Investigating Advertisers' Domain-changing Behaviors and Their Impacts on Ad-blocker Filter Lists

Su-Chin Lin*, Kai-Hsiang Chou*, Yen Chen, Hsu-Chun Hsiao,
Darion Cassel, Lujo Bauer, Limin Jia

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國立臺灣大學
National Taiwan University

Carnegie Mellon University

NSLAB
National Taiwan University
Network Security Lab

CyLab Carnegie Mellon University
Security and Privacy Institute

* Both authors contributed equally to this research.

How Ad Blocker Works

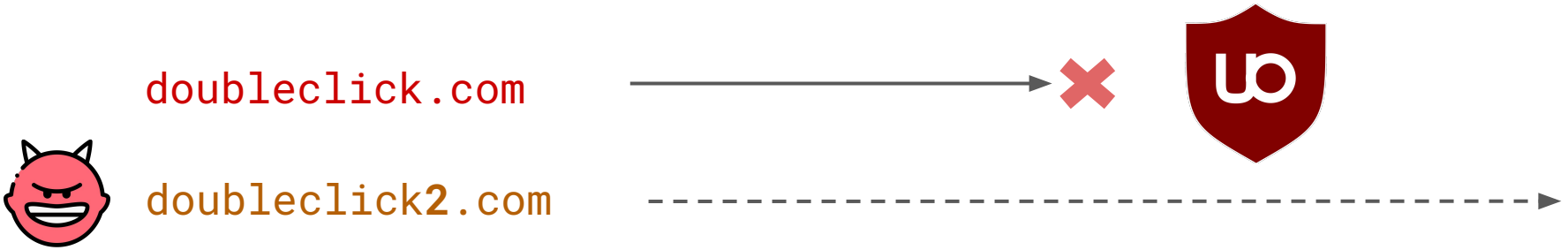
- Ad blockers rely on static filer lists to block ad domains

How Advertisers Circumvent Ad Blockers

- Anti ad-blocker
- Bad user experience

How Advertisers Circumvent Ad Blockers

- Previous research [11,15,36,56] observed that advertisers change domains to circumvent ad blockers
- But no systematic investigation on the impact



We define doubleclick**2**.com as a *replica ad domain (RAD domain)*

A Real-world Case: *Clickadu's* RAD Domains

RAD domain	Appearing date	Blocked date
sghehllds.com	2019-06-21	2019-07-25
drjgjngf.com	2019-06-22	2019-07-15
qumagee.com	2019-07-16	2019-10-04
xineday.com	2019-08-18	2019-09-05
mrzikj.com	2019-08-26	2019-10-09
tibacta.com	2019-09-01	2019-09-07

Motivation

- No prior study has systematically investigated the RAD domain influence
- We would like to know the prevalent and privacy impact of RAD domains
- Analyzing RAD domains can potentially help filter-list maintainers to react to domain-chaning behaviors

Research Questions and HighLights

1. What are the common patterns of RAD domains?
    - We propose methods for discovering RAD domains
    - We present a taxonomy of common doman-changing patterns

Research Questions and HighLights

2. How prevalent are RAD domains?
    - RAD domains appear on 10.24% of the 50K websites we crawled

Research Questions and HighLights

3. What is the privacy impact of RAD domains?
    - RAD domains can additionally extend the timespan of the ad domain for 558 days

