





Changes to .com/.net/.edu name servers in preparation for DNSSEC

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Two name server behavior changes

1. New referral behavior
2. Glue no longer promoted to authoritative status
 - In preparation for DNSSEC deployment in *.com/.net/.edu*
 - Changes were implemented on March 1, 2010
 - Details at:
[http://www.verisign.com/domain-name-services/
domain-information-center/dns-behavior/index.html](http://www.verisign.com/domain-name-services/domain-information-center/dns-behavior/index.html)





▪ New referral behavior

- Now return a referral for queries for names at or below a delegation point
- No more “non-authoritative glue” responses
- Change from “what BIND 8 did” to “what BIND 9 does”
- Old behavior would have been a potential problem for DNSSEC validation



Query for *ns1.example.com / IN / A*

Former behavior (non-authoritative answer):

```
;; ->>HEADER<<-  
;; flags: qr; [...]

;; QUESTION SECTION:  
;ns1.example.com. IN  A

;; ANSWER SECTION:  
ns1.example.com. A    192.0.2.1

;; AUTHORITY SECTION:  
example.com.      NS    ns1.example.com.  
example.com.      NS    ns2.example.com.

;; ADDITIONAL SECTION:  
ns1.example.com. A    192.0.2.1  
ns2.example.com. A    192.0.2.2
```

Current behavior (referral):

```
;; ->>HEADER<<-  
;; flags: qr; [...]

;; QUESTION SECTION:  
;ns1.example.com. IN  A

[Empty Answer section]

;; AUTHORITY SECTION:  
example.com.      NS    ns1.example.com.  
example.com.      NS    ns2.example.com.

;; ADDITIONAL SECTION:  
ns1.example.com. A    192.0.2.1  
ns2.example.com. A    192.0.2.2
```





Cycles

- This configuration is called a cycle:

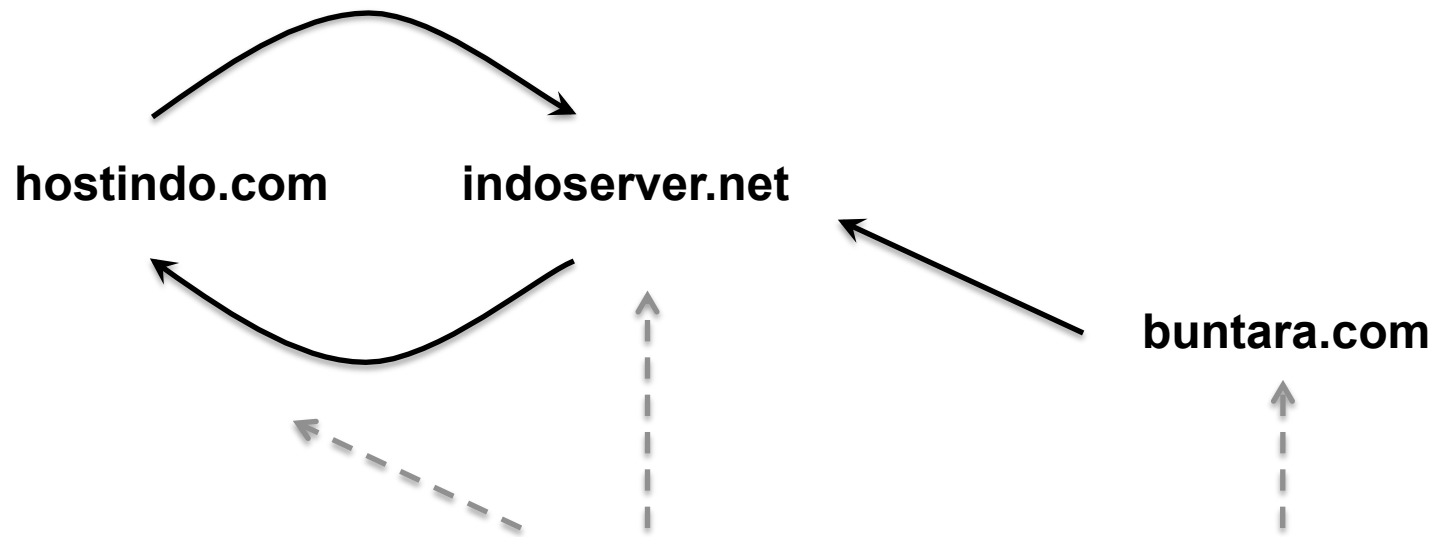
```
example.com.  NS  ns1.example.net.  
example.com.  NS  ns2.example.net.
```

```
example.net.  NS  ns1.example.com.  
example.net.  NS  ns2.example.com.
```

