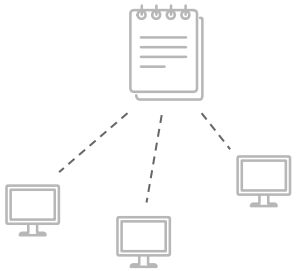
TOR
LOCATING HIDDEN SERVERS

Lasse Øverlier & Paul Syverson
Presented by Andy Zeng

Tor's Hidden Services



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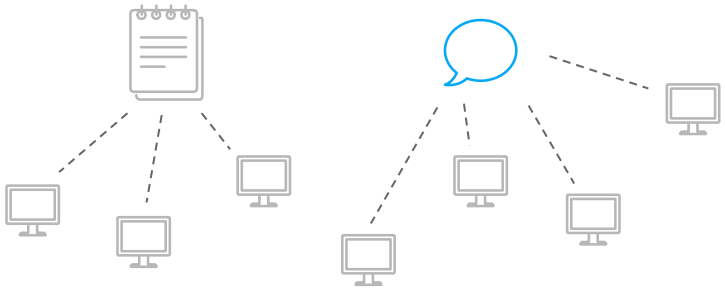

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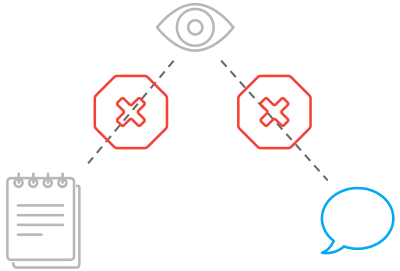

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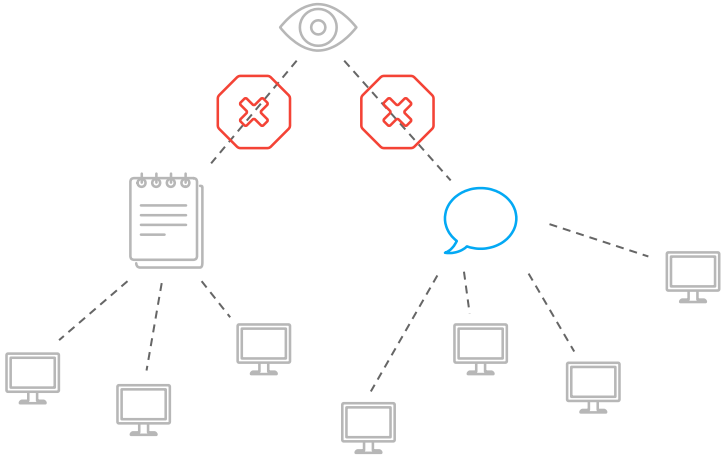

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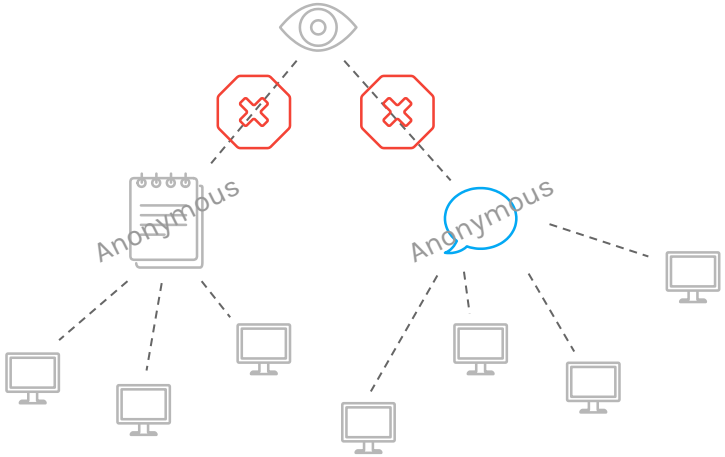

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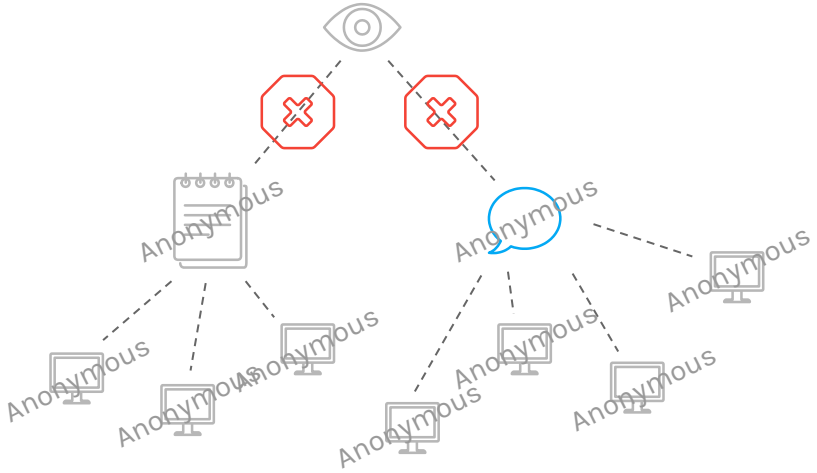

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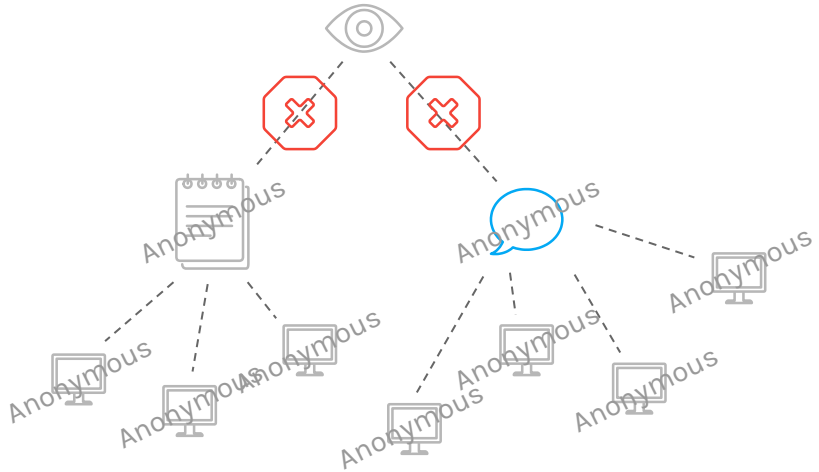

