

# CS558 Network Security

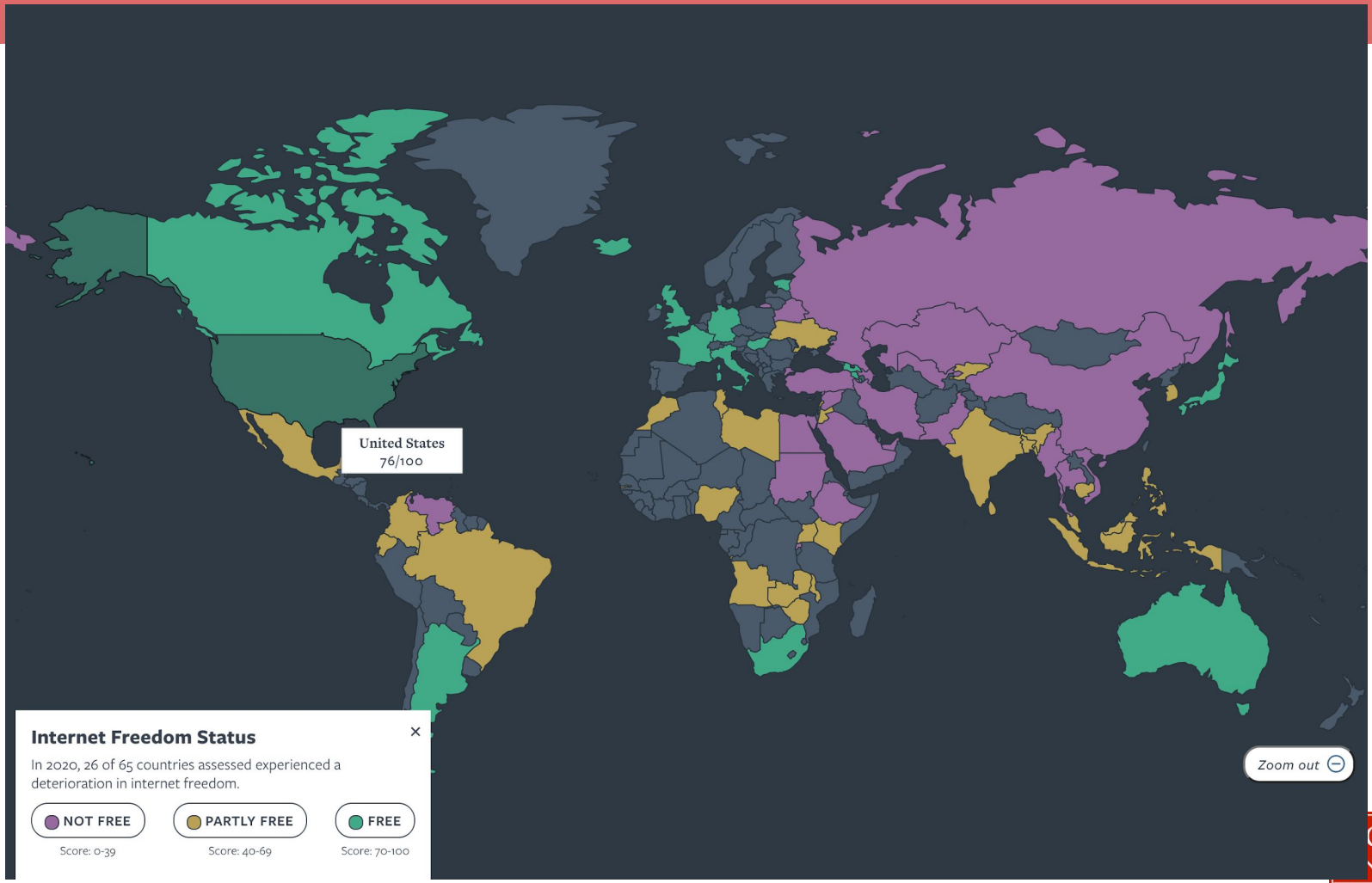
Lecture 15: Metadata and Tor *hello*

# Setting the Stage for Censorship Circumvention

① Can you connect?

---

② Can you get to any domain?



