IPv6 in Real Life
Deployment of Popular Servers in IPv6

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The objetive?

- If my wife would have a computer with only IPv6 connectivity, what she would see?

- N.B. My wife is a lawyer with no computer literacy

Why?

- Everybody is telling that IPv4 space is finishing

- Everybody is telling that we must migrate to IPv6

- But... is there life in IPv6 ?

- AKA "Does IPv6 encapsulates in something more than PowerPoint?"

Investigation method

- No rocket science here

- Just some easy lookups in DNS space and some easy to do test

- And some web digging

- Our idea is to update it on each RIPE meeting

Investigation method (2)

- Get the most visited webs per country

  - Source: http://www.alexa.com/

- Check for:

  - Ask to the DNS of that domain for...

  - a AAAA DNS entry for the web service and the email

Investigation method (3)

- If there is a DNS entry, verify that it works

  - Open the web page with a IPv6 navigator

  - Telnet to port 25 and do some basic SMTP dialog

  - Dig to the IPv6 DNS server

http://ipv6.hp.com/

Google

!! URLtoMURL !!   MURL   Apple España ▾   Amazon   eBay   Yahoo!   Noticias (482) ▾

HP IPv6 TEST BED HOME

HP IPv6 TEST BED

Living the Internet Future Today

IPv6 TESTBED   IPv6

Congratulations, you're accessing this page using IPv6 from 2001:4030:f::4

IPv6 is the future language of the internet, the foundation of next-generation products and services. The HP Managed Services Design and Delivery team is building an environment where we can be immersed in IPv6 and gain a deep understanding of it.

Our test bed is a rich ecosystem of clients and servers in a multi-campus, enterprise-scale IPv6/IPv4 network, linking HP with universities, business partners, and public IPv6 services.

We will experiment with authentication and encryption, secure and dynamic DNS, multimedia services, quality of service, large address space management, network monitoring and advanced network management, and new IPv6-enabled products.

Links to other IPv6 sites:

- IETF IPv6 working group home
- IPv6 forum home
- 6bone home
- 6bone registry query page
- 6net-related sites
- North American IPv6 Task Force
- WIDE IPv6 Tutorials
- IPv6style site

- 6bone registry page for this project
- RFC Address Plan Diagram
- USA IPv6 Map from Lancaster U., UK
- IPv6 News
- World use of IPv6 address space

9/28/2006 14:40 MST
INTERNET TRAFFIC REPORT   81
www.InternetTrafficReport.com

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Investigation method (4)

- Making the easier, dificult

- Though you can associate A and AAAA records to www.example.com, many domains do it diferently:

  - `www.ipv6.example.com`

  - `www6.example.com`

  - `ipv6.example.com`

Investigation method (5)

- We also verify the DNS hierarchy

- Root servers with AAAA addressing

- TLD (gTLD and ccTLD) with AAAA addresing

- TLD that accept AAAA entries for subdomain DNS servers

Iconography

- ***** Correct, DNS entry and server answers

- **#** Incorrect, No DNS entry

- **?** Liar, DNS entry but no answer

And now, the results

Some samples

- Most of the countries gave same results

- We will show some average results and some distinguished cases

Australia

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Indonesia

	*	#	?
www.example.com	1		0
www.ipv6.example.com	1		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	2	96	2
SMTP IPv6	2	98	0
DNS	2	98	0

correct Web servers
www.ipv6.indo.net.id. 3600   IN   AAAA   2404:170:33::33
ipv6.indo.net.id.   3500   IN   AAAA   2404:170::32:17
www.itb.ac.id.   2001:d30:3:508::136
ipv6.itb.ac.id.   43200 IN   AAAA   2001:d30:3::19
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.cbn.net.id.   10800 IN   AAAA   2001:d10:2::80 (test site)
ipv6.itb.ac.id.   43200 IN   AAAA   2001:d30:3::19
correct MX servers
mx.ipv6.cbn.net.id.   10800 IN   AAAA   2001:d10:2::25
www.ipv6.indo.net.id.   2091 IN   AAAA   2404:170:33::33
liar MX servers

correct DNS servers
ns1.itb.ac.id.   43195 IN   AAAA   2001:d30:103:3000::53
ipv6.indo.net.id.   3581 IN   AAAA   2404:170::32:17
liar DNS servers