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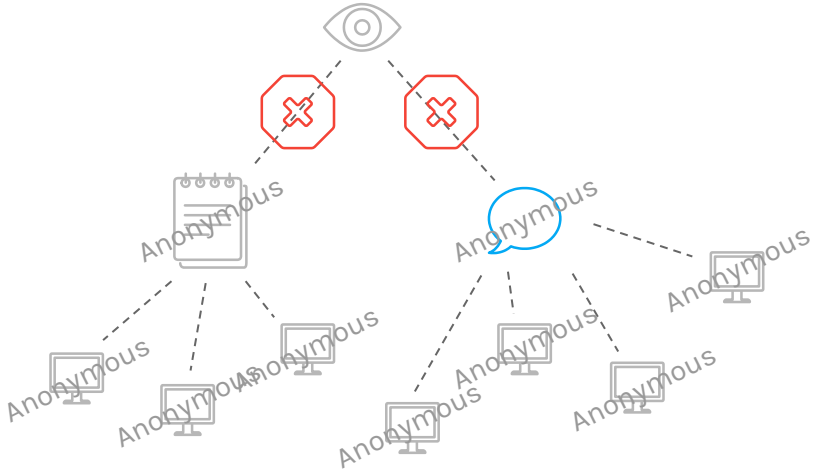
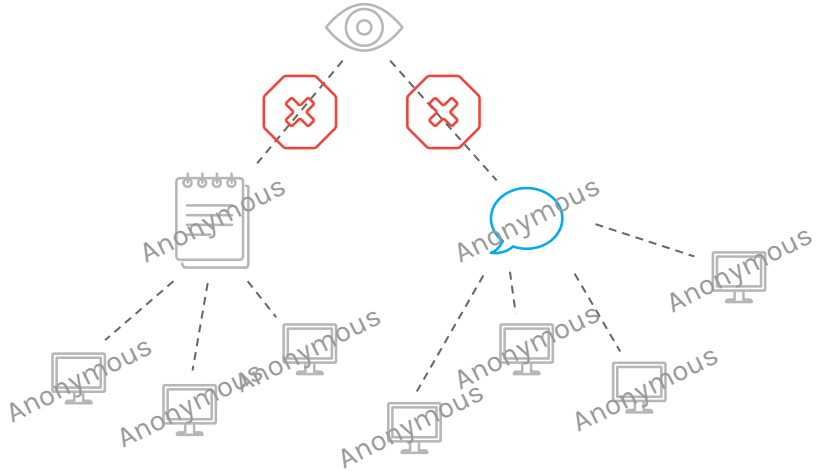


Client

Server

Tor's Hidden Services



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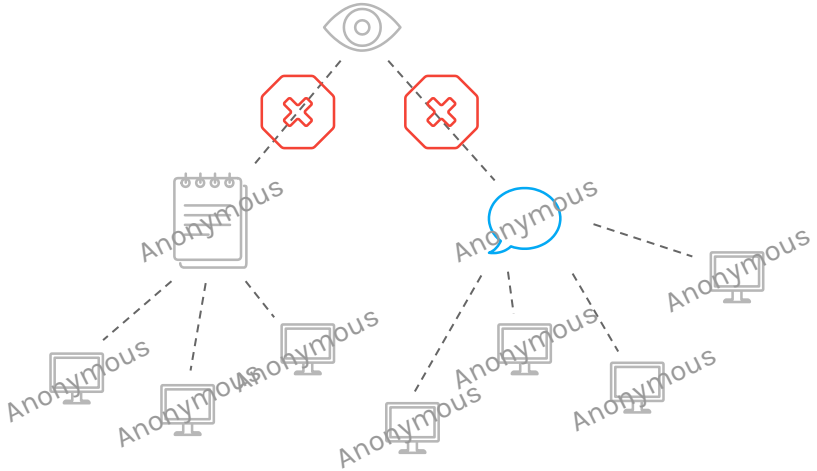

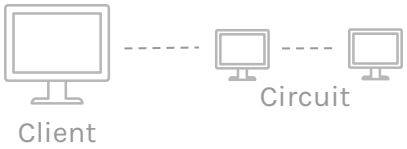

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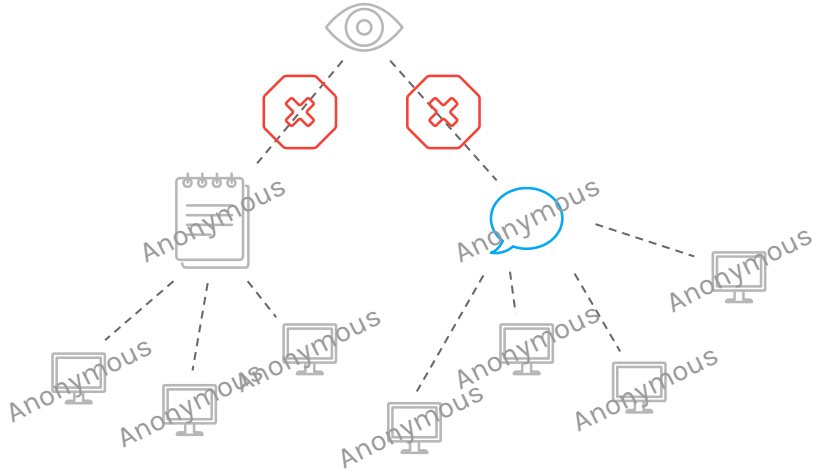
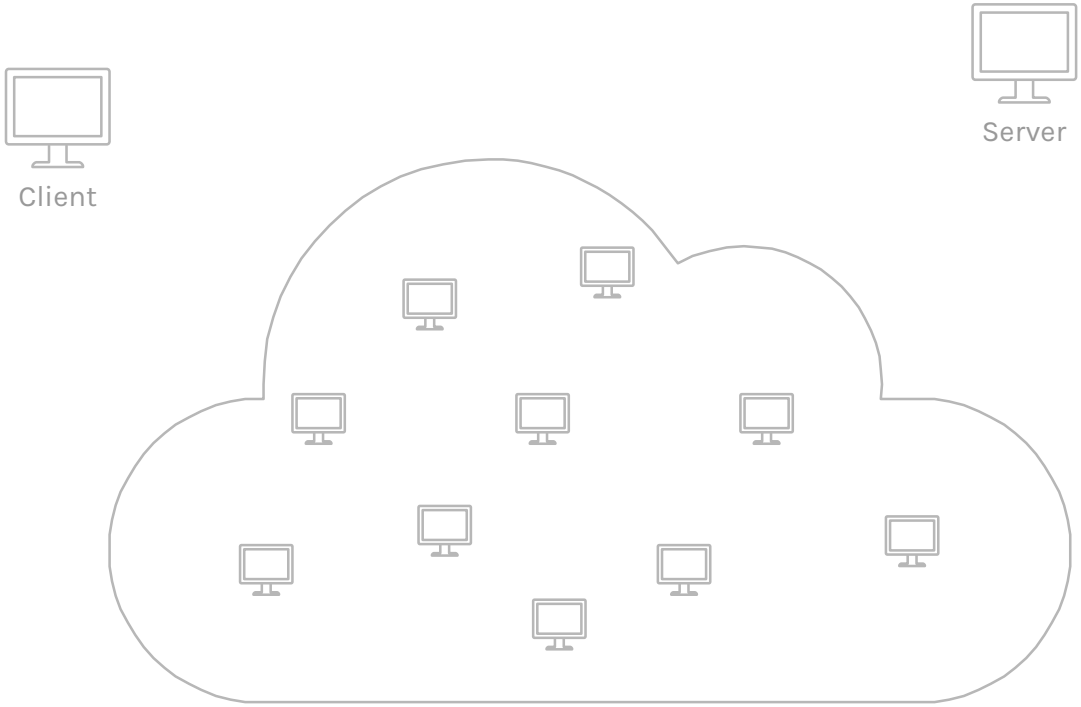


