UNIVERSITÄT
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DNS Censorship

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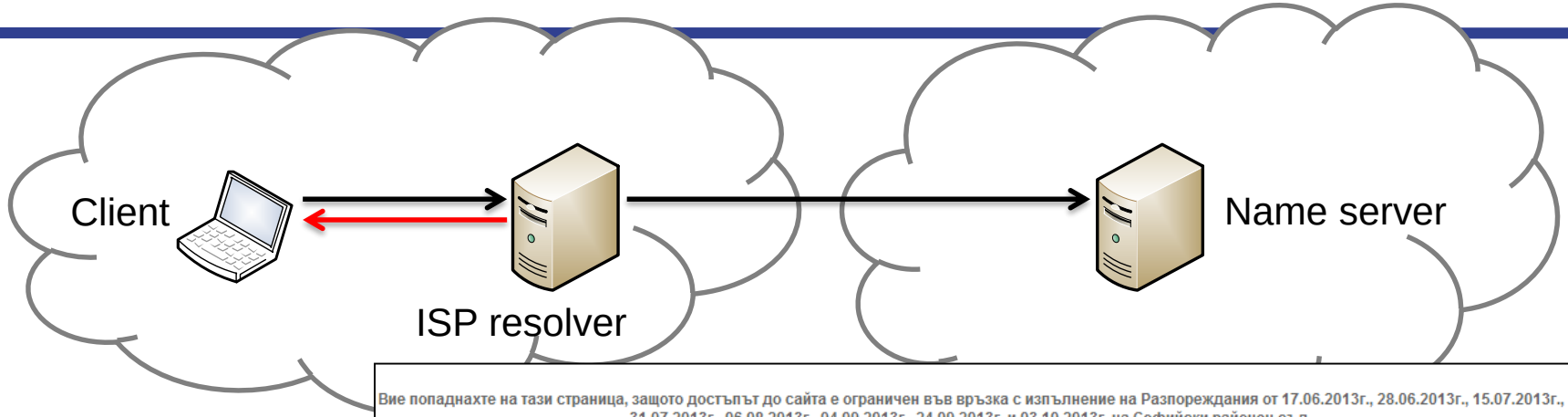
Internet-Technology & Web Engineering

DNS Filtering on ISP Resolver



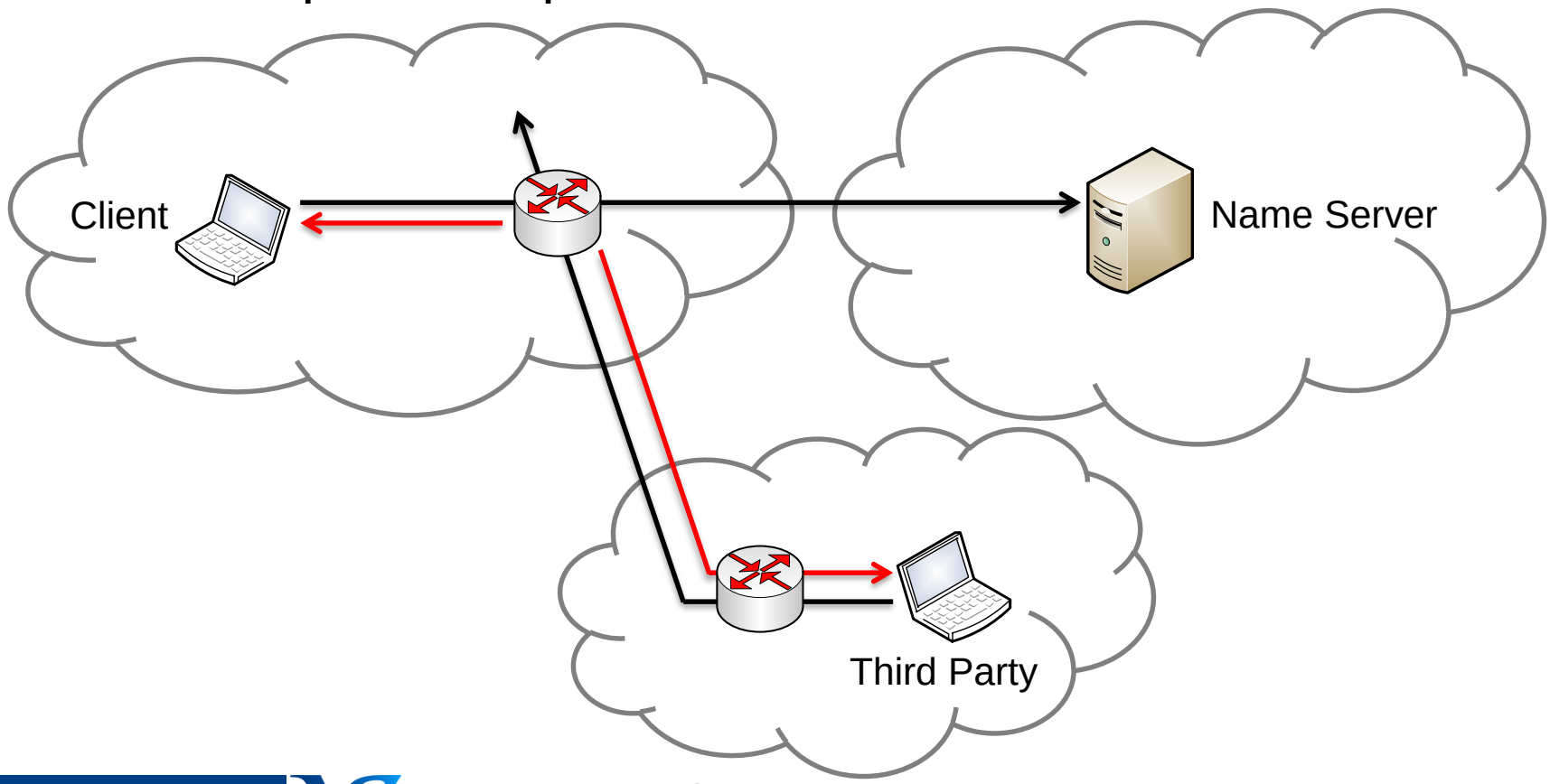
Вие попаднахте на тази страница, защото достъпът до сайта е ограничен във връзка с изпълнение на Разпореждания от 17.06.2013г., 28.06.2013г., 15.07.2013г., 31.07.2013г., 06.08.2013г., 04.09.2013г., 24.09.2013г. и 03.10.2013г. на Софийски районен съд.

