A Survey of Real Sybil Attacks

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ABSTRACT

1. INTRODUCTION

The sbyil attack [7] is nowadays a well-known attack on both centralized and decentralized systems and an active research area. Sybil attacks occur in a variety of systems. Attacks can occur in sensor networks , social networks, content rating systems [9], vehicular ad hoc networks and many more. At this point in time, there are already surveys on surveys [10, 12, 18].

The focus of this survey will not be yet another survey on the current state of the art, but will focus on real-world attacks using Sybil, eclipse and sinkholing techniques. We perceive these to be belonging to the same broad class of attacks. The goal is to provide a list of scientific articles and describe the datasets used in their evaluations. The outcome of this survey will be the largest structured collection of various datasets which are collected if the data is publicly available or if the authors are willing to share their data. Additional datasets are added as well which were either created by means of manual annotation or by other parties.
The list of datasets will, for instance, cover fake profiles on social networking sites (Facebook), communication systems (Twitter), search engine link farms, auction sites, review sites, sock puppets on news sites, and various other Internet-deployed systems. A key challenge is the diversity and formatting of these datasets. The goal is to design a unifying format to enable scientists to easily use all available datasets for their latest research findings with minimal effort.

The survey will provide a structured listing with key aspects of each dataset, including, description, origin, size, creation date, and copyright license.

2. DATA USED IN SCIENTIFIC ARTICLES

We have composed a list of scientific articles on the topic of the sybil attack. We list – where applicable and available – the year, amount of nodes in the dataset, amount of sybils, whether it concerns real or synthetic data and whether the dataset is publicly available and mentioned in the paper. The results of this can be found in Table 1.

We observe that none of the papers mention the availability of their dataset in their paper. Also, all papers do not use a dataset with a ground truth.

Year	Mechanism	# Nodes	# Sybils	Real-world data	Dataset availability
2004	Overlay defense* [15]	5050	1010	No	• No link in paper • Public availability unknown • Author response pending
2005	Defending sensors* [24]	No simulation	No simulation	N/A	N/A
2006	Self-registration* [6]	±500	±20	No	• No link in paper • Public availability unknown • Author response pending
2006	SybilGuard [22]	1. 1.000.000 2. 10.000 3. 100	±100	No	• No link in paper • Public availability unknown • Author response pending
2006	Computational Puzzles [2]	No simulation	No simulation	N/A	N/A
2008	Sybillimit [21]	1. 932.512 2. 900.822 3. 106.002 4. 1.000.000	TBD	1. Yes 2. Yes 3. Yes 4. No	• No link in paper • Public availability unknown • Author response pending
2008	Cluster Analysis* [20]	1. 101 2. 94	All possible pairs: 1. 5.050 2. 4.371	Yes (Since it concerns real devices in this paper, we perceive it as real data)	• No link in paper • Public availability unknown • Author response pending
2009	SybilInfer [5]	1. 1.000 2. ±33.000	1. 100 2. ± 2.000	1. No 2. Yes	• No link in paper • Public availability unknown • Author response pending
2009	Timestamp series [13]	No simulation	No simulation	N/A	N/A
2009	SyMon [8]	50.000	2.500 to 25.000 in steps of 2.500	No	• No link in paper • Public availability unknown • Author response pending
2009	Dsybil [23]	1. 496.622 2. 2.339 3. 480.189 4. 6.040 5. 105.283	Unknown	Yes	• No link in paper • Public availability unknown • Author response pending
2009	SumUp [16]	3.002.907	No ground truth Estimation: 12% (360.349)	Yes	• No link in paper • Public availability unknown • Author response pending
2011	GateKeeper [17]	1. Varying (Synthetic) 2. 446.181 3. 539.242	1. Varying 2. 43.725 sybils admitted 3. 76.572 sybils admitted	1. No 2. Yes 3. Yes	• No link in paper • Public availability unknown • Author response pending
2011	Mitigating* [9]	> 65.000 (Sybil network attached, no information on size)	Not mentioned	Yes, real sybils unkown	• No link in paper • Public availability unknown • Author response pending

2011	Leveraging* [4]	542.133	16.264 (3%)	Yes	• No link in paper • Public availability unknown • Author response pending
2011	Incorperating trust* [11]	1. 4.158 2. 82.168 3. 11.204 4. 8.638 5. 7.066 6. 33.696 7. 75.879 8. 614.981 9. 1.000.000 10. 1.000.000 11. 1.000.000 12. 1.000.000 13. 1.134.890	Not mentioned	Yes	• No link in paper • Public availability unknown • Author response pending
2012	SybilDefender [19]	1. 3.072.441 2. 3.097.165	10.000, 5.000, 1.000 (Compromised nodes)	Yes	• No link in paper • Public availability unknown • Author response pending
2013	Sok [1]	1. 718.115 2. 26.588 3. 63.392 4. 92.117	Various	Yes	• No link in paper • Public availability unknown • Author response pending
2013	SybilShield [14]	100.000	500 (generated)	Yes, sybils are synthetic	• No link in paper • Public availability unknown • Author response pending
2014	SybilRank [3]	1. 10.000 2. 18.772 3. 9.877 4. 10.000 5. 7.115 6. 10.000 7. 10.000 8. 10.000	5.000 (connected to each dataset)	Yes, sybils are synthetic	• No link in paper • Public availability unknown • Author response pending

Table 1: Current state of the art reviewed on their datasets. (* = mechanism was not named by the author(s)).

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