Chile

	*	#	?
www.example.com	0		1
www.ipv6.example.com	1		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	96	3
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.elmundo.es.   AAAA   2001:800:400:10::115
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.chile.com.   600   IN   AAAA   2800:8:0:102::12
www.ipv6.chile.com.   86400   IN   AAAA   2800:8:0:102::12
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

China

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

The big numbers on web servers

- 4315 domains examined

- 13 have web servers with some usefull information (not "it works" pages)

- 26 incorrects

Incorrect webs servers

- Many "test", "it works", etc. (9)
- Others simply didn't answer (17)
  - 2002: 1
  - 2001: 10
  - 2800: 1
  - 3FFE: 4
  - FF00: 1

SMTP & DNS servers

- Mail servers

  - 2 answered

  - 4 didn't

- DNS servers

  - 5 answered

  - 4 didn't

Funny and/or interesting things
(Perhaps... terrible?)

1st prize

- ## If you lie, LIE

  ```
  $ dig www.ipv6.chello.at

  ...

  ;; ANSWER SECTION:

  www.ipv6.chello.at.86400 IN A 195.34.131.138

  www.ipv6.chello.at.    86284    IN       AAAA
  2001:730::3:a00:20ff:fe85:962c
  ```

2nd Prize

- I AM INTERNET

```
;www.autoplius.lt.              IN      AAAA
autoplius.lt.      43200  IN      AAAA    ff00::
```

3rd prize

- When bigger, better

  `www.ipv6.microsoft.com. 1679 IN AAAA 2002:836b:9820::836b:9886`

- Microsoft.com is in the top 100 in every country, so we found it when researching every country

Nominations

- One server that actually works

- A spanish newspaper (it appears in the list of most of the spanish speaking countries)

  `www.ipv6.elmundo.es`. `AAAA 2001:800:400:10::115`

Finally, some good old friends

	Web	MX
ripe.net	*	#
arin.net	*	#
apnic.net	*	#
lacnic.net	*	*
afrinic.net	#	#

More good ole friends

	Web	MX
iana.org	#	#
icann.org	#	#
ietf.org	*	*

DNS Hierarchy

Root servers

- 5 root servers operating in IPv6

    - according to www.root-servers.org

- But they don't appear in /domain/ named.root, so are mostly invisible

- We think, NOW is the time to introduce them

IPv6 Root Servers?

- We need to modify the /domain/named.root file of all servers

- Dificult for installed base

  - But installed base doesn't usually work with IPv6

- Upgrading/Changing hard/soft to IPv6

  - Get new named.root file

TLD DNS servers

- 17 TLD with 4 IPv6 DNS servers

- 27 TLD with 3 IPv6 DNS servers

- 51 TLD with 2 IPv6 DNS servers

- 72 TLD with 1 IPv6 DNS server

- 97 TLD without IPv6 DNS servers

4 AM
4 CL
4 CZ
4 FR
4 JP
4 LU
4 MT
4 NP
4 PM
4 PT
4 RE
4 SI
4 TF
4 VA
4 WF
4 YT
4 ZA
3 AE
3 AF
3 AN
3 BG
3 CN
3 CU
3 GB
3 GE
3 HR
3 ID
3 IE
3 INT
3 IS
3 IT
3 LI
3 PH
3 PL
3 PY
3 SE
3 SK
3 TN
3 TP
3 TW
3 UA
3 UG

TLD DNS Servers (2)

- .int 3 servers
- .biz 2 servers
- .com 2 servers
- .info 2 servers
- .mobi 2 servers

- .org 2 servers
- .aero 1 server
- .edu 0 servers
- .gov 0 servers
- .mil 0 servers

