

IVIPTR: Resource Record

draft-tariq-dnsop-iviptr-01

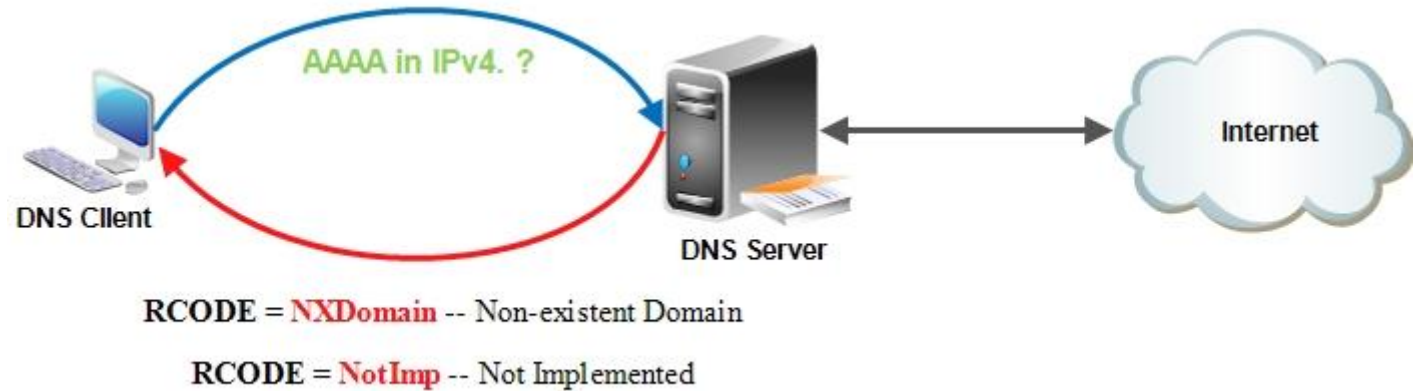
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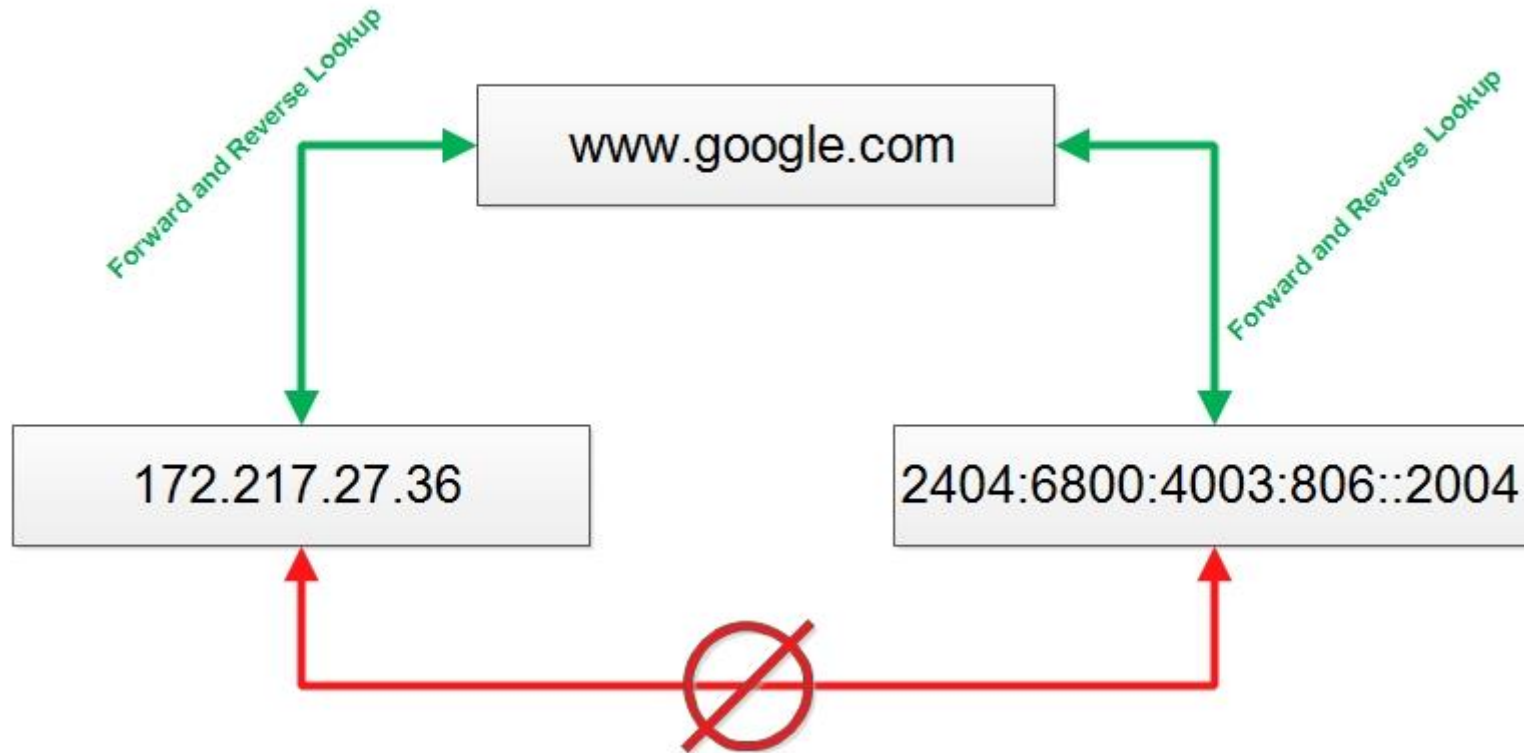
URL: <https://datatracker.ietf.org/doc/draft-tariq-dnsop-iviptr/>

