Cyber Security Threats in Digital Advertising

Karl Dominguez

Introduction

- ▶ IBM Business Services, Threat Analyst
- Malware Research and Software Development, zvelo Inc.
- Mobile Malware Analyst, Asurion LLC
- ▶ Threat Research Engineer, Trend Micro



Topics

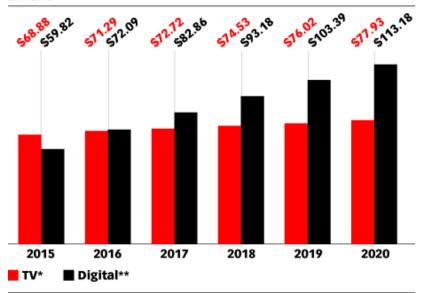
- Digital Advertising Economy
- Ad Tech Ecosystem
- ▶ The Ad Fraud:
 - Publisher-based Ad Fraud
 - Malicious and "Objectionable" Content
 - Non Human Traffic
- The Bieber Project



Digital Advertising Economy

US Digital Ad Spending for 2016 is at \$72 billion

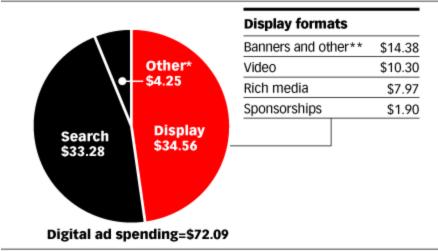




Note: *includes broadcast TV (network, syndication and spot) and cable TV; **includes advertising that appears on desktop and laptop computers as well as mobile phones, tablets and other internet-connected devices, and includes all the various formats of advertising on those platforms Source: eMarketer, Sep 2016

215529 www.eMarketer.com

US Digital Ad Spending, by Format, 2016 billions



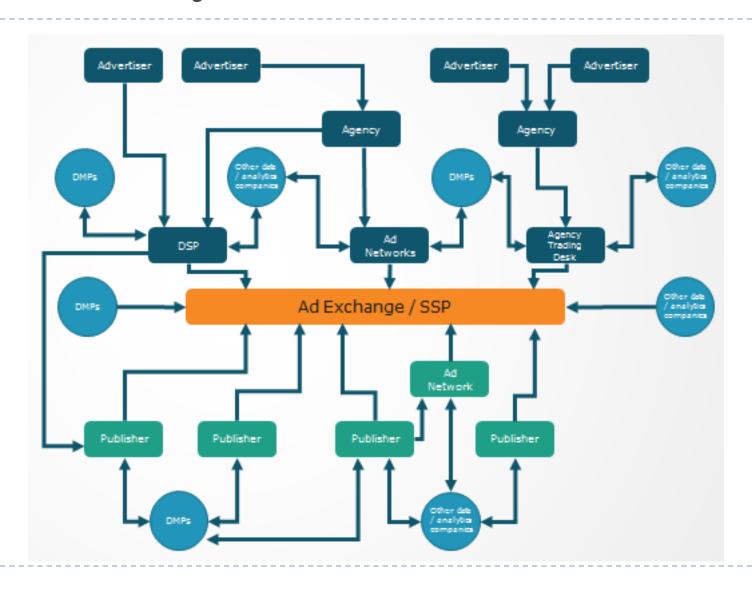
Note: includes advertising that appears on desktop and laptop computers as well as mobile phones, tablets and other internet-connected devices on all formats mentioned; numbers may not add up to total due to rounding; *includes classifieds and directories, email, lead generation and mobile messaging; **includes ads such as Facebook's News Feed Ads and Twitter's Promoted Tweets
Source: eMarketer, Sep 2016

215541 www.eMarketer.com

Source: https://www.emarketer.com/Article/US-Digital-Ad-Spending-Surpass-TV-this-Year/1014469