RIPE support of DNS

- Many TLD use RIPE IPv6 DNS servers as secondary

  - 6 TLD have two RIPE IPv6 DNS servers as secondaries

  - 62 TLD have one

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2 ZW
2 UG
2 TP
2 NP
2 LK
2 AN
1 ZA
1 VN
1 VI
1 VG
1 VA
1 UY
1 UA
1 TR
1 TH
1 TD
1 TC
1 SZ
1 SV
1 SN
1 SK
1 SG
1 SD
1 PY
1 PS
1 PH
1 OM
1 NE
1 NC
1 MW
1 MT
1 MS
1 ML
1 MC
1 MA
1 LY
1 LV
1 LT
1 KZ
1 KI
1 KH
1 KG

But... it's true?

- 248 IPv6 DNS servers answered

- 55 didn't answer

Popular DNS servers

- ns-ext.isc.org: 7 TLDs
- ns0.ja.net: 8 TLDs
- ns2.nic.fr: 8 TLDs
- sec3.apnic.net: 10 TLDs
- ns-ext.vix.com: 13 TLDs
- ns.ripe.net: 19 TLDs
- sunic.sunet.se: 31 TLDs

NICs support

- Does the NICs support IPv6 DNS servers for child zones?

  - Not a exhaustive research

  - Many linguistic problems

  - We think less than 10 support it

What would be Internet Powered by IPv6 for my wife?