Case Study: Twitter/Youtube filter in Turkey

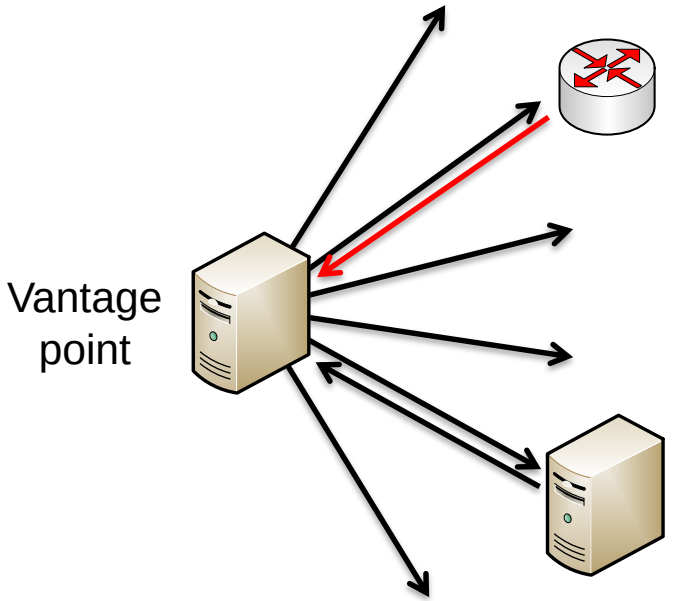
- Turkish ISPs ordered to filter Twitter/Youtube
- DNS filtering on ISP resolver
  - Easily bypassed
  - Public open resolvers
- Block access to 8.8.8.8
  - Later, ISPs hijack 8.8.8.8
- IP filtering of websites
  - High maintanence cost

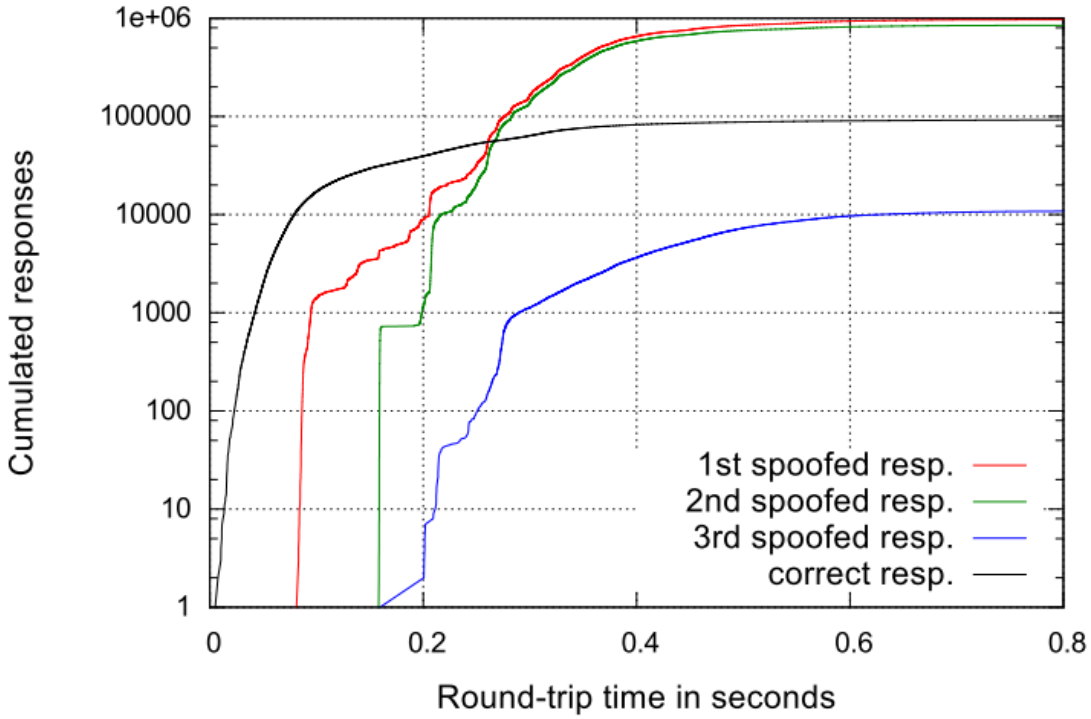
DNS Filtering by Packet Injection

- Deep Packet Inspection of all DNS queries
  - Router spoofs responses for unwanted domain names



