17 September 2013

Dear ICANN Board and Staff,

We, the members of the New TLD Applicant Group ("NTAG"), write to expand upon our initial comment about name collision and Security, Stability and Resiliency ("SSR") and to reply to some comments we disagree with that were submitted during the initial 21-day commenting period for this topic. This letter reflects the interests of the entire NTAG. It is the result of an unprecedented, cooperative effort between rival applicants and with organizations outside of the ICANN community that are concerned about cyber security.

But before diving into the heart of this letter, we invite you to take a step back. Stability and security with the new gTLD program are core to ICANN's mission and vital to the success of the entire program. If any gTLD launch goes awry — especially if due to SSR issues — it could spoil consumer adoption for all applicants who've launched or are waiting to launch. This is why NTAG believes it is in our interest to support enhancements to cyber security, including to convey data-driven analysis that helps you to decide what is best for the new gTLD program from a SSR perspective.

Since submitting the first letter, NTAG has been hard at work to provide you with what we hope is a substantial, data-driven update and reasonable mitigation approach:

- NTAG members have donated thousands of dollars worth of hardware to help OARC, the provider of root query data, to upgrade its capabilities to allow for greater access to and further study of Day in The Life of the Internet ("DITL") data that is the subject of the Interisle report.
- NTAG has extracted OARC-provided DITL data and analyzed it based on the structure outlined in Appendix B to this letter. The slight differences between the NTAG analysis and Interisle's are discussed in Appendix C.
- NTAG members convened a live TLD Security Forum on 22 August to discuss the merits of the Interisle report and how we can supplement it with what we believe is more reasonable analysis. Engagement has been so compelling that it has encouraged NTAG to move ahead on the efforts described below, as well as to convene another live TLD Security Forum in Washington, D.C. on 1 October[1]. ICANN Staff and Board are more than welcome to attend and join the many other stakeholders who plan to participate.

We do not wish to toot our own horn, but need to stress how incredible it has been for NTAG to unite on the above efforts within such a brief period of time (*i.e.*, 20 calendar days since staff posted name collision for public comment). You can imagine how daunting it has been to gather and analyze data that helps to provide perspective to the Interisle study and Verisign's comments. Interisle has been commissioned to conduct the name collision study for ICANN. Verisign, as a root server operator, has private access to data. As such, both entities have had at least a six-week head start to access and

[1] https://tldsecurityforum.eventbrite.com

analyze root query data and frame discussions about name collision and security risks with the new gTLD program.

Based on the NTAG's efforts to date, below we outline as objectively as possible what we believe could sufficiently mitigate name collision risks and why. We believe that this letter can help the Board with its effort to reach a balanced (i) understanding of cyber security impacts with the new gTLD program and (ii) decision of the name collision issues.

Massive Overcounting of Collisions

Our initial response letter pointed out an obvious issue with using root query data as a proxy for measuring the proportion of DNS queries made against non-delegated TLDs: caching. The caching issue overestimates the number of collisions as a fraction of overall query traffic in multiple ways, due to both the effect of delegated domains having long TTLs and the standard treatment of TTLs on negative responses by recursive DNS servers.

It is our understanding that Google intends to submit a detailed paper on this issue, based upon data collected from their recursive PublicDNS system. We urge the Board and Staff to pay close attention to their findings, which include the fact that the root data set often overstates the number of collisions by a factor of 39x (.corp) and even up to 500x (.ice).

Our Suggested Mitigations

The NTAG has come up with a set of mitigations that we believe reduces the risk from name collisions to an acceptable level, and to well below the risk of any other TLD delegated in the last decade.

The mitigations fall into two categories: those applied to all TLDs and those applied to only the most problematic.

We recommend that ICANN mandate implementation of the following protections at the registry level for each new TLD:

- Prevent registration of second level domains corresponding to the major existing gTLDs[2].
- Prevent registration of specific terms related to the Internet, networking, protocol, web related file extensions or common internal hostnames. This list is included in Appendix D.
- Exclude terms that a rightful owner has entered into the TMCH, require a one-year hold on second-level domain registration for strings that present more than a certain number of queries represented in the DITL data, with a custom hold list generated for each proposed TLD. In Appendix A, NTAG presents a chart showing collision risks before and after applying the proposed hold for strings that present more than 10,000 queries. The 10,000 threshold is merely a suggestion. We leave it to the Board and Staff to decide the acceptable risk threshold. In a

[2] com, net, org, biz, edu, gov and mil.

couple of weeks, NTAG will be able to generate and report a custom list for each proposed new TLD at various threshold levels: 50,000 queries, 20,000 queries, 10,000 queries, 5,000 queries, and 1,000 queries. An example list for one proposed new TLD, .med, is included in Appendix E, along with the list of all 210 strings that would exceed a 10,000 query threshold.

