

DNS Stability Measurements

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1. Introduction

Domain Name System is used to map domain names to IP addresses and vice versa. Domain Name System consist of two pieces, DNS Servers and resolvers. Resolvers are client applications which brings the IP address(es) of a domain name upon request of a user application or operating system. DNS Servers receives queries from resolvers and they find and send the corresponding IP address(es) of the domain name back to clients.

Domain Name System is one of the fundamental pieces of the Internet, without them surfing in the Internet is very hard if not impossible. When you want to visit a website such as "www.cs.columbia.edu", operating system should find the IP address of this machine. It can be said that DNS is one of the core protocols of the Internet.

In this research project, the stability of DNS Servers are measured. The most popular 500 domain names are used during the measurements. In the first part of the project, DNS Server numbers and maximum DNS Server separation are found for each domain name. In the second part, these domain names are queried for an one month period and their uptime percentages measured.

2. Why DNS stability is important?

As we mentioned above, Domain Name System is in action anytime you are surfing on the Internet. In terms of companies, unstable DNS means loss of revenue and customer. In terms of customers, stable DNS means high availability and comfortable surfing.

In June 2001, Microsoft experienced a DOS attack to his DNS Servers which results temporary service failure because all of its DNS Servers are in the same subnet. After this attack Microsoft has handed over the management of its DNS routing systems to Akamai Technologies.

Analysts said that DNS is simple and straightforward and that it does what it is supposed to do. "The actual problem isn't so much with DNS itself, the problem is with managing it," said Michael Hoch, an analyst at Aberdeen Group, in Boston [Infoworld].

Although not a good situation to be in, it is not unique, explains Michael Hoch, senior analyst at Aberdeen Group. He says Microsoft's practice wasn't shoddy. "The practice was common -- the majority of enterprises approach DNS [the same way]," he says. "Most have three to 10 name servers, and that's commonly how they set it up." [FindArticles].

In this project, we try to find the current situation in DNS field in terms of both

DNS Server number, maximum DNS separation and DNS uptime percentage.

3. Measurement Setup

We have developed a bunch of Java applications for this project. The names and the functionality of main ones are given below.

AlexaParser : Alexa.com is an Amazon.com company which provides the top 500 domains for free. Top 100.000 domains are also available for a reasonable price. This Java application parses the HTML files of Alexa.com and produce a list of top 500 domain names.

AuthoritativeDNSServerFinder: This application finds the authoritative DNS Servers of given domains.

MaximumDNSSeparationFinder: This application traceroutes each DNS Server of a domain name and finds the maximum separation between them. It uses the traceroute utility of Unix system for path discovery. The algorithm for calculating maximum DNS separation will be given later.

UptimeProber: This application periodically tries to resolve of a domain name via its authoritative DNS Servers.

Most of the measurements done on Unix systems of Columbia University Department of Computer Science.

4. Results

1. DNS Server Numbers

It can be seen from *Table 1* that most of the domains have only two DNS Servers and the others have three or four.

DNS Number	Domain Number
1 DNS	4
2 DNS	298
3 DNS	82
4 DNS	68
5 DNS	22
6 or More DNS	20

Table 1. DNS Server Numbers

Figure 1 shows the percentage for each DNS number. Sixty percent of the domains have two DNS Server and another 30 percent have three or four. The complete list of domain names and their DNS Server numbers are given in appendix.

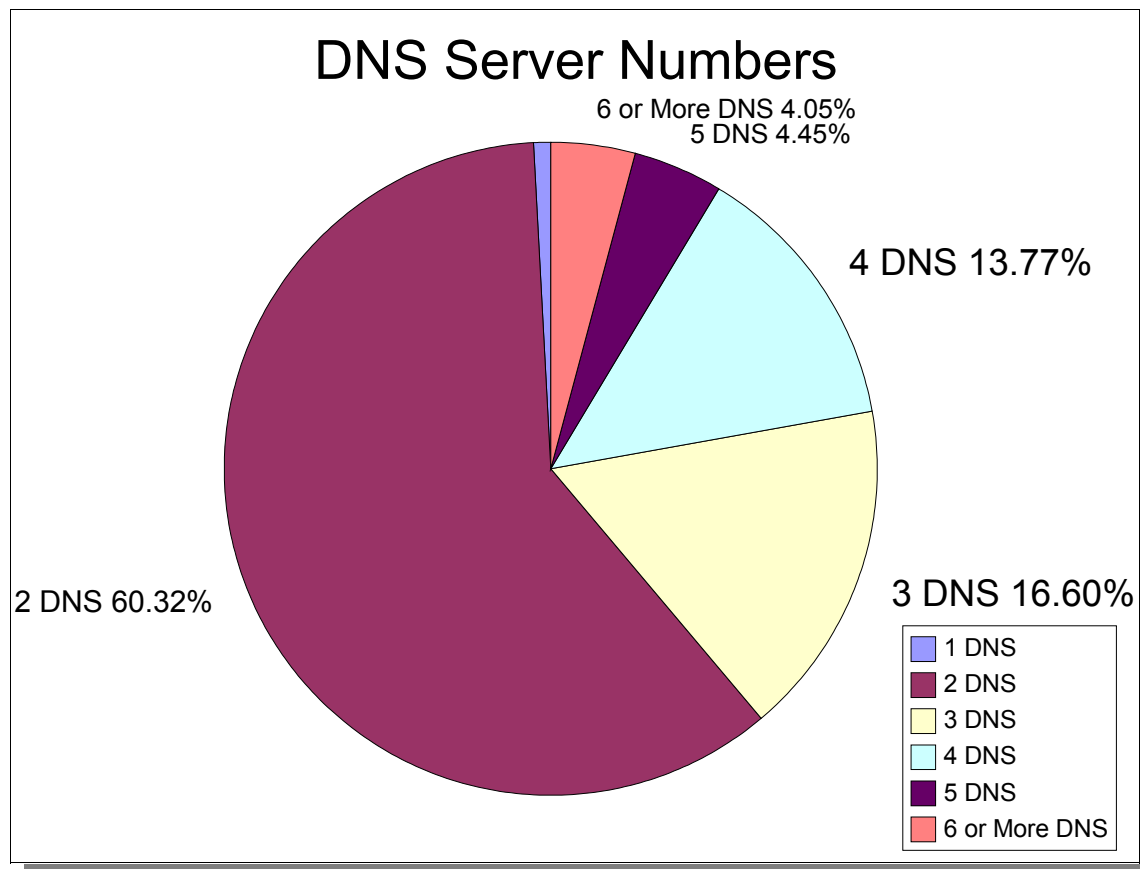


Figure 1. DNS Server Numbers

2. Maximum DNS separation

The following algorithm is used to calculate the maximum DNS separation:

Lets assume that there are 4 DNS servers ns1, ns2, ns3, ns4 for a given domain. First, traceroute each DNS Server and then calculate the difference between each pair [there are 6 pair (ns1,ns2) (ns1,ns3) (ns1,ns4) (ns2,ns3) (ns2,ns4) (ns3,ns4)]

The difference for each pair is calculated by counting the different routers on their ways. For example consider the comparison of ns1 and ns2. Lets assume that their traceroutes are:

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ns1 > router1 router2 router6 router9
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```
ns2 > router1 router2 router3 router4
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Then their difference is 2 (because only the last two hops are different).