Rendezvous **Protocol**

Client

Server

Rendezvous **Protocol**



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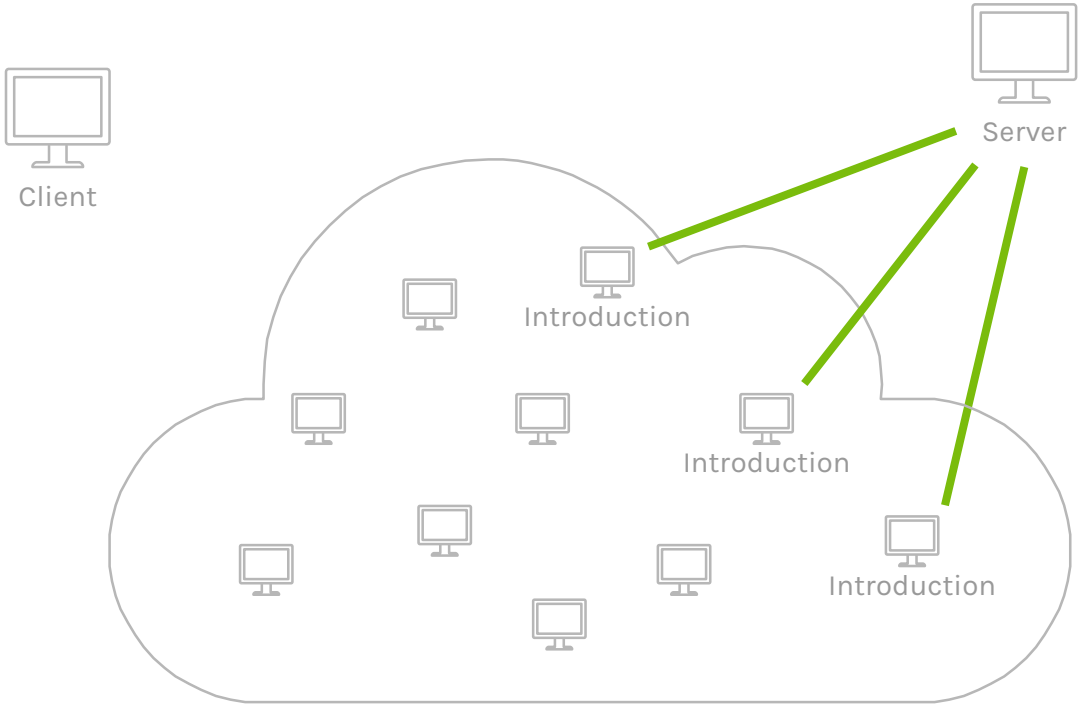

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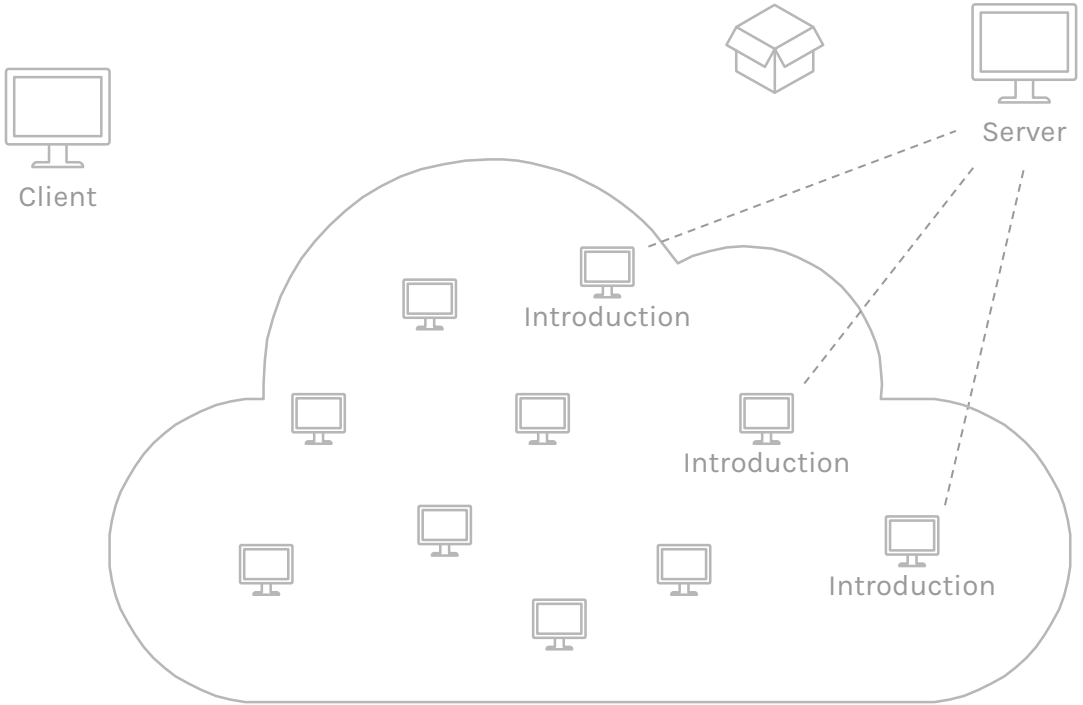
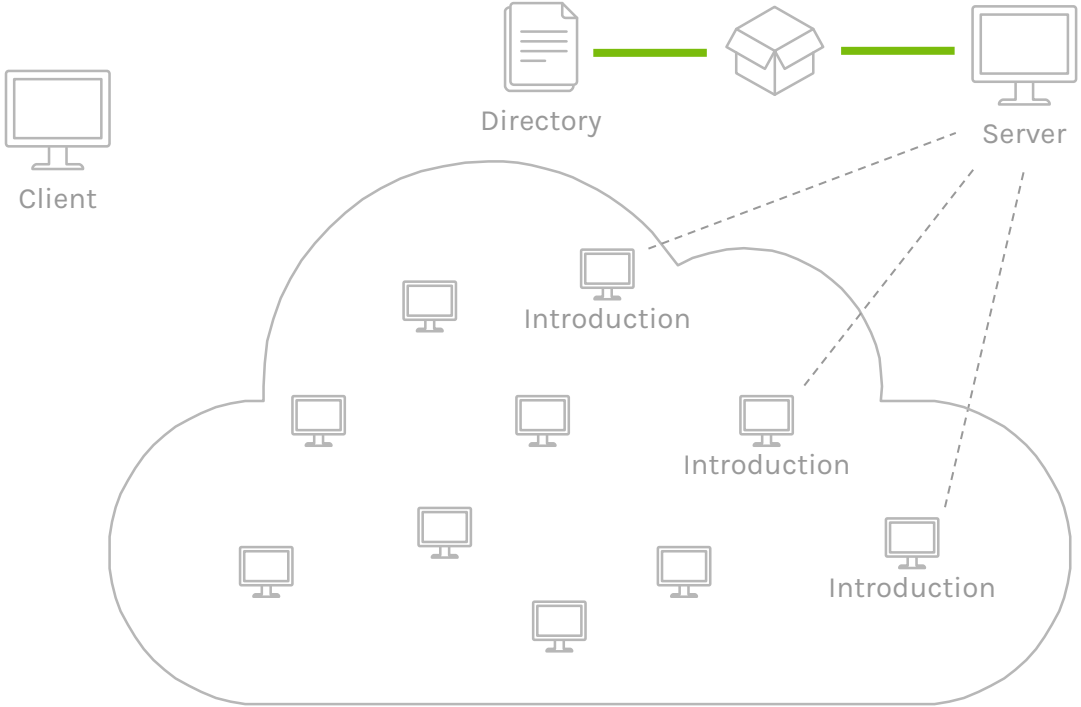


