# IPv6 Addresses on the DNS

**Fernando Gont**

IPv6 Hackers #1
Berlin, Germany. July 30, 2013
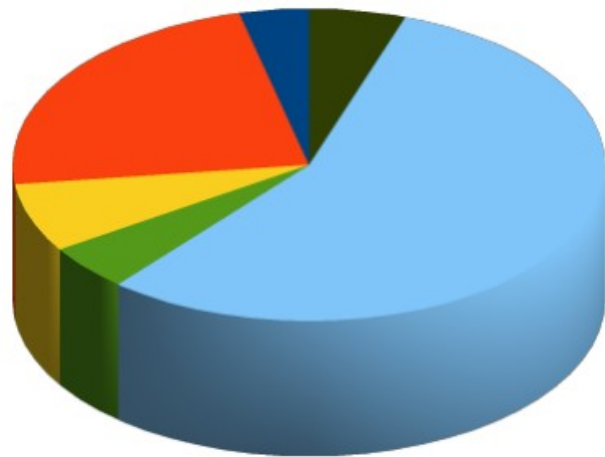
# Some background...

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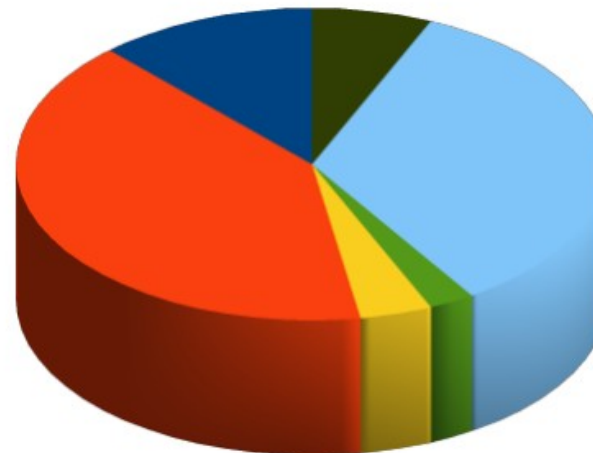NETWORKS

# Background

- IPv6-toolkit's addr6 tool analyzes IPv6 addresses

- Originally produced to gain insights into IPv6 address scanning

- Two datasets:

    - Alexa's top 1M sites

    - World IPv6 Launch Day

- Sample of the results...

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# IPv6 address distribution for the web



WIPv6LD (AAAA records)

Alexa's Top-1M sites (AAAA records)

WIPv6LD (AAAA records) (A)

Alexa's Top-1M sites (AAAA records) (A)

- Byte-pattern
- Embed-IPv4
- Embed-Port
- IEEE-based
- ISATAP
- Low-byte
- Random
- Teredo

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# IPv6 address distribution for MXs



WIPv6LD (MX records)

Alexa's Top-1M sites (MX records) (A)
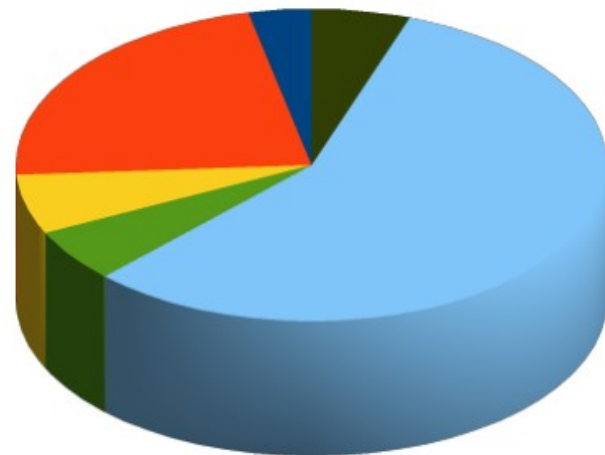
WIPv6LD (MX records) (A)

Alexa's Top-1M sites (MX records) (A)

Legend:
- Byte-pattern
- Embed-IPv4
- Embed-Port
- IEEE-based
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# IPv6 address distribution for the DNS



WIPv6LD (NS records)

Alexa's Top-1M sites (NS records) (A)

WIPv6LD (NS records) (A)

Alexa's Top-1M sites (MX records) (A)