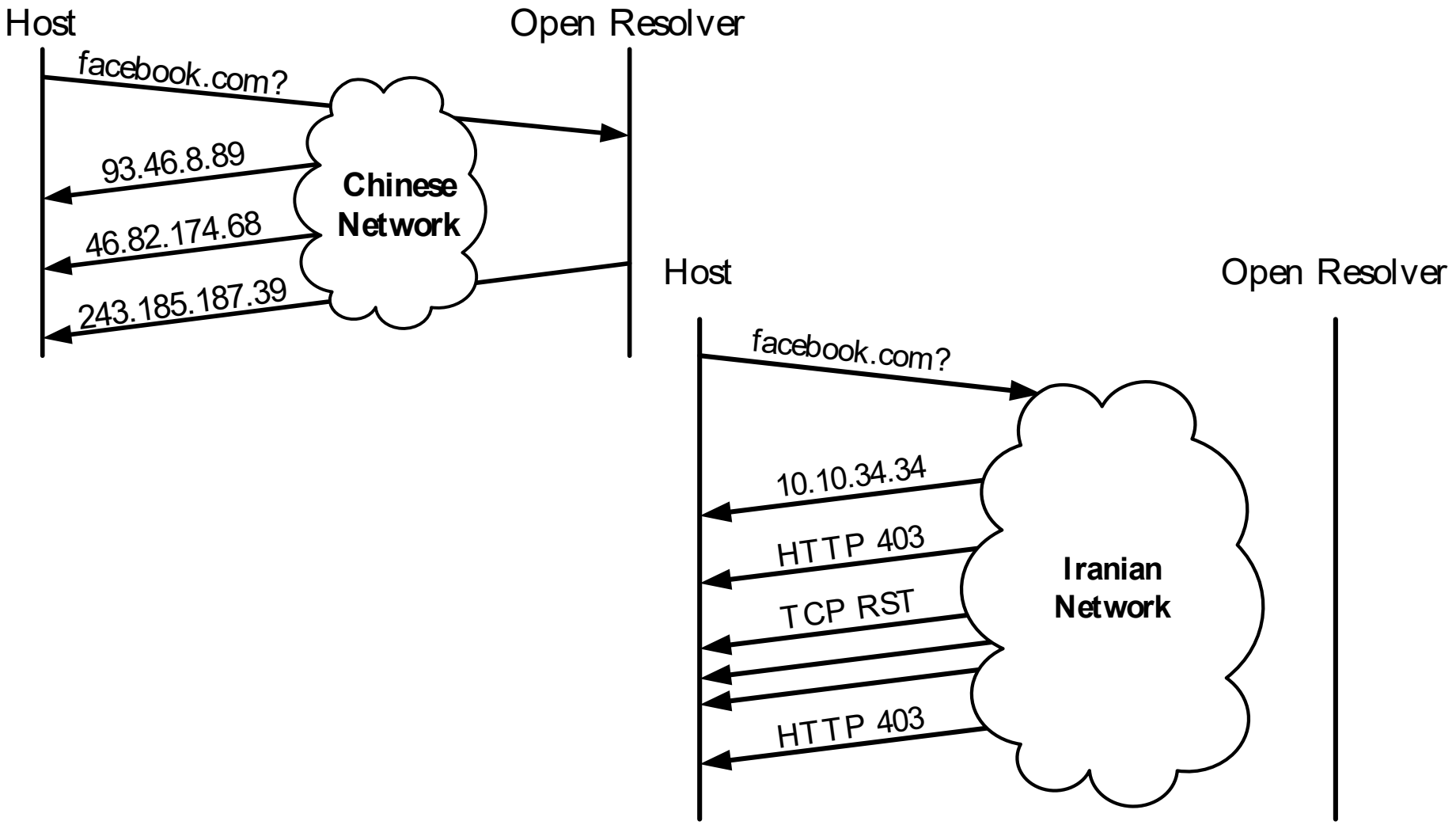
Probing for DNS Injectors



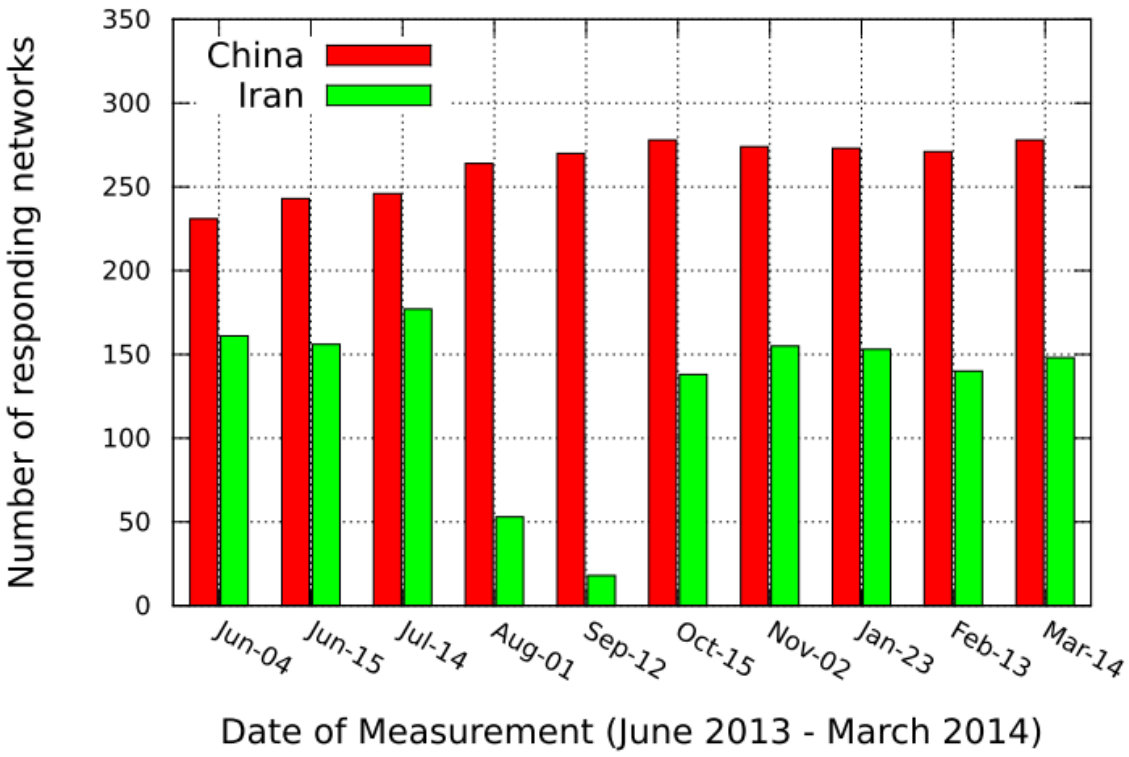


- 100k correct responses from open resolvers
- 1.9M spoofed responses from 1.1M addresses