- Block the registration of the decimal integers between 0 and 255 as an SLD under the new TLDs. This will prevent collisions from malformed reverse DNS lookups on IPv4 addresses.

The NTAG believes that this is a good base set of requirements, but that all of these protections could be reconsidered on a case-by-case basis using the RSEP process. It is likely that most of these protections would not be relevant to closed ".brand" TLDs, and we look forward to discussing more nuanced protections for those applications.

For three of the most controversial new TLDs, .corp, .home and .mail, we propose the following path forward:

1. That string contention be resolved in the normal order of business for all three strings.
2. That contracting and delegation move forward with the parties that emerge from contention, assuming that they agree to the following protections:
    a. That they operate a 90 day sunrise period for all strings.
    b. That they operate a one-year extended sunrise period for the most common brand names seen globally in name collisions. A tentative list of about 800 brand-related names, generated from the top 2000 strings seen as SLDs, is available in Appendix F.
    c. That they operate a one-year hold for the top 50 SLDs seen in requests for each TLD, assuming such strings have not already been included in previous lists. A list of these names is found in Appendix G.
    d. That while domains could be pre-sold for each TLD that no second level names will be delegated for a period of one year.
    e. That the TLD server logs from each of these new TLDs be turned over to OARC monthly for analysis by interested parties. This would allow ICANN and others to gauge the effectiveness of this risk mitigation program as it operates.
    f. That these protections could be shortened via the RSEP process, if supported by DNS query data.

Conclusion

In summary, our research shows that only a few known items are outstanding and require one or two weeks of further study. NTAG will follow-up this letter with a final report that includes these remaining items. Notably, NTAG will provide a report of registration hold lists for all proposed new TLDs and charts showing how implementing such holds would reduce name collision queries below certain risk thresholds, including the threshold which Board and Staff are to determine represents an adequate level of risk. What is known now provides strong support for permitting the new gTLD program to safely and successfully proceed, provided NTAG's proposed mitigations are implemented.

Safety and success of the new gTLD program is important and achievable. Complaints with one new gTLD could risk prospects for all participants, inside and outside of ICANN. Because NTAG members understand this obvious correlation between consumer trust and new gTLD adoption, we're committed to taking actions that align with the interests of Internet users. Name collision mitigations are but one example where we strongly believe that launch of the new gTLD program could help to enhance cyber security for users.

To help Board and Staff develop a fuller view and understand our commitment to cyber security, we encourage attendance at the second NTAG-sponsored TLD Security Forum. Specifically to Board members, irrespective of the stakeholders or committee(s) you represent, we believe that participation in the forum could help to inform your decision for moving forward on the name collision issue and deepen your understanding of cyber security for related future issues. Simply RSVP your interest in attending the TLD Security Forum at https://tldsecurityforum.eventbrite.com.

Among other content, a live overview of the issues — including an update of the remaining research items — will be provided. Participants can also look forward to hearing from voices outside of the ICANN community with a relevant take on Internet security issues. These conversations continue the productive talks from the first forum, where experts and stakeholders concerned with cyber security, including PayPal and a major certificate authority provider, joined the ICANN community to help address name collision risks, promote security with the new gTLD program and otherwise provide input on the evolution of the Internet as championed by ICANN.

Thank you for considering the data and analysis in this letter. We appreciate you taking time to hear our views before deciding this issue, especially because we've only recently gained access to the data necessary to add valuable input to the discussion.

Sincerely,
Members of the NTAG

Appendix A: Before and After Mitigations

The NTAG modeled the effect of removing SLDs that cannot be registered (such as _msdcs), filtering for the Chrome random 10 letter domains (which account for no security risk) and applying our suggested mitigations against the 2013 DITL dataset. This included the special treatment (a one-year hold with exceptions for TMCH terms) of all SLDs that have received more than 10,000 requests in that dataset. The 10,000 request line is completely arbitrary, and was chosen by the NTAG as a strawman proposal. We will provide the Board and Staff with simulations of other thresholds in our next report.

Figure 1: This chart shows the number of requests for the top-10 proposed TLDs in the DITL 2013 data, alongside the remaining collisions after taking into account the protections NTAG recommends in this letter.

