

DNS without Child NS Records

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IBM NS1 Connect

One Day,
The
Impossible
Happened

I was scanning through all of the zones that we (IBM NS1 Connect) have in our database.

An assertion in the code blew up.

The program could not get the NS records for a zone.

At a minimum, a zone needs an SOA record and an NS RRset.

Instead of
working around
the case...
I investigated.

I could have just updated the code to handle that unusual case, but I had a look instead.

The zone was a real customer zone, with real data.

Queries through my local resolver all worked as expected.

Queries through public resolvers all worked as expected.

NS differ at
parent & child

```
$ dig -t ns XXX.YY @ns1.nic.YY
```

```
...
```

```
XXX.YY.      86400  IN  NS  dns4.p06.nsone.net.  
XXX.YY.      86400  IN  NS  dns1.p06.nsone.net.  
XXX.YY.      86400  IN  NS  dns2.p06.nsone.net.  
XXX.YY.      86400  IN  NS  dns3.p06.nsone.net.
```

```
...
```

```
$ dig -t ns XXX.YY @dns1.p06.nsone.net.
```

```
...
```

```
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 48968  
;; flags: qr aa rd; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 1
```

```
...
```

Yet queries
seem to work.

```
$ dig -t mx XXX.YY @dns1.p06.nsone.net. +short
```

```
1 mx1.AA.BBB.
```

```
5 mx2.AA.BBB.
```

```
10 mx3.AA.BBB.
```

```
$ dig -t mx XXX.YY @9.9.9.9 +short
```

```
1 mx1.AA.BBB.
```

```
10 mx3.AA.BBB.
```

```
5 mx2.AA.BBB.
```

How Is This Possible?

At first I thought it was some weird edge case.

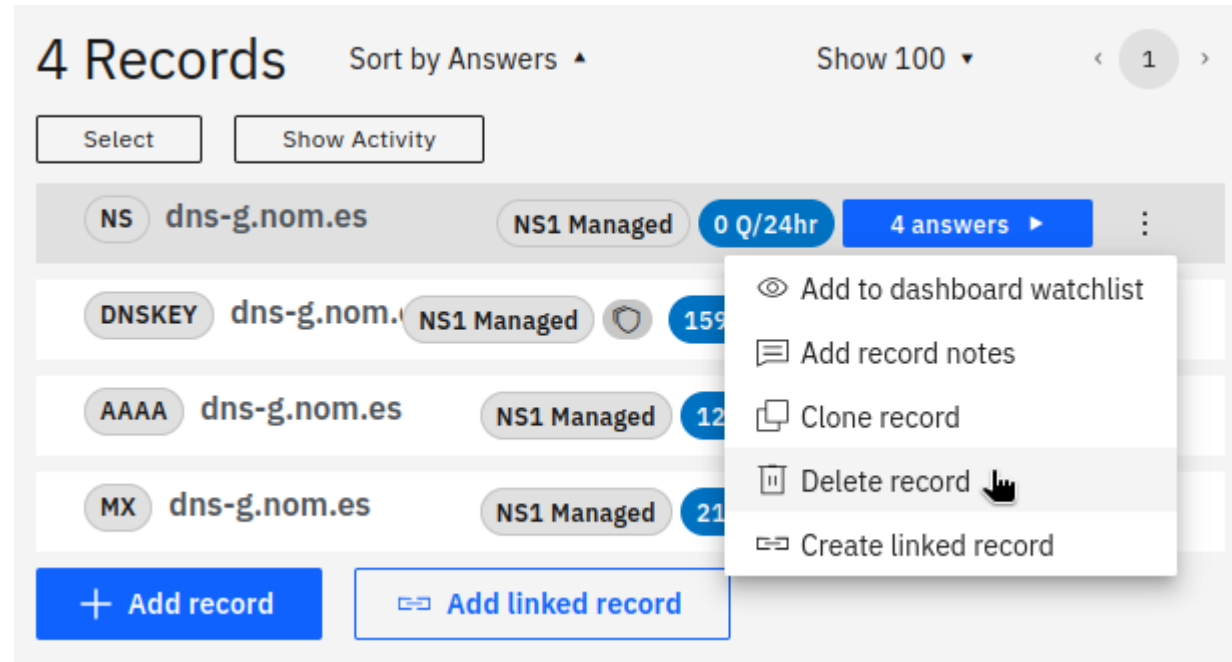
- A server might send us a zone without any apex NS if we are secondary.
- We have *linked zones*, which have no records of their own.
- We have *linked records*, which point to records in other zones on our system.
- We have zone versions, and maybe that was confused.

But this was just a plain old zone.

Making a Zone without NS

We give each zone a default NS.

It turns out, you can just delete the NS records.



DELETING ALL APEX NS

NOT SURE IF BUG OR FEATURE

Are there...
Many?

```
ns1=> select count(*)  
from dns.zone z  
where not exists (  
    ...  
  
    count  
-----  
    4239  
(1 row)
```

Next Step:
Hard Core
Research!

Possible steps for serious investigation:

1. Check queries from public resolvers
2. Review source from open source resolvers
3. Set up test-bed to investigate behavior
 - a. Set up scenarios
 - b. Capture packets
 - c. Review contents & timings

YOLO:
Just Hack
with
RIPE Atlas

Since doing proper research seems hard, and this is not really *that* important, let's just make a few RIPE Atlas measurements and see what we get.

Initial
RIPE Atlas
Results:
Identical
Success Rates

AAAA lookup for normal zone:

<https://atlas.ripe.net/measurements/160336229/>

AAAA lookup for same zone without NS:

<https://atlas.ripe.net/measurements/160465086/>

Per-Probe Counts (total 98 probes, using first non-error response):

Expected answers (unsigned): 16

Expected answers (DNSSEC-signed): 78

Errors/Timeouts: 1

REFUSED responses: 0

Empty answers: 1

Unexpected results: 2

RIPE Atlas
Results with
Many More
Probes:
Seems Okay?

AAAA lookup for same zone without NS (public IPv6):
<https://atlas.ripe.net/measurements/160871580/>

Per-Probe Counts (total 967 probes, using first non-error response):

Expected answers (unsigned): 132

Expected answers (DNSSEC-signed): 817

Errors/Timeouts: 7

REFUSED responses: 0

Empty answers: 5

Unexpected results: 6

Delegation in the Zeitgeist

The IETF DELEG working group posits a world with all delegation information in the parent.

Parent-Centric Delegation Handling in DNS Resolvers
IETF draft proposes ignoring NS in children.

Conclusion

DNS can work without NS records.

This is... surprising.

What does it mean for the DNS?

Probably this is just odd. Certainly we should not all start deleting NS records in our zones... right?

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