Rendezvous Protocol



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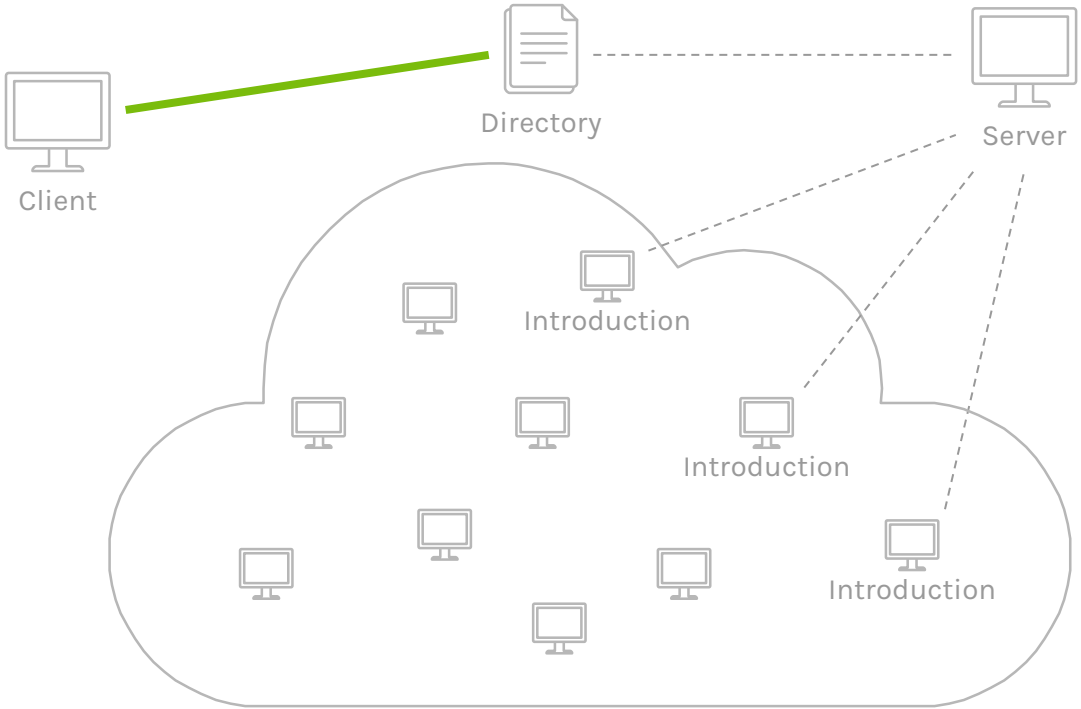

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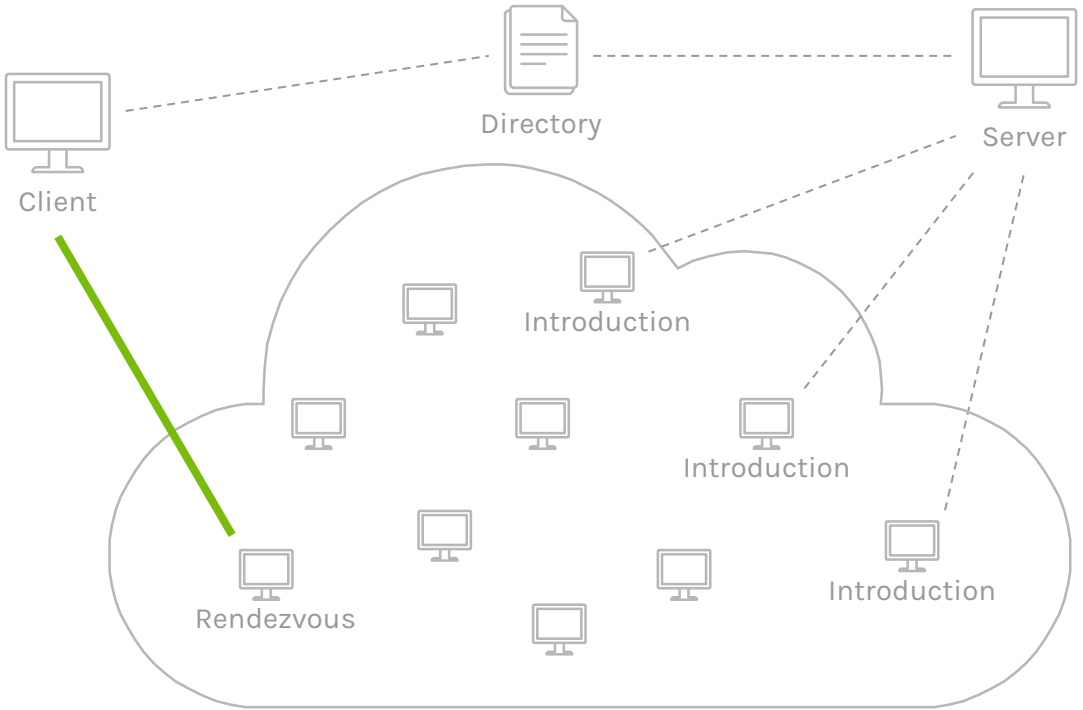

