

A black and white photograph of the IST building in Lisbon, viewed from a distance across a large lawn. The building is a large, multi-story structure with a central tower. The lawn is wide and open, with some trees and pathways visible. The sky is clear.

 **TÉCNICO**
LISBOA

Transition to IPv6

DNS | **Mail** | **Web**

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IST

Introducing IPv6 in the Portuguese Public Administration

April 9th 2015

A background image of a document with text, overlaid with a yellow grid pattern.

 **TÉCNICO**
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DNS

- Requirements
- Implementation steps
- Common issues

9th of April, 2015 Introducing IPv6 in the Portuguese public administration 2

DNS Requirements

- IP Network in DualStack (IPv4 and IPv6)
- DNS software must support:
 - AAAA Record Type
 - “ip6.arpa” domain
 - udp6 and tcp6 sockets ([::]:53)

DNS Requirements

- Same requirements for both authoritative and resolvers/cache servers
- Resolvers must be able to do recursive reverse lookup on “ip6.arpa”

DNS Implementation (step 1)

- Register an hostname for tests and query it:

```
(e.g. ipv6.exemplo.pt IN AAAA 2aff:
59:59::1)
```

DNS Implementation (step 1)

- Configure IPv6 on authoritative servers (OS and DNS software) and test a query for a hostname through IPv6

- e.g. add 2aff:59:59:abcd::1/64 to first dns server "ns1.example.pt"

Then: test query examples:

```
$ dig www.exemplo.pt @2aff:59:59:abcd::1
C:\> nslookup www.exemplo.pt 2aff:59:59:abcd::1
```

DNS Implementation (step 2)

- Update domain (e.g. "exemplo.pt") to include authoritative servers IPv6 addresses.

```
ns1.exemplo.pt  IN A      1.1.1.1
                IN AAAA   2aff:59:59:abcd::1
ns2.exemplo.pt  IN A      1.1.1.2
                IN AAAA   2aff:59:59:abcd::2
```

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7

DNS Implementation (step 3)

- Request “ip6.arpa” delegation for your IPv6 prefix to your LIR, or RIPE.

- In our example: 9.5.0.0.9.5.0.0.f.f.a.2.ip6.arpa.

- relative to prefix 2aff:59:59::/48

- Add a test PTR record to a test hostname.

```
$ORIGIN 0.0.0.0.9.5.0.0.9.5.0.0.f.f.a.2.ip6.arpa.
```

```
1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0 IN PTR
ipv6.exemplo.pt.
```

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8

DNS Common issues

- Firewall issues:
 - udp/53 packets > 512 bytes filtered
 - larger replies being filtered which leads to timeouts and SERVFAILs
 - DNS servers with firewalls blocking IPv6 traffic by default
 - leads to longer delays or SERVFAILs

9th of April, 2015

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9

DNS Common Issues (cont.)

- DNS resolvers which don't support AAAA queries return NOT IMPLEMENTED

```
$ dig aaaa tecnico.ulisboa.pt @<IP/FQDN some dns resolver>

; <<>> DiG 9.8.4-rpz2+rl005.12-P1 <<>> aaaa tecnico.ulisboa.pt @1.2.3.4
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOTIMP, id: 51826
;; flags: qr rd; QUERY: 0, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 0
;; WARNING: recursion requested but not available

;; Query time: 0 msec
;; SERVER: 1.2.3.4#53(1.2.3.4)
;; WHEN: Mon Apr 6 16:37:21 2015
;; MSG SIZE rcvd: 12
```

9th of April, 2015

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10

Mail Requirements

- MTAs and MDAs must support sockets TCP over IPv6
- Check with your supplier if your AntiVirus/ AntiSPAM has support too
- DNS support for both AAAA and reverse lookups of IPv6 addresses

Mail Implementation steps (part 1)

- Start with your MTAs (mail relays/ gateways)
 - Add IPv6 network configuration
 - Do some testing editing your local hosts file
`/etc/hosts` or `c:\windows\system32\drivers\etc\hosts`
 - Add DNS AAAA records to your DNS

Mail Implementation steps (part 2)

- Now Mail Servers (MDAs and MSAs)
 - Add IPv6 network configuration
 - Do some testing editing your local hosts file
`/etc/hosts` or `c:\windows\system32\drivers\etc\hosts`
 - Add DNS AAAA records to your DNS
 - Use DNS TTL 300 to rollback faster if you find a problem.

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13

Mail Common Issues

- Firewalls...
 - check your firewalls including those on your mail servers
- Mail policy (e.g. rate limit) doesn't support or handle correctly IPv6 addresses
- SPF records referring only MTAs IPv4 addresses

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14

Web Requirements

- DNS with IPv6 connectivity *is not required!*
- DNS authoritative servers with support for AAAA records
- Desktop/Server OSs released after than 2007 are all guaranteed.
- Web server software... *pick one!*

Web Pages | Common Issues

- Firewalls...again!!!
- ACLs on Web server software
- Applications designed for IP based authorizations only

Web Pages | Common Issues

- Logging and log parsing not handle IPv6 address format
 - Accounting and statistics not working well with IPv6 clients

9th of April, 2015

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17

Q&A

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