- Lord Howe Island

  - 11 km long by 3 km wide

  - Population: 350

  - Nearest civilization: 700 km

Questions?
Suggestions & Corrections are welcome

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juan.cerezo@bt.com
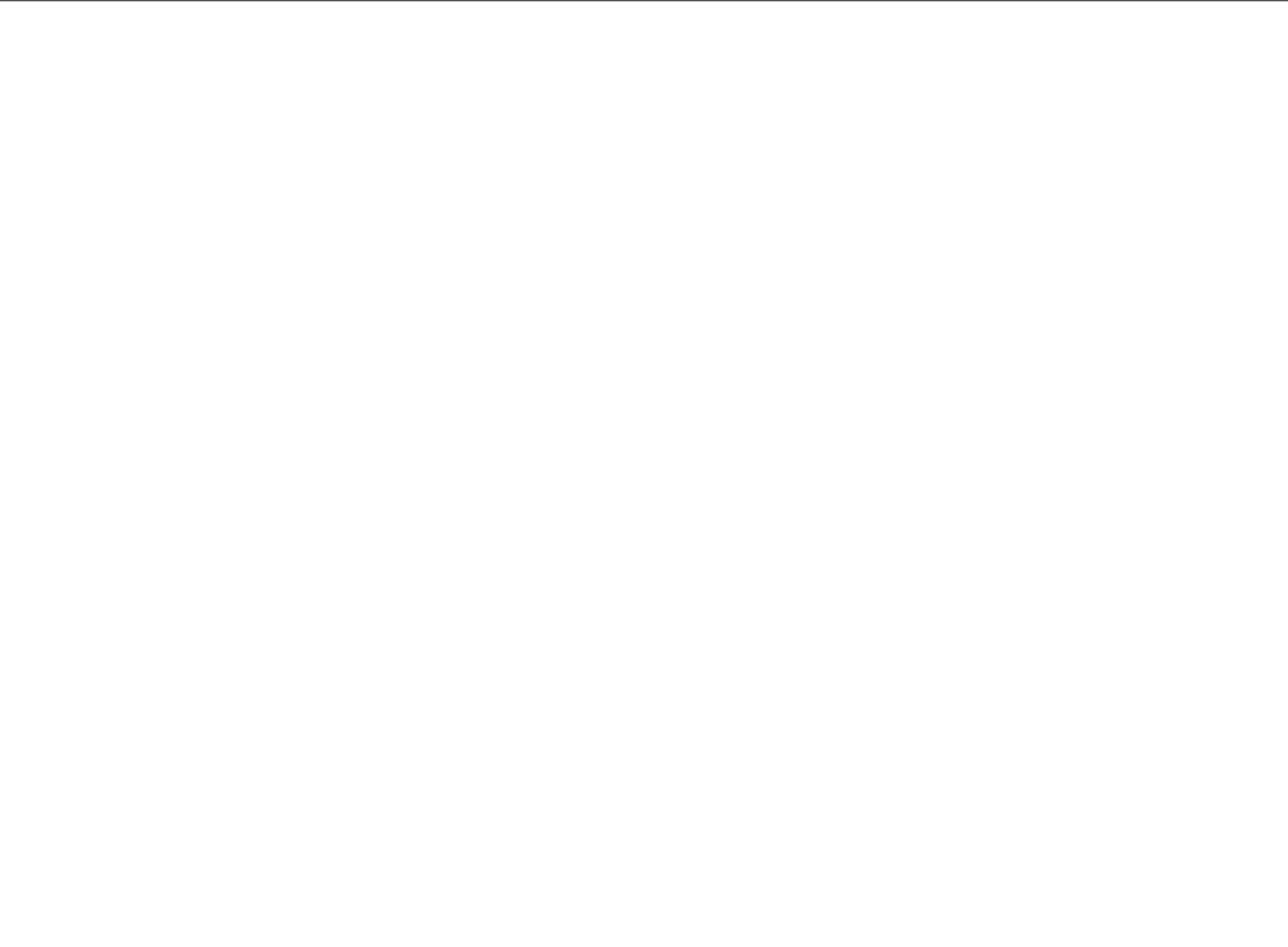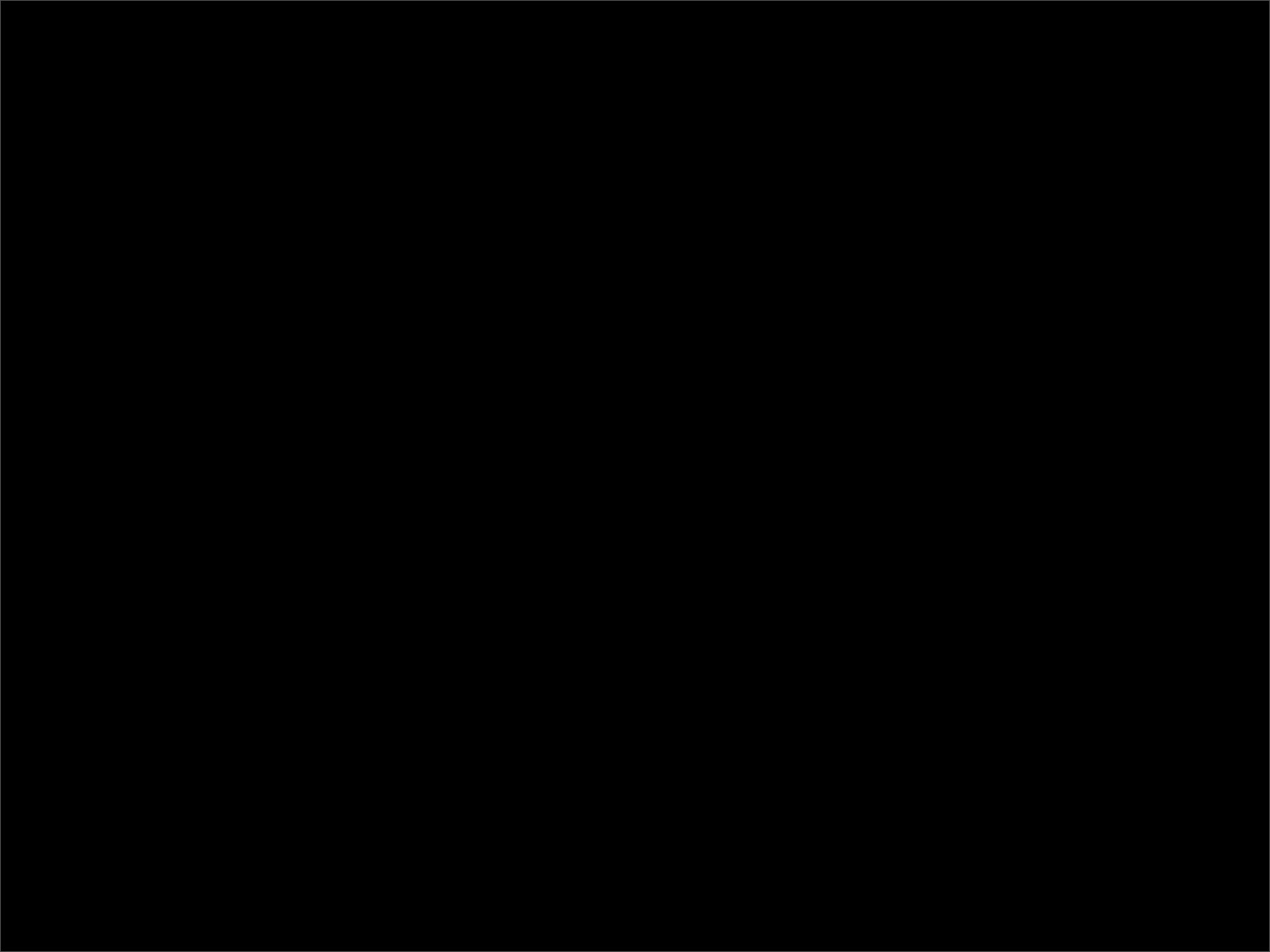
Argentina

