Measuring IPv6 deployment with

BitTorrent

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Background

- CompSci MSc thesis by Martin Defêche
- Results presented to v6ops WG at IETF76, by Eric Vyncke
  - draft-defeche-ipv6-traffic-in-p2p-networks-00
- uTorrent has had IPv6 support since mid-2008
  - Use bittorrent overlay as a means to discover IPv6 capable hosts
  - Measure location, latency, MTU, transition mechanisms
  - Longitudinal study is most interesting

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Methodology

- Dummy BitTorrent client
  - Based on LibTorrent library
  - Get some popular torrents from TPB
  - Connect in IPv4 and IPv6
  - Never download any content
  - Collect information about addresses and network
- Background testing (tracepath6 & ping6) of
  - TTL, Hop Limit (hop count)
  - MTU in IPv4 and IPv6
  - Latency in IPv4 and IPv6
  - Transition mechanisms

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Measurement window

- See presentation to IETF76 for earlier results
- Running since June 2010 on UK-based host
  - ~4.75M peers discovered
  - Connected to around 385K (PEX contains a lot of rubbish)
  - 14K IPv6 peers discovered (excluding bogons)
  - Connected to around 1K IPv6 peers ☹

- These are very preliminary results – more work/time definitely required

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Why so few IPv6 peers?

- No IPv6 trackers?
- BEP 32: IPv6 extensions to the BitTorrent DHT
  - not currently implemented in libtorrent
  - patches welcome!
- Relying on PEX for discovery of IPv6 peers
- PEX data largely stale/useless
  - See http://www.tribler.org/trac/wiki/PEXCrawl

IPv6 peer connectivity types

- Connectivity types
  - Native: 1%
  - Teredo: 86%
  - 6to4: 13%
- Bogons:
  - 6bone, link-local, garbage
  - Around 10% of total discovered IPv6 peers
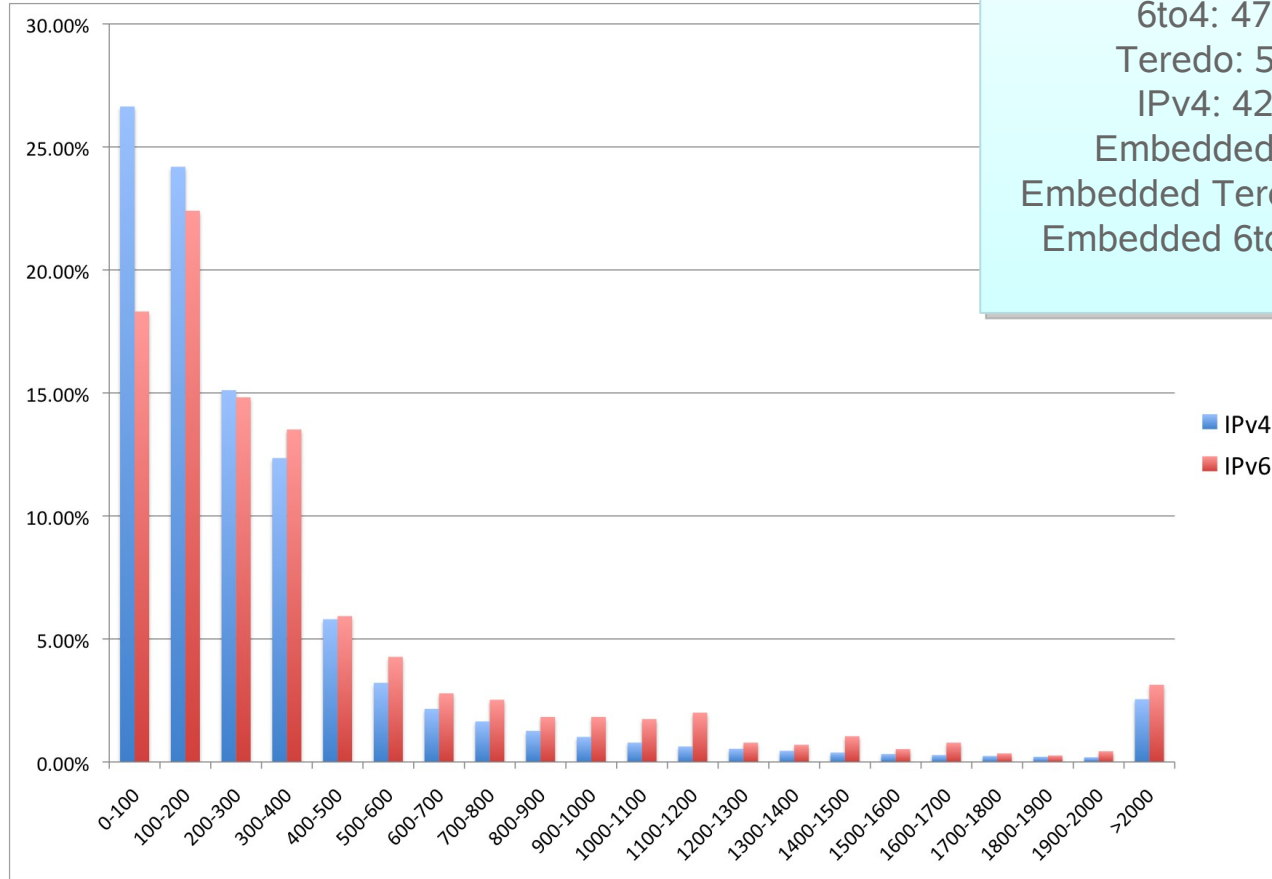
MTU