Legend:
- Byte-pattern
- Embed-IPv4
- Embed-Port
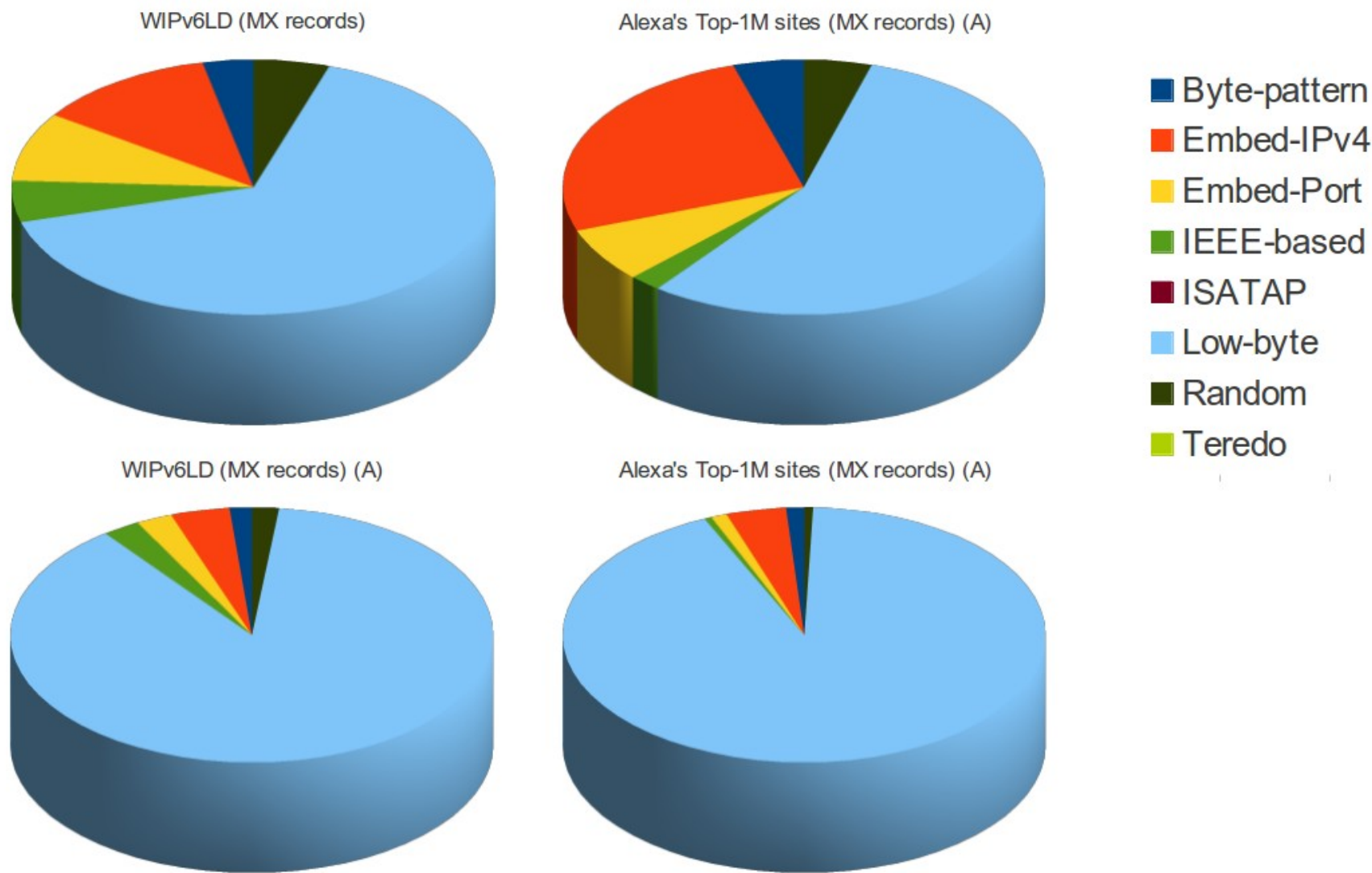- IEEE-based
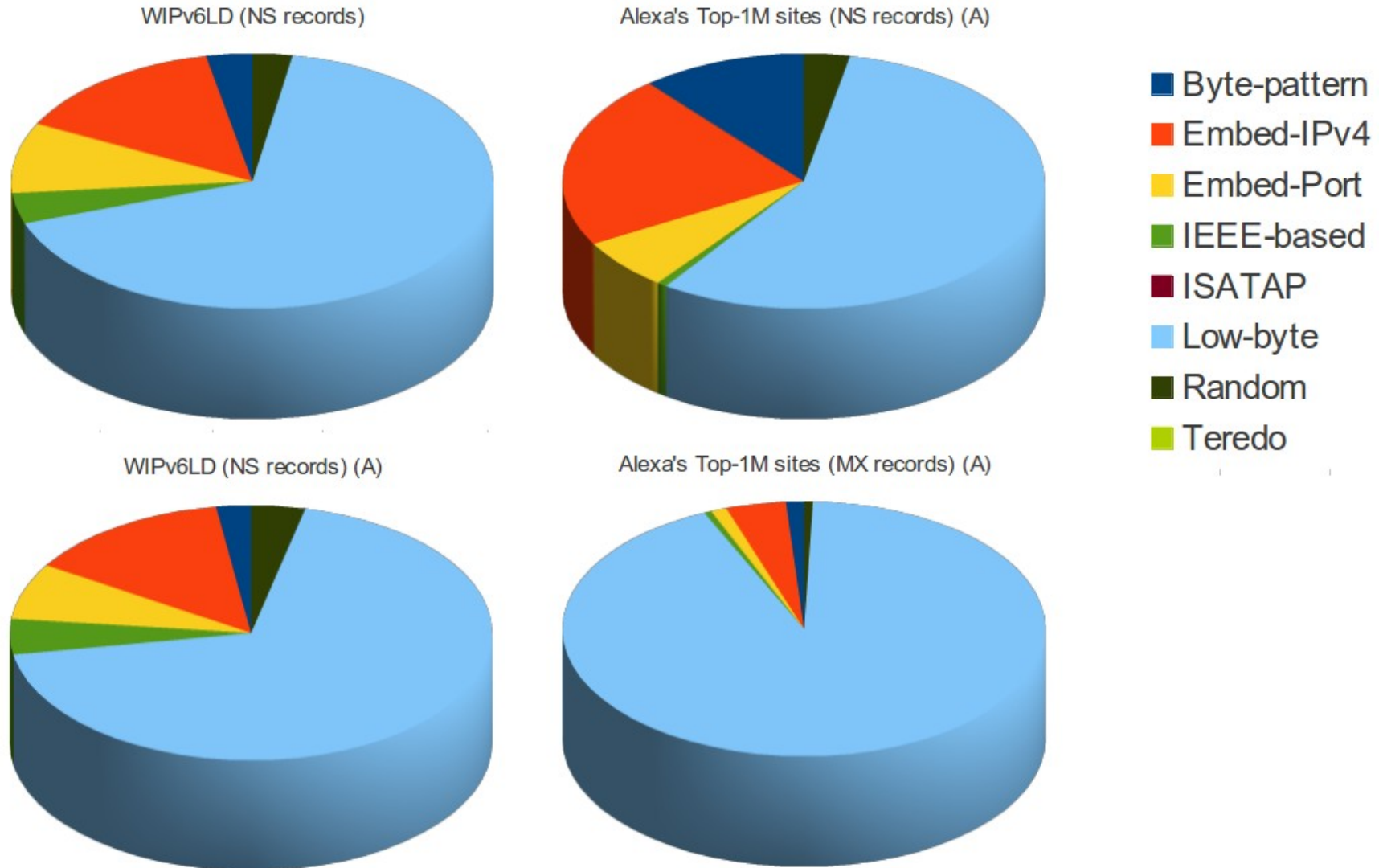- ISATAP
- Low-byte
- Random
- Teredo