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		2
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	1	96	3
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.elmundo.es. 28800   IN   AAAA   2001:800:400:10::71
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.uba.ar.   86400 IN   AAAA   3ffe:8070:1018:1::2
ipv6.no-ip.com.   120   IN   AAAA   2002:51e7:e65f:1::1 (test site)
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Austria

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	97	2
SMTP IPv6	0	100	0
DNS	1	99	0

correct Web servers
www.ipv6.t-online.de. 2499   IN   AAAA   2003:2:0:f302::1:1
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.chello.at.   2499   IN   AAAA   2001:730::3:a00:20ff:fe85:962c
correct MX servers

liar MX servers

correct DNS servers
zoidberg.ipv6.chello.at. 2538   IN   AAAA   2001:730::3:a00:20ff:fe85:962c
liar DNS servers

Bahrain

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Belgium

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Brazil

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Bulgaria

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Canada

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Colombia

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.elmundo.es.   IN   AAAA   2001:450:9:10::115
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Costa Rica

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Croatia

	*	#	?
www.example.com	0		1
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.hr.   3600   IN   AAAA   3ffe:200:58:1::2
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Cyprus

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Czech Republic

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	1		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
ipv6.lupa.cz.   1800   IN   AAAA   2001:1508:1002:c::2
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Denmark

	*	#	?
www.example.com	1		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	1	97	2
SMTP IPv6	0	100	0
DNS	1	99	0

correct Web servers
www.ku.dk.   IN   AAAA   2001:878:100:12::135
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
ipv6.tele2.dk.   300   IN   AAAA   2001:1580:5002:2000::5
correct MX servers

liar MX servers

correct DNS servers
garm.ipv6.ku.dk.   86340 IN   AAAA   2001:878:100:11::34
quark.ipv6.ku.dk.   86340 IN   AAAA   2001:878:100:11::5
liar DNS servers

Dominican Republic

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.noaa.gov.   86400   IN   AAAA   2001:468:504:4010:2c0:f0ff:fe3e:81ed
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Ecuador

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		2
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	0	97	3
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.hp.com.   3600   IN   AAAA   2001:1890:1109:fc:20b:cdff:fe6b:a9e8
ipv6.hp.com.   3600   IN   AAAA   2001:1890:1109:3006:156:152:32:7
0
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Egypt