- MTU
  - IPv6: 1317
  - Native IPv6: 1472
  - IPv4: 1498
  - Embedded IPv4: 1497

Peers not responding to MTU probe:
IPv4 – 7.80%
IPv6 – 6.12%

Hop counts

- Hops from measurement point to peer
  - IPv6: 5.77
  - Native IPv6: 13.15
  - IPv4: 12.54
  - Embedded: 12.33
  - Embedded 6to4: 11.43
  - Embedded Teredo: 12.42

Average RTT

IPv6: 464ms
Native IPv6: 183ms
6to4: 477ms
Teredo: 584ms
IPv4: 427ms
Embedded: 316ms
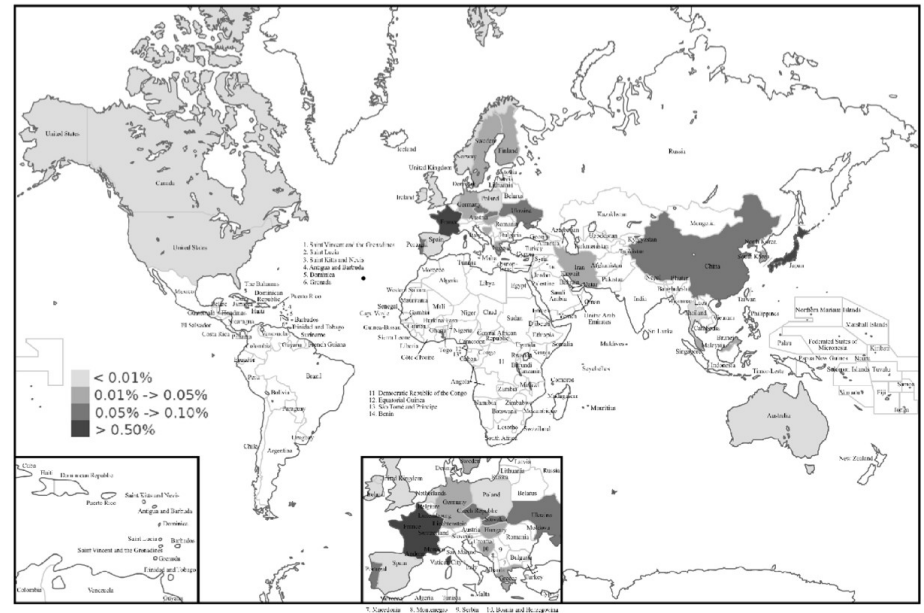Embedded Teredo: 302ms
Embedded 6to4: 585ms

Where are the peers?

Country	IPv6	IPv4		
US		3435	860640	0.40%
CA		898	287844	0.31%
AU		701	299180	0.23%
IN		646	204113	0.32%
GB		612	299752	0.20%
ES		581	290289	0.20%
IT		416	130431	0.32%
PL		319	125546	0.25%
Mauritius? → MU		303	85212	0.35%
FR		302	109175	0.28%
SE		256	72328	0.35%
United Arab Emirates → AE		251	87056	0.29%
PH		205	79588	0.26%
Saudi Arabia → SA		202	44813	0.45%

Almost all native peers discovered are on free.fr

Future work

- More IPv6 peers!
- Pretty pictures
- Longitudinal analysis
  - Mainly interested in *evolution* of these results over time
- Getting regularly updated results online
- Finding additional measurement hosts

Thanks for your attention!

Questions?

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