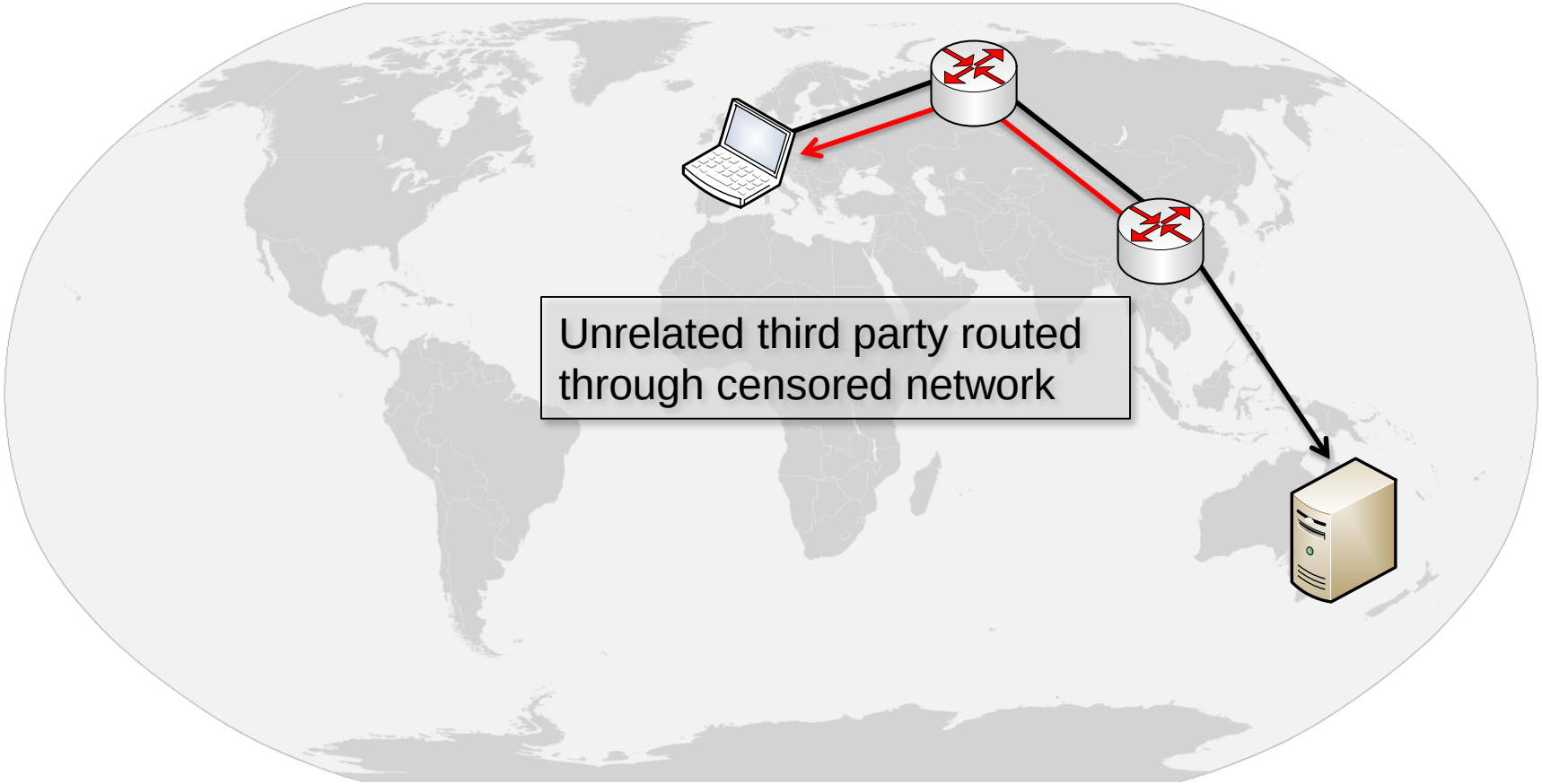
DNS Injection in China and Iran



Injected „facebook.com“ Responses over Time



What if… ? Impact on Third Parties

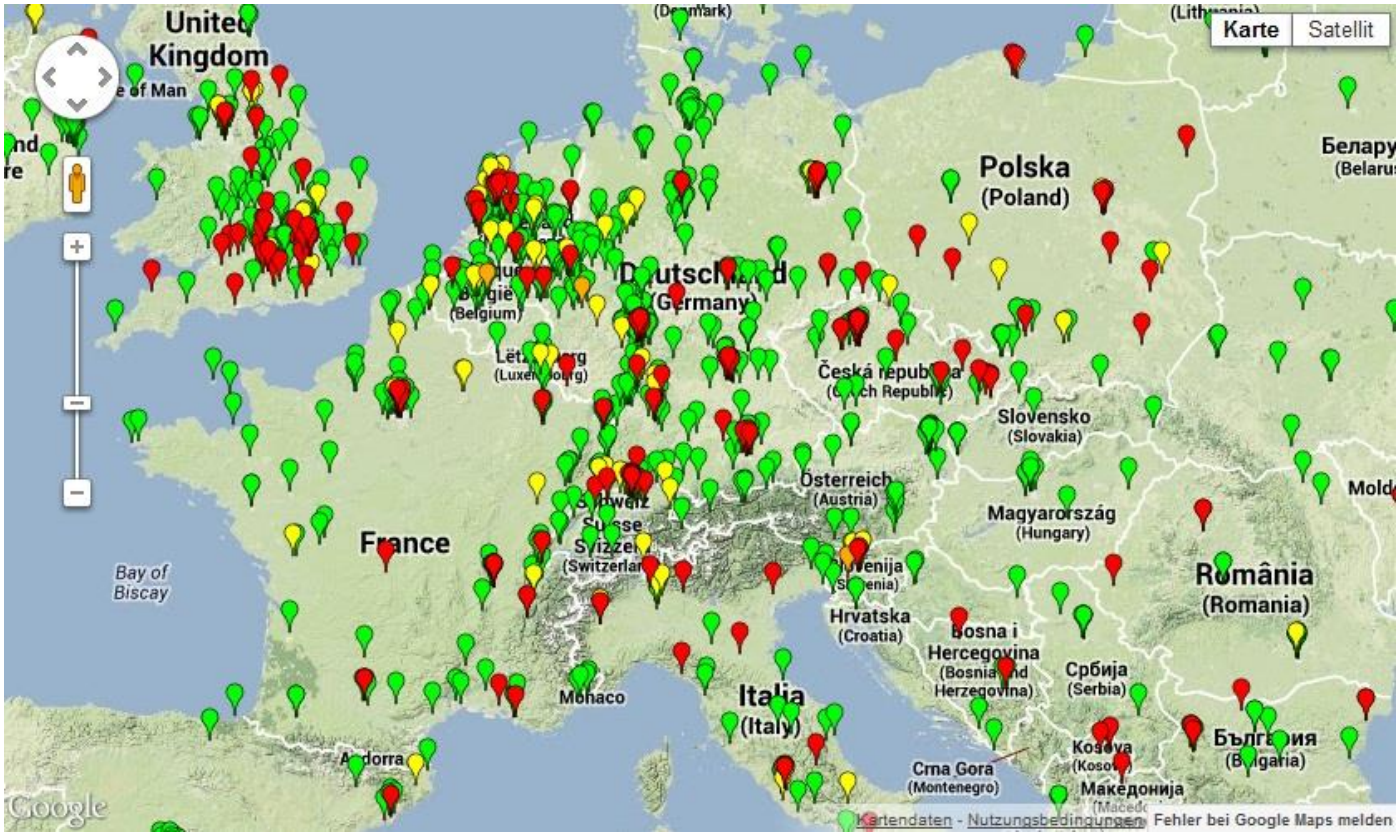


Measurement with RIPE Atlas for „de“

- Measure impact with RIPE Atlas network
  - Few thousand hardware probes worldwide

- Send DNS query to „de“ top-level domain server
  - Check if response is spoofed