Ad Tech Ecosystem

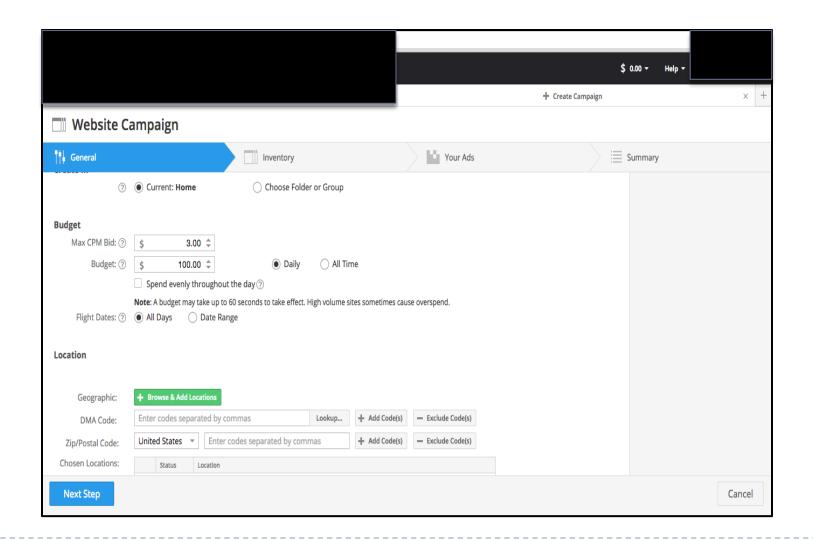


Ad Tech Ecosystem

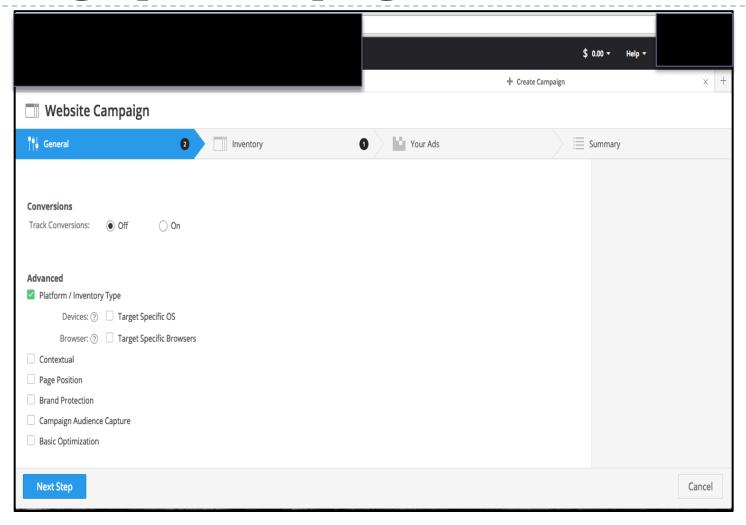
emand Side Platform Ad Agency



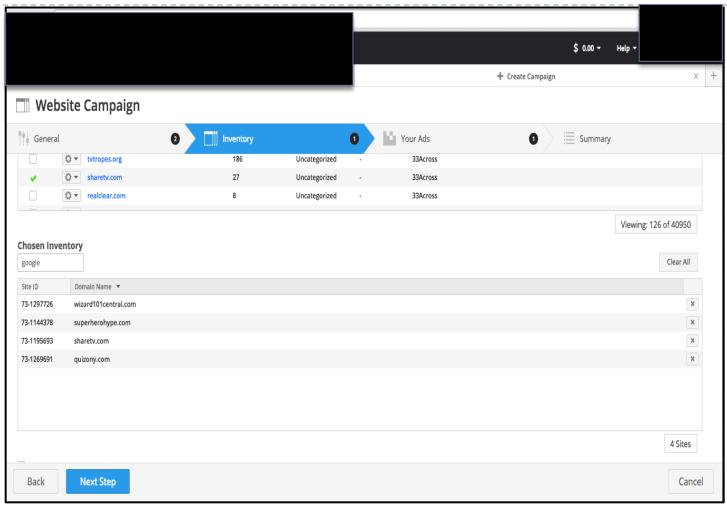
Setting up a Campaign



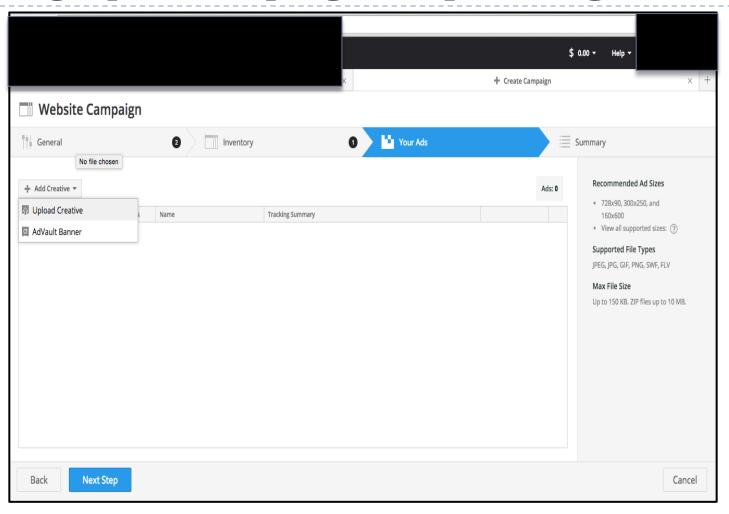
Setting up a Campaign - Criteria



Setting up a Campaign



Setting up a Campaign – Uploading Creative



The Ad Fraud Problem

- Deliberate practice of attempting to serve ads that have no potential to be viewed by a human user
- Lots of varying statistics regarding the extent of the problem.
- Estimates range from 13% to as high as 60% of impressions served online were "suspicious".





Show me the Money!

- Who makes money out of this?
 - Traffic Sellers The people who sells traffic to publishers.
 - Publishers The publishers who buys the traffic and get money off the advertisers.

What can we do about it?



Interactive Advertising Bureau

- What is the IAB?
- Released a Ad Fraud Taxonomy



https://www.iab.com/wp-content/uploads/2015/05/IAB_Anti_Fraud_Principles_and_Taxonomy.pdf



IAB Ad Fraud Taxonomy

Illegitimate and Non-Human Traffic Sources

- Hijacked device
- Crawler masquerading as a legitimate user
- Data-center traffic

Non-traditional / other traffic

- Proxy traffic
- Non-browser User-Agent header
- Browser pre-rendering

Hijacked Tags

- Ad Tag Hijacking
- Creative Hijacking

Site Impression Attributes

- Auto-Refresh
- Ad Density
- Hidden Ads
- Viewability
- Misappropriated Content
- Falsely Represented
- Non Brand Safe
- Contains Malware

Ad creative / other

Cookie Stuffing



101: What it Really Means

There are basically 3 main types of Ad Fraud:

- Publisher tricks to Increase Impression Count
- Illegal or Malicious Content
- Use of Non Human Traffic to Increase Impressions

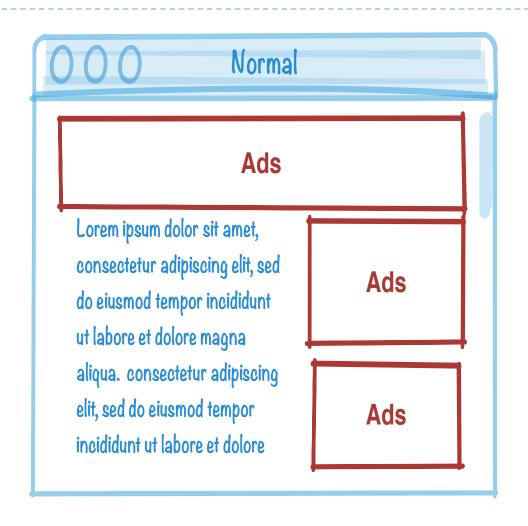


- Various techniques that publishers use to make an Ad impression look like more.
- Some prominent examples are:
 - Hidden Ads
 - Ad Stacking



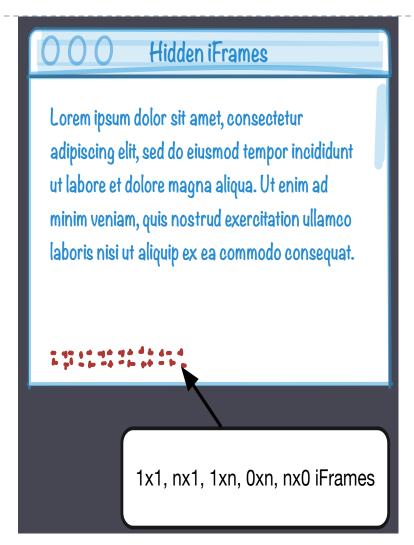


What the advertiser wants:



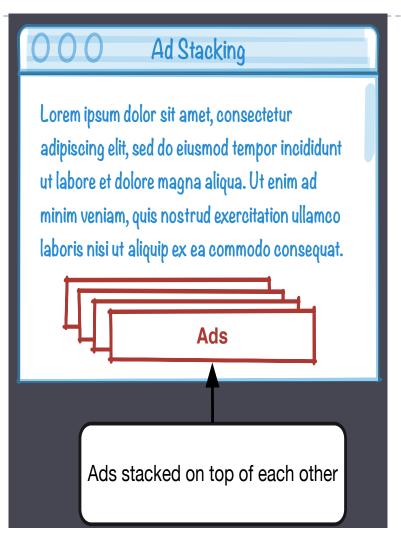


But some publishers will do this (Hidden Ads):





Or this (Ad Stacking):





Objectionable or Malicious Content

- Malvertisiting
- Greyware
- Scams
- Objectionable Content



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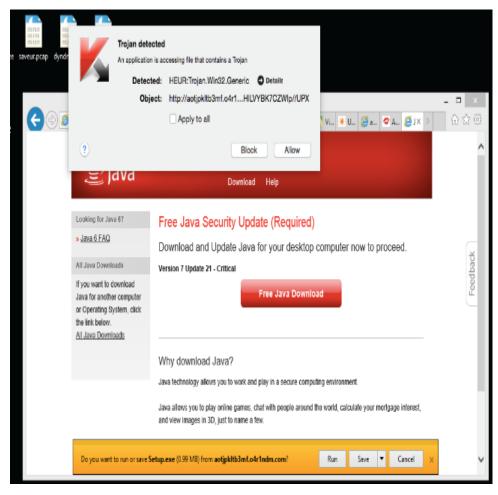
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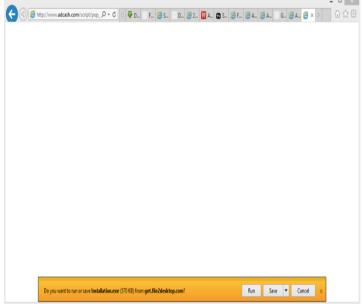
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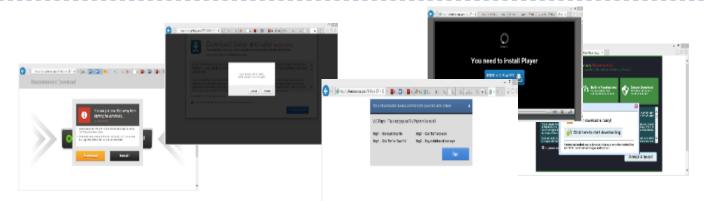
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Ad network was serving malware!





Adware

Ads that will serve you more Ads

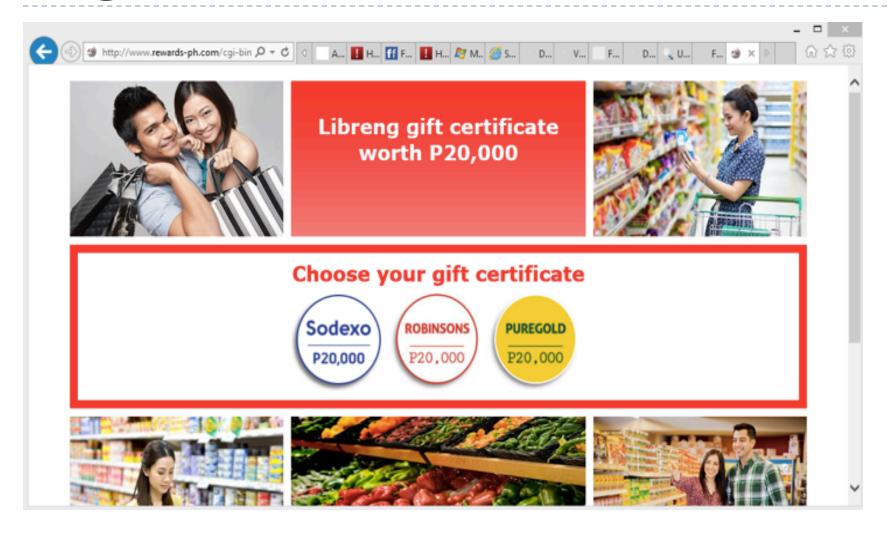






Scamvertising!







Use of Non Human Traffic to Increase Impressions

Bots. This is probably the most common thing that comes to mind.

What is the best way to investigate this?



Buying Internet Traffic

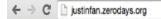
What is
Purchased
Internet Traffic
made of?



Can I buy internet traffic and get away with it?



The Bieber Project

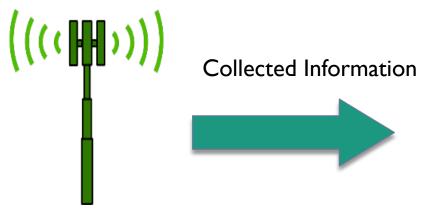


Justin Bieber Ultimate Fan Blog



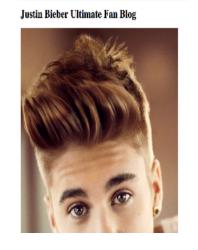


Honeypot

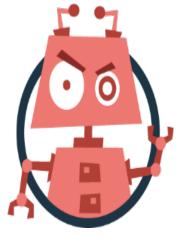


Bieber with a "Wire"

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Fraudulent Impressions?