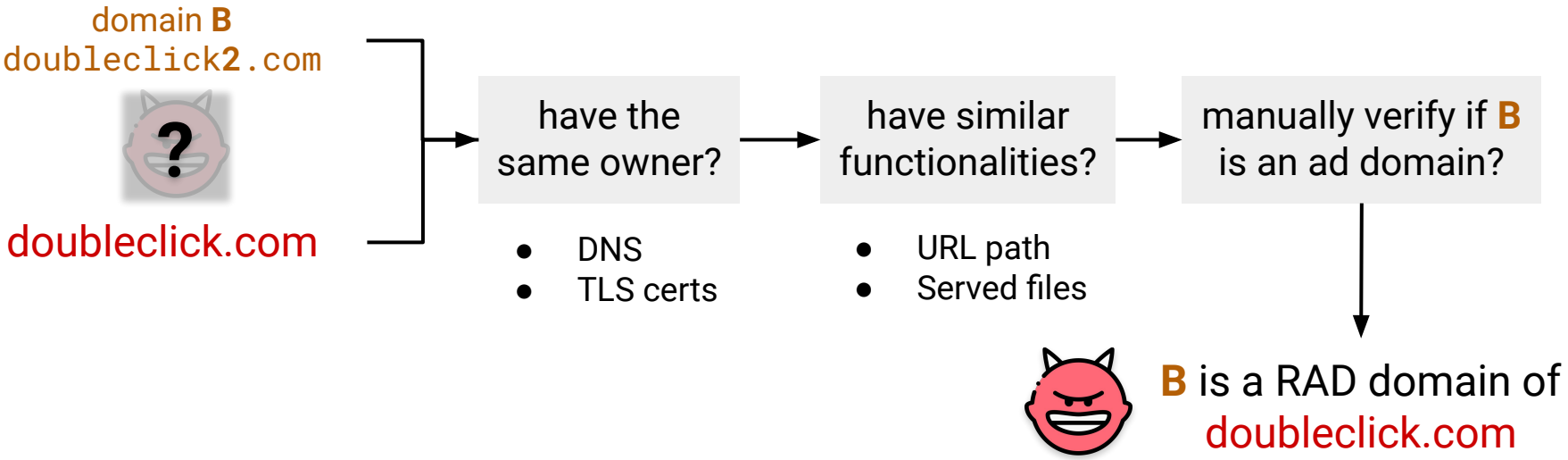
Methodology

- How do we identify RAD domains?
- Is a domain **B** doubleclick2.com an RAD domain of doubleclick.com?

domain **B**
doubleclick**2**.com

doubleclick.com

Methodology



Results - How Prevalent Are RAD Domains?

- We identified 1,748 RAD domains, and 652 of them were not blocked as of Feb. 2021
- We discoverd 10.24% of the 50K websites we crawed sent at least one request to RAD domains

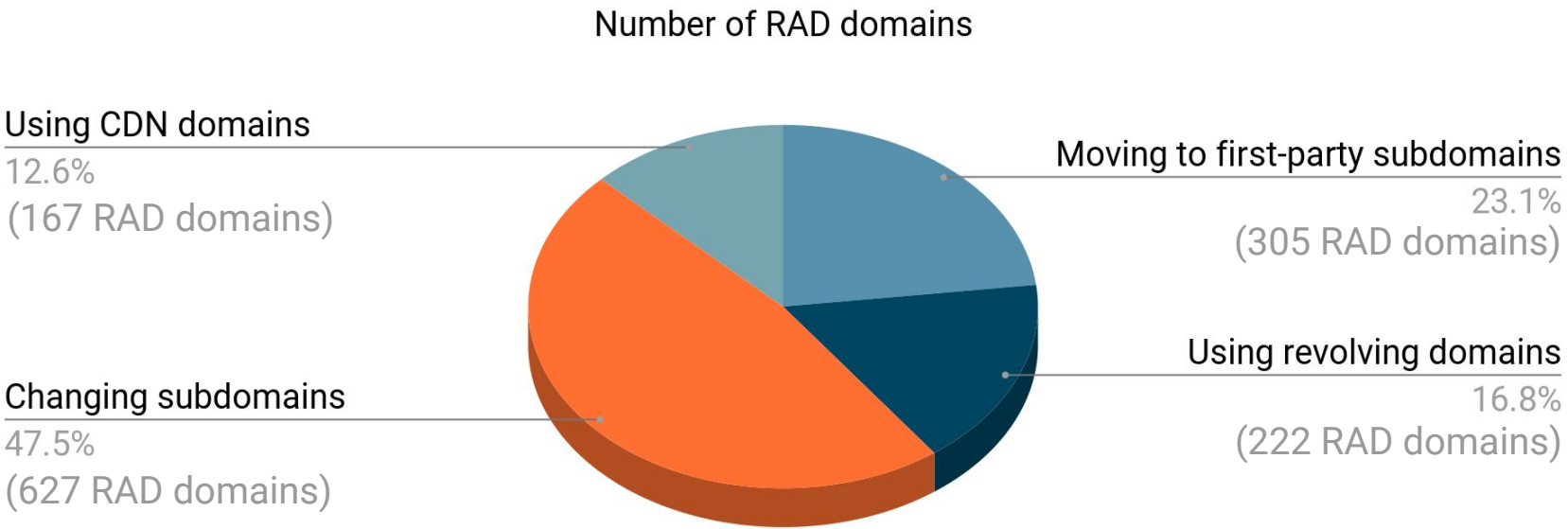
RAD domains are prevalent and can substantially harm user’s privacy

Results - What Is the Privacy Impact?