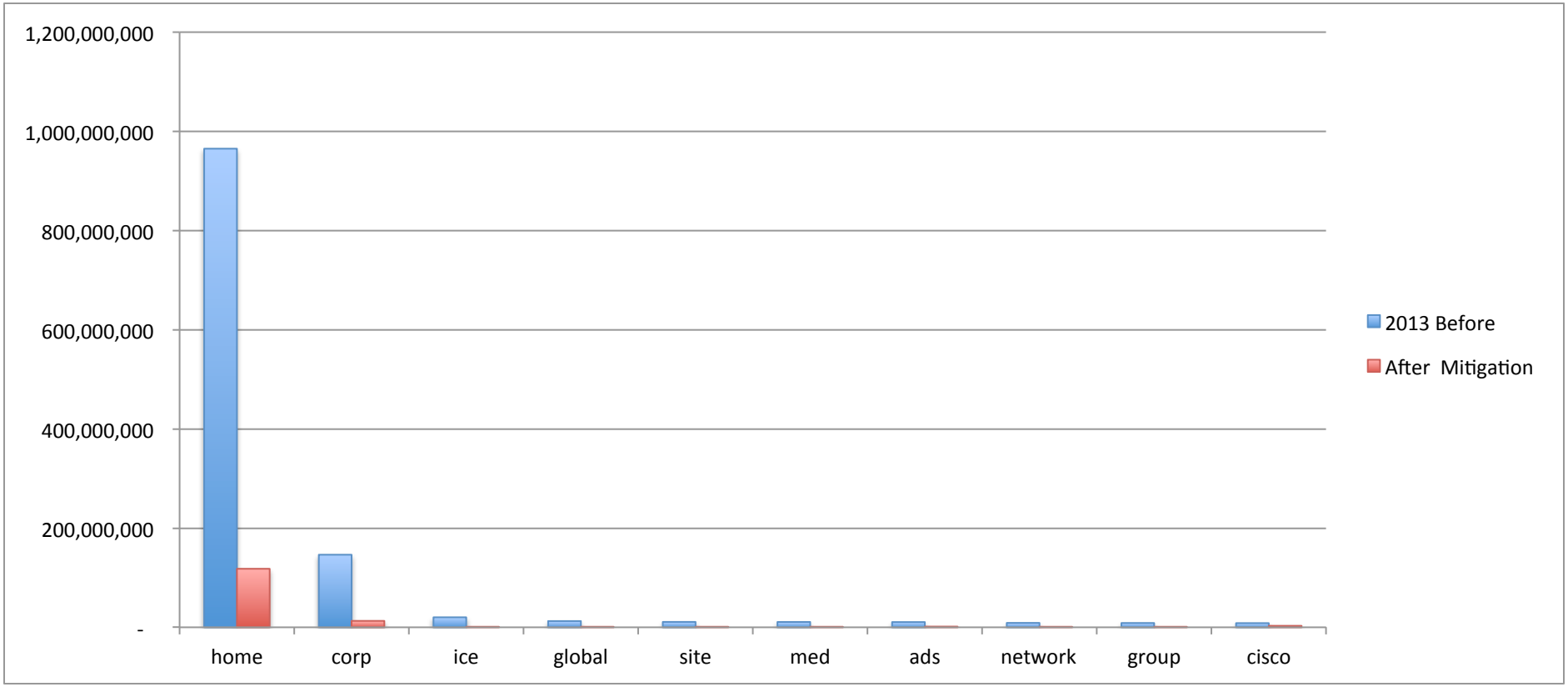


Figure 2: This chart shows the same information for the 10 most frequent TLDs outside of .corp and .home.