Problem



- The Current DNS Standard does not support to resolve:
 - IPv4 address to IPv6 address
 - IPv6 address to IPv4 address
- When querying for such a record
 - For example: when querying AAAA of a resource when IPv4 address is known
 - The response code (**RCODE**) for such query is normally '**RCODE-3 (No Such Name)**'

The Broken Link in DNS



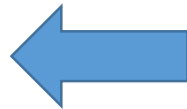
The Google example

```
C:\Users\          >nslookup www.google.com
Server:   adc-rise.riphah.edu.pk
Address:  192.168.105.250

Non-authoritative answer:
Name:     www.google.com
Addresses: 2404:6800:4003:806::2004
          172.217.27.36
```

Problem in Practice

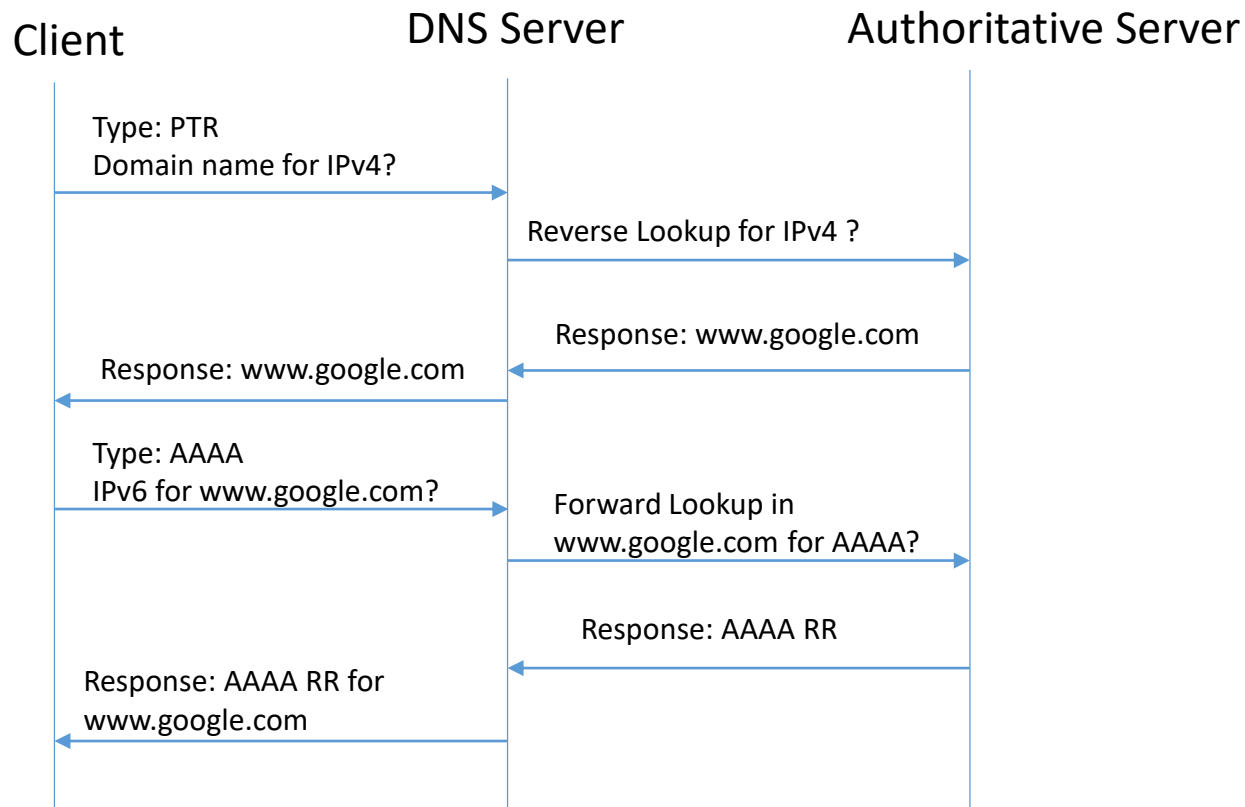
```
> Frame 1: 97 bytes on wire (776 bits), 97 bytes captured (776 bits) on interface
> Ethernet II, Src: IntelCor_c8:f0:1e (84:ef:18:c8:f0:1e), Dst: Cisco_61:76:39
> Internet Protocol Version 4, Src: 192.168.101.75, Dst: 8.8.8.8
> User Datagram Protocol, Src Port: 63939, Dst Port: 53
v Domain Name System (query)
  [Response In: 2]
  Transaction ID: 0x83f9
  > Flags: 0x0120 Standard query