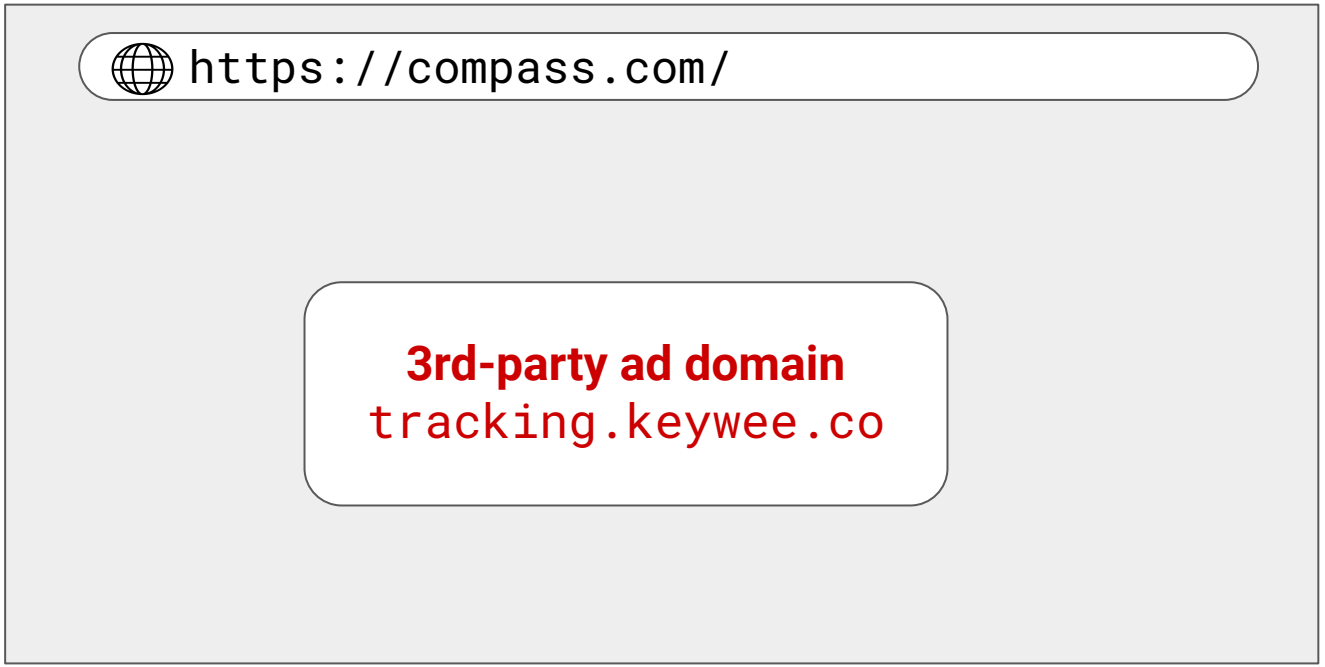
- 415 (23.7%) of RAD domains exhibit privacy-intrusive behaviors by DuckDuckGo's Tracker Radar
- RAD domains can additionally extend the timespan of the ad domain for 558 days

RAD domains are an effective approach to circumvent ad blockers

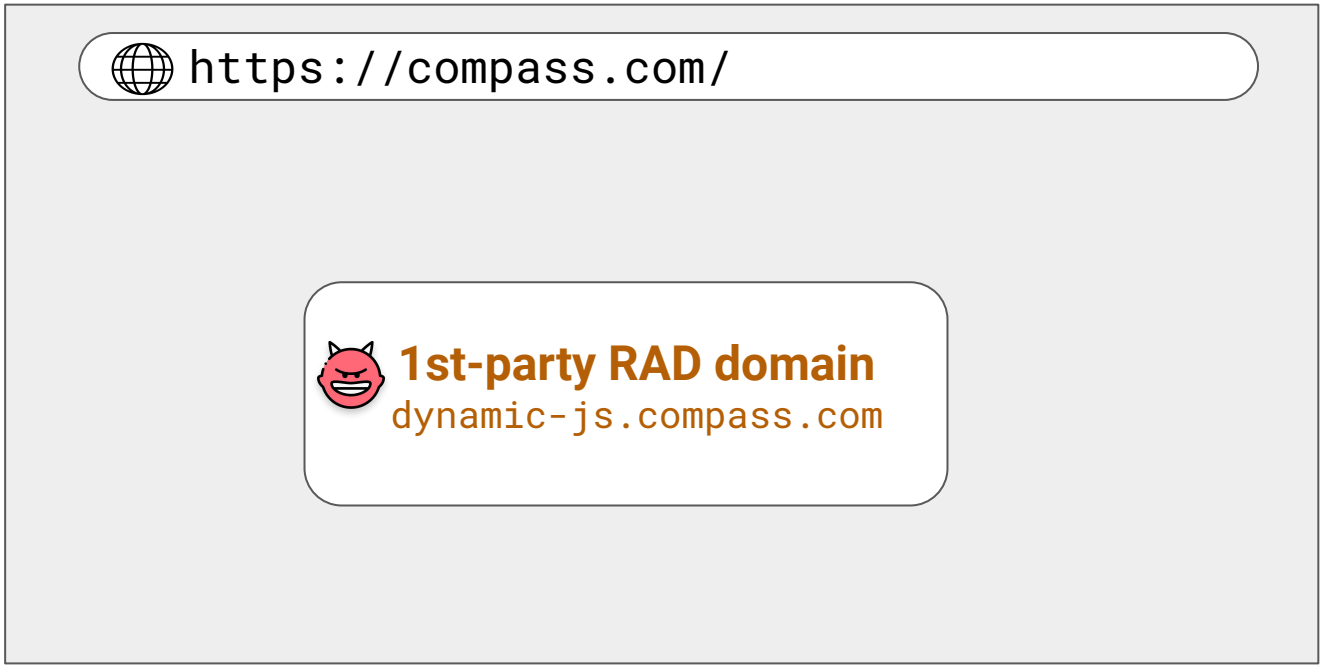
Results - What Are the Common Patterns?