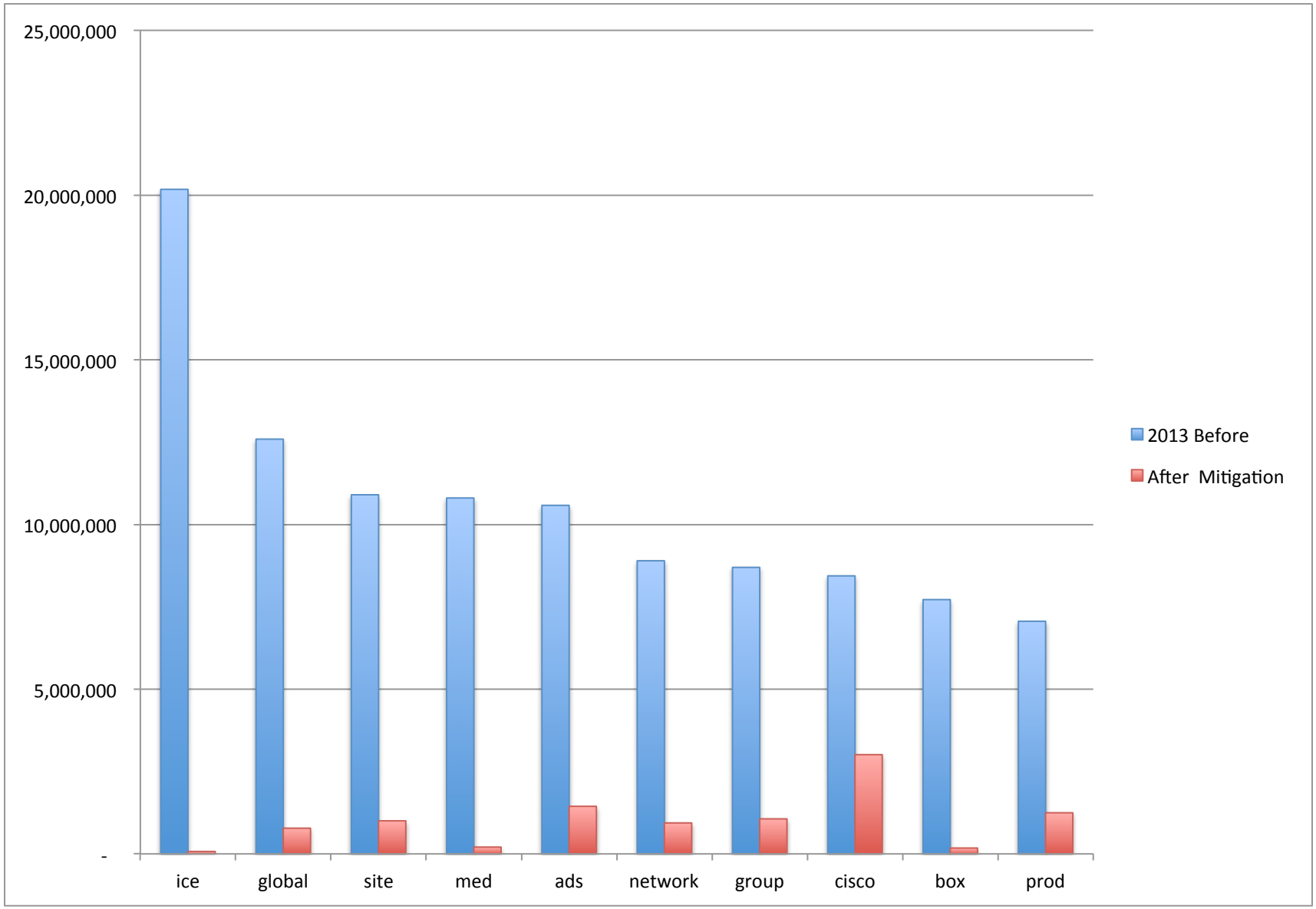
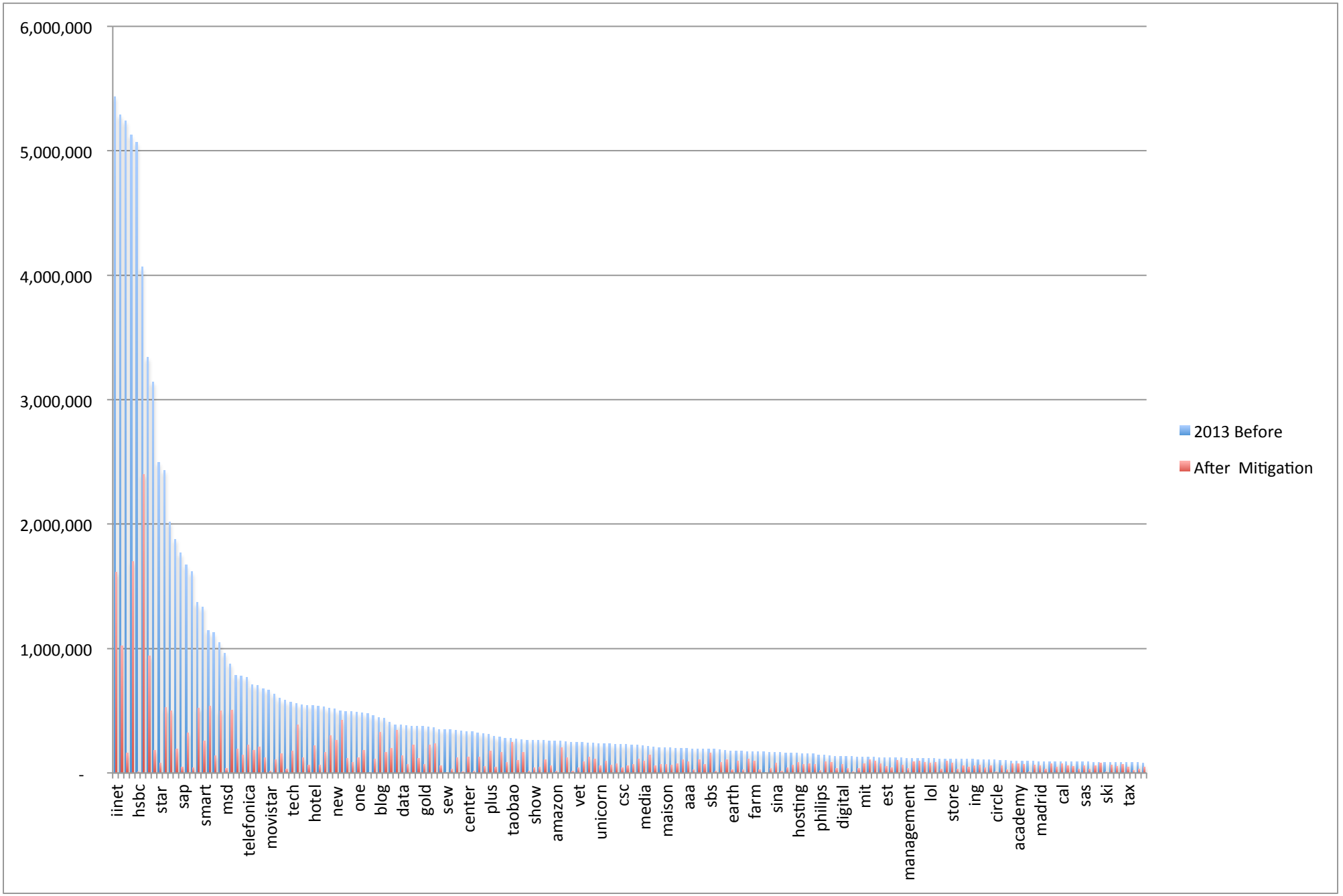


