

IVIPTR: Resource Record for DNS Draft-Tariq-DNSOP-IVIPTR-00

Tariq Saraj

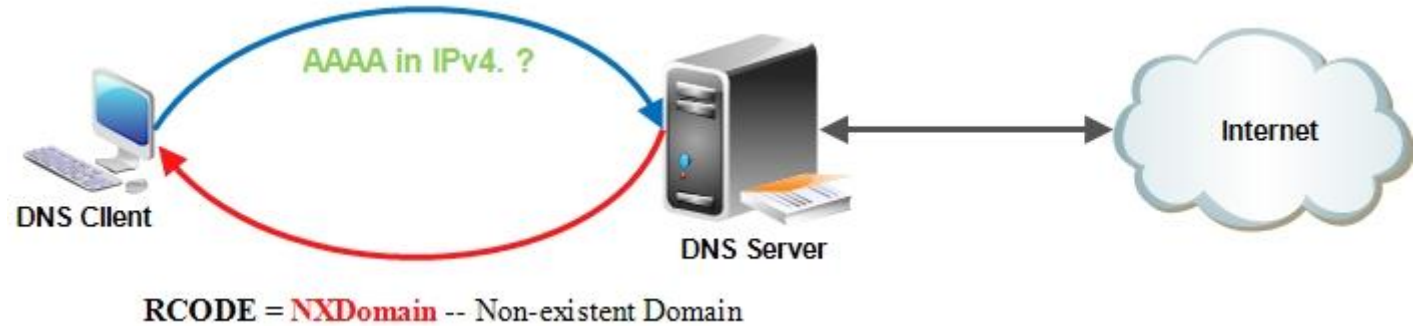
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Introduction

- A new DNS Resource Record i.e. IVIPTR
- Resolves IPv4 address to IPv6 and vice versa

Problem



- The Current DNS Standard does not support to resolve:
 - IPv4 address to IPv6 address
 - IPv6 address to IPv4 address
- For example:
 - When querying AAAA of a resource when IPv4 address is known
 - The response code (RCODE) for such query is usually '**Non-Existent Domain (3)**'

Problem in Practice

```
Frame 1: 83 bytes on wire (664 bits), 83 bytes captured (664 bits) on interface 0
Ethernet II, Src: IntelCor_c8:f0:1e (84:ef:18:c8:f0:1e), Dst: Ubiquiti_8f:a3:cf (80:2a:a8:8f:a3:cf)
Internet Protocol Version 4, Src: 31.133.158.245, Dst: 31.130.229.6
User Datagram Protocol, Src Port: 59380, Dst Port: 53
Domain Name System (query)
```

[\[Response In: 2\]](#)

Transaction ID: 0xab7d

Flags: 0x0120 Standard query

Questions: 1

Answer RRs: 0

Authority RRs: 0

Additional RRs: 1

Queries

74.125.68.99: type AAAA, class IN

Name: 74.125.68.99

[Name Length: 12]

[Label Count: 4]

Type: AAAA (IPv6 Address) (28)

Class: IN (0x0001)

Additional records

www.google.com IP Address

```
Domain Name System (response)
```

[\[Request In: 1\]](#)

[Time: 0.003829000 seconds]

Transaction ID: 0xab7d

Flags: 0x81a3 Standard query response, No such name

1... .. = Response: Message is a response

.000 0... .. = opcode: standard query (0)

.... .0.. = Authoritative: Server is not an authority for domain

.... ..0. = Truncated: Message is not truncated

.... ...1 = Recursion desired: Do query recursively

.... 1... = Recursion available: Server can do recursive queries

....0.. = Z: reserved (0)

....1. = Answer authenticated: Answer/authority portion was authenticated by the server

....0 = Non-authenticated data: Unacceptable

.... 0011 = Reply code: No such name (3)

RCode: Non-Existing Domain

Questions: 1

Answer RRs: 0

Authority RRs: 1

Additional RRs: 1

Queries

74.125.68.99: type AAAA, class IN

Name: 74.125.68.99

[Name Length: 12]