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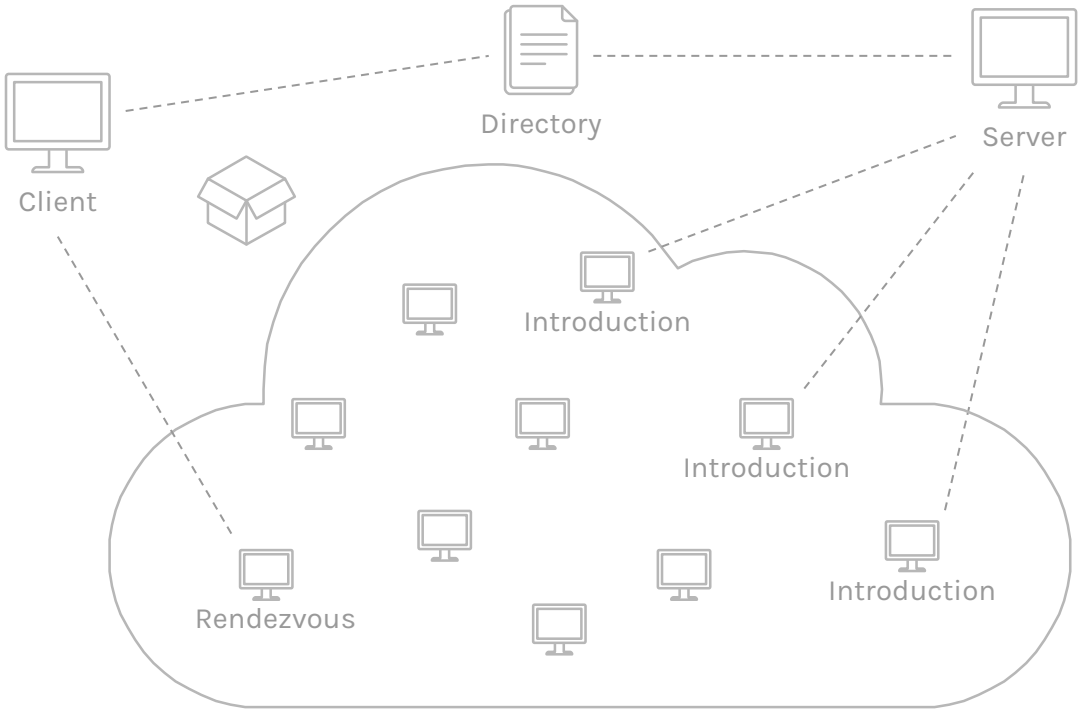

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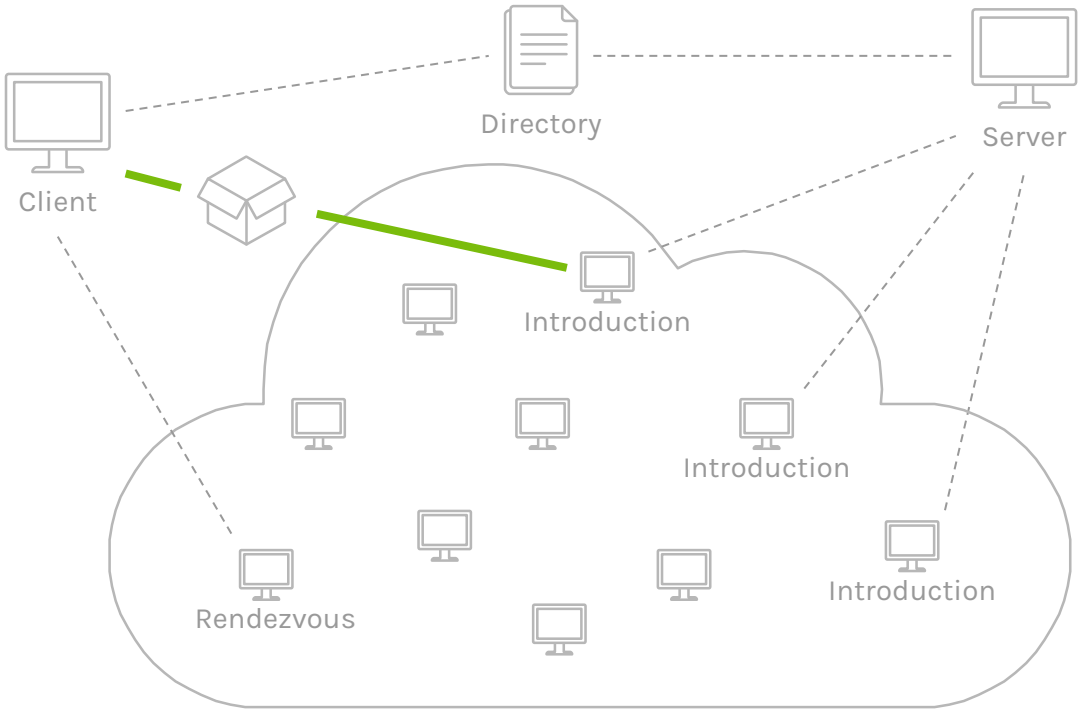