And the “maximum DNS separation” for a given domain is the maximum of these six distances. The maximum DNS separation for top 500 domains are given below.

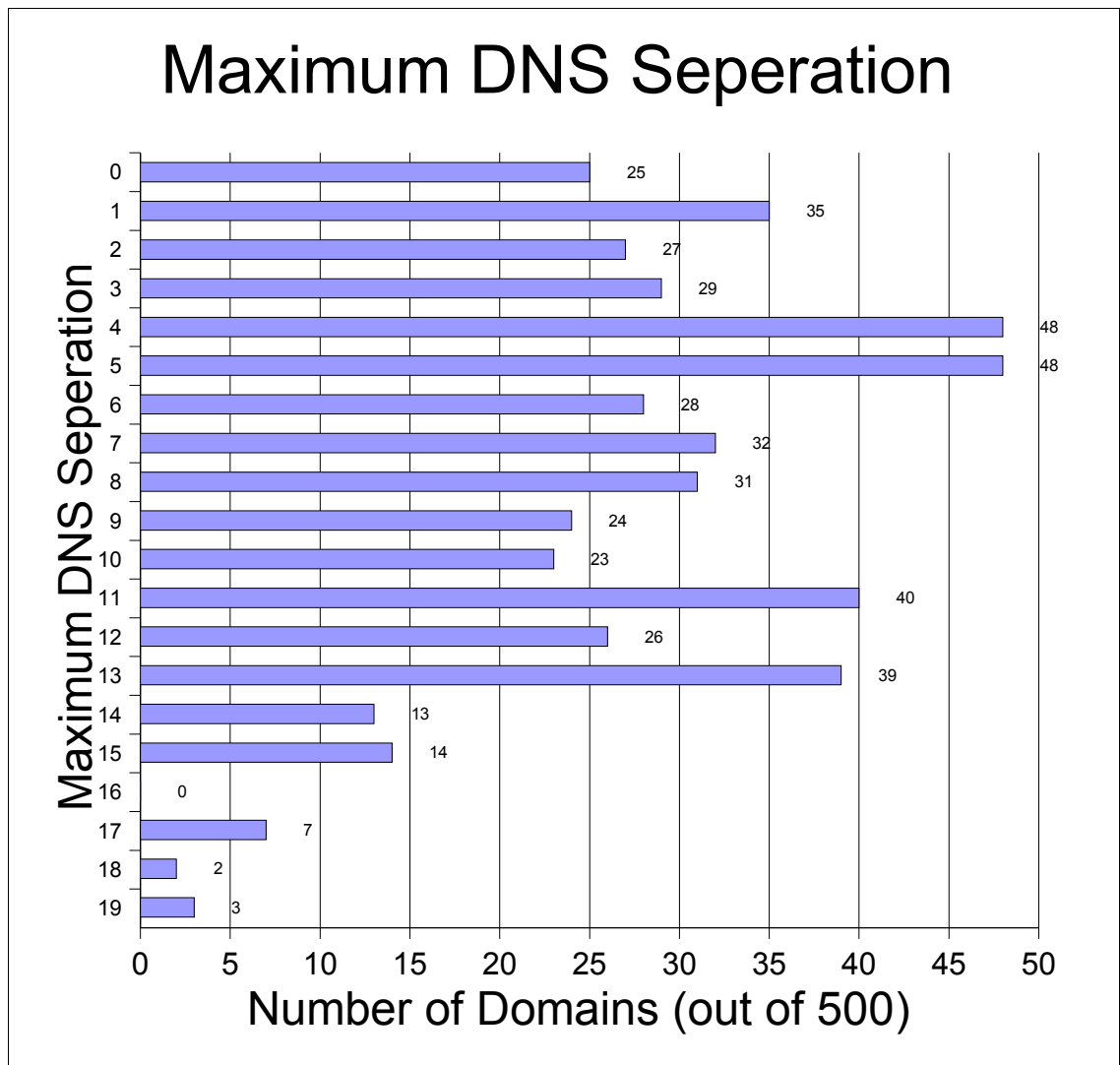


Figure 2. Maximum DNS Seperation

More than seventy five percent of the domains have a maximum DNS separation of at least four. The complete list of domain names and their maximum DNS separation are given in appendix.

3. Uptime Percentages

Uptime measurements are done in thirty days and each domain probed 300.000 times. The customized prober behaves like a real resolver. For each domain it sequentially queries the DNS servers of this domain until receiving a response. And also each DNS Server queried at most three times with a timeout values of 2,4 and 8 seconds. If none of the DNS servers response, prober increments the missed query counter of this domain.

In Table 2, there are number of misses and qualified domains for each class. Also, a graphical chart of the same results can be seen from Figure 3.

Number of Misses	Domain #	Domain %
Perfect	175	35.00%
1- 5 Miss	70	14.00%
6-10 Miss	40	8.00%
11-20 Miss	51	10.20%
21-50 Miss	52	10.40%
51- 100 Miss	25	5.00%
101-500	40	8.00%

