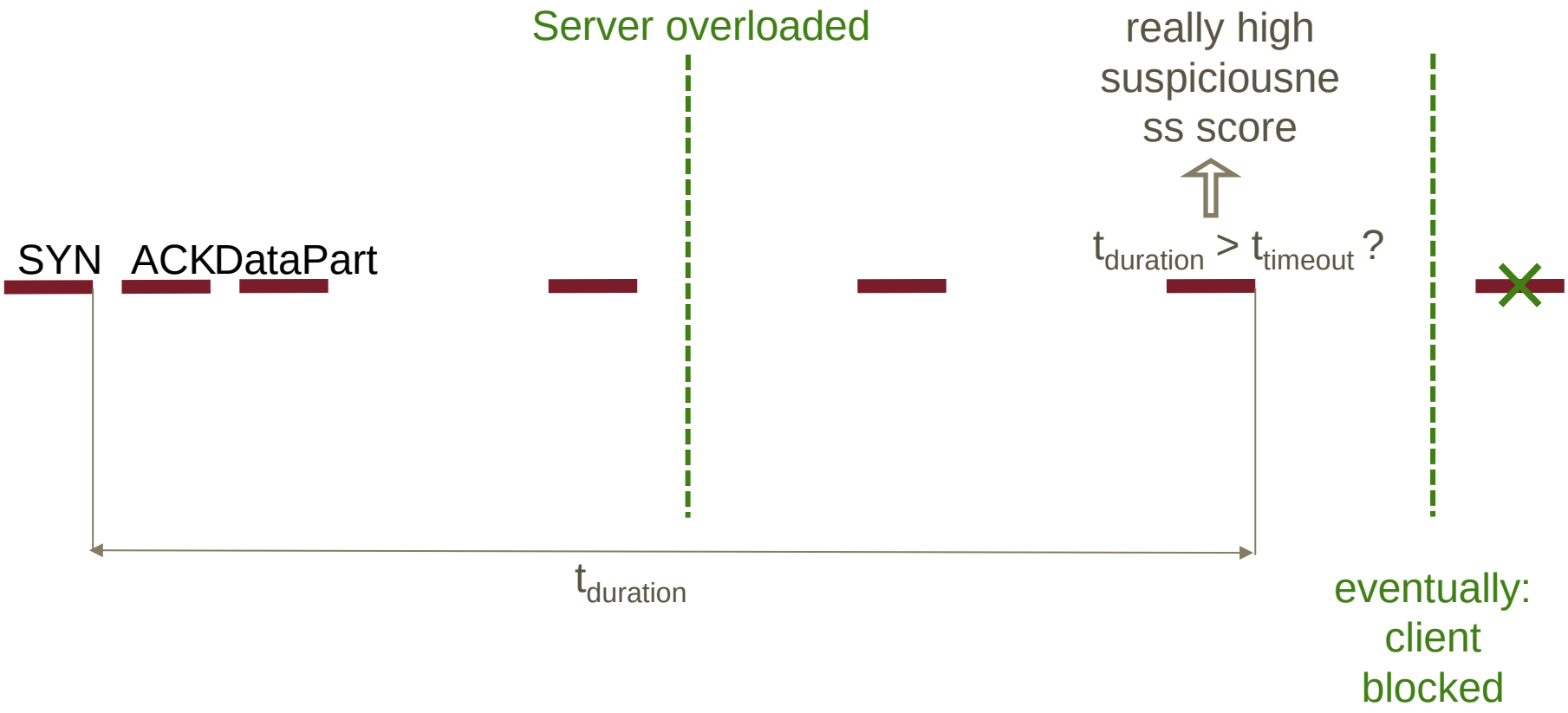
The Framework

Phase 3 – Attack Mitigation:



Which are the attacking clients?