  Questions: 1
  Answer RRs: 0
  Authority RRs: 0
  Additional RRs: 1
v Queries
  v 36.27.217.172.in-addr.arpa: type AAAA, class IN
    Name: 36.27.217.172.in-addr.arpa
    [Name Length: 26]
    [Label Count: 6]
    Type: AAAA (IPv6 Address) (28)
    Class: IN (0x0001)
  > Additional records
```



```
> Frame 2: 157 bytes on wire (1256 bits), 157 bytes captured (1256 bits) on interface
> Ethernet II, Src: Cisco_61:76:39 (00:17:94:61:76:39), Dst: IntelCor_c8:f0:1e
> Internet Protocol Version 4, Src: 8.8.8.8, Dst: 192.168.101.75
> User Datagram Protocol, Src Port: 53, Dst Port: 63939
v Domain Name System (response)
  [Request In: 1]
  [Time: 0.162353000 seconds]
  Transaction ID: 0x83f9
  > Flags: 0x8180 Standard query response, No error
  Questions: 1
  Answer RRs: 0
  Authority RRs: 1
  Additional RRs: 1
v Queries
  v 36.27.217.172.in-addr.arpa: type AAAA, class IN
    Name: 36.27.217.172.in-addr.arpa
    [Name Length: 26]
    [Label Count: 6]
    Type: AAAA (IPv6 Address) (28)
    Class: IN (0x0001)
  > Authoritative nameservers
  > Additional records
```