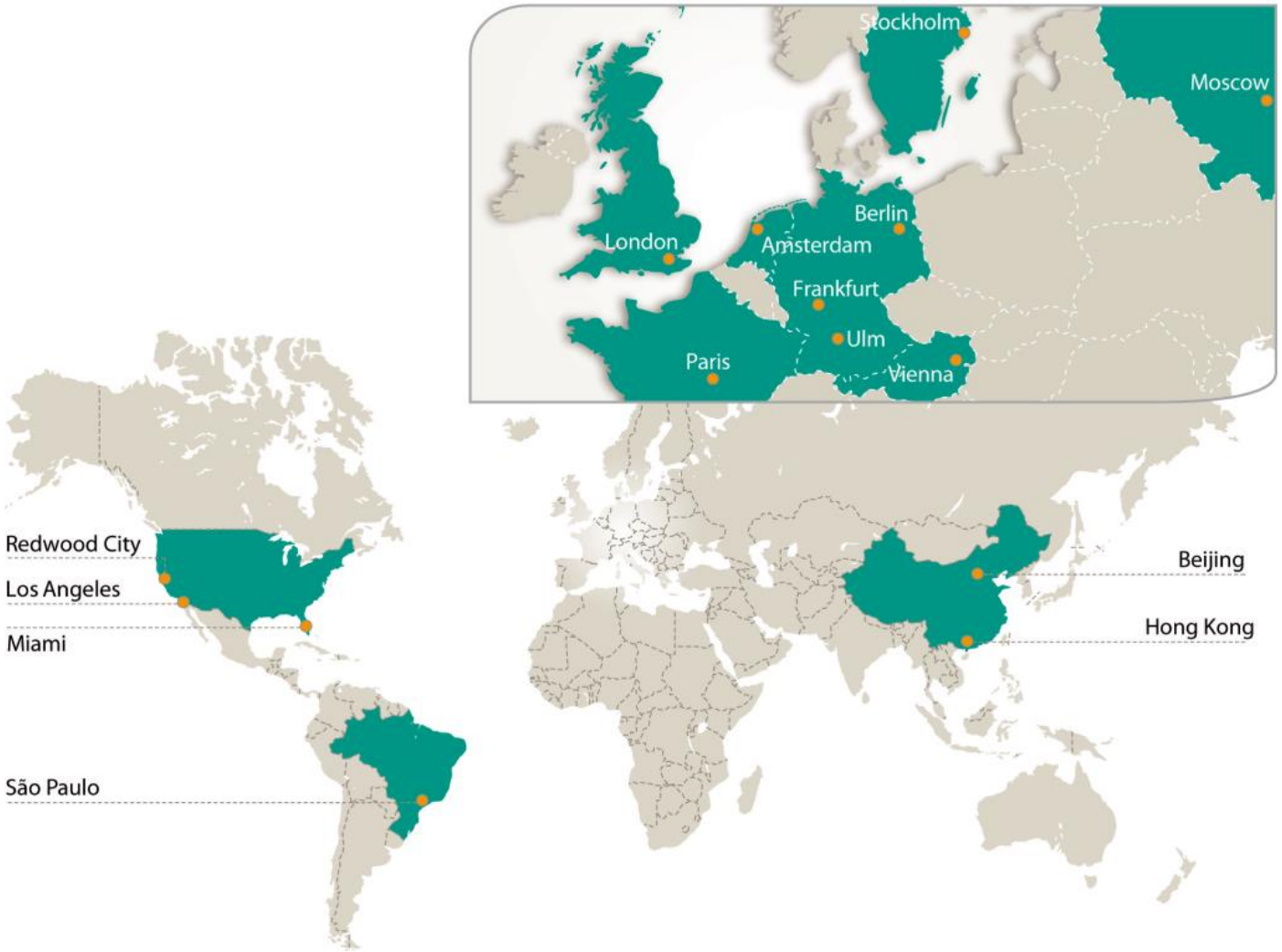
Measurement with RIPE Atlas for „de“



Sep 2012

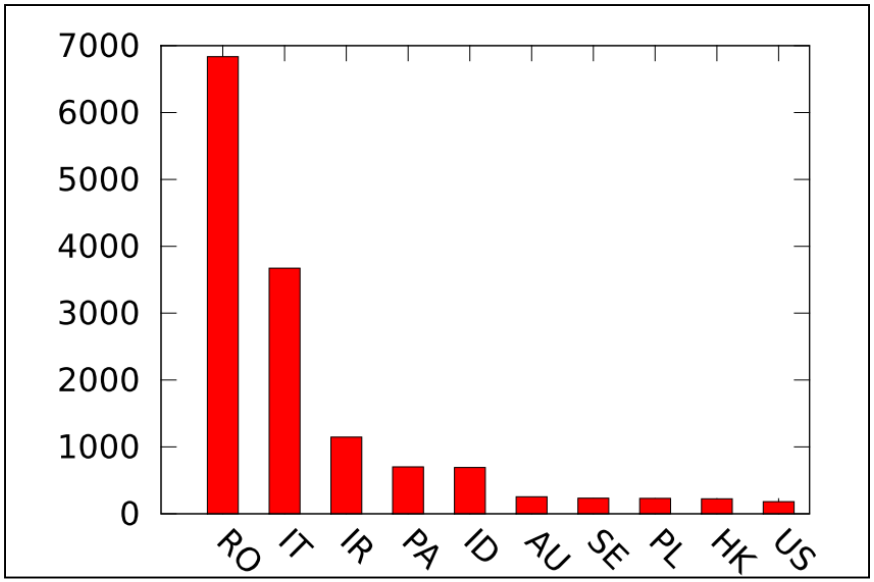
- Green: all good Red: affected
  - Yellow: routed to China but not affected