Table 2. Number of misses

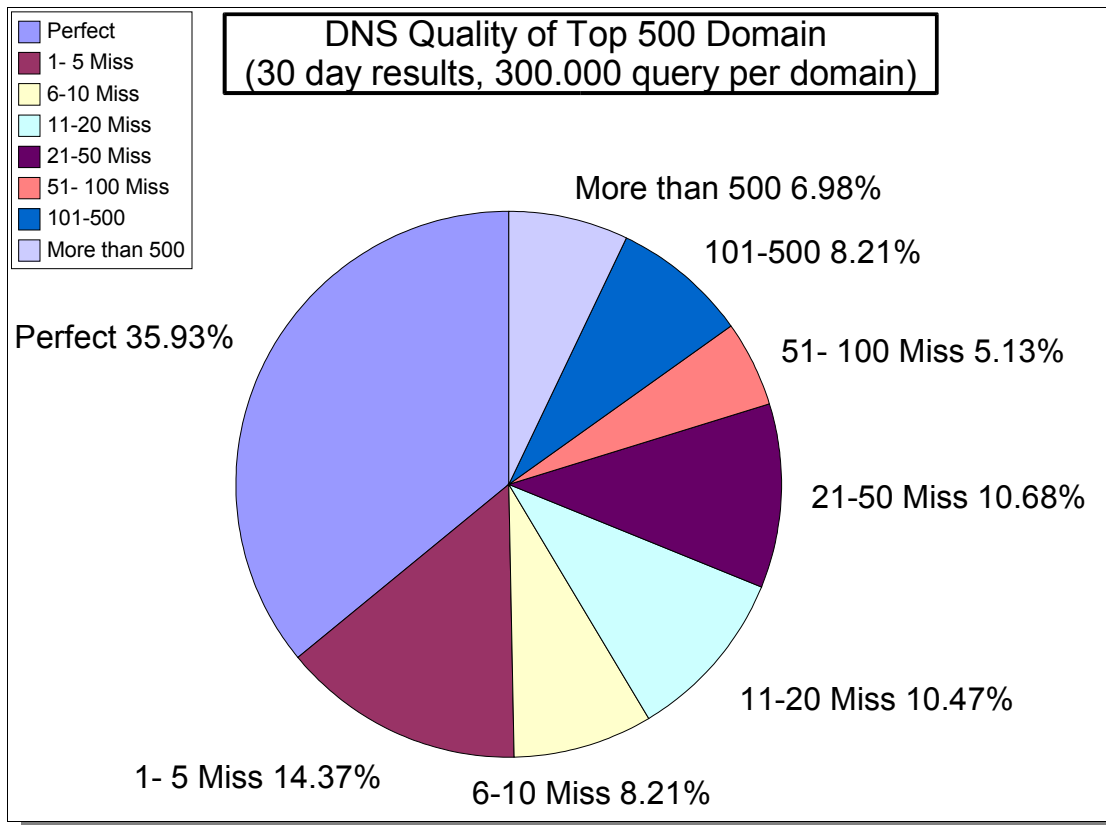


Figure 3. Number of Misses

5. Analysis of the Results

There is a summary of these measurements in *Table 3*. On the average the domains whose uptime is higher have more DNS servers and these servers are separated more than others without an exception. It can be seen easily that DNS server number and maximum DNS separation increases towards the bottom of the table. So these results prove that more DNS servers and better separation of these servers brings high uptime values. The new ICANN chief also stresses the importance of DNS stability with these words: “Our key challenge is to make sure that the Domain Name System remains stable.” [ICANN].

Uptime	Domain #	DNS	DNS<>
Below 99.99	120	2.17647	4.85714
%100 - %99.99	180	2.35556	6.46111
Perfect	170	3.57647	9.55882

Table 3. Overall Comparison

6. Appendix

No	Rank	Domain	DNS	DNS<>	Uptime	Miss	Response	Query
1	128	. www.adobe.com	3	10	93.96194	20195	314267	334462
2	305	. www.blackplanet.com	2	0	97.17854	9460	325827	335287
3	53	. www.maplestory.com	2	2	97.79622	7324	325014	332338
4	327	. www.fc2web.com	3	1	99.33921	2196	330134	332330
5	28	. www.msn.co.il	2	8	99.34671	2163	328932	331095
6	308	. www.5460.net	2	8	99.48486	1712	330626	332338
7	375	. www.1stblaze.com	2	1	99.48663	1697	328862	330559
8	169	. www.domainsponsor.com	2	1	99.51832	1615	333671	335286
9	401	. www.haohz.com	2	0	99.51839	1592	328967	330559
10	290	. www.revenue.net	2	2	99.55533	1471	329334	330805
11	319	. www.incredimail.com	2	2	99.56813	1448	333841	335289
12	78	. www.sportsline.com	4	2	99.67604	1074	330448	331522
13	148	. www.17173.com	2	0	99.68417	1044	329515	330559
14	459	. www.totalvelocity.com	2	0	99.72229	918	329640	330558
15	249	. www.cjb.net	2	2	99.75124	832	333627	334459
16	389	. www.online.sh.cn	2	9	99.75807	805	331934	332739
17	48	. www.cnool.net	2	3	99.75931	805	333654	334459
18	60	. www.nypost.com	2	7	99.76985	762	330333	331095

19	479	. www.hanafos.com	2	8	99.78155	726	331613	332339
20	380	. www.peel.com	2	2	99.80166	665	334624	335289
21	89	. www.abetterinternet.com	2	0	99.81016	628	330177	330805
22	273	. www.gooooal.com	2	1	99.81164	626	331713	332339
23	412	. www.offeroptimizer.com	2	1	99.81395	616	330480	331096
24	351	. www.sitesell.com	2	5	99.81517	615	332119	332734
25	350	. www.tyfo.com	2	0	99.81848	601	330493	331094
26	342	. www.sina.com.hk	2	18	99.82879	569	331767	332336
27	468	. www.internet-optimizer.com	2	1	99.82998	562	329995	330557
28	179	. www.dj99.com	3	15	99.83357	558	334726	335284
29	154	. www.baidu.com	1	0	99.84662	513	333949	334462
30	145	. www.v111.com	2	1	99.85037	495	330310	330805
31	382	. www.cafe24.com	1	9	99.86849	436	331086	331522
32	400	. www.dn.se	2	3	99.87143	425	330132	330557
33	205	. www.archive.org	2	0	99.87903	402	331916	332318
34	20	. www.tok2.com	2	3	99.89259	361	335729	336090
35	424	. www.cantv.net	4	12	99.89299	354	330450	330804
36	177	. www.trafficsyndicate.com	4	4	99.89301	356	332384	332740
37	135	. www.slotch.com	3	0	99.89386	349	328469	328818
38	333	. www.hkflash.com	2	5	99.89408	352	331977	332329
39	27	. www.avl.com.cn	2	10	99.89661	344	332390	332734
40	109	. www.ivillage.com	2	0	99.90371	320	332019	332339
41	388	. www.zaobao.com	2	0	99.91709	278	335011	335289
42	139	. www.macauslot.com	2	8	99.92137	263	334199	334462
43	480	. www.people.com.cn	2	1	99.92697	243	332491	332734
44	439	. www.cctv.com	2	9	99.93144	227	330869	331096
45	467	. www.speedbank.co.kr	1	0	99.93188	224	328594	328818
46	69	. www.asiafriendfinder.com	2	4	99.93276	226	335865	336091
47	325	. www.americansingles.com	4	13	99.93365	223	335868	336091
48	360	. www.blocket.se	2	1	99.93478	217	332523	332740
49	66	. www.gznet.com	2	10	99.93492	214	328603	328817
50	440	. www.miniclip.com	2	6	99.93712	208	330596	330804
51	233	. www.capitalone.com	2	4	99.93869	203	330893	331096
52	211	. www.smni.com	2	1	99.93886	205	335082	335287
53	275	. www.daum.net	2	4	99.94409	187	334272	334459
54	71	. www.msn.co.jp	2	3	99.94872	170	331349	331519
55	11	. www.sapo.pt	3	8	99.94942	170	335920	336090
56	445	. www.worldnetdaily.com	2	1	99.94948	167	330389	330556
57	457	. www.atnext.com	2	4	99.95107	162	330933	331095