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Estonia

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Finland

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

France

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Germany

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		1
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	1	97	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.t-online.de.   83233   IN   AAAA   2003:2:0:f302::1:2
www.ipv6.t-online.de.   83233   IN   AAAA   2003:2:0:f302::1:1
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
ipv6.denic.de.   86400   IN   AAAA   2001:608:6::1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Greece

	*	#	?
www.example.com	1		0
www.ipv6.example.com	0		3
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	96	3
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.sch.gr.   IN   AAAA   2001:648:1:10:203:baff:fed2:cd07
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
ipv6-rts.ipv6.auth.gr. 172800 IN   AAAA   2001:648:2800:209:202:b3ff:feb8:99aa
www6.sch.gr.   300   IN   AAAA   2001:648:1:10:203:baff:fed2:cd07
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Hong Kong

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		2
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	1	96	3
SMTP IPv6	0	99	1
DNS	0	99	1

```
correct Web servers
www.ipv6.hinet.net.    3600   IN     AAAA   2001:238::2
liar Web servers
www.ipv6.microsoft.com. 1679   IN     AAAA   2002:836b:9820::836b:9886
www.ipv6.cityu.edu.hk.     IN     AAAA   3ffe:c00:802b:1::10
ipv6.no-ip.com.              IN     AAAA   2002:51e7:e65f:1::1 (test site)
correct MX servers

liar MX servers
ns1.ipv6.cityu.edu.hk.  14206   IN     AAAA   3ffe:c00:802b:1::10
ns2.ipv6.cityu.edu.hk.  14400   IN     AAAA   3ffe:c00:802b:1::11
correct DNS servers

liar DNS servers
ns1.ipv6.cityu.edu.hk.  14194   IN     AAAA   3ffe:c00:802b:1::10
ns2.ipv6.cityu.edu.hk.  14388   IN     AAAA   3ffe:c00:802b:1::11
```

Hungary

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	1		0
ipv6.example.com	0		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www6.atw.hu.   3600   IN   AAAA   2001:618:1a08::4

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

India

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		3
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	97	3
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.sify.com.   IN   AAAA   2001:e48:0:1::3
ipv6.sify.com.   86272 IN   AAAA   2001:e48:0:1::3
www.ipv6.hp.com.   3600   IN   AAAA   2001:1890:1109:fc:20b:cdff:fe6b:a9e8
ipv6.hp.com.   3600   IN   AAAA   2001:1890:1109:3006:156:152:32:70
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Iran

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	0
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Ireland

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
ipv6.eircom.net.   86400   IN   AAAA   2001:bb0:dd0::2
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Israel

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Italy

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Japan

	*	#	?
www.example.com	1		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.odn.ne.jp.   86400   IN   AAAA   2001:278:0:1106::4
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Jordan

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Kuwait

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Lebanon

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Lithuania

	*	#	?
www.example.com	0		1
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.autoplius.lt.   IN   AAAA   ff00::
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Malaysia

	*	#	?
www.example.com	1		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.mmu.edu.my.   IN   AAAA   2001:e68:2000:6403:a00:20ff:fe95:e3f6
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Mexico

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		4
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	95	4
SMTP IPv6	0	99	1
DNS	0	99	1

correct Web servers
www.ipv6.elmundo.es   IN   AAAA   2001:450:9:10::71
liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.unam.mx.   IN   AAAA   2001:448:1:6c::2
www.ipv6.unam.mx. 7200 IN   AAAA   2001:1218:1:6c::2
www.ipv6.udg.mx.   IN   AAAA   3ffe:82f0::210:5aff:fe99:f59b
www.ipv6.udg.mx.   60   IN   AAAA   2001:1210:a::230:6eff:fe1f:7
www.ipv6.hp.com.   3600   IN   AAAA   2001:1890:1109:fc:20b:cdff:fe6b:a9e8
correct MX servers

liar MX servers
imperio.ipv6.udg.mx.   60   IN   AAAA   2001:1210:a::230:6eff:fe1f:7
correct DNS servers

liar DNS servers
imperio.ipv6.udg.mx.   60   IN   AAAA   2001:1210:a::230:6eff:fe1f:7