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# Some "surprises"...

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# Alexa's Top 1M sites dataset

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# Web server IPv6 addresses

- Overall analysis:

    - Unicast:   6045 (99.90%)

    - Multicast:      0 (0.00%)

    - Unspec.:        6 (0.10%)  **<---- ???**

- Unicast addresses:

    - Global:    5955 (98.51%)

    - 6to4:            43 (0.71%)  **<---- ???**

    - IPv4-comp:  36 (0.60%)  **<---- ???**

    - Link-local:     5 (0.08%)  **<---- ???**

    - Loopback:      6 (0.10%)  **<---- ???**

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# Mail server IPv6 addresses

- Overall analysis:

  - Unicast:  4596 (100.00%)

  - Multicast:     0 (0.00%)

  - Unspec.:      0 (0.00%)

- Unicast addresses:

  - Global:    5955 (98.51%)

  - 6to4:          4 (0.09%)  **<---- ???**

  - IPv4-comp:   3 (0.07%)  **<---- ???**

  - Link-local:    1 (0.02%)  **<---- ???**

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# DNS server IPv6 addresses

- Overall analysis:

  - Unicast:   3595 (100.00%)

  - Multicast:       0 (0.00%)

  - Unspec.:       0 (0.00%)

- Unicast addresses:

  - Global:    3589 (99.83%)