58	188	. www.smutserver.com	2	3	99.95228	158	330937	331095
59	397	. www.adultfriendfinder.com	2	1	99.95466	150	330655	330805
60	216	. www.phoenixtv.com	2	1	99.95605	147	334315	334462
61	297	. www.myetang.com	2	2	99.95617	145	330659	330804
62	438	. www.hinet.net	3	4	99.95695	144	334315	334459
63	310	. www.tlmsn.com.mx	1	0	99.95762	141	332593	332734
64	30	. www.free.fr	2	4	99.95892	136	330959	331095
65	29	. www.msn.se	2	5	99.96033	132	332608	332740
66	465	. www.pdbox.co.kr	2	3	99.96191	126	330678	330804
67	367	. www.samsungcard.co.kr	2	0	99.96436	118	330977	331095
68	331	. www.lavalife.com	3	5	99.96459	119	335972	336091
69	37	. www.scourt.go.kr	2	4	99.96787	108	335987	336095
70	473	. www.new21.net	2	13	99.96995	100	332640	332740
71	484	. www.searchscout.com	2	5	99.97191	93	331002	331095
72	91	. www.chb.co.kr	2	9	99.97202	93	332246	332339
73	253	. www.pconline.com.cn	2	6	99.97205	93	332641	332734
74	57	. www.gator.com	2	5	99.97263	90	328728	328818
75	326	. www.ig.com.br	2	5	99.97445	84	328728	328812
76	387	. www.6to23.com	2	5	99.97459	85	334377	334462
77	190	. www.263.net	2	17	99.97518	83	334376	334459
78	405	. www.126.com	2	6	99.97560	82	336008	336090
79	288	. www.walla.co.il	2	6	99.97560	82	336009	336091
80	291	. www.stoo.com	3	3	99.97563	81	332236	332317
81	164	. www.msn.co.kr	2	3	99.97644	78	331018	331096
82	328	. www.t2t2.com	2	6	99.98044	65	332265	332330
83	141	. www.ctn.com.cn	2	3	99.98044	65	332270	332335
84	394	. www.neopets.com	2	4	99.98097	63	331032	331095
85	413	. www.bbc.co.uk	4	6	99.98114	62	328756	328818
86	16	. www.netian.com	2	5	99.98126	63	336034	336097
87	283	. www.globo.com	2	15	99.98215	60	336032	336092
88	357	. www.altavista.com	2	2	99.98247	58	330746	330804
89	63	. www.webmasterworld.com	2	4	99.98270	58	335229	335287
90	436	. www.earthlink.net	2	4	99.98287	57	332677	332734
91	61	. www.paypopup.com	2	2	99.98306	56	330501	330557
92	463	. www.nease.net	2	7	99.98388	53	328764	328817
93	420	. www.gamebase.com.tw	3	3	99.98397	53	330502	330555
94	464	. www.sohu.com	3	7	99.98431	52	331470	331522
95	500	. www.xinhuanet.com	2	12	99.98479	50	328768	328818
96	181	. www.163.net	2	3	99.98565	48	334410	334458

97	222	. www.netvigator.com	2	10	99.98580	47	331047	331094
98	450	. www.blogspot.com	2	1	99.98598	47	335240	335287
99	236	. www.wo.to	3	7	99.98602	47	336043	336090
100	74	. www.reuters.com	2	6	99.98639	45	330511	330556
101	75	. www.excite.co.jp	3	13	99.98646	45	332273	332318
102	487	. www.lead2.com.cn	2	9	99.98648	45	332689	332734
103	430	. www.ourgame.com	2	6	99.98648	45	332689	332734
104	121	. www.ignkeywords.com	2	0	99.98658	45	335244	335289
105	443	. www.samsung.net	2	2	99.98678	44	332690	332734
106	83	. www.whenu.com	2	4	99.98688	44	335242	335286
107	98	. www.rapidblaster.com	2	4	99.98688	44	335245	335289
108	483	. www.geocities.co.jp	2	2	99.98692	43	328773	328816
109	385	. www.lycos.com.cn	2	6	99.98721	43	336052	336095
110	435	. www.wooribank.com	2	0	99.98736	42	332293	332335
111	370	. www.netease.com	2	7	99.98744	42	334420	334462
112	238	. www.hao123.com	3	13	99.98762	41	331054	331095
113	182	. www.networksolutions.com	3	8	99.98780	41	336053	336094
114	452	. www.km169.net	2	17	99.98869	38	336052	336090
115	210	. www.americanexpress.com	2	13	99.98884	37	331485	331522
116	129	. www.ssn.biz	2	3	99.98899	37	336060	336097
117	371	. www.x2game.com	2	4	99.98926	36	335249	335285
118	223	. www.pchome.com.tw	3	4	99.98941	35	330521	330556
119	13	. www.163.com	2	8	99.98974	34	331488	331522
120	22	. www.ancestry.com	2	1	99.99032	32	330531	330563
121	184	. www.btopenworld.com	4	9	99.99068	31	332703	332734
122	489	. www.qq163.com	2	13	99.99095	30	331492	331522
123	437	. www.in.gr	2	2	99.99118	29	328789	328818
124	133	. www.tencent.com	2	5	99.99128	29	332711	332740
125	161	. www.siatkids.com	5	13	99.99154	28	330777	330805
126	448	. www.cjmall.com	2	8	99.99154	28	331063	331091
127	80	. www.playforum.net	1	0	99.99183	27	330528	330555
128	5	. www.nate.com	2	2	99.99184	27	330777	330804
129	31	. www.cyworld.com	2	4	99.99197	27	336063	336090
130	97	. www.hotornot.com	2	1	99.99197	27	336063	336090
131	3	. www.damoim.net	2	1	99.99219	26	332714	332740
132	55	. www.21cn.com	2	11	99.99246	25	331497	331522
133	336	. www.jrj.com.cn	2	12	99.99249	25	332709	332734
134	174	. www.onlinedown.net	2	9	99.99253	25	334433	334458
135	171	. www.advertising.com	2	4	99.99270	24	328794	328818

