

Report on Teredo Sunset Experiment

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Teredo in a nutshell

- Uses a Teredo Server for address configuration/resolution
 - Windows discovers by resolving `teredo.ipv6.microsoft.com`
- Data to/from Teredo peers goes direct peer to peer
- Uses Teredo Relays for forwarding data to/from non-Teredo peers
- RFC 4380 section 5.5:

Teredo is designed as an interim transition mechanism, and it is important that it should not be used any longer than necessary. The "sunset" procedure will be implemented by Teredo clients, servers, and relays, as specified in this section. [...]

What RFC 4380 says about sunsetting

- The Teredo servers are expected to participate in the sunset procedure by announcing a date at which they will stop providing the service.
- This date depends on the availability of alternative solutions to their clients, such as "dual-mode" gateways that behave simultaneously as IPv4 NATs and IPv6 routers.
- Most Teredo servers will not be expected to operate more than a few years.
- Teredo relays are expected to have the same life span as Teredo servers.

Why Sunset Teredo now?

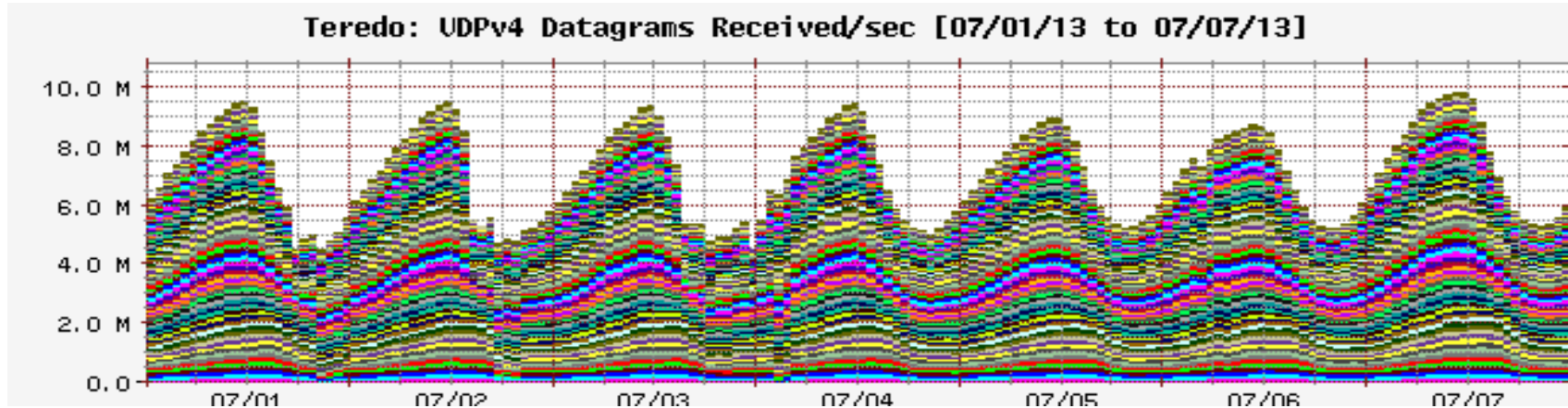
- Recent strides to native IPv6 connectivity deems Teredo as redundant
- Yet another service sys admins disable in enterprise settings (see RFC 5991)

Sunset Experiment

- **Goal:** measure impact of sunsetting Teredo on IPv6 connectivity
- Announced a priori on the v6providers list
- Switched off teredo.ipv6.microsoft.com from July 9th – July 15th
- Provided backup at test.ipv6.microsoft.com