Bieber with A Wire

```
29 var fp1 = new Fingerprint();
30 var fp2 = new Fingerprint({canvas: true});

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31 var fp3 = new Fingerprint({ie_activex: true});
32 var fp4 = new Fingerprint({screen_resolution: true});
                                                                      Justin Bieber Ultimate Fan Blog
34 var BrowserFingerprint1 = fp1.get()
35 var BrowserFingerprint2 = fp2.get()
36 var BrowserFingerprint3 = fp3.get()
37 var BrowserFingerprint4 = fp4.get()
39  var UserAgent = navigator.userAgent;
40 var BrowserCodeName = navigator.appCodeName;
41 var BrowserName = navigator.appName;
42 var BrowserVersion = navigator.appVersion;
43 var CookiesEnabled = navigator.cookieEnabled;
44 var BrowserLanguage = navigator.language;
45 var BrowserOnline = navigator.onLine;
46 var BrowserPlatform = navigator.platform;
47 var BrowserGeo = getLocation();
48 var BrowserProduct = navigator.product;
49 var JavaEnabled = navigator.javaEnabled();
51 var HistoryLength = history.length;
52  var WindowInnerWidth = window.innerWidth;
53 var WindowInnerHeight = window.innerHeight;
54 var WindowOuterWidth = window.outerWidth;
55  var WindowOuterHeight = window.outerHeight;
56 var WindowPageXOffset = window.pageXOffset;
57  var WindowPageYOffset = window.pageYOffset;
58 var WindowScreenX = window.screenX;
59  var WindowScreenY = window.screenY;
60 var WindowTop = topWindows();
61 var WindowName = window.name;
63 var AlterInnerWidth = window.innerWidth || document.documentElement.clientWidth || document.body.clientWidth;
64 var AlterInnerHeight = window.innerHeight || document.documentElement.clientHeight || document.body.clientHeight;
66  var LocationHost = location.host;
67  var LocationHostName = location.hostname;
68 var LocationHash = location.hash;
69 var LocationHref = location.href;
```



Data Stored for Analysis

ntlog.txt

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Justin Bieber Ultimate Fan Blog



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7/2015 8 13:19:33|-480|7|Widevine Content Decryption Module*Shockware Plash**Chrome Robe Desktop Viscer*Mative Client**Chrome FDF

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Safari/537.36 | Mozilla | Netocape | 5.0 (Windows NT 6.1) wW661 AppleWebKit/537.36 (KNTML), like Gooko) Chrome/41.0.2272.89 Safari/537.36 | true|en-US| true|Win32 | Geoko| true||0||1050) 708||0|-61-47|437|false|slateframe|justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||http://justinfan.zerodays.org||h



Client Home

Order Now



AFFILIATE PROGRAM FAQ CONTACT US

Announcements

Features List

Buy Website Traffic

Are you looking for the easiest way to get a huge traffic boost on your website? Maxvisits.com is here to meet your needs! We can deliver traffic from 45 different countries, targeted for your site category, from as low as \$1 per 1,000 visitors.

That's right, our cheap traffic will bring you targeted visitors, customers, rankings improvement and most importantly real web traffic. Your site will be the proud recipient of a steady flow of website visitors, and this will finally lead to your success as a site owner.

There are plenty of businesses online that offer to buy website traffic, but not all of them are going to be beneficial to your website. We offer top level visitors to your site for the best prices and we will not fail you.

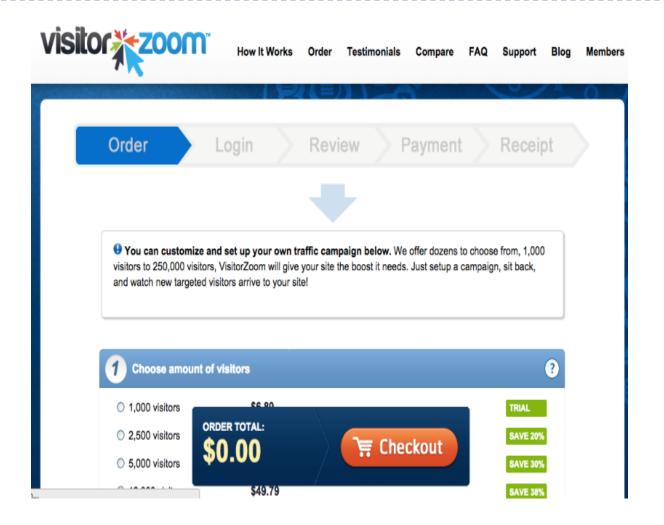
We have provided 1,4 8 6,2 2 5,0 0 0 visitors to our loyal customers!



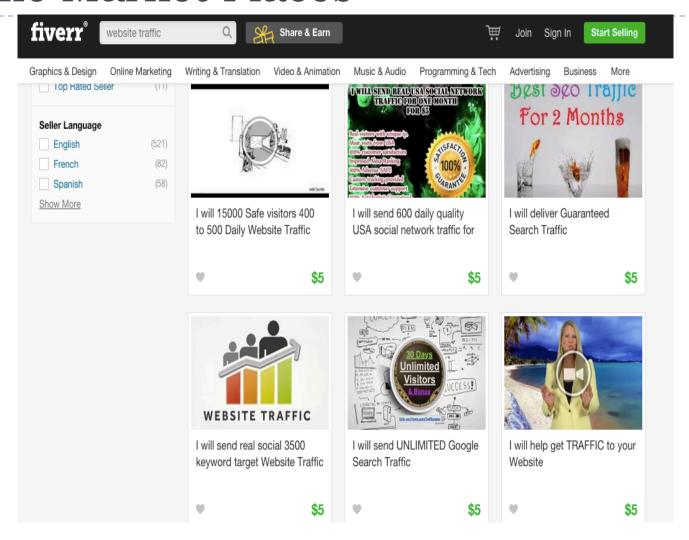


Limited Time Offer - Get 10,000 Free Visitors With All Orders





Traffic Market Places



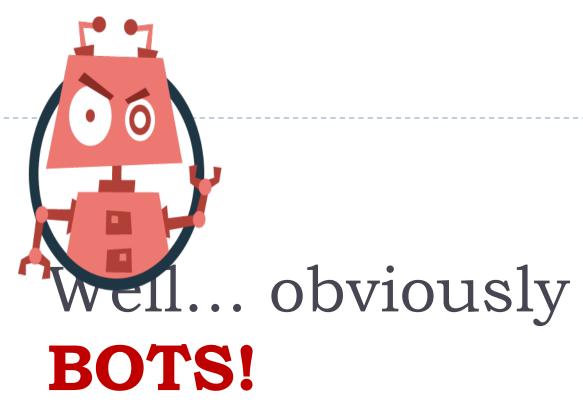
Traffic Market Places

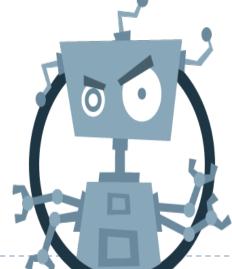


What is Purchased Internet Traffic Made Of?









How do we know?