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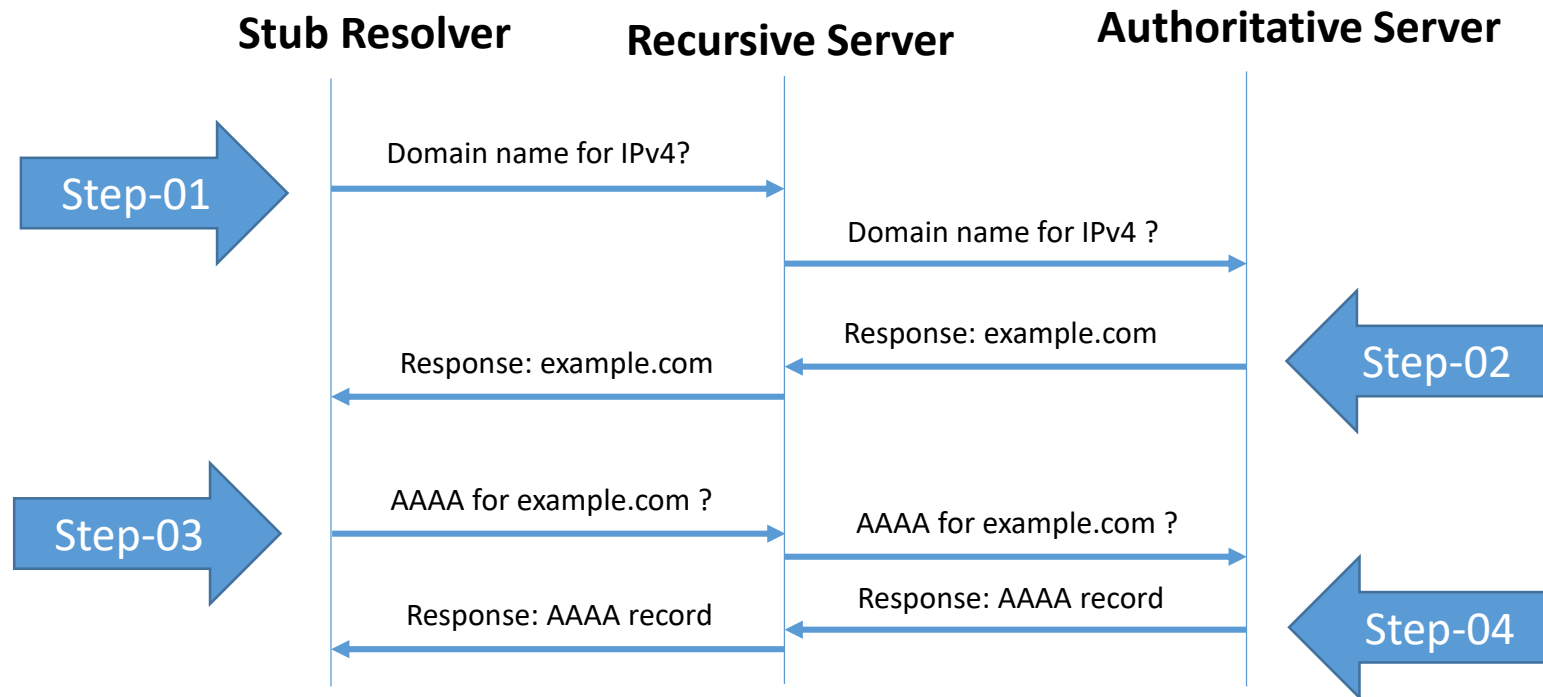
Type: AAAA (IPv6 Address) (28)

Class: IN (0x0001)

Authoritative nameservers

Resolving through current DNS Standard

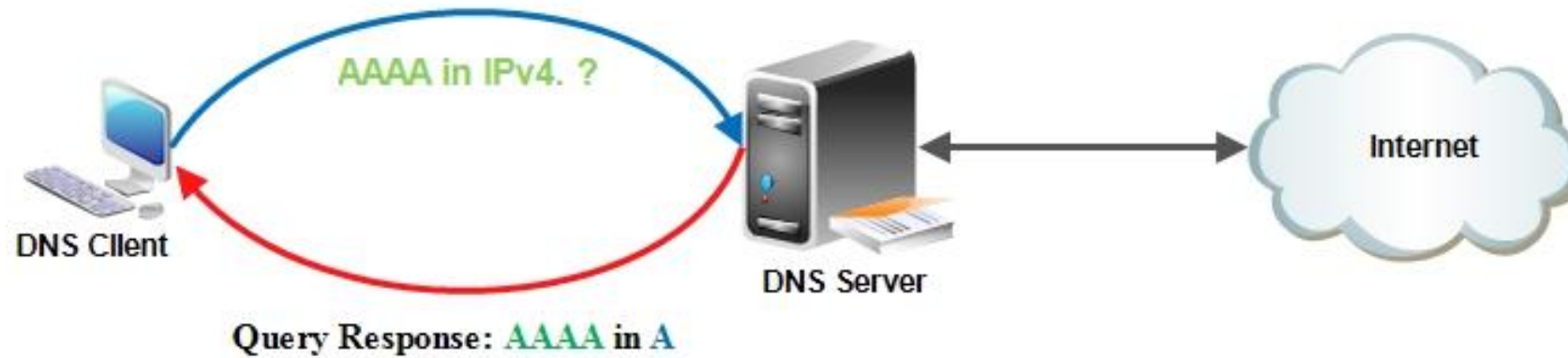
- When:
 - IPv4 address is known and one wants to resolve it to IPv6.