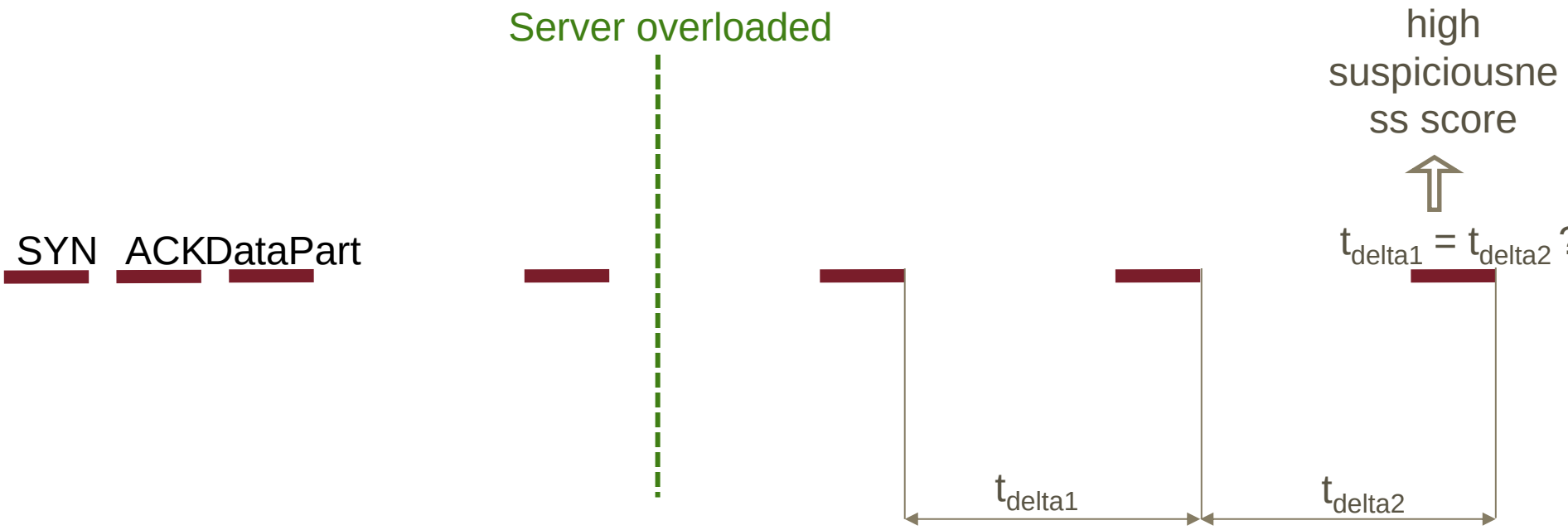
Method 1: Max. Duration



Method 1: Max. Duration

- Pro
  - Clear identification
- Contra
  - False Positives: normal but slow clients blocked
  - Long identification phase