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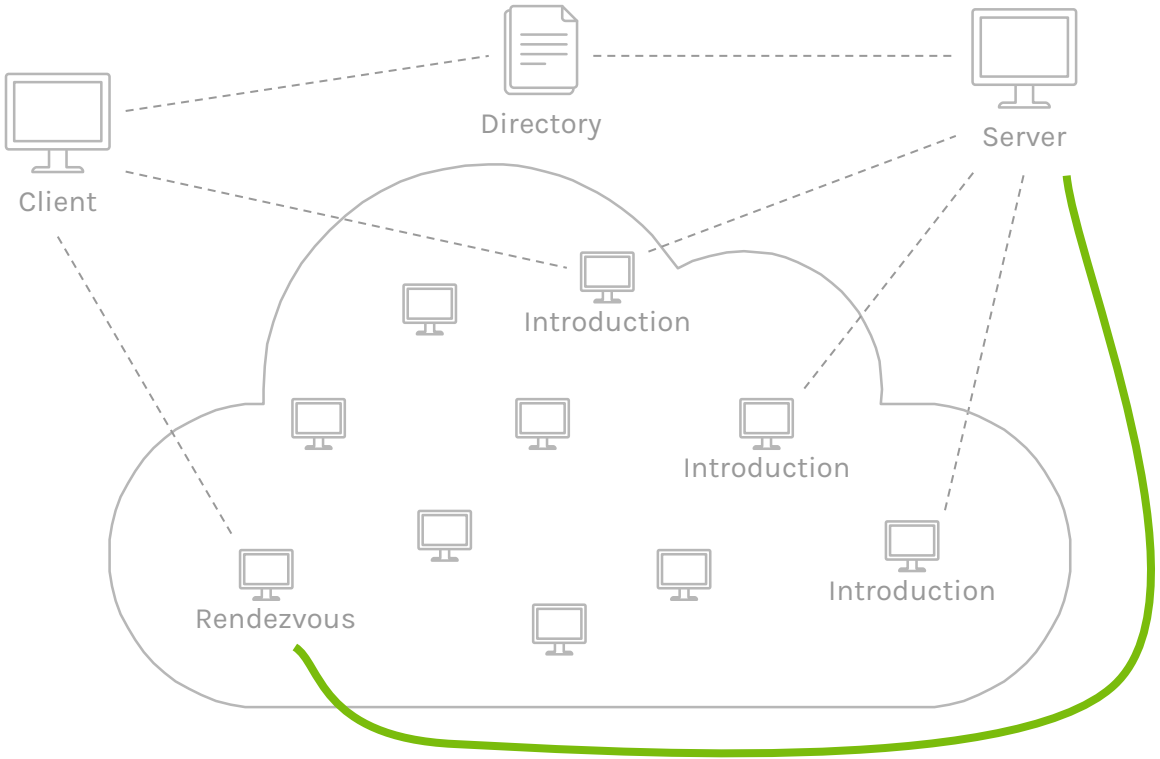

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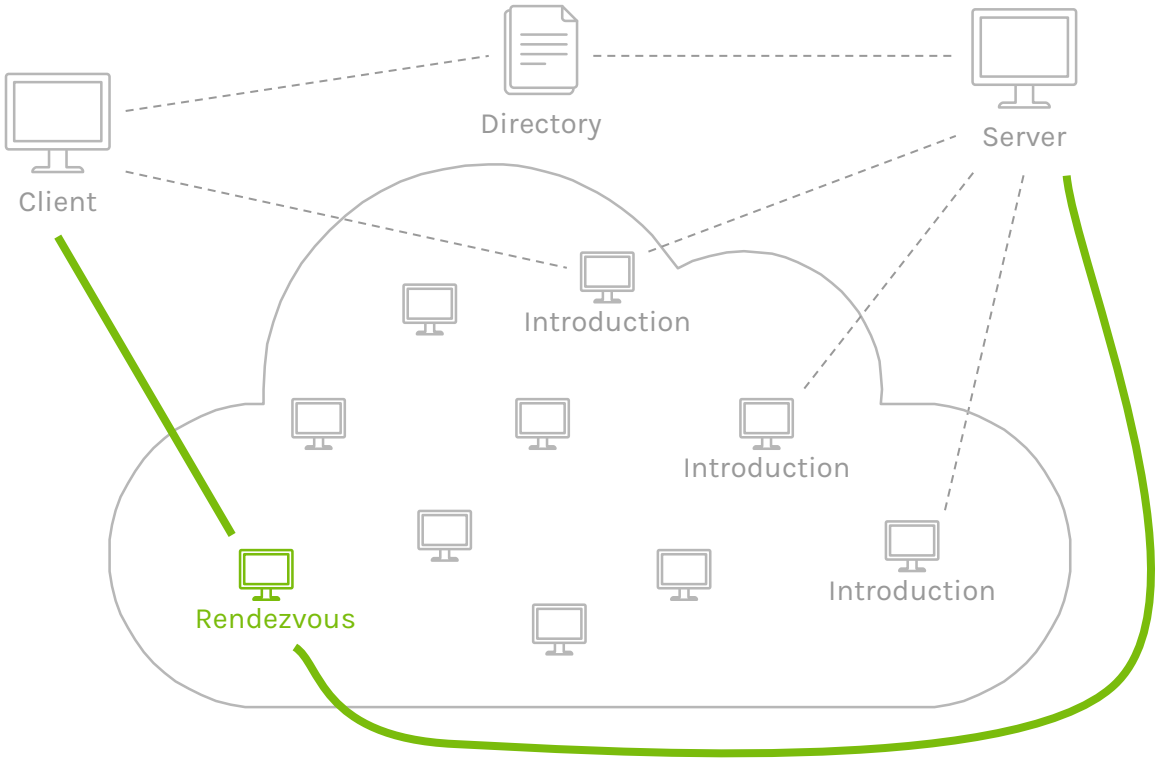