Resolving through current DNS Standard

- **The bottleneck:**
 - Not all the domain name labels map to both IPv4 and IPv6 addresses
 - Mostly, these days domains has different PTR records for corresponding AAAA and A record
- Thus, current DNS standard cannot fully be utilized to resolve IPv6 address against IPv4 address and vice versa

IVI PTR: Proposed Resource Record



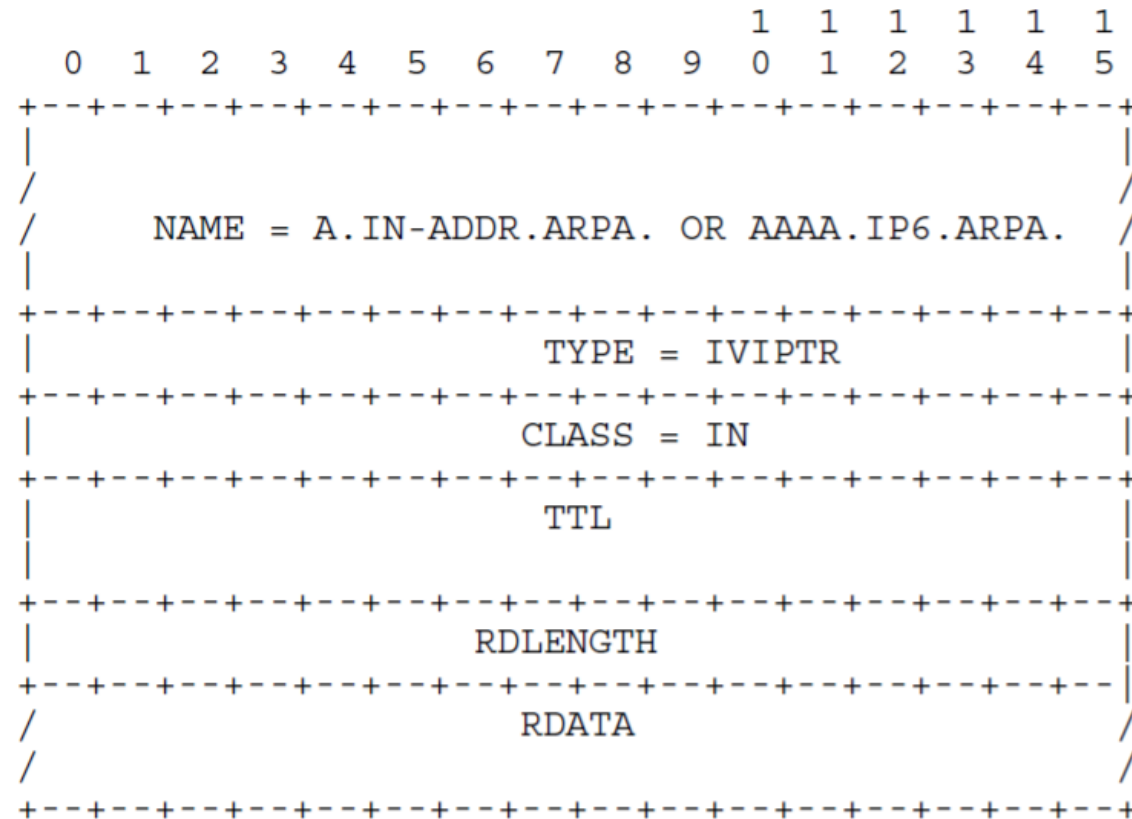
Use Case: Firewall Rules Auto Updation

- Firewall rules normally configured for IPv4 traffic monitoring
- IPv6 is enabled in the same network for some application testing or need IPv6 rules to be configured automatically for each corresponding IPv4 rule
- Firewall automatically resolve IPv6 address if available for each of the configured IPv4 address using the proposed Resource Record (IVI PTR)
- Traffic monitoring rules for IPv6 will automatically be deployed against each resolved IPv4 address
- Currently, without the proposed IVI PTR RR, one must configure these rules manually

IVIPTR: The Proposed RR

- The IVIPTR RR has the following format:

<OWNER> <TTL> <CLASS> IVIPTR <IVI target >



Query Processing

- The query processing involves both standard reverse and forward lookups:
 - when the recursive name server receives a response for the IVIPTR RR against reverse lookup
 - After caching the response it will form a new query for forward lookup in such a way that
- Case-01: If the original query NAME field has A.IN-ADDR.ARPA. and TYPE field is IVIPTR
 - The NAME field of the new query should be RDATA resource
 - The TYPE field should be 'AAAA'
- Case-02: If the original query NAME field has AAAA.IP6.ARPA. and TYPE field is IVIPTR
 - The NAME field of the new query should be RDATA resource
 - The TYPE field should be 'A'
- Finally, the response against forward lookup is placed in the answer section of the original query and replied back to stub resolver

Questions ?