Clues are in the Impression...



There are Lots of Clues...

A browser can provide a lot of clues...

Look for suspicious information...

- Plugins
- Mime Types
- Screen Attributes
- Window Attributes
- Product identifiers
- Navigator
 Attributes
- Location
 - Attributes

Frame Rates

Browser Rendering

Attributes

- User Agents
- JavaScript Enabled
- Cookies Enables
- And many more...



Clues

```
<b>Analyzing Impression 2 .....
<div> BrowserVersion : 5.0 (Macintosh; Intel Mac OS X 10_10_0) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/42.0.2311.90 Safari/537.36 </div>
<div> SERVER_NAME : justinfan.zerodays.org </div>
<div> LocationPort : </div>
<div> BrowserLanguage : en-US </div>
<div> SCRIPT_FILENAME : /home/content/r/y/a/ryantalabis/html/justinfan/record.php </div>
<div> MimeTypeLength : 8 </div>
<div> PATH_TRANSLATED : </div>
<div> ScreenAvailHeight : 1057 </div>
<div> HistoryLength : 2 </div>
<div> LocationHref : http://justinfan.zerodays.org/ </div>
<div> BrowserOnline : TRUE </div>
<div> LocationHost : justinfan.zerodays.org </div>
<div> SCRIPT_NAME : /record.php </div>
<div> PluginName : Widevine Content Decryption Module*Chrome PDF Viewer*Shockwave Flash*Chrome Remote Desktop Viewer*Native Client*Chrome PDF Viewer* 
<div> DocumentReferrer : </div>
<div> HTTPS : </div>
<div> HTTP_ACCEPT_CHARSET : </div>
<div> REQUEST_METHOD : GET </div>
<div> HTTP_CONNECTION : keep-alive </div>
<div> REMOTE_ADDR : 122.53.157.210 </div>
<div> REMOTE_PORT : 53501 </div>
<div> WindowScreenY : -161 </div>
<div> WindowScreenX : -1917 </div>
<div> SERVER_ADMIN : support@supportwebsite.com </div>
<div> HTTP_ACCEPT_LANGUAGE : en-US,en;q=0.8 </div>
<div> HTTP_ACCEPT_ENCODING : gzip, deflate, sdch </div>
<div> SERVER_ADDR : 173.201.211.56 </div>
<div> HTTP_USER_AGENT : Mozilla/5.0 (Macintosh; Intel Mac OS X 10_10_0) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/42.0.2311.90 Safari/537.36 </div>
<div> HTTP_REFERER : http://justinfan.zerodays.org/ </div>
<div> WindowPageXOffset : 0 </div>
<div> REMOTE_HOST : </div>
<div> WindowOuterHeight : 1049 </div>
<div> REQUEST_TIME_FLOAT : </div>
<div> ScreenWidth : 1920 </div>
<div> WindowTop : TRUE </div>
<div> BrowserGeo : </div>
<div> LocationHostName : justinfan.zerodays.org </div>
<div> JavaEnabled : TRUE </div>
<div> CookiesEnabled : TRUE </div>
```

Clues

Some clues are obvious...

BO	BP	ВО	BR	BS					BT						BU	BV	,	DW
gzip, deflate		Keep-Alive			/compatible	e; MSIE 6.0; W	/indows N	T E 1. CV/1\		1 1 /222	NET CLD	2.0 5073	7. Info	ath 1)	DU	DV		/homo/co
															27	14015.0.0		/home/co
gzip, deflate		Keep-Alive				(compatible;												
gzip, deflate		Keep-Alive				(compatible;												
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; N	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; N	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; N	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; N	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IIK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IK 2, 4, 0	, 454; N	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate	ru	Keep-Alive	justincity.zer	http://justin	Mozilla/4.0	(compatible;	MSIE 8.0;	Windows N	T 5.1; Trid	ent/4.0;	MRSPUTN	IK 2, 4, 0	, 454; M	lozilla/4.0	0 (compatible	; MSIE 6.0	; Win	/home/co
gzip, deflate		Keep-Alive				(compatible;												



Traffic Generators

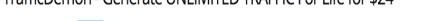


Brand *NEW* Traffic Software
Generates 867,981 Targeted Visitors
On Autopilot And Banks
\$540,430.00...



Traffic Demon

TrafficDemon - Generate UNLIMITED TRAFFIC For Life for \$24



TrafficDemon

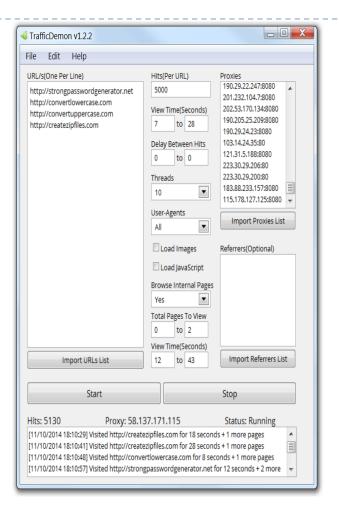
Created 1 year ago in Bots

Generate Unlimited Website Traffic 24/7

Looking to give your **stats a nice boost**(or **skyrocket them!**) or even start **your own** website **traffic business?** In either case you have found **the last software package you will ever need!**



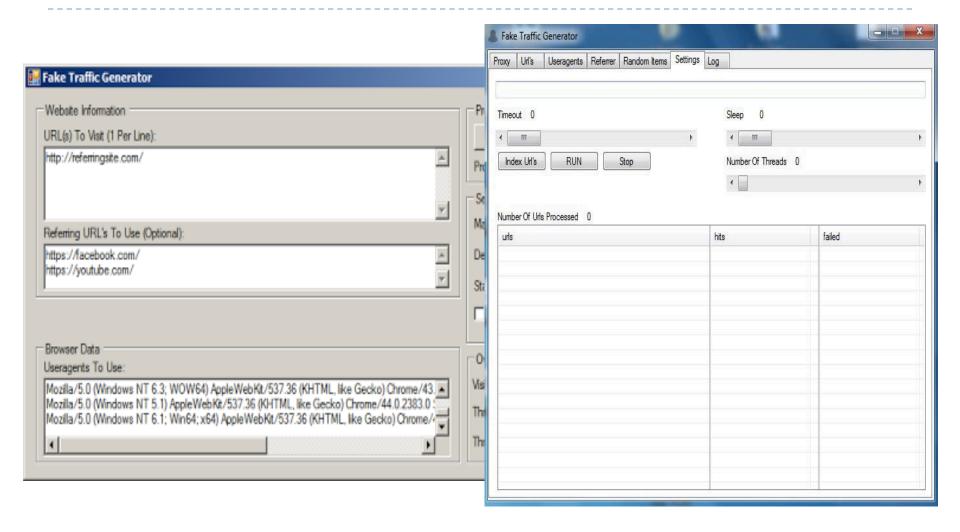
୬ (8⁺) (**a** (**b**) (**b**)