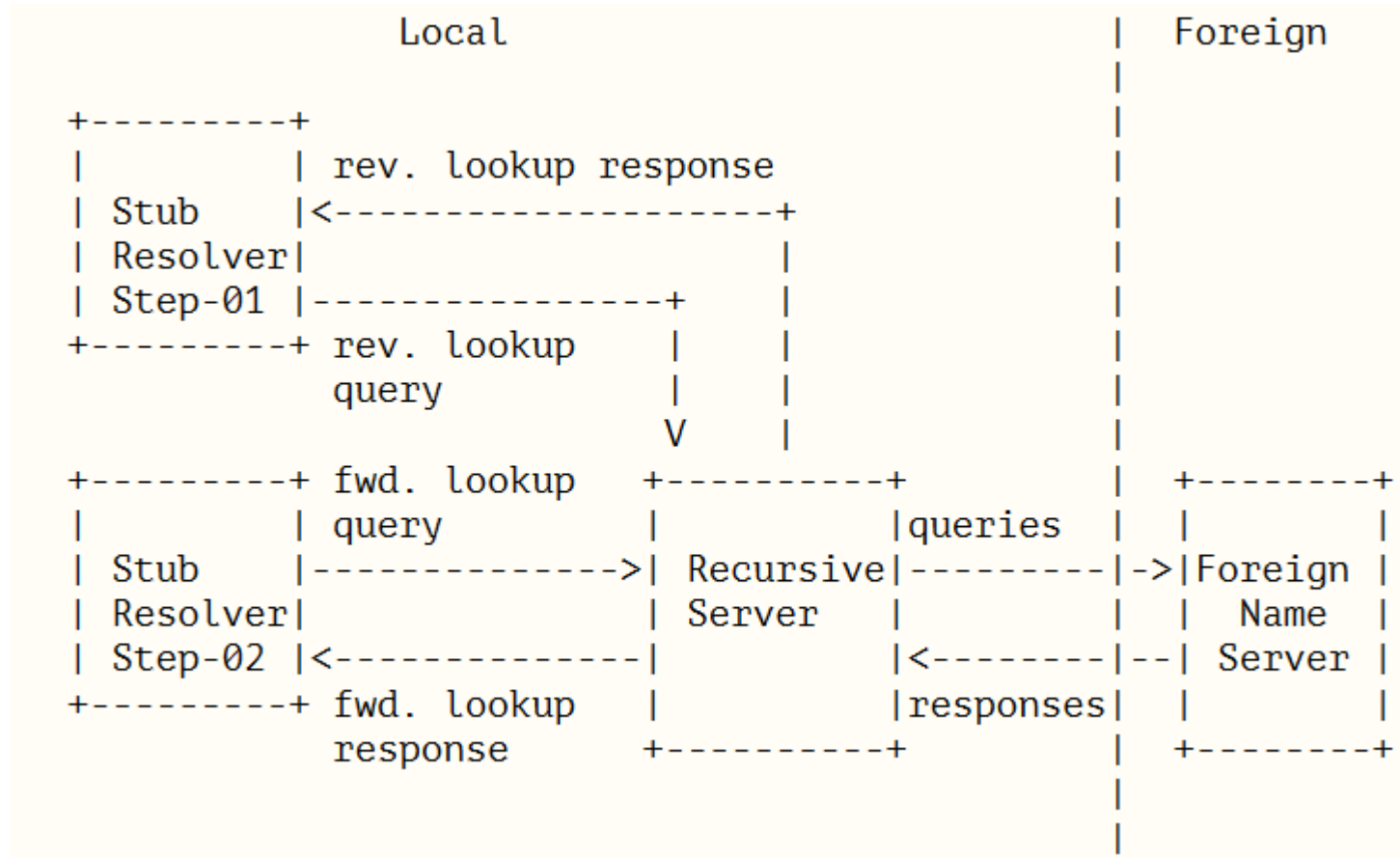


Ideally: How to resolve IPv4 to IPv6?

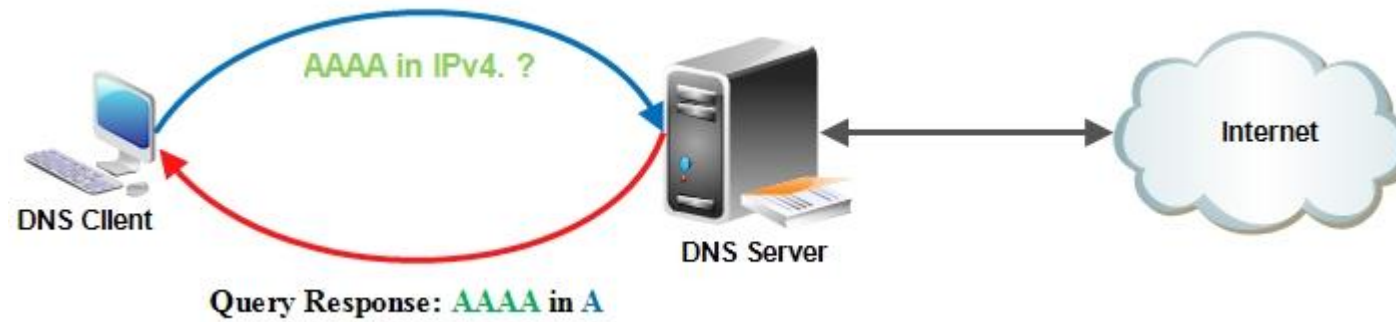


But !... Not all the IPv4 or IPv6 addresses have the same corresponding Domain Name label

Ideally: How to resolve IPv4 to IPv6?