Anycast Locations of „de“



Measurement with Open Resolvers for all TLDs

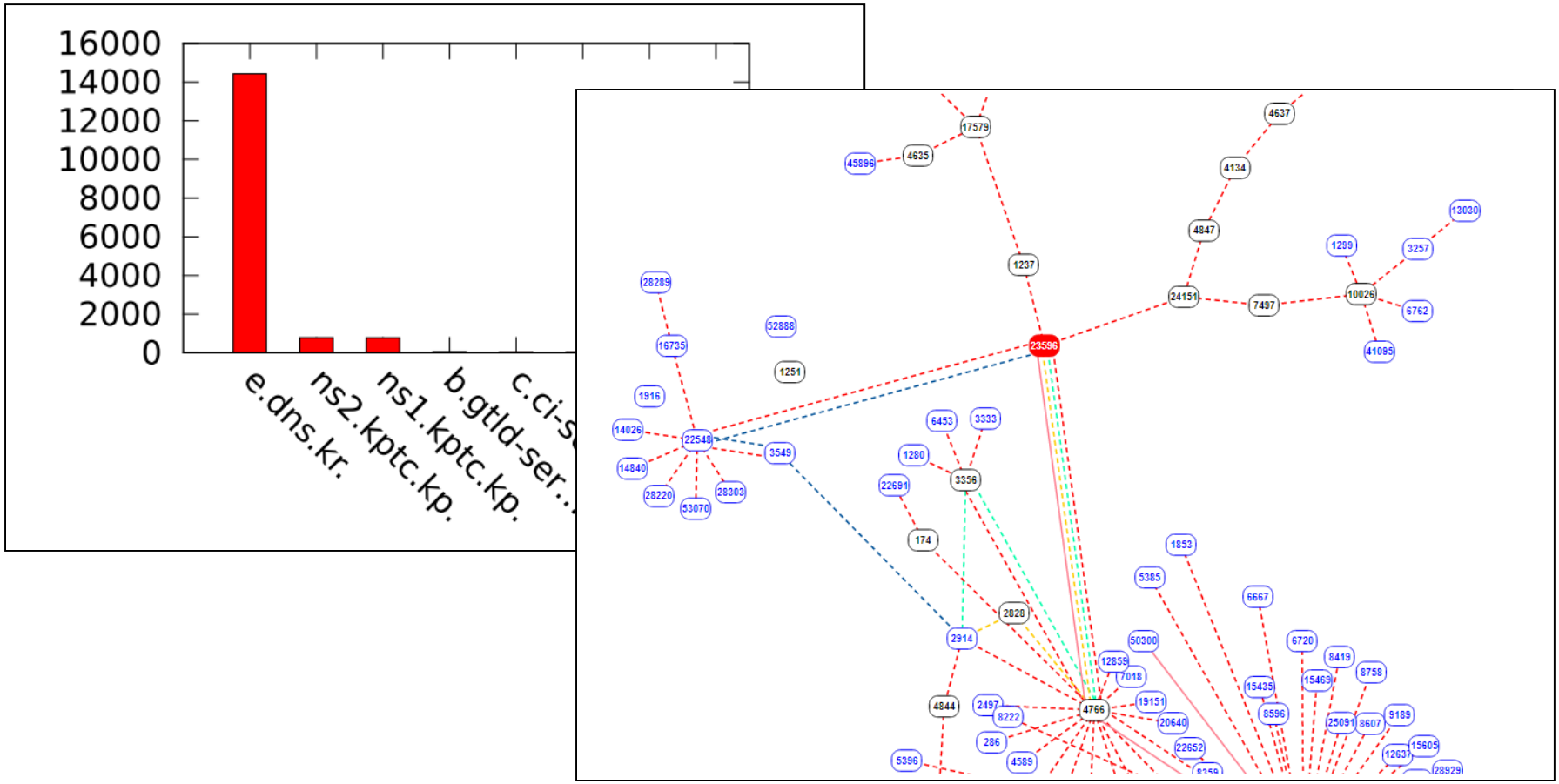
- Test 270k open resolvers with all TLDs
  - 15k in China, all affected from DNS injection
  - 245k outside of China in 188 countries/regions
- 15k affected by Chinese DNS injection (6%)



Affected	CC	AS#	Organization