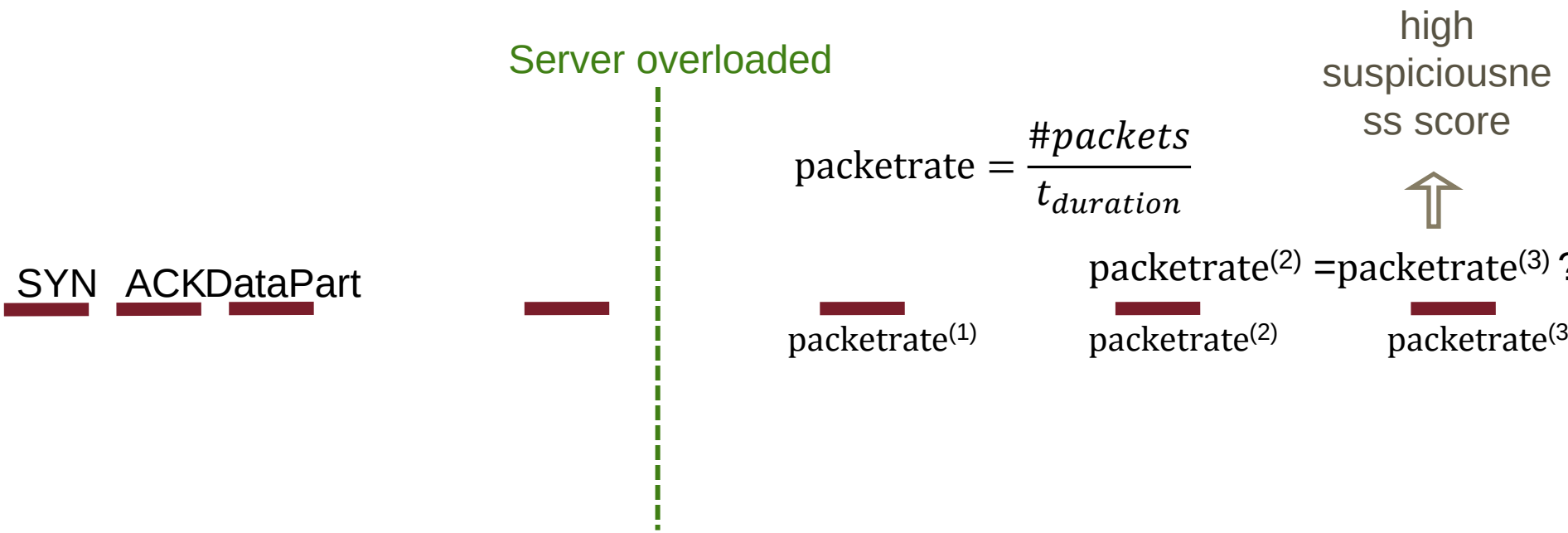
Method 2a: Even Packet Rate



Method 2a: Even Packet Rate

- Pro
  - Few connection details to remember
- Contra
  - False Positives: happens sporadically to normal clients
  - Forgets older messages