Proposed IVIPTR: Increasing The Trust on DNS



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


Firewall: The idea originating Usecase

- Firewall rules are configured for IPv4 packet filtering
- As IPv6 enabled in the same network for some application testing or other requirements
- Firewall will automatically resolve IPv6 address for each of the configured IPv4 address using the proposed IVPTR RR
- Firewall will automatically deploy IPv6 rules parallel to each of the resolved IPv4 address to IPv6

Other Use Cases

- Automating Security Rules in Network Security components
- Promoting IPv6 Usage
 - ftp 192.168.0.1
- Customized Debugging Utilities
 - Traceroute
- Early Whitelisting
 - Spam Filtering

Forward Lookup Zone file Scenarios

- Case-1: Ideal Scenario

```
; zone file for example.com  
  
x.example.com.    IN A 192.168.0.1  
  
x.example.com.    IN AAAA 2001:DB8:0::1
```

- Case-2: Non-Ideal Scenario

```
; zone file for example.com  
  
x.example.com.    IN A 192.168.0.1  
  
x6.example.com.   IN AAAA 2001:DB8:0::1
```

X can be any label, such as 'www', 'ftp' etc.

IVIPTR RR for IPv4 Prefix

```
; reverse zone file example.com for IPv4
```

```
1.0.168.192.IN-ADDR.APRPA.  IN PTR x.example.com.
```

```
1.0.168.192.IN-ADDR.ARPA.  IN IVIPTR x6.example.com.
```

IVI PTR RR for IPv6 Prefix

```
; reverse zone file example.com for IPv6
```

```
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.8.b.d.0.1.0.0.2.IP  
6.ARPA.  IN PTR x6.example.com.
```

```
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.8.b.d.0.1.0.0.2.IP  
6.ARPA.  IN IVIPTR x.example.com.
```

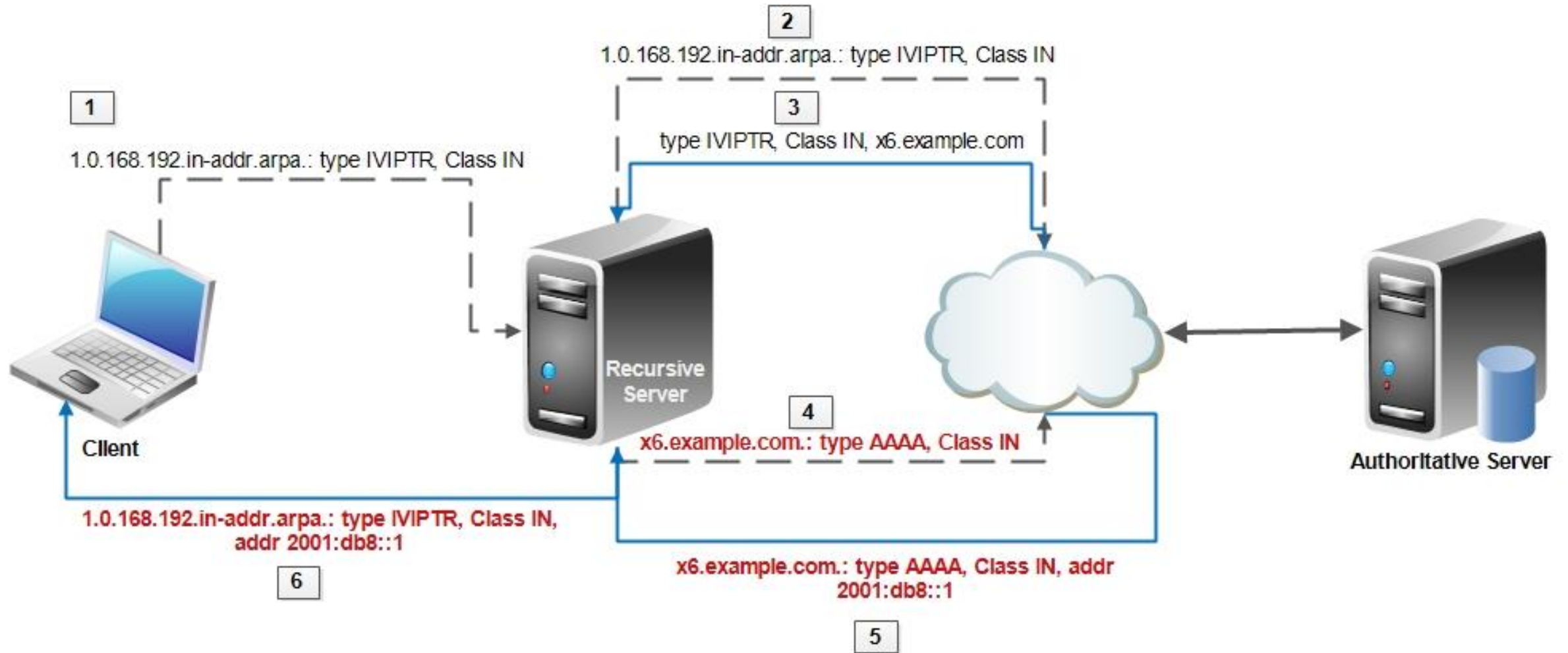
Query Processing (QP)

```

          1 1 1 1 1 1
          0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|
/
/      NAME = 1.0.168.192.IN-ADDR.APRPA.      /
|
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|
|                                     TYPE = IVIPTR |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|
|                                     CLASS = IN   |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|
|                                     TTL          |
|
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|
|                                     RDLENGTH    |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
/
|                                     RDATA      /
/
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
```

