IVIPTR: Resource Record
draft-tariq-dnsop-iviptr-01

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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

```plaintext
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
User Datagram Protocol, Src Port: 63939, Dst Port: 53
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
  Queries
    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
User Datagram Protocol, Src Port: 53, Dst Port: 63939
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
  Queries
    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 Use case

- 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 IVIPTR 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.
IVIPTR RR for IPv6 Prefix

; reverse zone file example.com for IPv6

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

1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.8.b.d.0.1.0.0.2.IP 6.ARPA. IN IVIPTR x.example.com.
Query Processing (QP)
QP: Case-01
NAME field contains IPv4 label

1. 1.0.168.192.in-addr.arpa.: type IPv4PTR, Class IN

2. 1.0.168.192.in-addr.arpa.: type IPv4PTR, Class IN

3. type IPv4PTR, Class IN, x6.example.com

4. x6.example.com.: type AAAA, Class IN

5. x6.example.com.: type AAAA, Class IN, addr 2001:db8::1

6. 1.0.168.192.in-addr.arpa.: type IPv4PTR, Class IN, addr 2001:db8::1
QP: Case-02
NAME field contains IPv6 label
Any Question ?