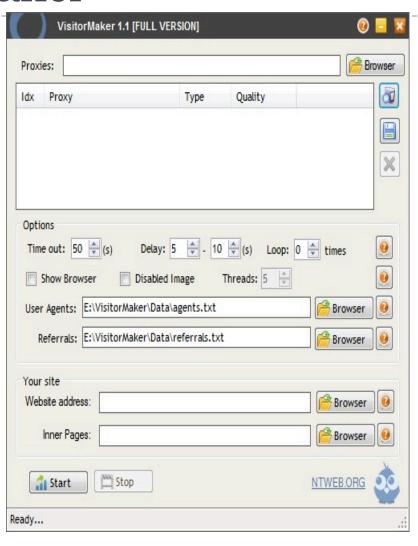
Traffic Spirit (also known as Traffic Ghost)



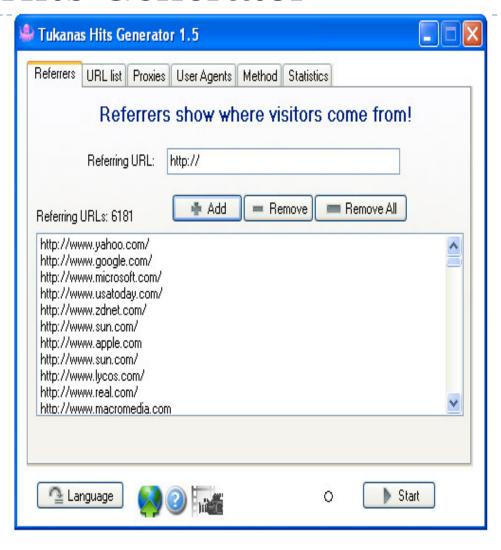
Fake Traffic Generator



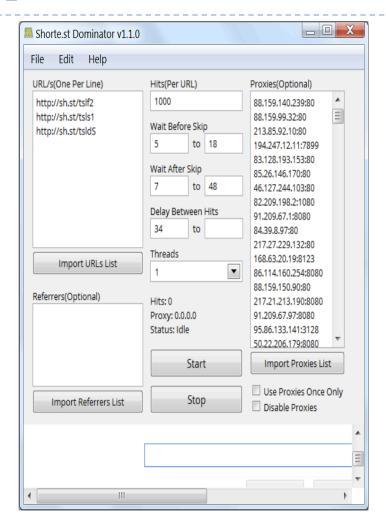
Visitor Maker



Tunkas Hits Generator



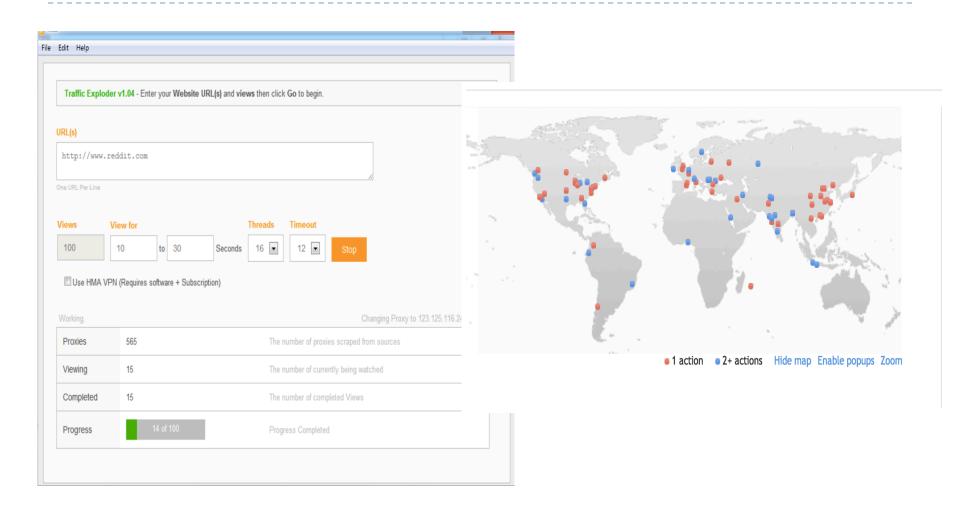
Dominator



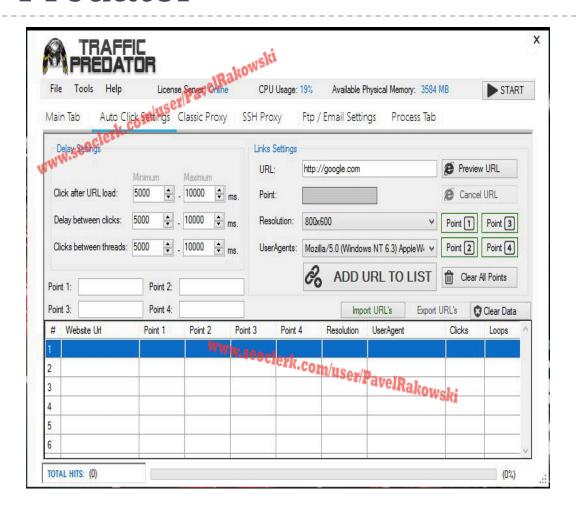