Figure 3: This chart shows the same before and after counts for the 200 TLDs following those in Figure 2.



Appendix B: Data Extraction Process

As part of the DITL (Day In The Life) project, data captures are provided to the DNS-OARC project. Participating root-server operators (and other DNS server operators) provide collections of compressed network traffic capture files. These captures are in a common format for network captures called PCAP that can be read by many different tools.

The root servers see queries for all sorts of DNS lookups, including many valid and invalid queries. The input dataset for 2012 is 5.21 TB compressed (for root servers A, C, E, F, H, I, J, K, L and M) and 2013 is 1.76 TB compressed (for root servers A, C, D, E, F, H, J, K, L and M). The 2012 data was captured between April 17th and April 19th, 2012. The 2013 data was captured between May 28th and May 30th 2013. Processing, decompressing and filtering these very large datasets takes considerable computing power. In order to make it easier for researchers and analysts to work with the data, it was decompressed, processed, filtered and converted to an easy to process form.

We used a tool with a long pedigree called "tcpdump" to process the PCAP files prior to filtration and conversion to intermediate forms. Tcpdump has been available since 1987 and is actively maintained to this day. Additionally, it is widely available for most platforms, including Linux, Mac, FreeBSD, Windows.

While decompressing and using tcpdump to convert the PCAP files, we created a collection of intermediate files that contain only the TLD strings of interest. The TLDs of interest included all applied for gTLDs and as well as a few other strings.

Subsequent to creation of the intermediate files, we produced per-TLD files. To create these, we aggregated the filtered intermediate files, and split them into one file per TLD. Each of these per-TLD files are sorted by SLD for easier subsequent analysis.

Appendix C: Discrepancies versus Interisle's report

While preparing data for analysis, a different set of tools were utilized than those used for the Interisle report. This was a conscious choice, as it allowed us to work towards reproducing Interisle's numbers without following the exact same methodology.

Interisle's report utilized a customized version of PacketQ to query the DITL data, whereas we used tcpdump and a series of data processing scripts. Because of the different tools and methodologies, we did encounter differences in our results, but are able to explain most of the differences.

We processed the data for 2013 and 2012 separately, and had managed to get our total query counts for 2013 within 1.25% after correcting for a few early processing errors. Such a small difference could have been explained by rounding errors[3] and small differences in how PacketQ and tcpdump process data.

It wasn't until we examined the 2012 numbers and saw that our 2012 data was under-reporting by 21.21% that we discovered a bug in our data extraction and filtering phase: Invalid queries containing spaces were not included in our processed datasets! Fortunately, this only had a negligible effect on the processed 2013 data, as there were relatively few queries with spaces in 2013[4]. Including queries with spaces brought the 2013 query count total up 1.36% more queries than Interisle's report. The only TLD that was significantly impacted by this bug was .APP, which was under-counted by 327,000 invalid queries (20.44%).