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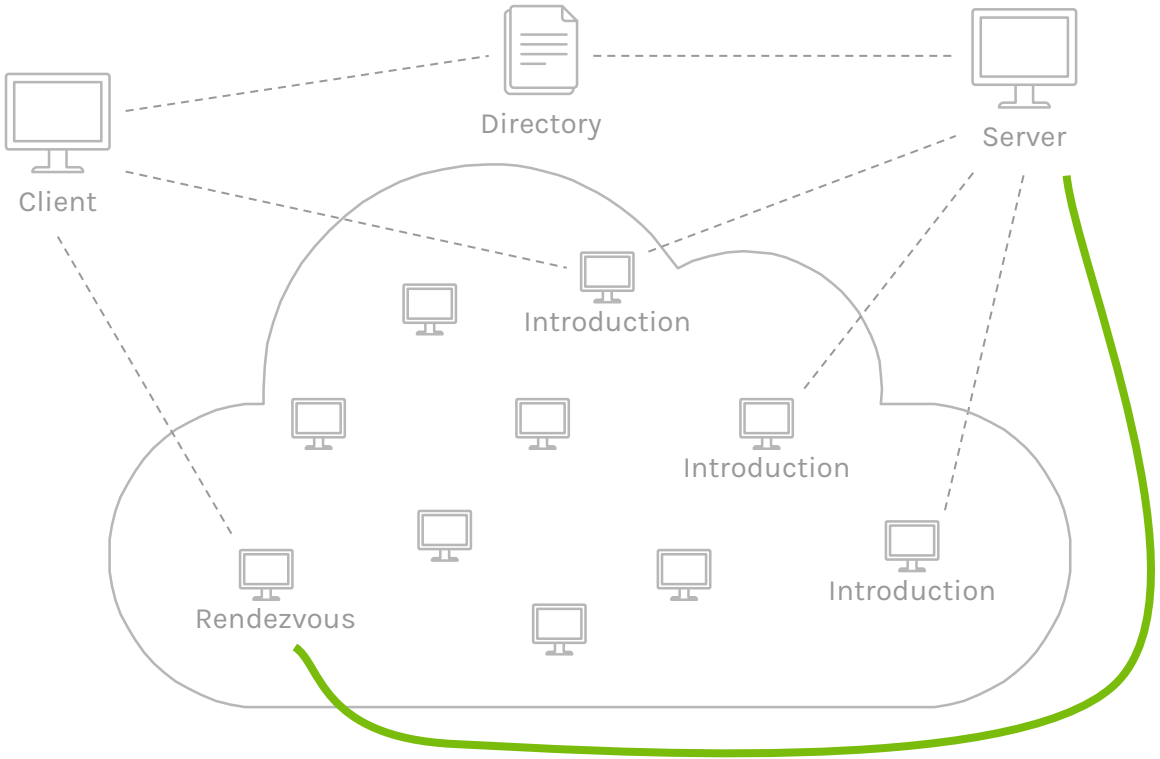

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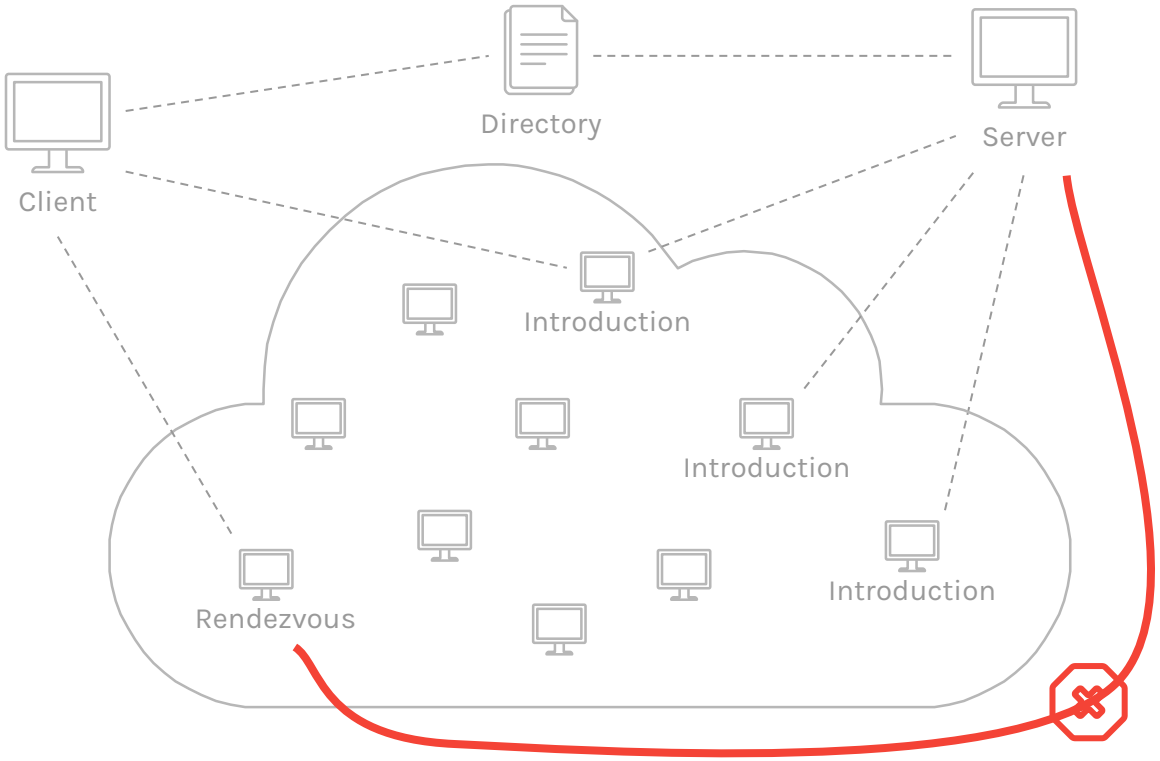

The Attack

Original:

The Attack

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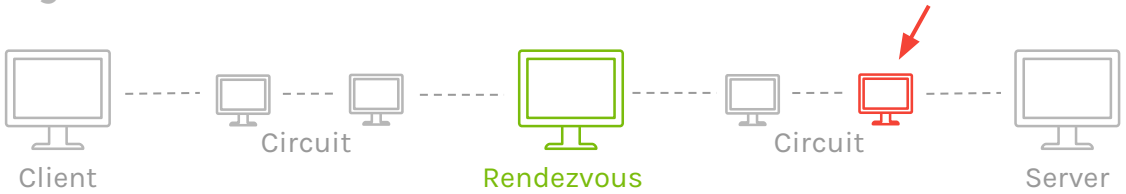

The Attack

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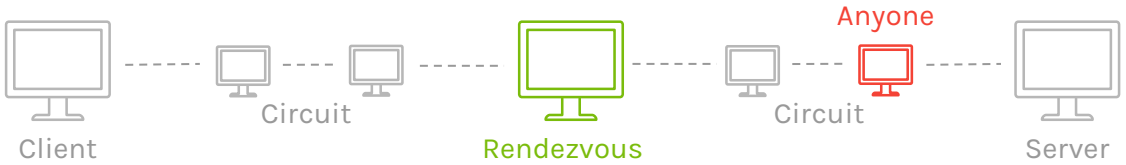