# Data vs Metadata

Search : Cute dogs

" I Love You "

" I Hate You "

IP address

Timing information

Sender , receiver

Version

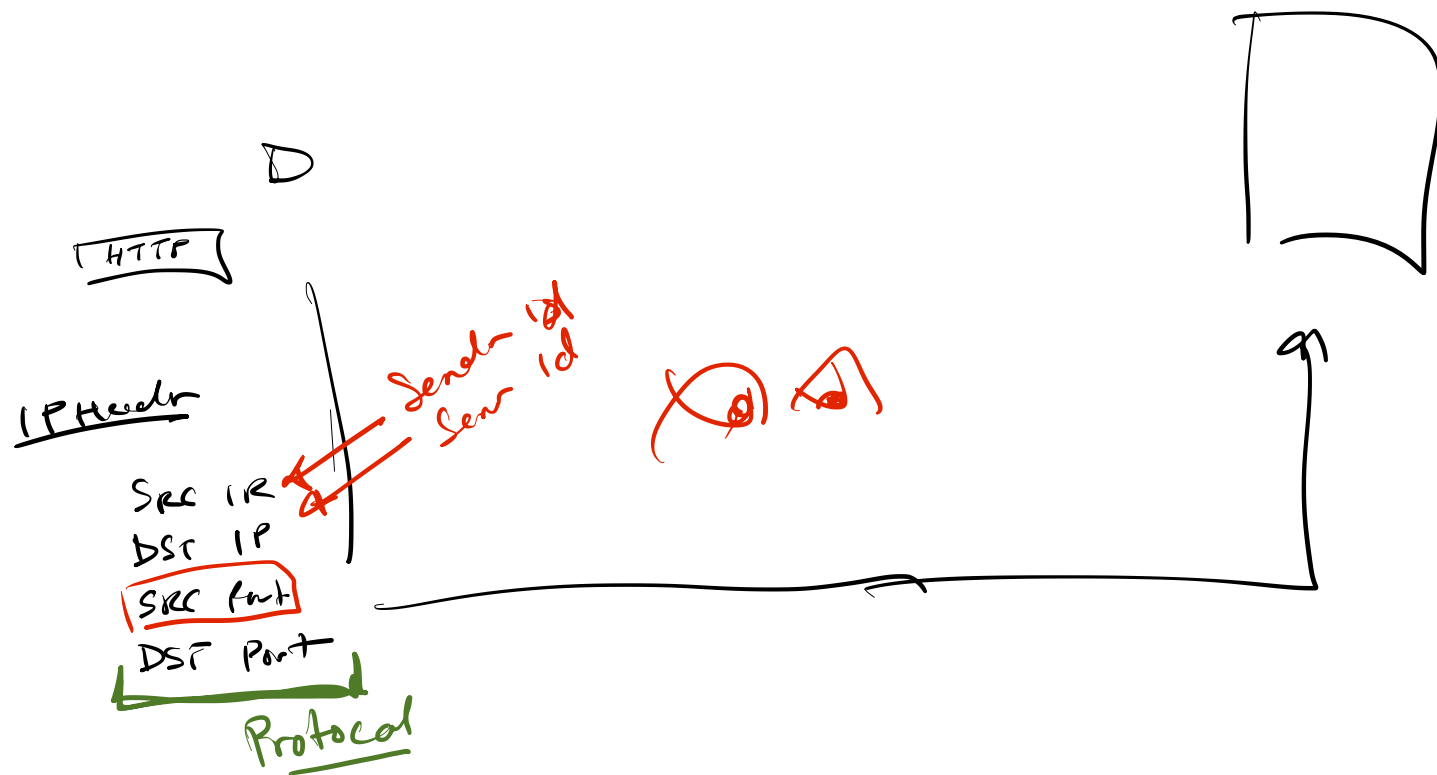
device information

length of msg

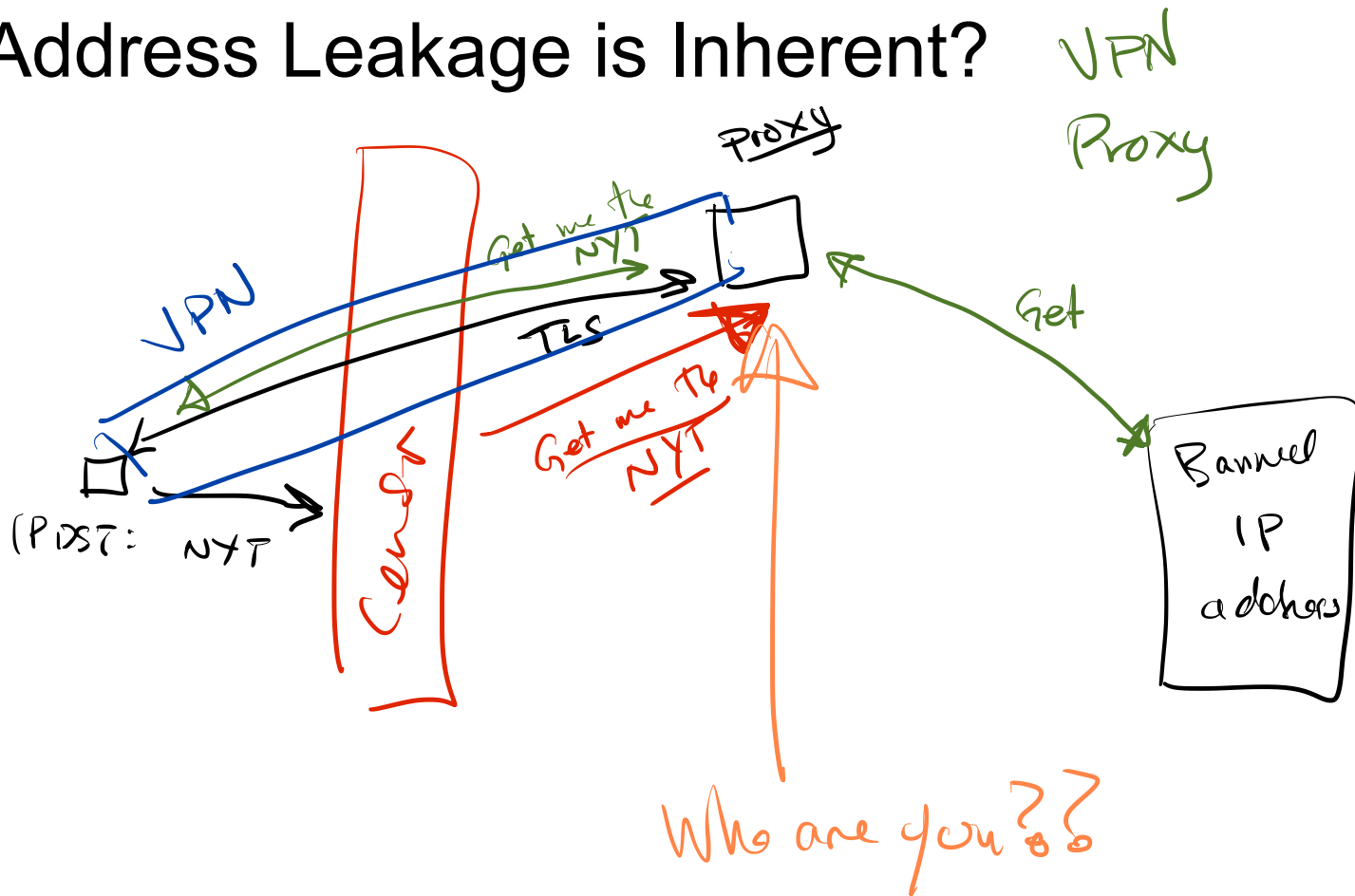
“We kill people based on metadata.”