The situation for 2012 was quite different as 2012 has a significant number of queries for "File moved-http://…" which contains spaces, as Interisle's report shows[5], which they report made up about 18% of the 2012 data. We found there to be at least 168,778,000 or 22.3% queries with spaces in them in 2012. This brings our total for 2012 to 2.04% shy of Interisle's counts for 2012.

While investigating differences in how PacketQ and tcpdump process DNS packets, a couple of observations were found that may help explain differences. Due to limited time, we were not able to thoroughly investigate these. The key take-away is that the DITL captures contain a large volume of invalid or malformed DNS packets, which may be processed differently by different software. The tools, however, produce very similar numbers, if not the same, when processing properly formed, valid queries.

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[3] Interisle's report rounds figures to the nearest 1000, which can produce significant percentage differences when comparing small query volumes.

[4] Interisle Consulting Group: *Name Collision in the DNS*, Table 10, Page 47.

[5] Interisle Consulting Group: *Name Collision in the DNS*, Table 11, Page 47.

[5]

- Unless PacketQ is told not to limit queries to “questions”, if TCP queries are present (such as EDNS0), these may be included in query counts. This would have a very small effect of having PacketQ count more packets than tcpdump, which does not include the query string for TCP responses.
- When the PUSH flag is present on a query (TCP), PacketQ appeared not to count it, but tcpdump did report it. This too represented a small number of queries.

We are satisfied that both Interisle’s and our own processing of the DITL data are valid, as our datasets result in numbers that are acceptably similar. Given the completely different analysis toolset and large quantity of data and short timeline, it is not feasible to work to explain every little difference in the numbers. At the macro level, the results are sufficient identical, and validate each other.

Appendix D: Reserved Technical Labels

```
root
wpad
isatap
host
intranet
jpg
wsf
dns
lan
undefined
autodiscover
pop
smtp
gif
printserver
css
comm
imap
file
anonymous
sip
sipexternal
sipinternal
internet
xml
null
pop3
hotspot
html
router
internal
msdcs
udp
tcp
```

Appendix E: Reserving SLDs with over 10,000 Collisions

The following is the list of TLDs found to have at least one valid SLD with more than 10,000 collision occurrences in the 2013 DITL data set. We propose that each new TLD registry reserve all SLDs with more than 10,000 collisions for an extended period.

active
ads
africa
amazon
anz
aol
app
apple
art
auto
baidu
bank
bar
bbc
bcn
beer
bet
bing
bio
blanco
blog
bloomberg
bom
boo
box
business
bzh
cal
cam
caravan
care
casa
catholic
cba
center
cisco
city
cloud
college
comcast
company
computer
corp
cpa
csc
data
dealer
delivery
dell
delta
dev
digital
directory
dish
doha
earth
eco
ecom
energy
ericsson
exchange
faith
family
farm
fashion
fish
flickr
foo
forum
fox
free
gal
game
games
global
gmail
gmbh
goo
goog
google
green
group
health
here
home
hospital
host
hosting
hot
hotmail
house
hsbc
ibm
ice
ifm
iinet
ikano
imdb
inc
ink
institute
islam
itau
kids
lanxess
law
legal
link
live
llc
llp
lol
london
lpl
ltd
madrid
mail
maison
man
management
map
matrix
med
media
medical
meo
mit
mlb
mnet
mobile
moe
msd
music
navy
network
new
news
nico
nyc
off
office
one
online
ooo
orange
partners
philips
photo
plus
porn
prod
pub
red
sap
sas
sbi
sbs
sca
scb
school
schule
search
security
services
ses
sex
sfr
show
sina
site
sky
smart
sohu
srt
star
stc
studio
style
sydney
systems
taobao
tata
tax
team
tech
telefonica
terra
thai
top
toshiba
town
tube
unicorn
vet
video
voyage
web
website
weir
win
windows
work
world
wow
xyz
yahoo
yandex
you
youtube
zone