Auto Web Bot



Traffic Exploder



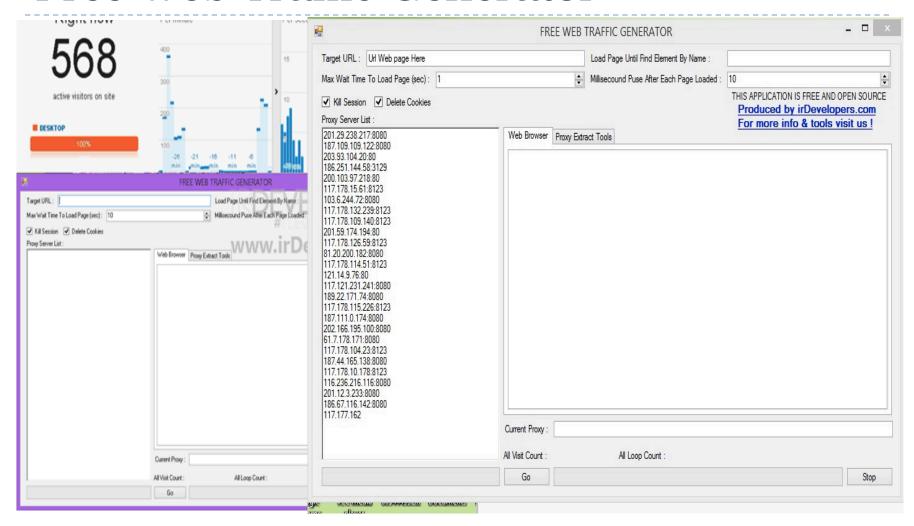
Traffic Predator



Magic Traffic Bot



Free Web Traffic Generator

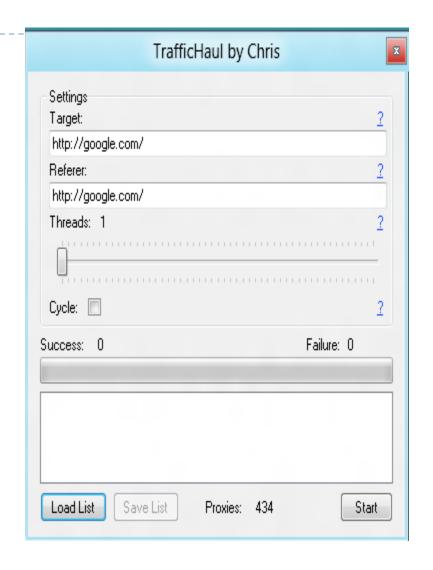


Traffic Haul

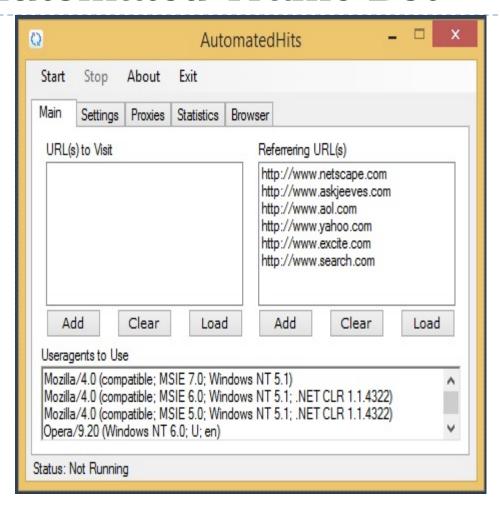


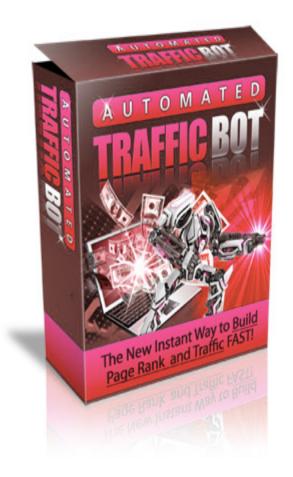
TRAFFIC BOT ADVANCED WITH 60+ HITS IN A SECOND, GUARANTEED!