Results - Moving to First-party Subdomains



Results - Moving to First-party Subdomains



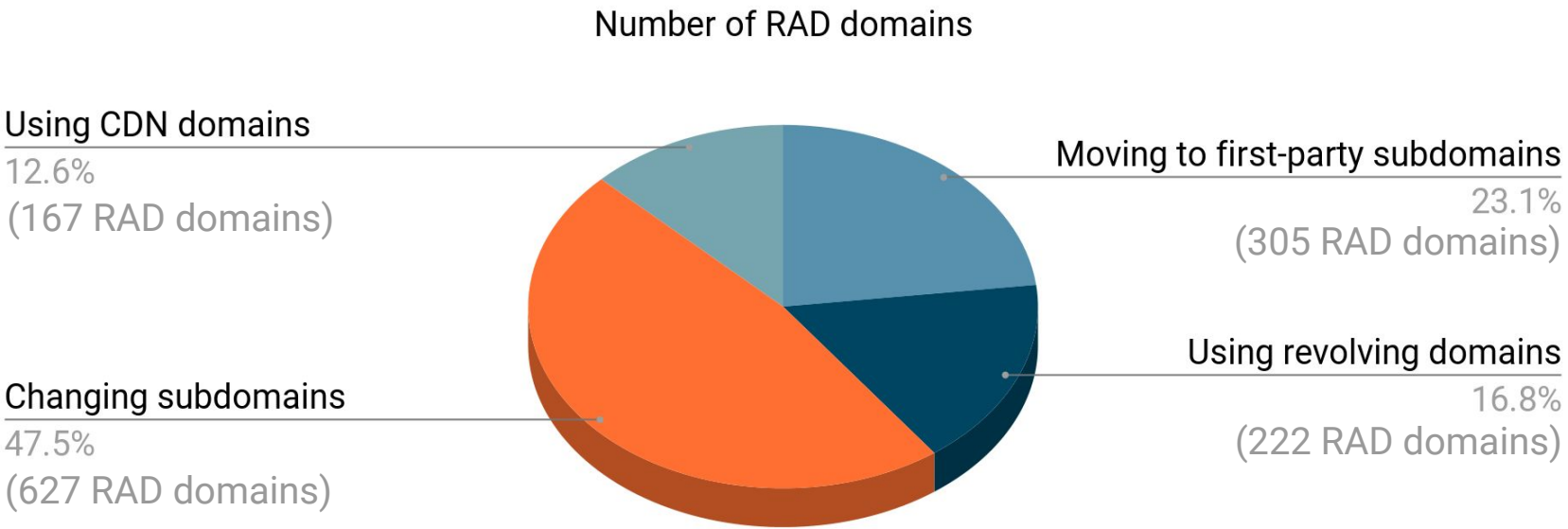
Results - Moving to First-party Subdomains

- Filter list policy is lenient regarding first-party ad domains
- It blurs the trust boundary between 1st and 3rd-party websites
- Advertisers encourages publishers to delegate ads using first-party proxy subdomains to bypass ad blockers

Results - Moving to First-party Subdomains

- Recommendation
  - **Content publisher**: should be transparent about the cooperation with advertisers
  - **Filter-list maintainers**: should consider the actual information flow on first-party domains

Results - What Are the Common Patterns?



Discussion - Possible Reasons For Using RAD Domains

- Customer isolation
- Localization
- Infrastructure changes
- Ad-blocker evasion

Future Work

- Report RAD domains to filter list community
- Improve our methodology to identify RAD domains
- Facilitate filter-list maintainer to react to RAD domains

Conclusion

- We propose methods for discovering RAD domains
- We present a taxonomy of RAD domain patterns
- RAD domains appear on 10.24% of the websites we crawled
- RAD domains extend the timespan of the ad domain for 558 days


Su-Chin Lin


r07922067@ntu.edu.tw


https://github.com/csienslab/RAD-domain-analysis/

Icon Credit

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