136	149	. www.hmall.com	2	5	99.99286	24	336066	336090
137	332	. www.chinaren.com	2	0	99.99306	23	331496	331519
138	455	. www.oingo.com	2	6	99.99309	23	332711	332734
139	59	. www.tradedoubler.com	2	4	99.99344	22	335263	335285
140	272	. www.hot.co.kr	2	5	99.99361	21	328797	328818
141	100	. www.eachnet.com	2	12	99.99365	21	330784	330805
142	132	. www.mir2.com.cn	2	15	99.99368	21	332308	332329
143	64	. www.jobkorea.co.kr	2	2	99.99396	20	331076	331096
144	8	. www.overture.com	2	7	99.99397	20	331502	331522
145	306	. www.sinobnet.com	3	17	99.99397	20	331502	331522
146	411	. www.89.com	2	11	99.99405	20	336070	336090
147	79	. www.dearyou.com	2	7	99.99428	19	332312	332331
148	277	. www.squares.net	2	7	99.99432	19	334439	334458
149	72	. www.tcup.com	2	8	99.99432	19	334439	334458
150	494	. www.iwon.com	2	5	99.99432	19	334443	334462
151	399	. www.interpark.com	2	3	99.99433	19	335268	335287
152	104	. www.mysearch.com	2	5	99.99458	18	332311	332329
153	203	. www.cnbb.com.cn	3	10	99.99459	18	332716	332734
154	265	. www.yahoo.co.jp	2	10	99.99459	18	332722	332740
155	189	. www.m-w.com	2	10	99.99462	18	334441	334459
156	107	. www.tribalfusion.com	2	4	99.99462	18	334444	334462
157	363	. www.tripod.com	4	9	99.99463	18	335267	335285
158	318	. www.sanspo.com	2	6	99.99463	18	335269	335287
159	460	. www.legendofmir.com.cn	2	15	99.99464	18	336074	336092
160	243	. www.maxmp3.co.kr	2	2	99.99486	17	330787	330804
161	43	. www.r114.co.kr	2	5	99.99487	17	331078	331095
162	147	. www.adscpm.com	2	1	99.99513	16	328802	328818
163	81	. www.adserver.com	2	1	99.99519	16	332302	332318
164	362	. www.club5678.com	2	6	99.99519	16	332318	332334
165	267	. www.netfirms.com	2	13	99.99522	16	334445	334461
166	137	. www.freechal.com	2	3	99.99522	16	334446	334462
167	15	. www.so-net.ne.jp	5	9	99.99524	16	336076	336092
168	429	. www.myway.com	2	5	99.99547	15	331080	331095
169	42	. www.lunarstorm.se	2	5	99.99549	15	332324	332339
170	226	. www.wellsfargo.com	2	10	99.99553	15	335274	335289
171	227	. www.allposters.com	2	5	99.99554	15	336075	336090
172	180	. www.cometsystems.com	2	3	99.99554	15	336075	336090
173	287	. www.hotbot.com	4	9	99.99576	14	330545	330559
174	391	. www.180solutions.com	2	8	99.99577	14	330791	330805

175	95	. www.excite.com	2	5	99.99577	14	330791	330805
176	85	. www.internet.com	2	2	99.99578	14	331508	331522
177	212	. www.ebs.co.kr	2	6	99.99579	14	332720	332734
178	162	. www.autotrader.com	2	1	99.99581	14	334447	334461
179	376	. www.terra.es	2	1	99.99605	13	328805	328818
180	38	. www.emode.com	2	4	99.99607	13	330792	330805
181	219	. www.terra.com.br	2	7	99.99609	13	332305	332318
182	173	. www.ggame.net	2	9	99.99609	13	332316	332329
183	158	. www.netflix.com	4	7	99.99609	13	332721	332734
184	255	. www.jubii.dk	4	7	99.99613	13	336077	336090
185	51	. www.netpia.com	2	2	99.99637	12	330793	330805
186	114	. www.exitfuel.com	2	4	99.99641	12	334450	334462
187	176	. www.realmedia.co.kr	2	2	99.99667	11	330794	330805
188	88	. www.home.ne.jp	2	1	99.99668	11	331084	331095
189	488	. www.weather.com	2	2	99.99668	11	331085	331096
190	345	. www.mainichi.co.jp	2	5	99.99668	11	331085	331096
191	422	. www.zakzak.co.jp	2	6	99.99669	11	332318	332329
192	302	. www.fastclick.com	2	1	99.99672	11	335274	335285
193	206	. www.uol.com.br	2	11	99.99696	10	328808	328818
194	2	. www.msn.co.uk	2	6	99.99698	10	330795	330805
195	199	. www.nexon.com	2	6	99.99698	10	330795	330805
196	462	. www.sprintpcs.com	3	5	99.99698	10	330795	330805
197	19	. www.nastydollars.com	2	2	99.99698	10	331511	331521
198	339	. www.mail.com	2	12	99.99702	10	336087	336097
199	45	. www.com.ne.kr	2	11	99.99726	9	328807	328816
200	425	. www.register.com	4	1	99.99726	9	328809	328818
201	123	. www.atomz.com	2	4	99.99728	9	330548	330557
202	414	. www.rakuten.co.jp	3	8	99.99728	9	330796	330805
203	68	. www.kbb.com	2	5	99.99728	9	331085	331094
204	316	. www.specificpop.com	2	4	99.99728	9	331085	331094
205	403	. www.joins.com	2	5	99.99729	9	332330	332339
206	263	. www.ebay.de	3	6	99.99730	9	332725	332734
207	192	. www.internetfuel.com	2	4	99.99730	9	332731	332740
208	433	. www.epinions.com	3	1	99.99730	9	332731	332740
209	417	. www.sportsseoul.com	2	9	99.99731	9	334453	334462
210	10	. www.sina.com	2	4	99.99732	9	335280	335289
211	153	. www.msn.com.br	3	12	99.99758	8	330555	330563
212	307	. www.bccard.com	2	4	99.99760	8	332725	332733
213	299	. www.wanadoo.fr	4	17	99.99761	8	334450	334458

