# SiegeBreaker : SDN based Decoy Routing System

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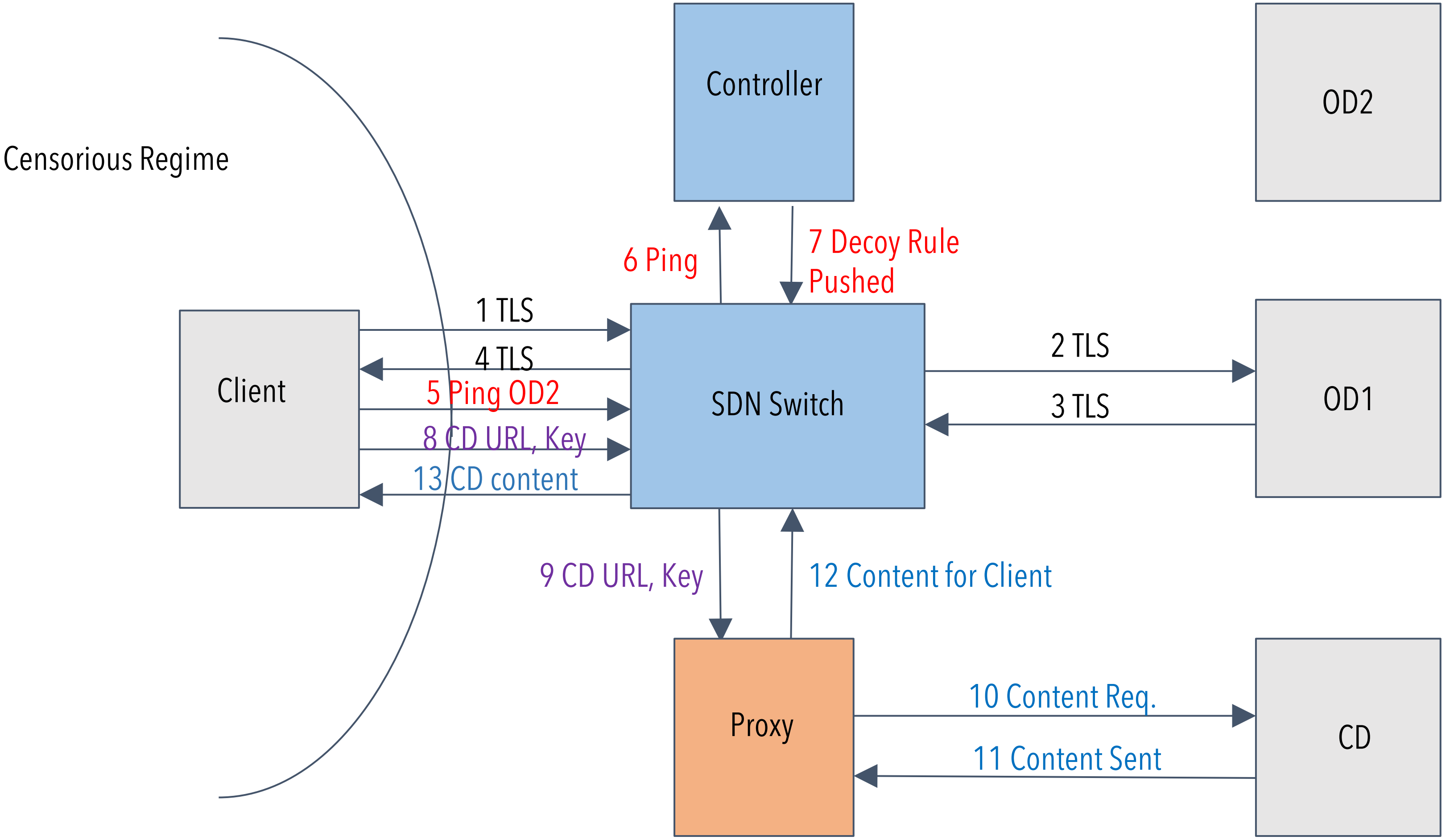
# Background and Motivation

Decoy Routing [Karlin11] : an approach to anti-censorship

- Proxy servers are easy to blacklist
- Idea : use smart *routers* as proxy servers
  - The user does not explicitly connect to a proxy.
  - Instead, he sends packets to an "overt destination". Their path crosses the decoy router.
  - The router acts as a Man-in-the-Middle and proxies the connection to its real destination.