Appendix F: Suggested Reserved Brand Strings for .corp, .home and .mail

sap
compassgroup
ad1
sanm
hospira
main
sealedair
worldnow
franke
abacus
delta
essilor
dci
davita
iusacell
astrium
advantech
sungardas
hologic
google
ticketmaster
directenergy
cencosud
mediatek
gmacr
yahoo
playtech
uff
blackbaud
checkfree
lpl
mgr
mapei
tomra
oldcastle
dunkinbrands
nbty
skype
iac
tkse
rsag
lgdisplay
hager
albras
vodacom
bancolombia
nmhg
bskyb
galpenergia
kuoni
networksolutions
fnac
leviton
ncsoft
elcorteingles
lan
cnooc
webtrends
mauser
sena
nexant
dc1
facebook
laerdal
masco

ray
luxottica
netservicos
smarttech
petroplus
intersil
umusic
iasis
wwt
ebx
telecomegypt
aeroflex
phh
astra
seal
bulgari
mcfa
arcelik
ahm
rminfra
perlos
telekomaustria
youtube
netiq
you
mobinil
firmex
crucell
investec
googl
grontmij
pdsi
pmsi
cabelas
mexicana
trader
dell
aol
imtech
amx
qpass
nomos
kaynakholding
colombiamovil
iplgroup
nas
twitter
beer
freshdelmonte
snagajob
xtralis
kordsa
howdens
muhaidib
jenoptik
oneneck
startupfarms
toshiba
att
allseas
kcadeutag
unitedlex
sinopac
bcferries
gowlings

walbroem
econcern
h
gateway
impaq
apptis
banqueatlantique
mobitv
thefa
stcolumba
pmi
pvnccdsb
cfao
markit
sea
alrajhi
ziraat
blooms
homeaway
pulse
blessedtrinity
asus
itvplc
arcsoft
acer
medhost
jss
corona
solmelia
wirelessadvocates
wsp
ariad
tereos
rchk
taro
navtech
skrivanek
adexus
libyana
tipper
mckoolsmith
psy
naes
publicisgroupe
zentiva
altura
localiza
fac
groupalia
goog
iamgold
sericol
rtlgroup
telesat
dhlglobalmail
weightwatchers
hillstar
shopzilla
olysteel
888holdings
kinepolis
max
mechel
hti
mli

gsf
cerebos
kahramaa
srv
yout
lenovo
cisco
abc
hfc
carmignac
device
luxus
ceridian
yandex
xfab
ragasa
twi
indofood
chemeketa
conres
viagogo
delicom
stallergenes
dot
eset
intrado
customink
china
crosig
razer
ascensionhealth
aerolia
criteo
tva
supermaxi
asiapacific
chopard
bellsouth
fosbel
qiagen
healthcarefirst
docstoc
savonagroup
sidlee
olivetti
ahl
rabobankgroep
cartoys
miniclip
sodimac
taketwo
mgmt
mcap
ask
geusa
enterasys
phones4u
fike
sophos
sundaysky
ziemann
twitte
youtub
fiorucci
ccn

aldec
ibm
hudbay
kadmon
youtu
sisd
apple
matrix
ocia
dallmayr
kbw
vitana
kharkov
millerthomson
idealease
aaa
yorktowne
heinlein
middle
pri
bmwc
pbi
mre
protransintl
cerner
faceboo
emergency
metro
intervision
vulcraft
symantec
jagex
lancom
anexinet
budenheim
bangkok
ebay
charter
pc6
ldsb
braves
ziprealty
foliofn
faceb
readynas
kstores
foseco
ahly
gcyc
swisslife
ftt
gogle
newag
neon
one
imbema
banvenez
longchamp
jgl
box
cfglobal
euriware
depetris
pssea
gmarket
fundacion
kiev
principal
sssas
ppl
nexon
office1
madcatz
premier
telepizza
gmcr
bmw
draeger
network
m
setup
saturnus
ascom
braemar
cat
gea
aglaia
devlab
tensar
porta
secom
midam
aeci
skyguide
deloitte
gamesys
sacmi
dys
domo
anna
greggs
meritz
hermes
cci
softpro
tiscali
furukawa
acando
greenergy
ibri
abbi
unic
happy
mobile
corp
ecolab
sungard
airbus
sdl
quest
rackspace
thrivent
tsol
concentra
hardie
zeppelin
presidio
ddsb
cardno
areva
sugar
abbott
itunes
baincapital
tpg
unifi
ccs
dev
mccain
microsoft
cima
enersys
burberry
bobevans
rencap
fitch
spacex
asia
awc
hot
uasc
btc
childrens
rasht
penfed
ergon
visanet
kobo
comcast
rai
face
reliance
sceggs
newline
santanderde
sjm
barentz
edpr
baleno
samsung
ferretti
siege
live
wvc
scl
unknown
thepantry
rfid
jebsen
dior
estacio
csun
haesslo
pago
shc
forrester
v
holdings
pioneer
sd33
compaq
twitt
sam
cassidian
speedy
ase
grp
efeu
toyon
unisource
dcs
monto
scania
london
sun
oracle
onion
daniel
gfk
goldentemple
ico
bob
bbc
varde
dolby
aviva
olympus
asseco
gpt
bsi
pcs
azul
cbc
boston
brother
baltimore
goo
walpole
atlanta
thun
icm
redmond
loc
ice
nemko
trans
royal
aurora
cowen
iss
lol
cbn
macintosh
canberra
bruehl
ebm
orion
privateer
sd45
jupiter
game
parker
fortis
dmz
bmc
giordano
columbia
ecobank
sirius
aditi
csi
forum
luton
belton
mtu
heartland
eller
grace
acs
sony
ali
mars
rts
thornburg
dornier
stargate
europa
den
theplanet
cpwr
kcg
eame
offshore
mbci