# Internet Metadata -- IP Address Leakage



# IP Address Leakage is Inherent?



# TLS Metadata -- Server Name Indications (SNI)

---

Client hello

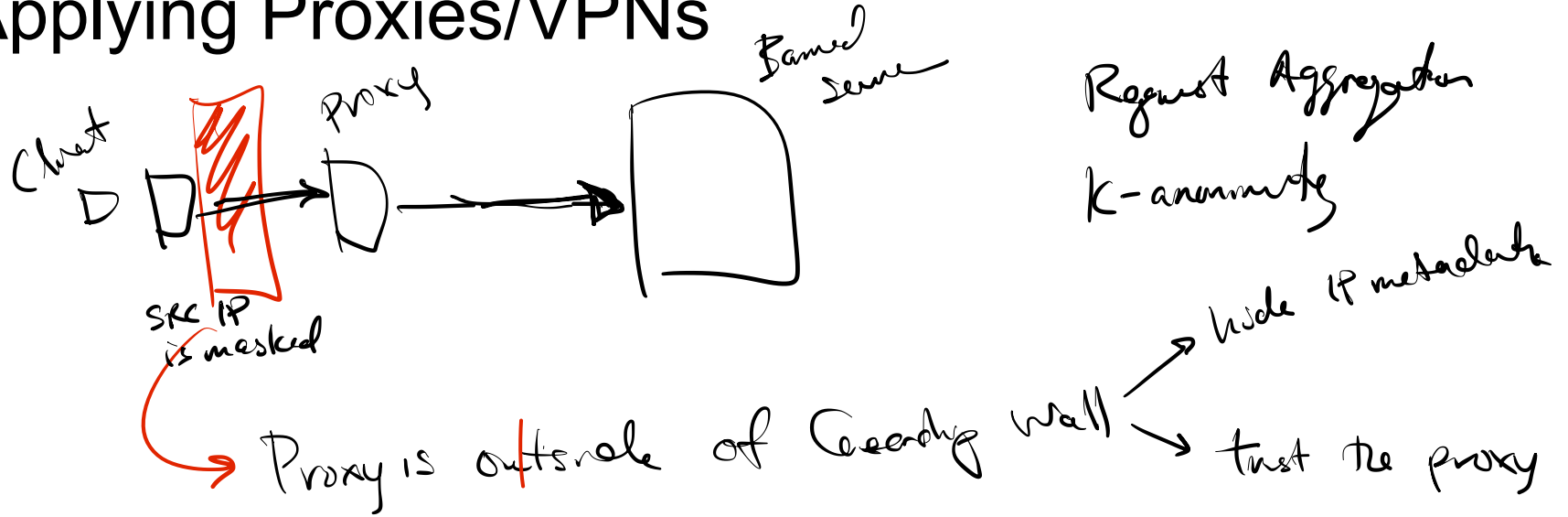
maps.google.com

Content Delivery networks CDN