- Problem : making real routers smart enough
  - To detect secret handshake on packets to proxy
  - To perform MitM attack
  - To act as a proxy and set up connection to real destination
- Idea : Build the system using SDN switches

# Proposed Architecture



- 1-4 : Set up normal HTTPS connection to Overt Destination
- 5-7 : Signal to Controller that this flow is for Decoy Routing. Special rule pushed to Switch: “send client-OD traffic to proxy”
- 8-9 : Send real (Covert) Dest. and key for TLS session to the proxy server, encrypted using public key of proxy
- 10-13 : MitM attack by proxy, hijacking HTTPS connection and connecting client to Covert Destination

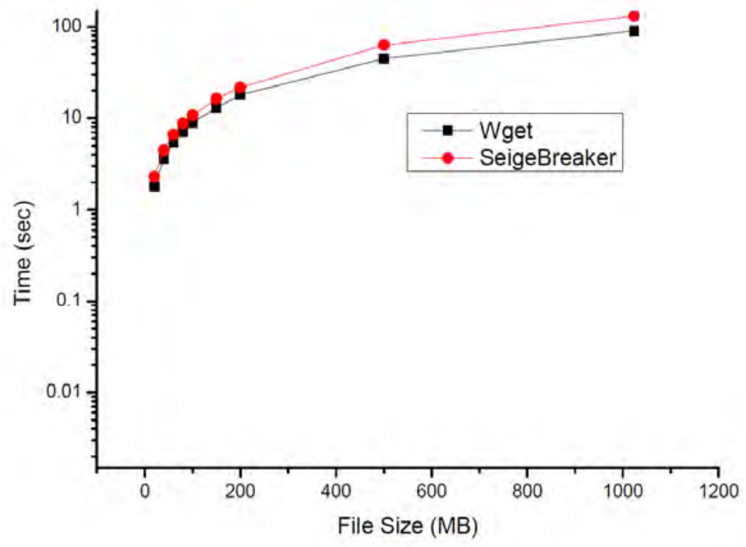
Note 1 : switch just redirects – the MitM is done by a full server.

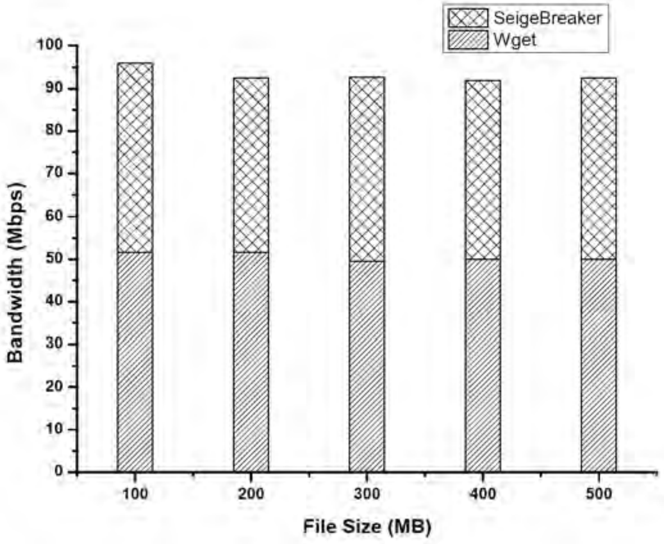
Note 2 : SiegeBreaker located outside boundary of censor country.

# Evaluation and Work in Progress

System implemented and tested on Deter lab [Deter].

Performance is comparable with regular TCP connections.





Work in Progress : Implementation on real SDN switches (HP, Zodiac fx).

# References

1. McKeown, Nick. "Software-defined networking." *INFOCOM keynote talk* 17.2, 2009.

2. J. Karlin, D. Ellard, A. W. Jackson, C. E. Jones, G. Lauer, D. Mankins, and W. T. Strayer, “Decoy routing: Toward unblockable internet communication.” FOCI, 2011.

3. Benzel, T. and Wroclawski, J., “The DETER project: towards structural advances in experimental cybersecurity research and evaluation.” *Information and Media Technologies*, *7*(4), 2012.