  - 6to4:          5 (0.14%)  **<---- ???**

  - IPv4-comp:   1 (0.03%)  **<---- ???**

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# World IPv6 Launch Day site dataset

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# Web server IPv6 addresses

- Overall analysis:
  - Unicast:   2652 (99.96%)
  - Unspec.:      0 (0.00%)
  - Multicast:      1 (0.04%)   **<---- ???**
- Unicast addresses:
  - Global:    2645 (99.74%)
  - 6to4:          7 (0.26%)   **<---- ???**

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# Mail server IPv6 addresses

- Overall analysis:

    - Unicast:  4273 (100.00%)

    - Multicast:       0 (0.00%)

    - Unspec.:        0 (0.00%)

- Unicast addresses:

    - Global:    4260 (99.70%)

    - 6to4:          13 (0.30%)  **<---- ???**

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# DNS server IPv6 addresses

- Overall analysis:

  - Unicast:  4788 (100.00%)

  - Multicast:      0 (0.00%)

  - Unspec.:        0 (0.00%)

- Unicast addresses:

  - Global:    4784 (99.92%)

  - 6to4:            4 (0.08%)  **<---- ???**

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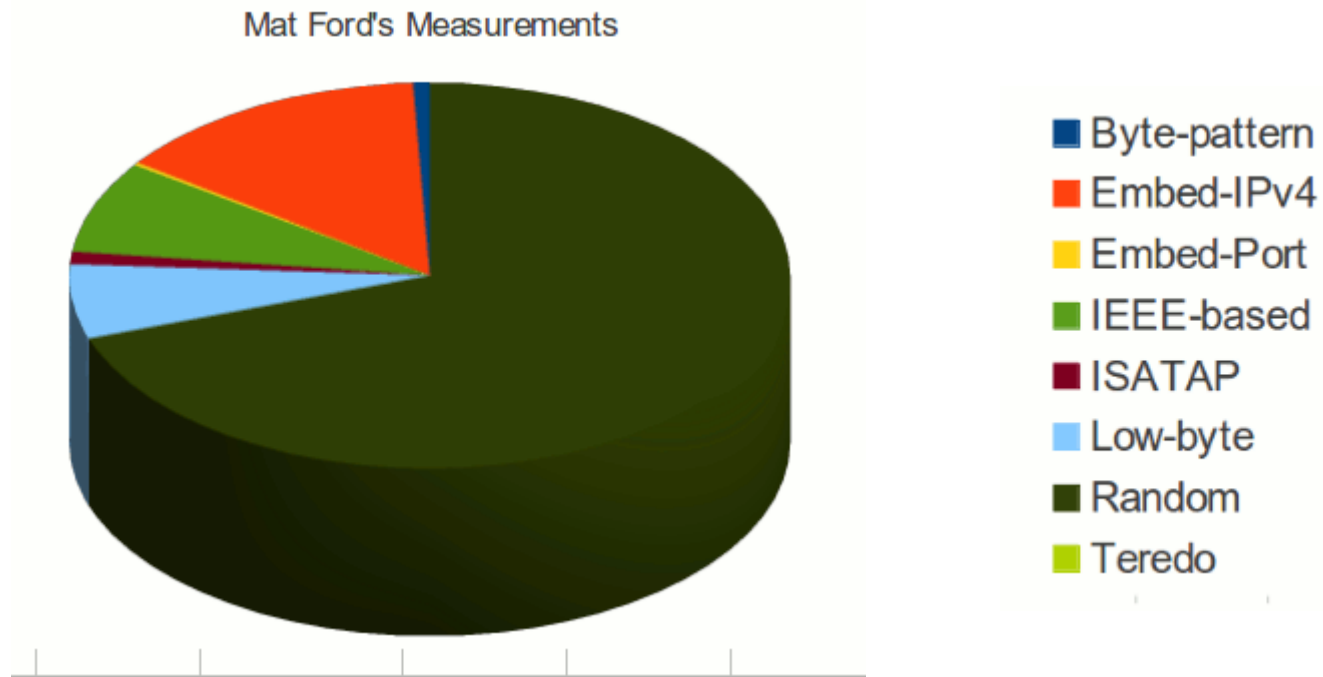NETWORKS

# Further work and ideas...

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# DNS police

- Generate a tool to automatically check and report incorret DNS entries

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# Client addresses

- Only limited data (we should analyze the User Agent string)



Mat Ford's Measurements

Legend:
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- Embed-IPv4
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- Teredo

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# Thanks!

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