6826	RO	9050	Romtelecom
3455	IT	3269	Telecom Italia
701	PA	11556	C&W Panama
263	IR	12880	ITC Iran
231	SE	3301	TeliaSonera
166	IR	48159	TIC Iran

Affected Destination Name Servers

- 14k resolvers affected from e.dns.kr (5.7%)



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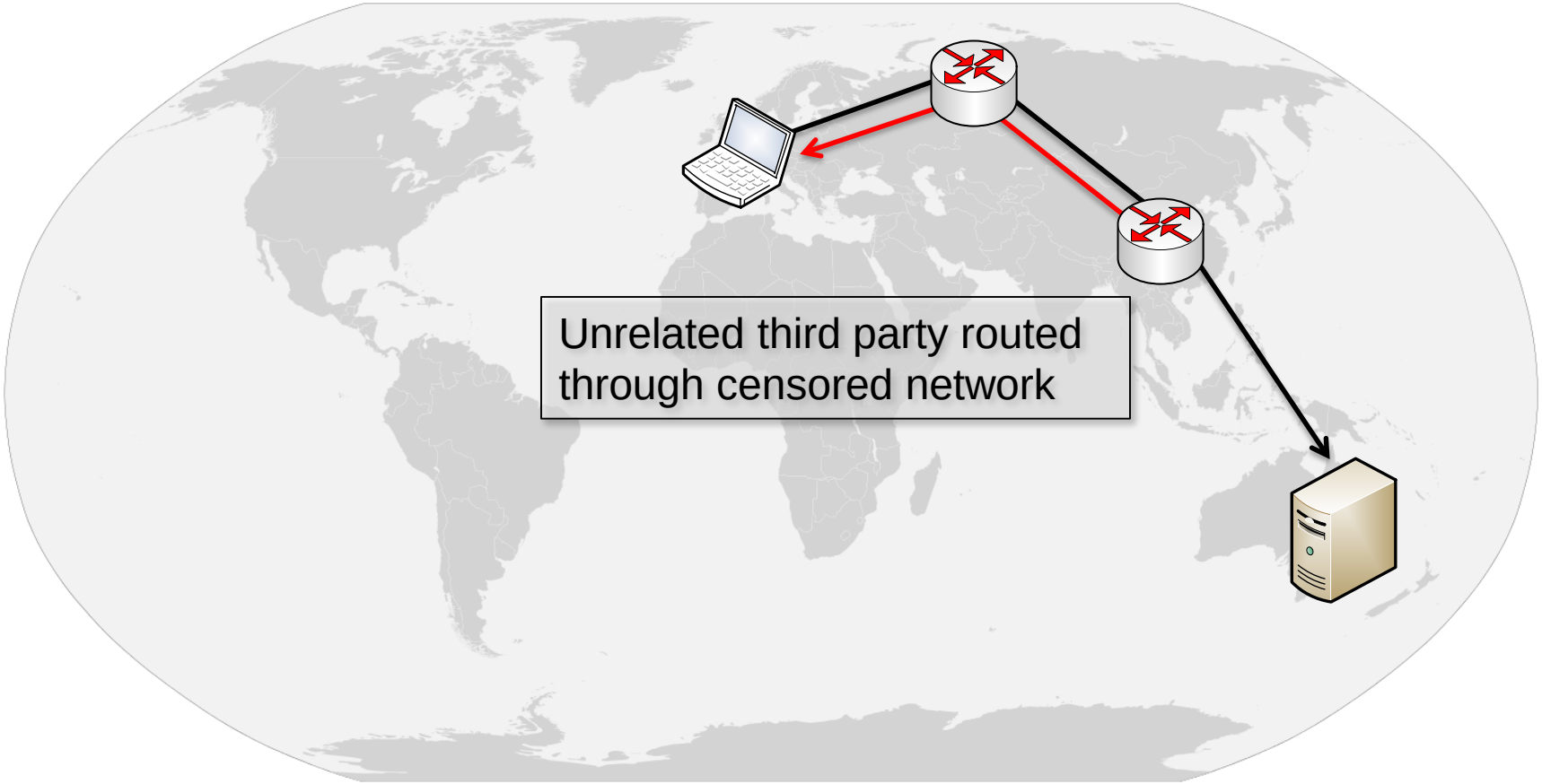