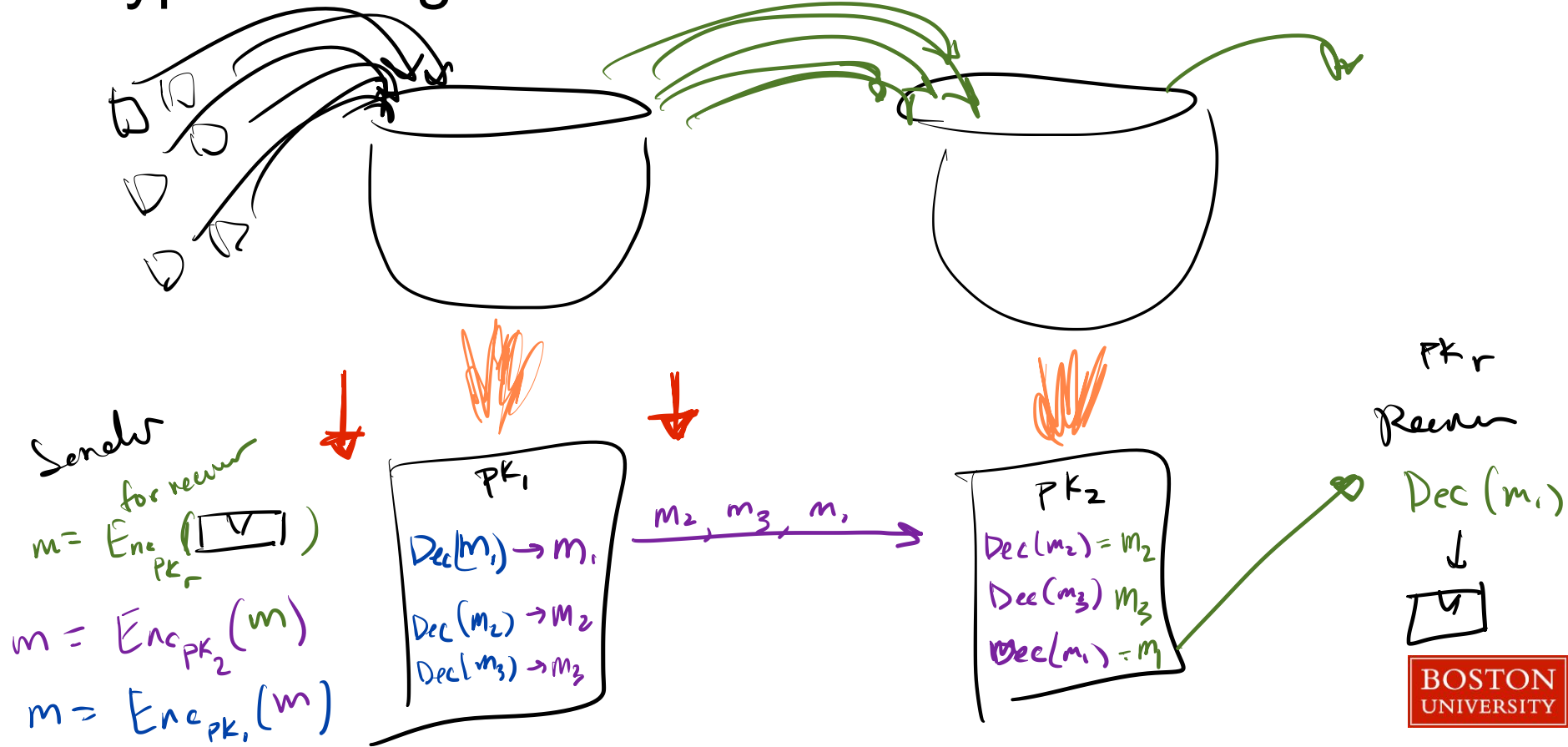


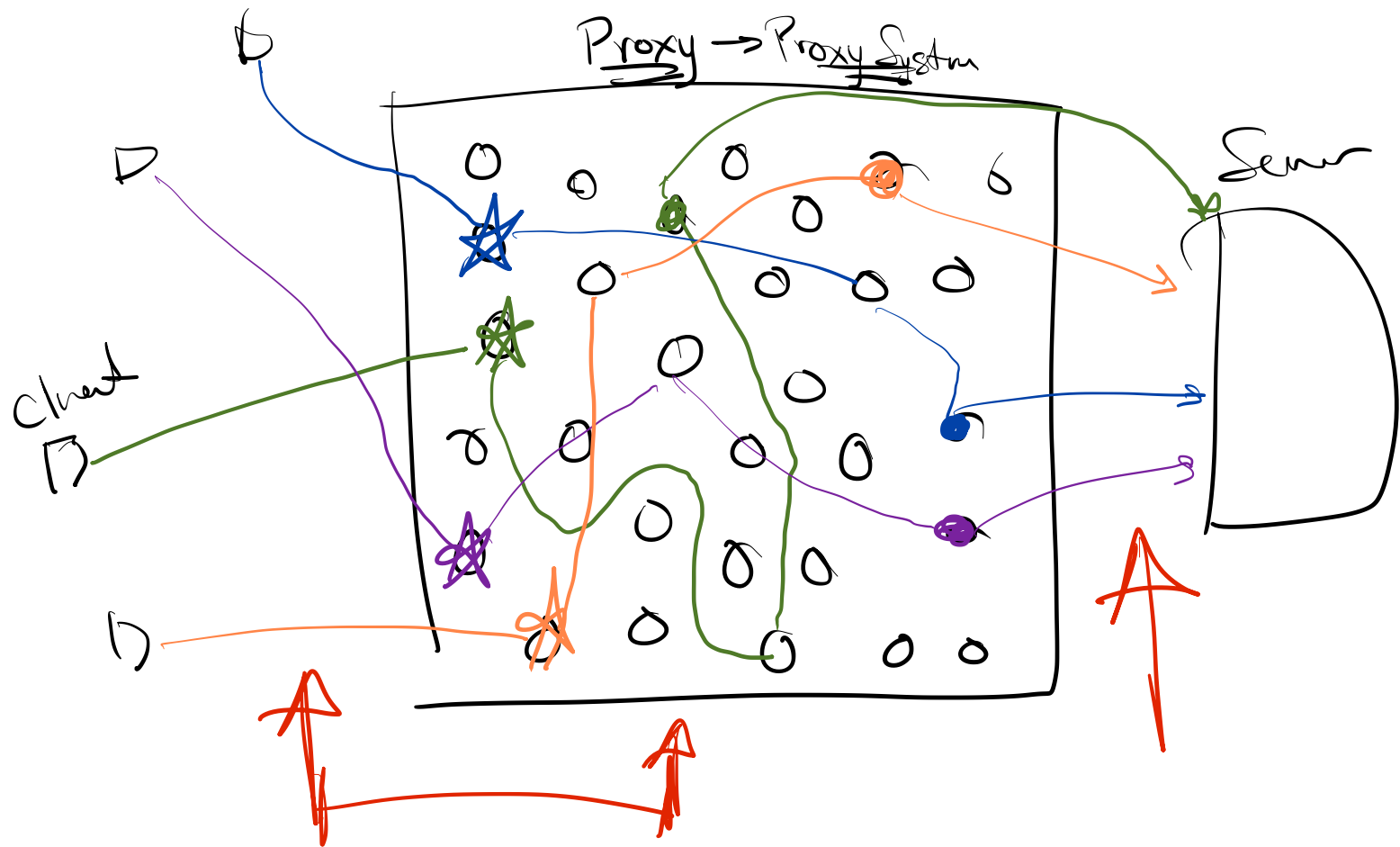
# Hiding IP Address Leakage

# Applying Proxies/VPNs



# Crypto Background -- Mix Nets





# Tor -- The Mix Net Perspective

Client