214	6	. www.ya.com	4	2	99.99787	7	328811	328818
215	474	. www.mail2web.com	2	3	99.99788	7	330798	330805
216	323	. www.plala.or.jp	3	15	99.99789	7	331084	331091
217	269	. www.geocities.jp	2	2	99.99789	7	331089	331096
218	118	. www.cox.net	3	9	99.99789	7	331089	331096
219	119	. www.chinavnet.com	2	14	99.99789	7	332331	332338
220	52	. www.trafficswarm.com	2	4	99.99791	7	335278	335285
221	341	. www.target.com	2	0	99.99792	7	336083	336090
222	298	. www.orbitz.com	4	13	99.99819	6	330799	330805
223	115	. www.lycos.com	5	9	99.99819	6	331088	331094
224	166	. www.magicn.com	2	7	99.99819	6	331089	331095
225	442	. www.tosp.co.jp	3	11	99.99819	6	331090	331096
226	456	. www.linksynergy.com	3	13	99.99819	6	331516	331522
227	92	. www.nasa.gov	3	3	99.99821	6	334452	334458
228	56	. www.allyes.com	3	14	99.99821	6	335279	335285
229	144	. www.rapid-pass.net	2	12	99.99821	6	336084	336090
230	340	. www.jcpenney.com	2	11	99.99849	5	331090	331095
231	343	. www.goo.ne.jp	3	13	99.99849	5	331515	331520
232	496	. www.55025.net	2	19	99.99850	5	332324	332329
233	197	. www.china.com	2	14	99.99851	5	335280	335285
234	390	. www.korea.com	2	7	99.99851	5	335280	335285
235	26	. www.donga.com	2	8	99.99851	5	335281	335286
236	335	. www.nih.gov	3	2	99.99878	4	328814	328818
237	40	. www.chol.com	3	5	99.99879	4	330555	330559
238	58	. www.kbs.co.kr	2	12	99.99879	4	331089	331093
239	398	. www.candybar.co.kr	2	7	99.99879	4	331091	331095
240	142	. www.addynamix.com	2	0	99.99879	4	331518	331522
241	76	. www.ocn.ne.jp	2	4	99.99879	4	331518	331522
242	476	. www.joyon.com	2	4	99.99880	4	332730	332734
243	186	. www.elmundo.es	5	8	99.99880	4	332730	332734
244	204	. www.ohcorea.com	2	9	99.99880	4	334456	334460
245	215	. www.dreamwiz.com	3	9	99.99881	4	335283	335287
246	259	. www.aftonbladet.se	3	11	99.99881	4	336093	336097
247	353	. www.bugsmusic.co.kr	2	4	99.99909	3	328815	328818
248	254	. www.nba.com	2	9	99.99909	3	328815	328818
249	23	. www.bugs.co.kr	2	5	99.99909	3	328815	328818
250	492	. www.bobaedream.co.kr	2	6	99.99909	3	328815	328818
251	466	. www.dmoz.org	2	0	99.99909	3	330555	330558
252	102	. www.hanmir.com	2	5	99.99909	3	331091	331094

253	167	. www.netmarble.net	2	4	99.99909	3	331093	331096
254	252	. www.roving.com	2	8	99.99910	3	331517	331520
255	338	. www.comcast.net	2	4	99.99910	3	331519	331522
256	90	. www.imbc.com	2	6	99.99910	3	331519	331522
257	235	. www.qksrv.net	2	15	99.99910	3	332336	332339
258	138	. www.ofoto.com	3	14	99.99910	3	332731	332734
259	406	. www.gajai.com	2	8	99.99910	3	332731	332734
260	110	. www.everyone.net	2	2	99.99910	3	334456	334459
261	472	. www.nonghyup.com	2	7	99.99911	3	335286	335289
262	214	. www.hi-ho.ne.jp	2	4	99.99939	2	328815	328817
263	359	. www.naver.com	2	8	99.99939	2	328816	328818
264	82	. www.mobile.de	2	3	99.99939	2	330557	330559
265	240	. www.att.net	4	7	99.99939	2	330557	330559
266	421	. www.verizon.net	4	8	99.99940	2	330802	330804
267	434	. www.bidclix.net	2	1	99.99940	2	330802	330804
268	386	. www.dell.com	5	1	99.99940	2	330803	330805
269	426	. www.empas.com	2	9	99.99940	2	331091	331093
270	470	. www.mlb.com	2	5	99.99940	2	331092	331094
271	324	. www.aljazeera.net	3	14	99.99940	2	331519	331521
272	12	. www.buddybuddy.co.kr	2	3	99.99940	2	331519	331521
273	33	. www.hankooki.com	2	5	99.99940	2	331520	331522
274	428	. www.ca.gov	3	7	99.99940	2	334456	334458
275	242	. www.freemove.com	2	5	99.99940	2	334460	334462
276	195	. www.t-online.de	4	4	99.99940	2	335283	335285
277	292	. www.clickbank.com	3	4	99.99970	1	328816	328817
278	84	. www.icq.com	2	3	99.99970	1	328817	328818
279	264	. www.qvc.com	3	3	99.99970	1	330558	330559
280	311	. www.voyeurweb.com	2	3	99.99970	1	330803	330804
281	198	. www.mapquest.com	2	3	99.99970	1	330803	330804
282	160	. www.infoseek.co.jp	2	1	99.99970	1	330803	330804
283	447	. www.biglobe.ne.jp	2	5	99.99970	1	330804	330805
284	393	. www.tvguide.com	2	8	99.99970	1	331518	331519
285	230	. www.cool.ne.jp	2	1	99.99970	1	331520	331521
286	244	. www.canada.com	2	5	99.99970	1	331521	331522
287	34	. www.popuptraffic.com	2	3	99.99970	1	331521	331522
288	293	. www.atdmt.com	3	11	99.99970	1	331521	331522
289	44	. www.hihome.com	2	3	99.99970	1	331521	331522
290	193	. www.redclouds.com	2	3	99.99970	1	332328	332329
291	17	. www.gmx.net	2	7	99.99970	1	332733	332734