- When queries for glue were returned in the Answer section, this pathological cyclic configuration resolved
 - The same name servers are authoritative for *.com* and *.net*
- But not after March 1, 2010



Identifying and finding the cycles



Date	Domains participating in a cycle	Domains affected by a cycle
September 23, 2009	139	3248
March 1, 2010	117	1239
April 23, 2010	26	136





Domains in a cycle as of 23 April 2010

hostindo.com
indoserver.net
150dollarsites.com
150dollarsites.net
aj4cp.com
aj4cp.net
evlilikfuari.net
lpgcngfuari.com
wise-hosting.net
wtmsys2.com
globalli.com
globalli.net
gencliksohbet.com

sevdabahcesi.net
vietsharing.net
vnnservers.com
thb.net
thbconsulting.com
naturel-bilisim.com
naturel-bilisim.net
yonelive.com
yonelive.net
0311host.com
0311host.net
sinzi.com
sinzi.net





■ Glue no longer promoted to authoritative status

- Registered domains can be removed from the zone
 - When in various hold statuses
 - During the Redemption Grace Period (before deletion)
- Former behavior:
 - Domain's delegation (NS RRset) removed
 - Address records (A and AAAA) below the domain remained...
 - ...and were promoted to authoritative status
 - (Yikes—*now those records would need to be signed!*)
- Current behavior:
 - Domain's delegation (NS RRset) removed
 - Address records (A and AAAA) below the domain are removed...
 - ...but still appear in Additional section of referrals if used by another domain





Example scenario

- The domain *example.com* is registered
- Its name servers are *ns1.example.com* (192.0.2.1) and *ns2.example.com* (192.0.2.2)
- The domain is on administrative hold
- Therefore its NS RRset is not published in the *.com* zone

- The domain *big-web-hosting.com* also uses *ns1.example.com* and *ns2.example.com* as name servers
- This domain is not on hold; its NS RRset is published





Query for *ns1.example.com / IN / A*

Former behavior:

```
;; ->>HEADER<<-  
;; flags: qr aa; [...]  
  
;; QUESTION SECTION:  
ns1.example.com. IN A  
  
;; ANSWER SECTION:  
ns1.example.com. A 192.0.2.1  
  
;; AUTHORITY SECTION:  
com. NS a.gtld-servers.net.  
[...]  
com. NS m.gtld-servers.net.  
  
;; ADDITIONAL SECTION:  
a.gtld-servers.net. A 192.5.6.30  
[...]  
m.gtld-servers.net. A 192.55.83.30
```

Current behavior:

```
;; ->>HEADER<<-  
;; flags: qr; [...], status NXDOMAIN  
  
;; QUESTION SECTION:  
ns1.example.com. IN A  
  
;; AUTHORITY SECTION:  
com. SOA [...]
```





Query for *www.big-web-hosting.com* / IN / A

Current and former behavior (a normal referral):

```
;; ->>HEADER<<-  
;; flags: qr; [...]  
  
;; QUESTION SECTION:  
;www.big-web-hosting.com. IN  A  
  
;; AUTHORITY SECTION:  
big-web-hosting.com.      NS      ns1.example.com.  
big-web-hosting.com.      NS      ns2.example.com.  
  
;; ADDITIONAL SECTION:  
ns1.example.com.          A       192.0.2.1  
ns2.example.com.          A       192.0.2.2
```





Conclusions

- No bad effects observed or reported
- We worked with registrars to correct domains affected by cycles
- Ready for DNSSEC!
 - *.edu* in Q3 2010
 - *.net* in Q4 2010
 - *.com* in Q1 2011

