

The Mirai Botnet

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Binary Beasts

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- Title: *Understanding the Mirai Botnet*

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- This paper then proposes reforms that can be made to prevent this kind of attack in the future

Contributions

- Lead Author

- Zane Ma - University of Illinois Urbana-Champaign

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 - Manos Antonakakis - Georgia Institute of Technology
 - Tim April - Akamai Technologies
 - Michael Bailey - University of Illinois Urbana-Champaign
 - Matthew Bernhard - University of Michigan
 - Elie Bursztein - Google
 - Jaime Cochran - Cloudflare
 - Zakir Durumeric - University of Michigan
 - J. Alex Halderman - University of Michigan

Contributions Cont.

- Continued...
 - Luca Invernizzi - Google
 - Michalis Kallitsis - Merit Network
 - Deepak Kumar - University of Illinois Urbana-Champaign
 - Chaz Lever - Georgia Institute of Technology
 - Joshua Mason - University of Illinois Urbana-Champaign
 - Damian Menscher - Google
 - Chad Seaman - Akamai Technologies
 - Nick Sullivan - Cloudflare
 - Kurt Thomas - Google
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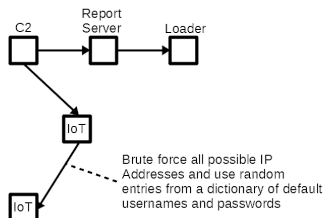
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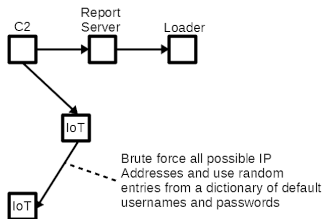
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 - In December 2016, it peaked at 600,000 devices before beginning to fade

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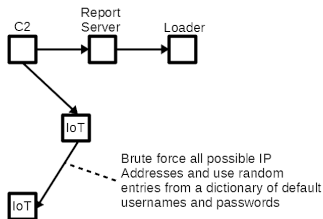


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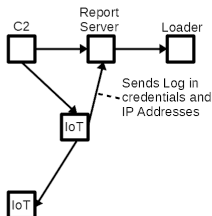
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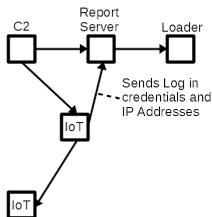
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- These were small dictionaries, containing 60 to about 200 credentials

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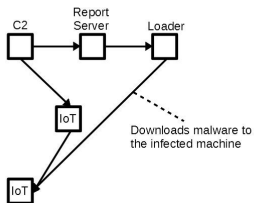
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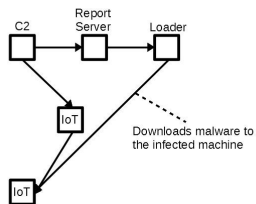
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- This information could later be used by the Command and Control (C2) server

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- This program would download a binary onto the victim and run the program

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 - These organizations would be much more likely to start search for and exploiting weaknesses in the malware if it infected their machines

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 - Brazil, Colombia, and Vietnam hosted most of the bots

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 - It's nearly impossible to distinguish between real requests and the attack.

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- With requests from multiple machines, it is difficult to prevent or dampen an attack on a server.

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- Lonestar Cell - most attacked target, destroyed internet capabilities in Liberia

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- Many binaries used by the malware were captured
- A number of organizations tried a variety of techniques and shared their information for this paper.

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 - Identified scans that targeted the IPv4 address space at an estimated rate of at least five packets per second

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 - In total, identified 31.5 % of banners (about 600k banners)

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 - Identified 67 C2 domains and 48 distinct username password dictionaries (containing a total 371 unique passwords)

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 - Results: 15,194 attacks from 146 unique IP clusters, which cover the Dyn attack and Liberia attacks

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 - At various points, competing command and control servers were subject to DDoS attacks

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- Standards for model and version identification allow server admins to easily see any and all machines that have known vulnerabilities.

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 - Renting out their botnet to other cybercriminals

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- Many attacks, such as the attack on Dyn, are believed to be a result of copy cat attackers

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- This attack served as a wake up call, prompting reform in these industries