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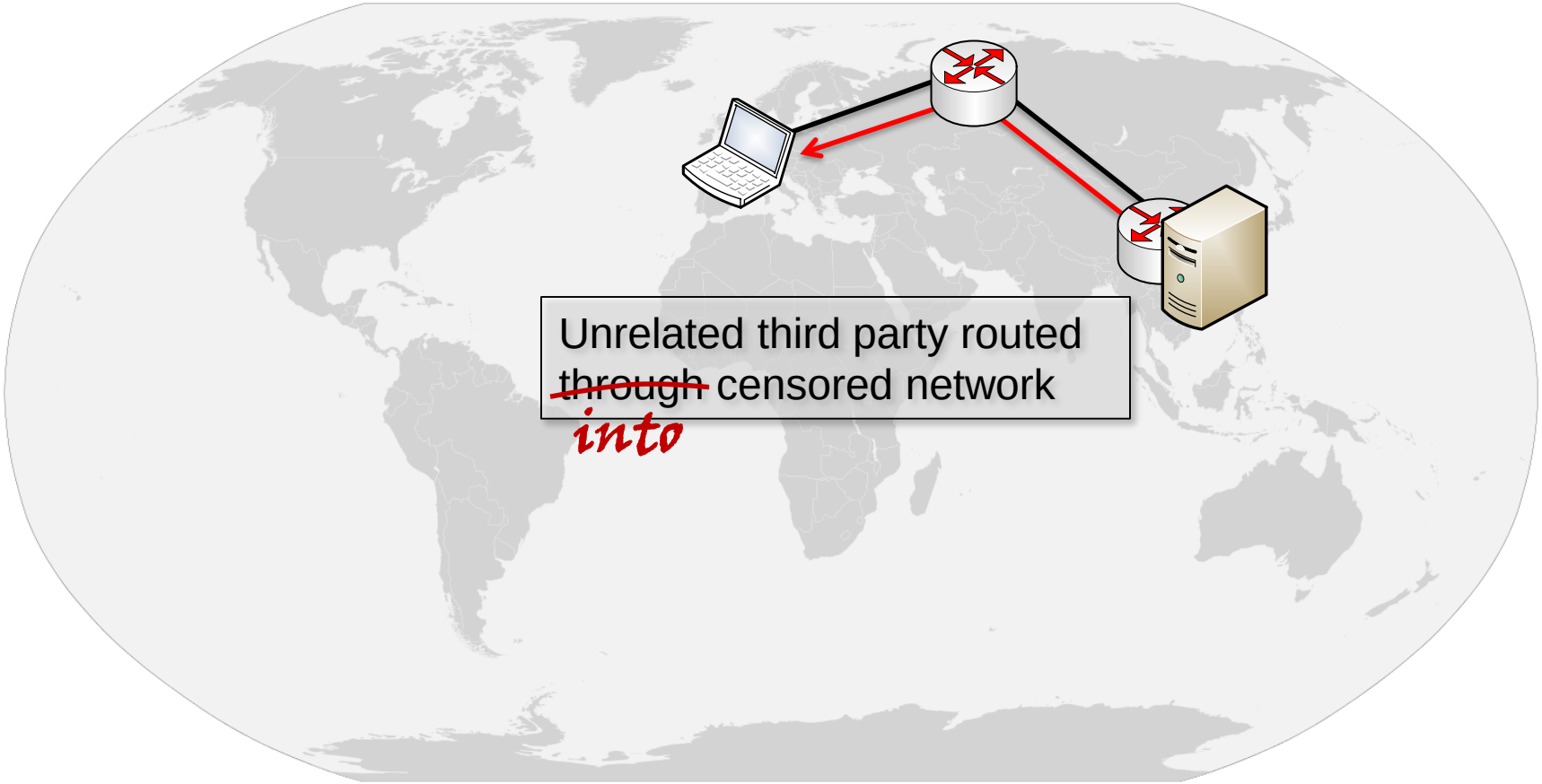

Conclusion

- DNS filtering on ISP resolver
  - Ineffective
- DNS filtering by packet injection
  - Can affect foreign third-parties
- DNSSEC mitigates effect of DNS injection