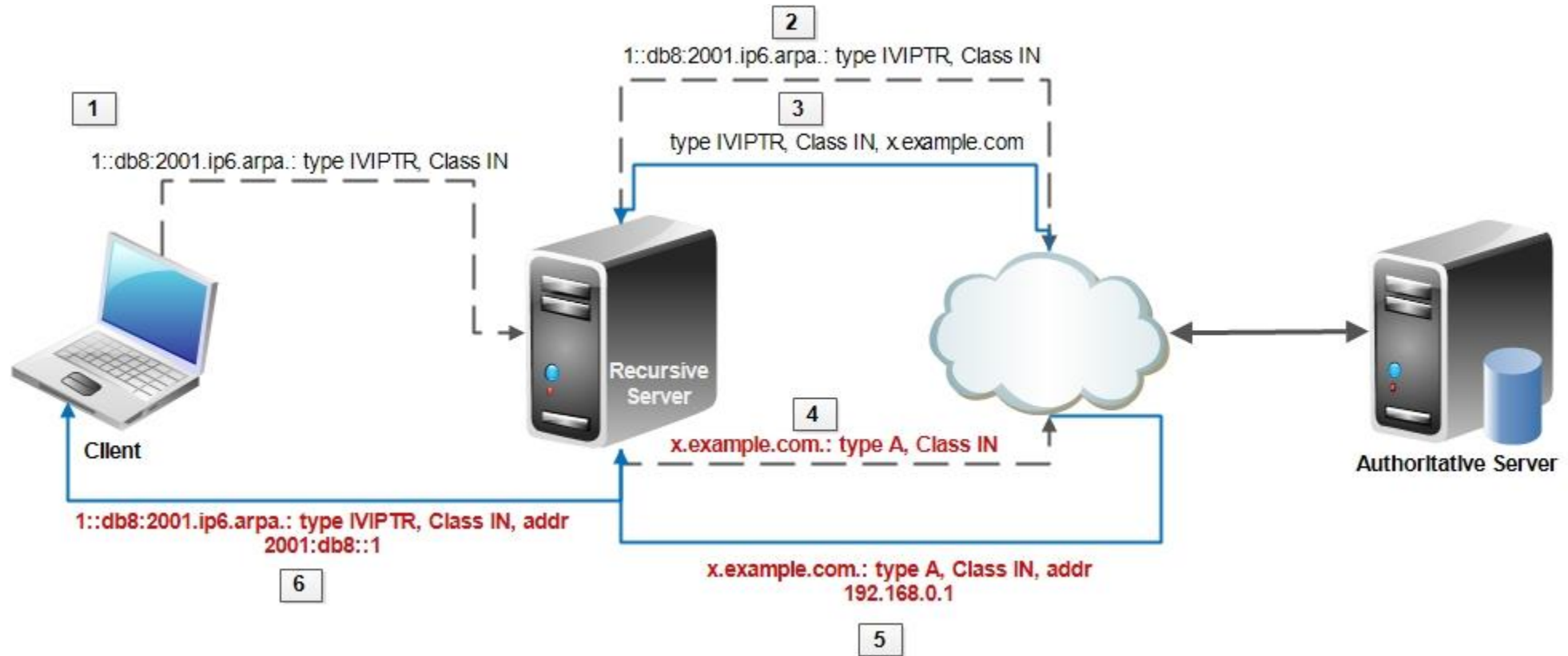
QP: Case-01

NAME field contains IPv4 label



QP: Case-02

NAME field contains IPv6 label



Any Question ?