http://fourerr.com/danish1658

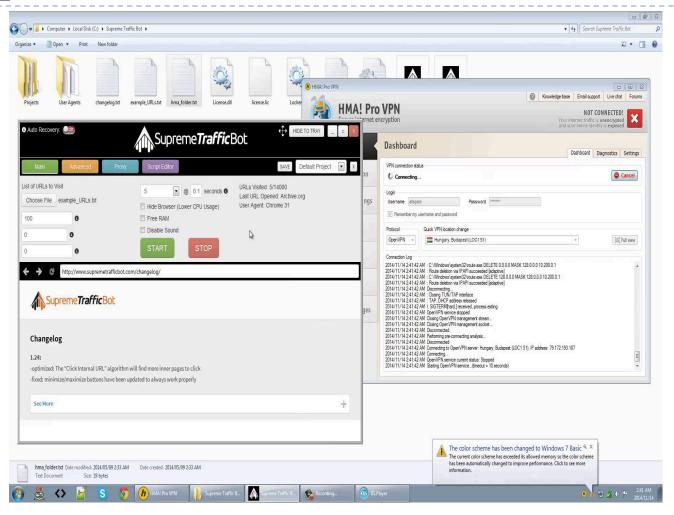


Automated Traffic Bot

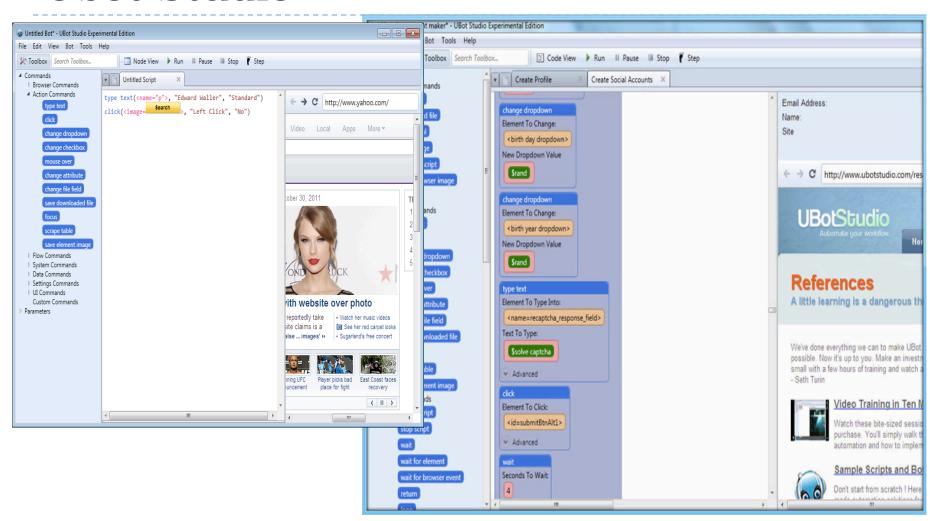




Supreme Traffic Bot



Ubot Studio



Traffic Generator Characteristics

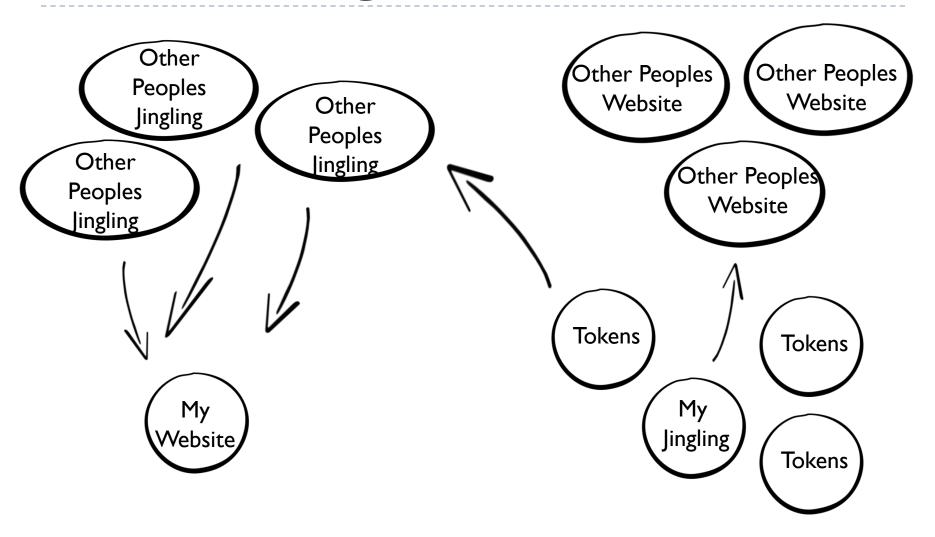
- Direct URL Visits
- InnerPages URL Visits
- Random Links Visits
- AutoClick Direct Links
- AutoClick Selected Area
- Multithreads
- Custom Screen Resolution
- Delay Between Threads
- Delay in Stay URL
- Delay Between Clicks
- Random Number of Views
- ▶ Repeat Every X Hours/Min.

- Delete History & Cookies
- Desktop User Agents
- Mobile User Agents
- Custom Referrers
- VPN Support
- IP Change every "X" min.
- ▶ IP Change every "X" Views
- Proxy Support
- SSH Support
- Proxy Scraper & Validator
- FTP Upload Proxies
- Mass Email Proxies

Traffic Exchanges - Jingling



Traffic Exchange 101



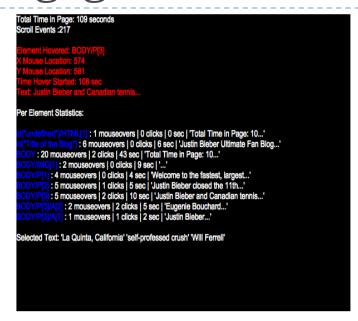
Using Malware for Traffic

- Create hidden browsers
- Generate random mouse movements
- Page Scrolls
- Random Clicks
- Mute volume



User Events and Engagements





est, largest and longest running Justin Bieber fansite. Ever wonder what Justin is up to? Our goal is to provide you with the latest info, pictures and videos of the two times grammy nominated star. Do to get our blog updates on your Tumblr dashboard.

the 11th Annual Desert Smash tennis tournament (hosted by Will Ferrell) with a stunning acoustic set on Tuesday evening. He was one of four musical acts at the concert. British songstress Natasha; Lifehouse, and a tribute band also performed.

anadian tennis superstar Eugenie Bouchard are the new power couple of celebrity tennis. Okay, Bouchard and her self-professed crush The Biebs aren't a couple in a dating sense, but the two talents joi star power to the 11th annual Desert Smash in La Quinta, California.





Can the NHT traffic actually be coming from a human?

Who for all intents and purposes they do not know they are visiting your site



Traffic is delivered to you through:

Your Site



Traffic Vendor

Justin Bieber Ultimate Fan Blog

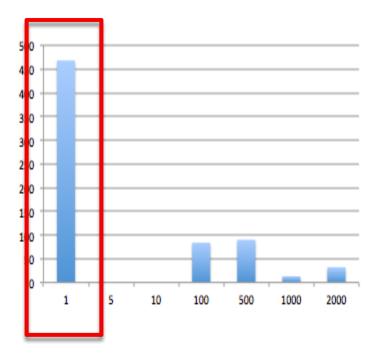
- Pop-ups
- Pop-unders
- iFrames





What are the Clues...?

70% of the viewports are I pixel!

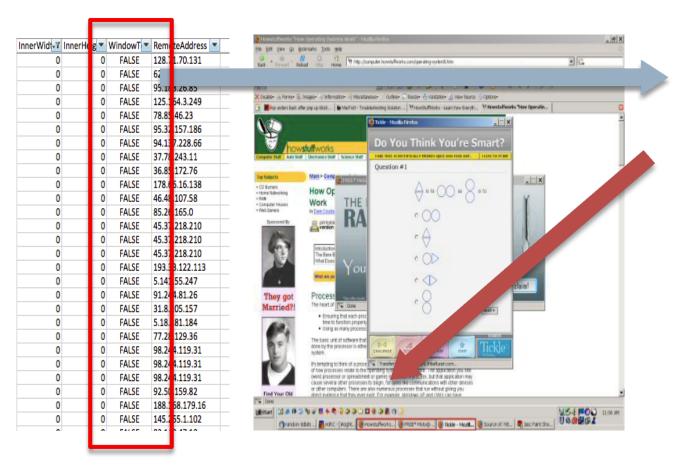


Meaning the size of the browsers viewing your site looks like this:



What are the Clues...?

The window is not the active window:



Your site is here

So...can I buy internet traffic and get away with it?





Depends.

- If an advertiser will audit the traffic and they know what to look for, you will get caught.
- If they don't you'll get away with it.
- The "quality" of traffic is directly proportional to how much you pay for it.
 - The lower prices, you'll get bots.
 - They higher prices, you'll get frames, popups or pop-unders.



Thank You!

Cyber Security Threats in Digital Advertising and Ad Fraud 101

Karl Dominguez