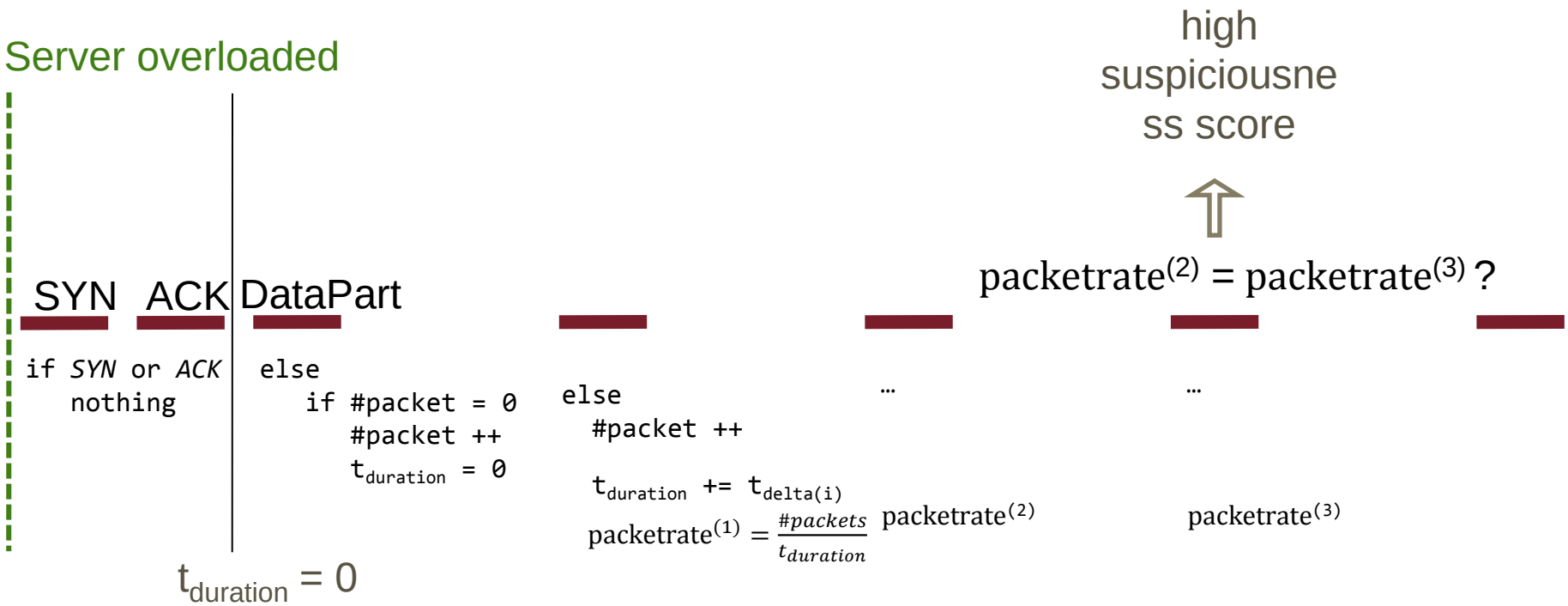
Method 2b: Even Packet Rate



Method 2b: Even Packet Rate

- Pro
  - Few connection details to remember
- Contra
  - TCP handshake packets are sent fast
    - Packet rate higher
    - Packet rate only decays slowly, therefore long identification phase

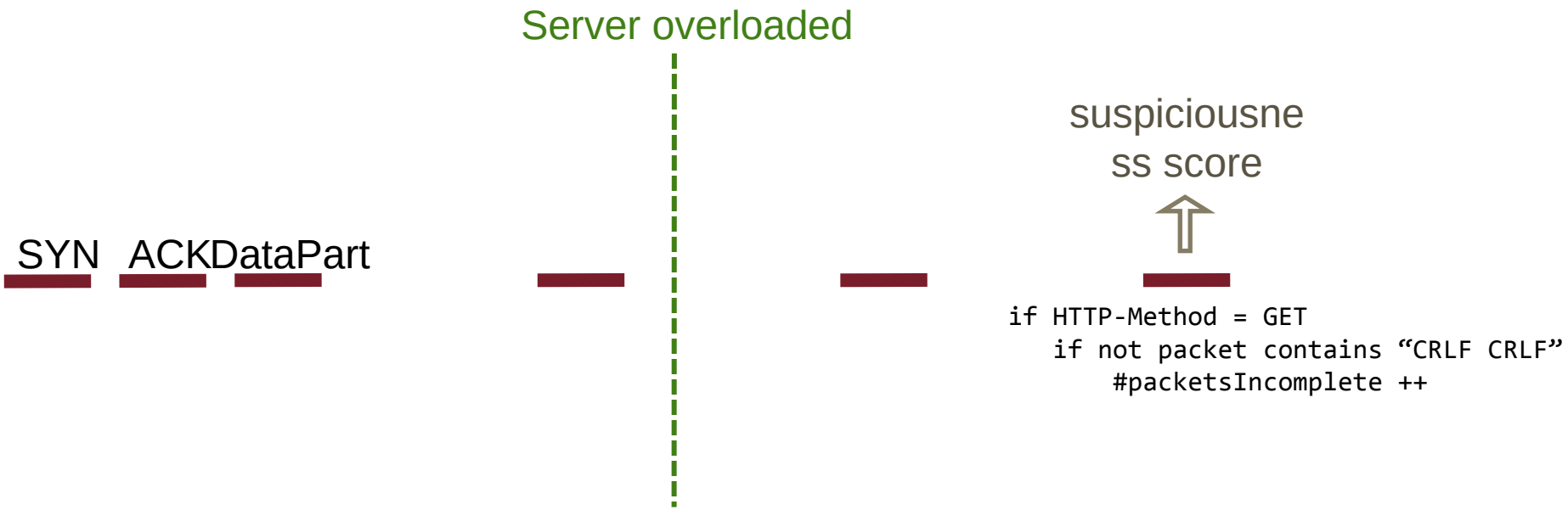
Method 2c: Even Packet Rate



Method 2c: Even Packet Rate

- Pro
  - Clear identification because of very low packet rate
- Contra
  - Large management effort

