



Orphaned Name Servers

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The problem space

- What is an Orphan Name Server?
 - A name server record exists in a delegation
 - The parent domain name no longer exists
- How does an name server record become orphaned?

How a name server is orphaned: Step 1

example.NET and example2.NET are registered in NET

in NET zone file:

```
example.NET      NS      ns1.example2.NET
example.NET      NS      ns2.example2.NET
example2.NET     NS      ns1.example2.INFO
Example2.NET     NS      ns2.example2.INFO
.
.
.
ns1.example2.NET A      10.0.1.53
ns2.example2.NET A      10.0.2.53
```

How a name server is orphaned: Step 2

`example2.NET` is deleted from in NET

in NET zone file:

```
example.NET      NS  ns1.example2.NET
example.NET      NS  ns2.example2.NET
example2.NET    NS  ns1.example2.INFO
Example2.NET    NS  ns2.example2.INFO
.
.
.
ns1.example2.NET A   10.0.1.53
ns2.example2.NET A   10.0.2.53
```

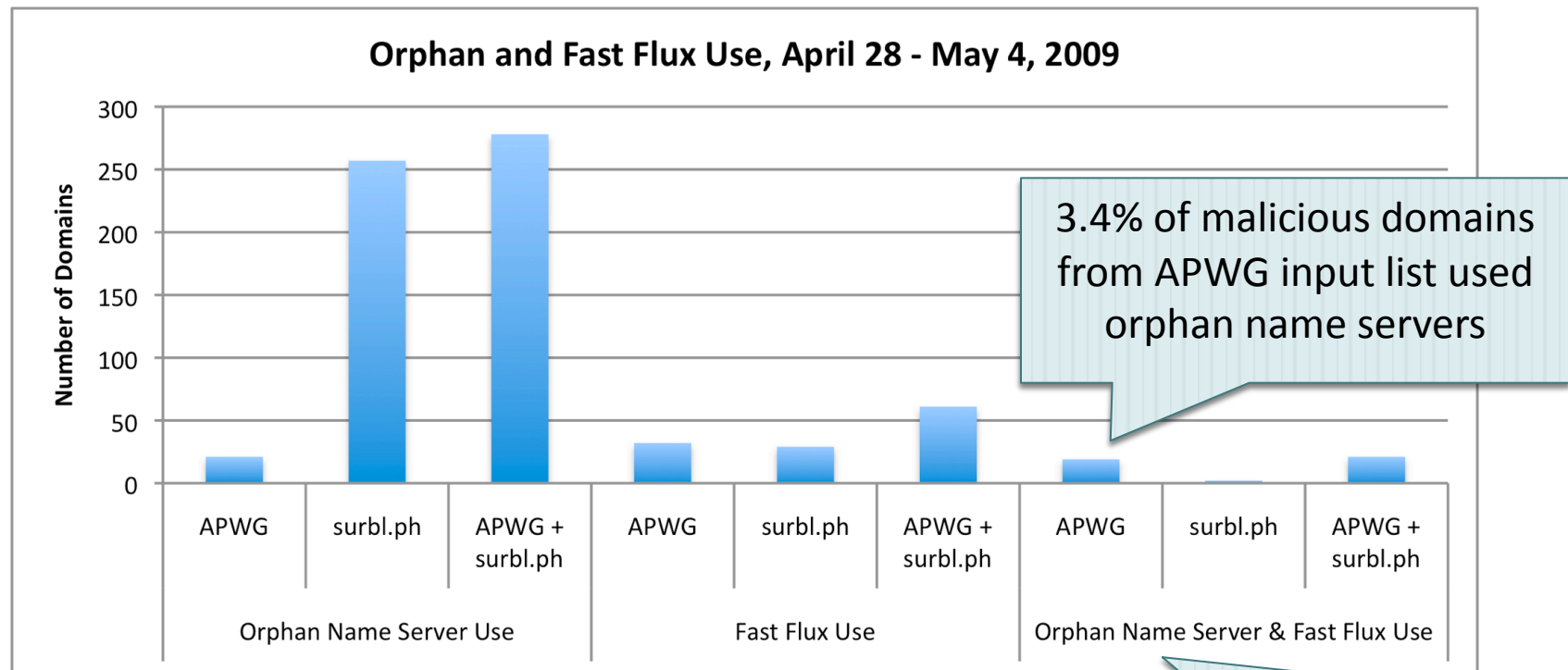
These resource records are removed by the registry when label is deleted

These resource records remain even though parent domain name no longer exists – these name servers are **orphans**

The registry cannot unilaterally remove the glue
– other domains may be using the same name server
Identifying orphans and removing glue is harder when
parent and delegation are not in same TLD

Does DNS abuse result from orphaned name servers?

- APWG study conducted by Internet Identity and Karmasphere
 - Correlate incidence of orphaned name servers among a sample set of domains against domains used in fast flux attack networks



Of the APWG input list identified as FF networks, 59% used orphaned name servers

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Initial findings, next steps

- Registry action to remove glue records for deleted domains may strip miscreants of an evasion and persistence tool
- Considerable cooperation across TLDs is needed
- Further study is needed before specific recommendations can be made
 - SSAC to collaborate with APWG
 - Kudos to Karmasphere and Internet Identity for initial study and preliminary results