292	321	. www.gamefaqs.com	2	8	99.99970	1	332738	332739
293	409	. www.intizen.com	2	5	99.99970	1	334459	334460
294	431	. www.cj.com	2	15	99.99970	1	335287	335288
295	282	. www.nifty.com	2	14	99.99970	1	335288	335289
296	200	. www.findall.co.kr	2	10	99.99970	1	336089	336090
297	361	. www.travelzoo.com	4	7	99.99970	1	336091	336092
298	268	. www.reference.com	2	4	99.99970	1	336096	336097
299	65	. www.chinamp3.com	2	10	99.99970	1	336096	336097
300	218	. www.google.com	4	13	100.00000	0	328818	328818
301	183	. www.bcentral.com	6	12	100.00000	0	330805	330805
302	36	. www.doubleclick.com	4	12	100.00000	0	334462	334462
303	150	. www.google.fr	4	13	100.00000	0	328818	328818
304	120	. www.warnerbros.com	2	12	100.00000	0	332734	332734
305	146	. www.match.com	3	13	100.00000	0	331096	331096
306	157	. www.amateurpages.com	2	11	100.00000	0	332733	332733
307	127	. www.gamespot.com	2	8	100.00000	0	330805	330805
308	220	. www.tom.com	4	19	100.00000	0	330804	330804
309	486	. www.ticketmaster.com	3	13	100.00000	0	335287	335287
310	369	. www.xanga.com	3	3	100.00000	0	334462	334462
311	112	. www.vg.no	4	17	100.00000	0	330557	330557
312	276	. www.macromedia.com	2	0	100.00000	0	332318	332318
313	388	. www.zedo.com	6	12	100.00000	0	335285	335285
314	86	. www.iloveschool.co.kr	4	5	100.00000	0	330557	330557
315	251	. www.chosun.com	2	11	100.00000	0	335285	335285
316	209	. www.citysearch.com	3	13	100.00000	0	330804	330804
317	315	. www.shockwave.com	2	0	100.00000	0	335285	335285
318	284	. www.bravenet.com	6	11	100.00000	0	331522	331522
319	257	. www.usps.com	3	5	100.00000	0	335287	335287
320	289	. www.msnusers.com	6	13	100.00000	0	330563	330563
321	266	. www.ninemsn.com.au	4	15	100.00000	0	330556	330556
322	274	. www.literotica.com	2	1	100.00000	0	334462	334462
323	444	. www.netzero.net	3	4	100.00000	0	332335	332335
324	221	. www.sina.com.tw	2	15	100.00000	0	330556	330556
325	124	. www.hotjobs.com	4	13	100.00000	0	335289	335289
326	493	. www.hotbar.com	4	5	100.00000	0	328818	328818
327	454	. www.kinghost.com	2	2	100.00000	0	331091	331091
328	208	. www.ibm.com	5	13	100.00000	0	331522	331522
329	419	. www.wsj.com	3	6	100.00000	0	334462	334462
330	314	. www.mtrexxx.net	2	1	100.00000	0	334459	334459

331	248	. www.sourceforge.net	3	10	100.00000	0	328818	328818
332	131	. www.careerbuilder.com	2	8	100.00000	0	328818	328818
333	312	. www.msn.com	6	11	100.00000	0	334462	334462
334	313	. www.showhappy.net	5	11	100.00000	0	334459	334459
335	228	. www.real.com	5	1	100.00000	0	332739	332739
336	234	. www.xfreehosting.com	2	1	100.00000	0	330556	330556
337	4	. www.google.co.uk	2	13	100.00000	0	331522	331522
338	134	. www.sayclub.com	3	14	100.00000	0	335289	335289
339	32	. www.indiatimes.com	4	17	100.00000	0	328818	328818
340	106	. www.cgiboy.com	2	12	100.00000	0	335289	335289
341	300	. www.onet.pl	4	17	100.00000	0	332740	332740
342	93	. www.drudgereport.com	2	0	100.00000	0	328818	328818
343	178	. www.ups.com	6	13	100.00000	0	336092	336092
344	46	. www.overstock.com	3	12	100.00000	0	331096	331096
345	427	. www.muchina.com	3	13	100.00000	0	330560	330560
346	366	. www.ebaymotors.com	4	4	100.00000	0	335289	335289
347	225	. www.sleazydream.com	2	1	100.00000	0	330563	330563
348	372	. www.trafficmp.com	2	13	100.00000	0	332339	332339
349	477	. www.realtor.com	4	8	100.00000	0	332734	332734
350	54	. www.google.co.jp	4	13	100.00000	0	331096	331096
351	490	. www.google.com.br	3	13	100.00000	0	331096	331096
352	449	. www.about.com	6	6	100.00000	0	331096	331096
353	471	. www.nfl.com	6	13	100.00000	0	330557	330557
354	117	. www.bidders.co.jp	5	9	100.00000	0	331519	331519
355	377	. www.google.com.gr	4	13	100.00000	0	328818	328818
356	261	. www.sympatico.ca	4	7	100.00000	0	334458	334458
357	358	. www.amazon.com	4	11	100.00000	0	331521	331521
358	461	. www.kir.jp	3	7	100.00000	0	328816	328816
359	396	. www.fedex.com	5	12	100.00000	0	335285	335285
360	14	. www.amazon.co.uk	2	11	100.00000	0	328818	328818
361	70	. www.udn.com	2	7	100.00000	0	332339	332339
362	18	. www.3721.com	3	18	100.00000	0	331095	331095
363	201	. www.amazon.co.jp	3	7	100.00000	0	331522	331522
364	344	. www.windowsmedia.com	6	11	100.00000	0	330805	330805
365	126	. www.com.com	2	8	100.00000	0	331520	331520
366	384	. www.99bb.com	2	7	100.00000	0	330804	330804
367	469	. www.msn.es	3	11	100.00000	0	328818	328818
368	294	. www.mcafee.com	2	7	100.00000	0	330558	330558
369	270	. www.verisign.com	3	8	100.00000	0	334460	334460