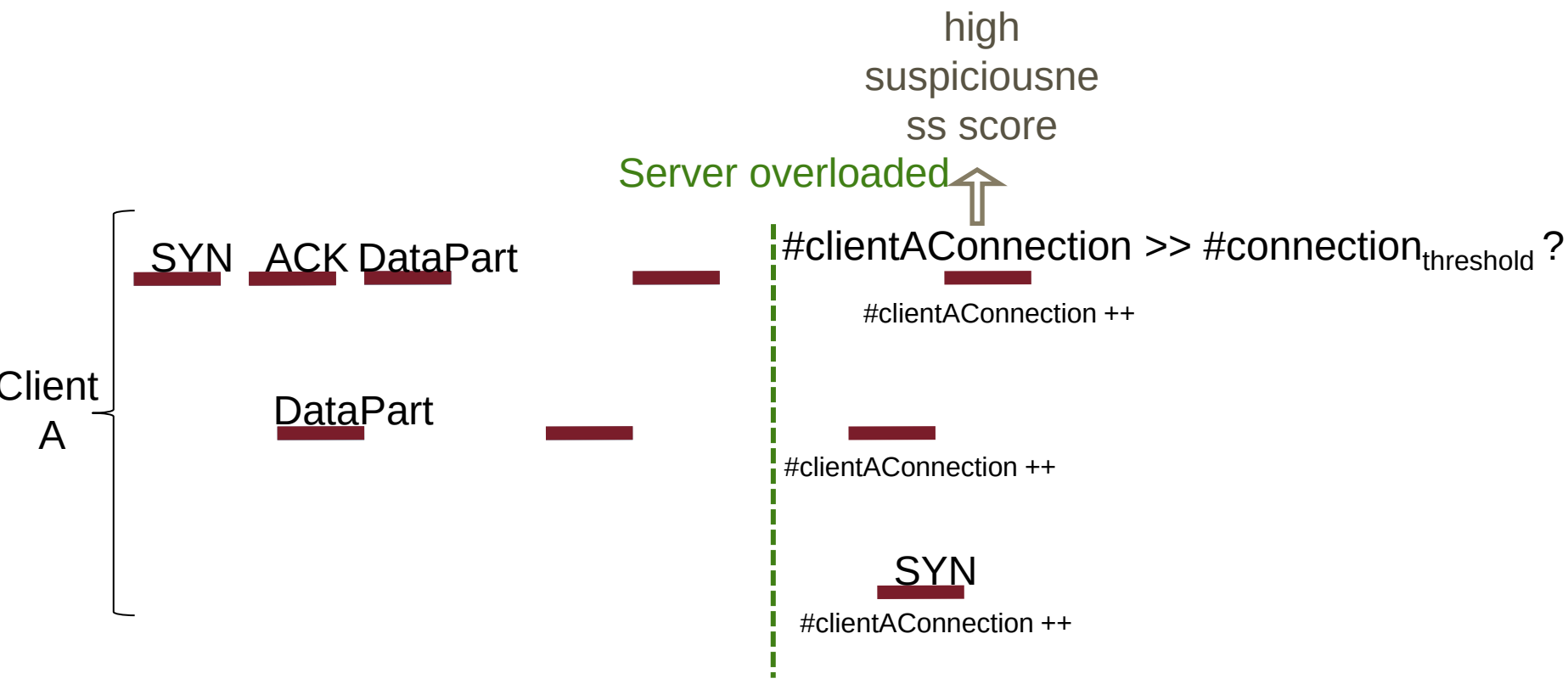
Method 3: Incomplete Packets



Method 3: Incomplete Packets

- Pro
  - Clear identification
- Contra
  - Large effort for identification of incomplete packets

Method 4: Connections



Method 4: Connections

- Pro
  - Little management effort
- Contra
  - Only for non-distributed DoS Attacks

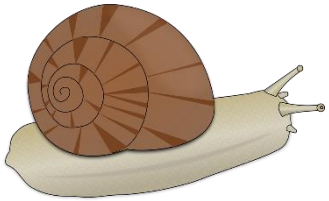
Summary

Completely automate detection, identification and mitigation of slow HTTP attacks.

Possibility to identify best identification technique.

Framework offers decent support against most DDoS attacks.

Thank you for your attention!



For details about the framework, please refer to:
Thomas Lukaseder, Alexander Hunt, Christian Stehle, Denis Wagner, Rens van der Heijden, Frank Kargl:
An Extensible Host-Agnostic Framework for SDN-Assisted DDoS-Mitigation

Thanks to pixabay.com