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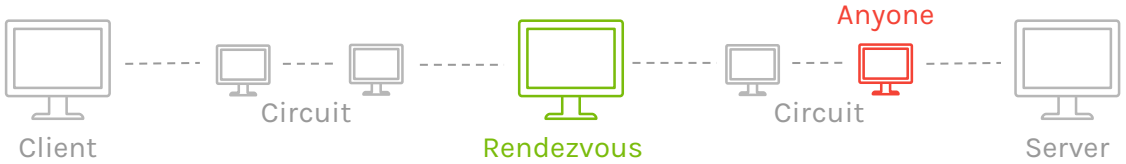
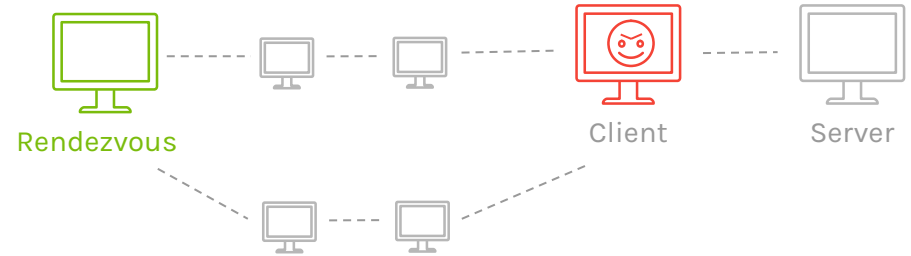


Objective:

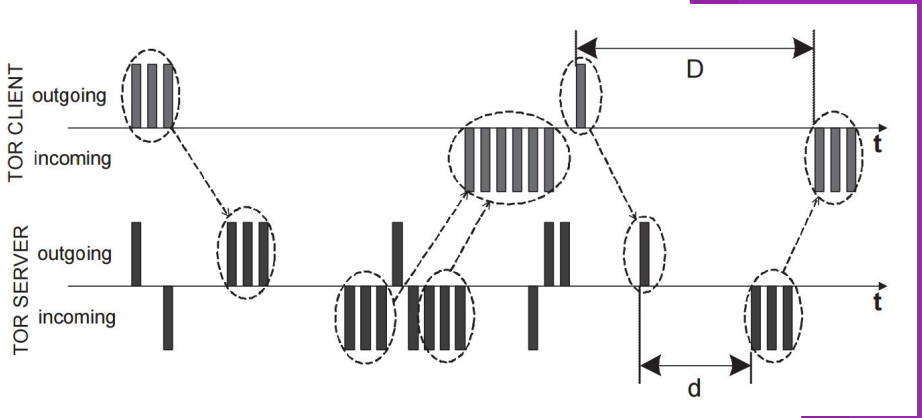


EXPERIMENTAL **SETUP**

- 2 hidden services on Tor
- Changes to client application code
  - Client -> 1 hop -> Rendezvous point
  - Easily create/destroy circuits to hidden server
  - Middleman node
  - Make middleman node trust-worthy to others

MODES OF **ATTACK**

- Timing analysis
- Service location attack
- Predecessory attack
- Distance attack



Owning the Rendezvous Point

MODES OF **ATTACK**

- Timing analysis
- Service location attack
- Predecessory attack
- Distance attack

Table 1. Experimental results of our attacks.

	Sample time	Time to first match	Circuits completed	Matched circuits	Largest single IP	Second largest
Server 1	7.8h	15 min	676	37	46%	5%
Server 1	6.8h	3 min	432	26	54%	7%
Server 2	4.9h	28 min	447	31	71%	3%
Server 2	10.6h	3 min	990	56	54%	7%

Owning the Rendezvous Point

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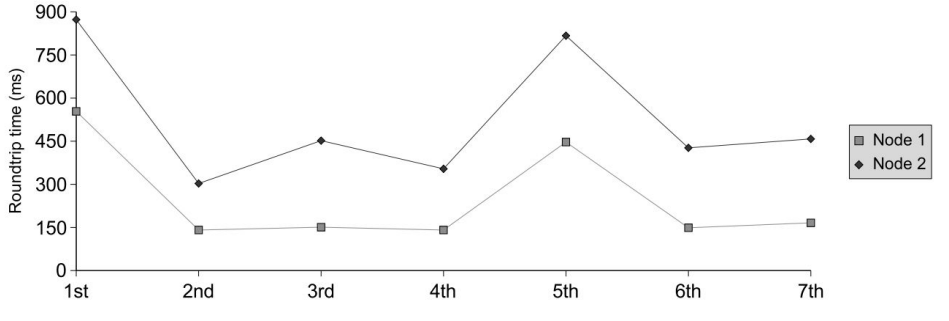


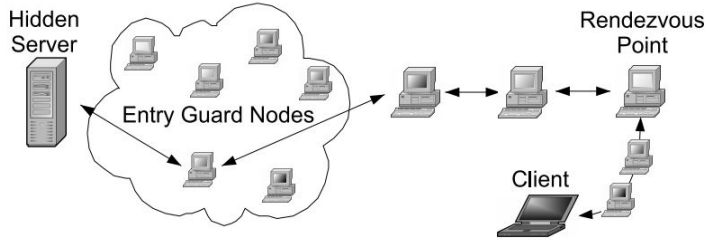
Owning the Rendezvous Point

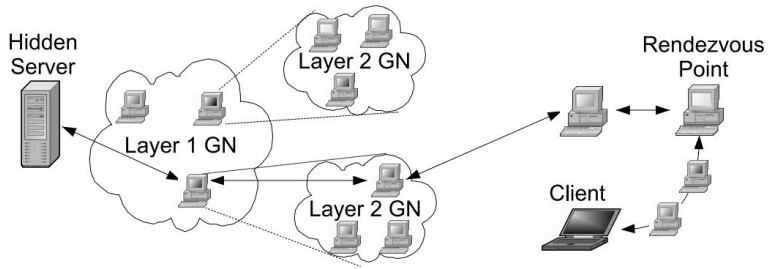
COUNTERMEASURES

- Dummy traffic
- Extend path between hidden server and rendezvous point
- Entry guard nodes (best)

Table 2. Experimental results when Hidden Server is using Entry Guard Nodes.

	Total circuits completed	Matched circuits	Largest single IP	Second largest	Third largest
Test 1	292	8	7	1	0
Test 2	106	6	5	1	0
Test 3	296	13	12	1	0
Test 4	292	10	4	3	3





WEAKNESSES

- Little address on edge cases
  - Dummy traffic vs timing signatures
  - Distance attack vs latency
  - Number of hidden services for experiments
- Solution is not perfect

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