370	481	. www.kbstar.com	3	14	100.00000	0	330555	330555
371	392	. www.sbs.co.kr	2	11	100.00000	0	331091	331091
372	485	. www.microsoft.com	5	11	100.00000	0	336092	336092
373	185	. www.friendster.com	2	7	100.00000	0	332335	332335
374	349	. www.classmates.com	4	15	100.00000	0	330804	330804
375	418	. www.nytimes.com	3	11	100.00000	0	331522	331522
376	271	. www.bellsouth.net	4	11	100.00000	0	336097	336097
377	286	. www.symantec.com	4	6	100.00000	0	334462	334462
378	155	. www.cnet.com	2	8	100.00000	0	336092	336092
379	229	. www.ynet.co.il	5	6	100.00000	0	336092	336092
380	317	. www.ign.com	4	11	100.00000	0	336090	336090
381	446	. www.rr.com	4	6	100.00000	0	331094	331094
382	224	. www.walmart.com	4	11	100.00000	0	332734	332734
383	423	. www.webshots.com	3	6	100.00000	0	332339	332339
384	73	. www.clickspring.net	3	7	100.00000	0	334459	334459
385	491	. www.mtv.com	7	10	100.00000	0	330563	330563
386	347	. www.bizrate.com	6	11	100.00000	0	336092	336092
387	309	. www.latinchat.com	2	4	100.00000	0	331521	331521
388	381	. www.travelocity.com	4	14	100.00000	0	334462	334462
389	329	. www.asahi.com	3	10	100.00000	0	336097	336097
390	24	. www.gameting.com	2	14	100.00000	0	330559	330559
391	320	. www.referralware.com	3	10	100.00000	0	330804	330804
392	168	. www.google.es	2	13	100.00000	0	332740	332740
393	172	. www.bestbuy.com	8	10	100.00000	0	330804	330804
394	337	. www.hotmail.com	4	7	100.00000	0	332331	332331
395	1	. www.yahoo.co.kr	5	10	100.00000	0	332734	332734
396	94	. www.dealtime.com	4	11	100.00000	0	332339	332339
397	213	. www.rediff.com	8	10	100.00000	0	331519	331519
398	125	. www.craigslist.org	3	10	100.00000	0	330558	330558
399	395	. www.cgiworld.net	5	11	100.00000	0	328817	328817
400	101	. www.yahoo.com	5	9	100.00000	0	334462	334462
401	285	. www.bankofamerica.com	3	14	100.00000	0	331522	331522
402	354	. www.dogpile.com	2	8	100.00000	0	330805	330805
403	136	. www.infospace.com	2	8	100.00000	0	336097	336097
404	352	. www.auction.co.kr	4	8	100.00000	0	328818	328818
405	67	. www.mediaplex.com	3	8	100.00000	0	330804	330804
406	498	. www.expedia.com	2	6	100.00000	0	330557	330557
407	346	. www.bestweb.tv	2	0	100.00000	0	336097	336097
408	258	. www.boston.com	4	10	100.00000	0	330563	330563

409	49	. www.marketwatch.com	3	6	100.00000	0	334461	334461
410	245	. www.usatoday.com	2	9	100.00000	0	330805	330805
411	379	. www.msn.com.tw	6	11	100.00000	0	332338	332338
412	458	. www.classmates.com	4	14	100.00000	0	335285	335285
413	9	. www.ebay.co.uk	4	4	100.00000	0	328818	328818
414	122	. www.2ch.net	3	4	100.00000	0	334459	334459
415	482	. www.alibaba.com	2	12	100.00000	0	331521	331521
416	304	. www.multimap.com	3	5	100.00000	0	330557	330557
417	402	. www.pricegrabber.com	3	12	100.00000	0	328818	328818
418	303	. www.msnbc.com	6	12	100.00000	0	331096	331096
419	105	. www.ebay.com	4	4	100.00000	0	336090	336090
420	87	. www.go.com	4	15	100.00000	0	331519	331519
421	62	. www.google.be	4	13	100.00000	0	336092	336092
422	96	. www.switchboard.com	6	12	100.00000	0	336091	336091
423	247	. www.ask.com	2	11	100.00000	0	332339	332339
424	373	. www.premium-offers.com	3	4	100.00000	0	331522	331522
425	432	. www.google.nl	3	13	100.00000	0	330558	330558
426	250	. www.yam.com	3	7	100.00000	0	332330	332330
427	151	. www.foxnews.com	2	5	100.00000	0	332734	332734
428	416	. www.guardian.co.uk	8	12	100.00000	0	330557	330557
429	47	. www.ebay.ca	4	4	100.00000	0	334458	334458
430	330	. www.google.com.au	4	13	100.00000	0	330557	330557
431	217	. www.noaa.gov	5	12	100.00000	0	332734	332734
432	130	. www.lgeshop.com	2	12	100.00000	0	335284	335284
433	163	. www.alltheweb.com	2	12	100.00000	0	331519	331519
434	280	. www.hp.com	6	11	100.00000	0	332739	332739
435	7	. www.mgame.com	2	12	100.00000	0	332339	332339
436	113	. www.apple.com	6	10	100.00000	0	328818	328818
437	191	. www.nikkansports.com	2	15	100.00000	0	335289	335289
438	441	. www.juno.com	3	4	100.00000	0	330805	330805
439	355	. www.cnn.com	4	5	100.00000	0	335289	335289
440	140	. www.google.de	4	13	100.00000	0	332331	332331
441	475	. www.rn11.com	2	4	100.00000	0	335285	335285
442	159	. www.aol.com	4	5	100.00000	0	335285	335285
443	407	. www.sony.com	4	15	100.00000	0	330556	330556
444	478	. www.yupimsn.com	6	12	100.00000	0	334462	334462
445	108	. www.google.com.mx	4	13	100.00000	0	332740	332740
446	41	. www.ezboard.com	3	5	100.00000	0	332331	332331
447	499	. www.freeservers.com	2	10	100.00000	0	330805	330805

448	143	. www.yomiuri.co.jp	2	5	100.00000	0	328817	328817
449	301	. www.joy1004.co.kr	2	8	100.00000	0	328818	328818
450	378	. www.msn.fr	3	11	100.00000	0	331522	331522
451	196	. www.pogo.com	2	9	100.00000	0	334462	334462
452	152	. www.passport.net	6	11	100.00000	0	336092	336092
453	39	. www.google.ca	4	13	100.00000	0	330803	330803
454	348	. www.barbie.com	2	12	100.00000	0	330557	330557
455	404	. www.wordtracker.com	5	10	100.00000	0	332740	332740
456	21	. www.cninfo.net	3	15	100.00000	0	334459	334459
457	256	. www.sina.com.cn	3	19	100.00000	0	330559	330559
458	246	. www.eroskorea.com	4	11	100.00000	0	332329	332329
459	187	. www.realmedia.com	4	13	100.00000	0	330804	330804
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461	170	. www.cartoonnetwork.com	4	5	100.00000	0	331522	331522
462	262	. www.imdb.com	5	11	100.00000	0	331096	331096
463	368	. www.superpages.com	3	5	100.00000	0	332734	332734
464	50	. www.washingtonpost.com	4	11	100.00000	0	330559	330559
465	383	. www.netscape.com	3	5	100.00000	0	330804	330804
466	207	. www.msn.de	3	11	100.00000	0	335285	335285
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