Morocco

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Netherlands

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

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correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

New Zealand

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Norway

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Oman

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Pakistan

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Palestinian Territory

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Peru

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		1
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	1	97	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.elmundo.es.   IN   AAAA   2001:450:9:10::71

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
ipv6.no-ip.com.   IN   AAAA   2002:51e7:e65f:1::1 (test site)
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Philippines

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Poland

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
ipv6.no-ip.com.   IN   AAAA   2002:51e7:e65f:1::1 (test site)
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Portugal

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	2
SMTP IPv6	0	99	1
DNS	1	99	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.telepac.pt.   IN   AAAA   2001:8a0:10:200::2 (test site)
correct MX servers

liar MX servers
mad.ip6.fccn.pt.   86383   IN   AAAA   2001:690:1fff:1600:20e:cff:fe31:c81e
correct DNS servers
ns2.ip6.fccn.pt.   86383   IN   AAAA   2001:690:1fff:200::200
liar DNS servers

Puerto Rico

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		3
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	97	3
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.noaa.gov.   IN   AAAA   2001:468:504:4010:2c0:f0ff:fe3e:81ed
www.ipv6.upr.edu.   10800 IN   AAAA   2001:468:1300::200:e2ff:fe30:b431
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Qatar

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Romania

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Russia

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Saudi Arabia

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Serbia and Montenegro

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Singapore

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Slovakia

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Slovenia

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

1
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

South Africa

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.za.net.   IN   AAAA   2001:a88:0:fffe::15
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

South Korea

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	1		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
ipv6.paran.com.   IN   AAAA   2001:220:1034::500

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Spain

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.elmundo.es.   IN   AAAA   2001:450:9:10::115

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Sudan

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Sweden

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

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correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Switzerland

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	1	98	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.t-online.de.   86400   IN   AAAA   2003:2:0:f302::1:2

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Syrian Arab Republic

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Taiwan

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		3
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	97	3
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.hinet.net.   3600   IN   AAAA   2001:238::2 (test site)
www.ipv6.ntu.edu.tw.   IN   AAAA   2001:e10:800:3::83 (test site)
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Turkey

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Ukraine

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

United Arab Emirates

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

United Kingdom

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	99	1

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.bt.com.   86400 IN   AAAA   2001:618:1:8000::5 (test site)
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers
ns.ipv6.bt.com.   86359 IN   AAAA   2001:618:1:1:2d0:b7ff:fe7e:69be

United States

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		3
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	97	3
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.noaa.gov.   14612   IN   AAAA   2001:468:504:4010:2c0:f0ff:fe3e:81ed
www.ipv6.hp.com.   3600   IN   AAAA   2001:1890:1109:fc:20b:cdff:fe6b:a9e8 (test site)
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Venezuela

	*	#	?
www.example.com	0		0
www.ipv6.example.com	1		1
www6.example.com	0		0
ipv6.example.com	0		1
Web Totals	1	97	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers
www.ipv6.elmundo.es. 28800   IN   AAAA   2001:450:9:10::115

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
ipv6.no-ip.com.   120   IN   AAAA   2002:51e7:e65f:1::1 (test site)
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Vietnam

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		2
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	98	2
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886
www.ipv6.vnn.vn.   86400 IN   AAAA   2001:c20:2001:1101::2
correct MX servers

liar MX servers

correct DNS servers

liar DNS servers

Yemen

	*	#	?
www.example.com	0		0
www.ipv6.example.com	0		1
www6.example.com	0		0
ipv6.example.com	0		0
Web Totals	0	99	1
SMTP IPv6	0	100	0
DNS	0	100	0

correct Web servers

liar Web servers
www.ipv6.microsoft.com. 1679   IN   AAAA   2002:836b:9820::836b:9886

correct MX servers

liar MX servers

correct DNS servers

liar DNS servers