loe
uag
auca
bax
sanmateocounty
tpe
mobi
attla
stc
esa
gome
bcc
hhgp
amorg
cicc
lcc
obg
lcs
cov
sov
dtc
inet
bwin
afg
w
gts
shg
cinepolis
rbi
daisy
alexlee
ddrc
y
gpm
netech
songa
zone
sds
rjy
groupe
trekk
metito
ssg
mch
uwg
host
ebsi
motech
pgslp
sbc
insight
esker
vib
jcom
ami
dpa
phf
k
carglass
guckenheimer
lutz
synovis
photo
telemar
hbi
kit
boosth
wcs
chipita
notebook
bghs
sof
tesa
comp
mcg
turkmen
tinsight
pharos
brm
bdsc
kfmc
ihi
elan
pc7
calvo
tmf
hmc
spgroup
ku6
hcb
stora
ult
rica
efi
cms
elite
oxia
ghelamco
bjs
asd
lamadeleine
optimum
texasgas
wonga
phe
whiteways
msi
sedgman
ande
teva
ini
alico
quanta
oxygen
hafele
easynet
capita
gva
company
mobicom
dfa
det
office
rcs
mig
applied
asi
vip
macedo
ima
ams
ecs
connors
lins
bonfiglioli
api
fleet
bbva
aero
genting
eroglu
shuttle
meritage
leman
selwyn
mclagan
imi
nextel
ucles
cogent
ensco
chamartin
efg
img
lindner
harbourfront
zet
tmk
empire
verizon
hsbc
alex
uanl
michelle
free
bou
nsw
allied
uhs
payday
mac
noco
palic
hildebrando
hyundai
grupo
stpaul
aem
cogema
eci
srilankan
coe
gim
sbs
john
serc
cit
mondial
omnilife
hudson
lena
magellan
triton
tsd
help
msp
res
uca
apac
magna
nse
tuv
rabobank
wacker
life
vega
amc
telos
kier
moreno
ames
gsc
cohen
naples
wasco
galaxy
indigo
miel
agi
bns
alice
cca
rideau
basler
xch
itt
boss
ruth
chaos
david
carlos
toledo
jeeves
infinity
dune
zurich
hrc
swift
ultra
bally
private
chapman
boardwalk
fenwick
master
trident
watts
smart
veolia
leighton
red
adams
leo
bfg
grey
mercury
space
claro
mmc
blake
amer
anadolu
hughes
guilford
fox
kingston
orange

Appendix G: Top 50 SLDs for .home, .corp and .mail

.home

intra
https
pro
tracker
br0
user
nohost
iphone
e
desktop
windows
dhcppc0
admin
invalid
mail
images
computer
gmail
pc2
server1
lifbcibllhkdhoafpjfnlhfpfgn
pldfl
i
laptop
error
videos
activationbbr
n
b
servidor
xxx
icongo
s
namics
ieeb
dhcppc1
a
ufi
hotmail
mybookworld
wdtvlive
ipad
com0
printer
d
user-hp
diskstation
u
php
bit

.mail

system
alico
com
net
yahoo
org
g
mail
company
hot
army
gateway
navy
google
www
receive
local
smtp
gmail
e
aol
hotmail
embarq
y
pop
rocket
rediff
corp
for
cra
professional
usmc
autodiscover
android
sazepad
usarmy
delete-me
imap
comcast
upc
jensen
abwin
att
live
gruppocredem
metro
win
border
campany
oma

.corp

lasercard
csodsandbox
rel
broker
beauty
rosinv
amlaw
vfa
srggi
grupoq
domain
uafc
dorseylaw
orklanet
hymall
tatenergo
eisenmann
cvstarrco
dipcmi
csodmgmt
airwatch
cfs2
dealerdotcom
neos
247wpp
imax
tecsys
cegos
meus
raccorp
fpprod
buyabs
bps
stibo
3pillar
canternet
nmhgext
ncic
grupomag
price
alior
ddefue001
associa
freetranslation
hcmdomain
cardone
amscan
wrgd
all