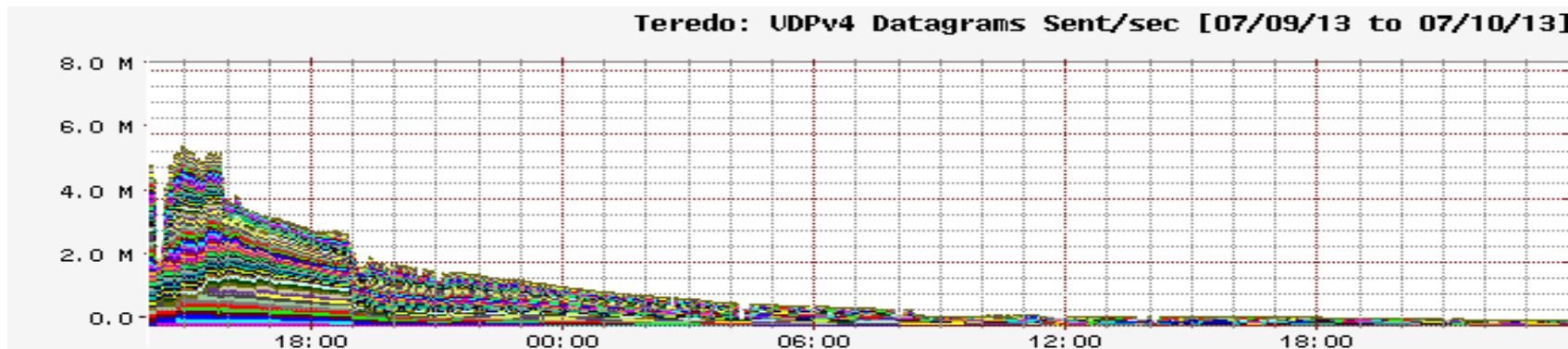
Teredo Sunset Experiment Results

- Standard Traffic Patterns



At peak: ~ 9.4 million datagrams per second

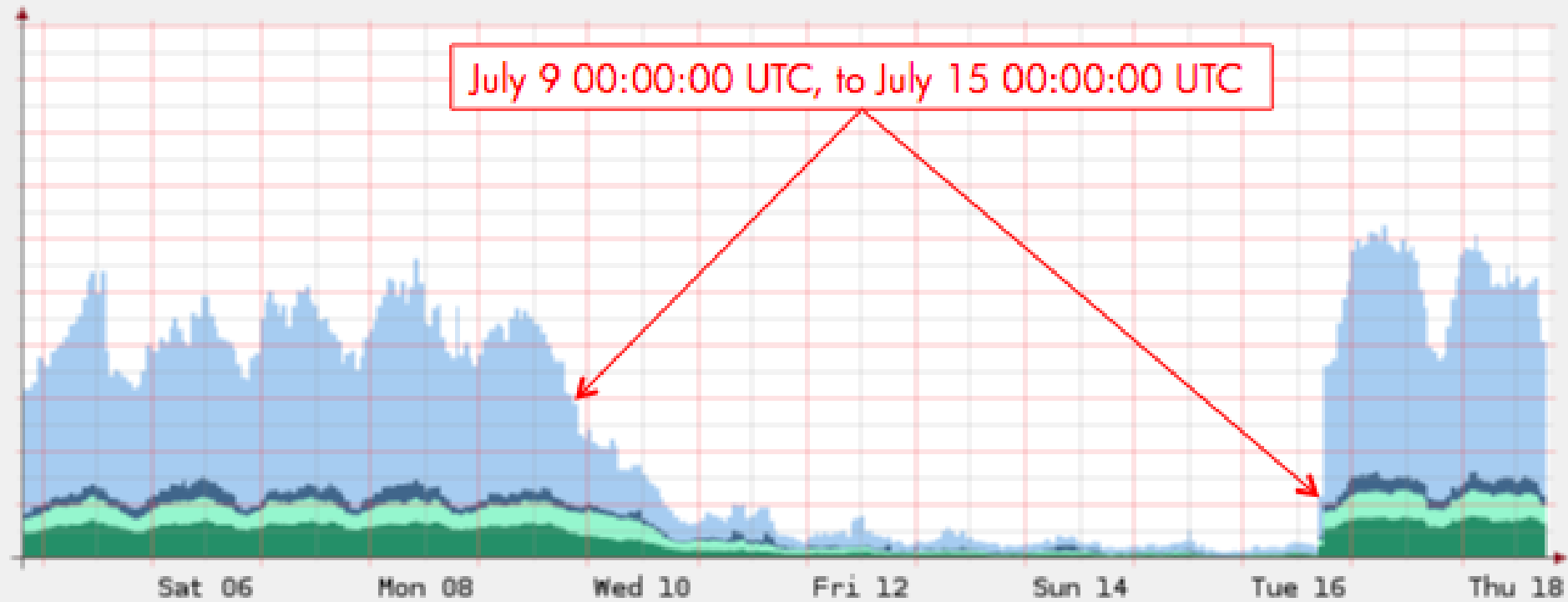
- 1st day after DNS change



Despite 5 minutes in DNS record, various DNS servers did not respect it

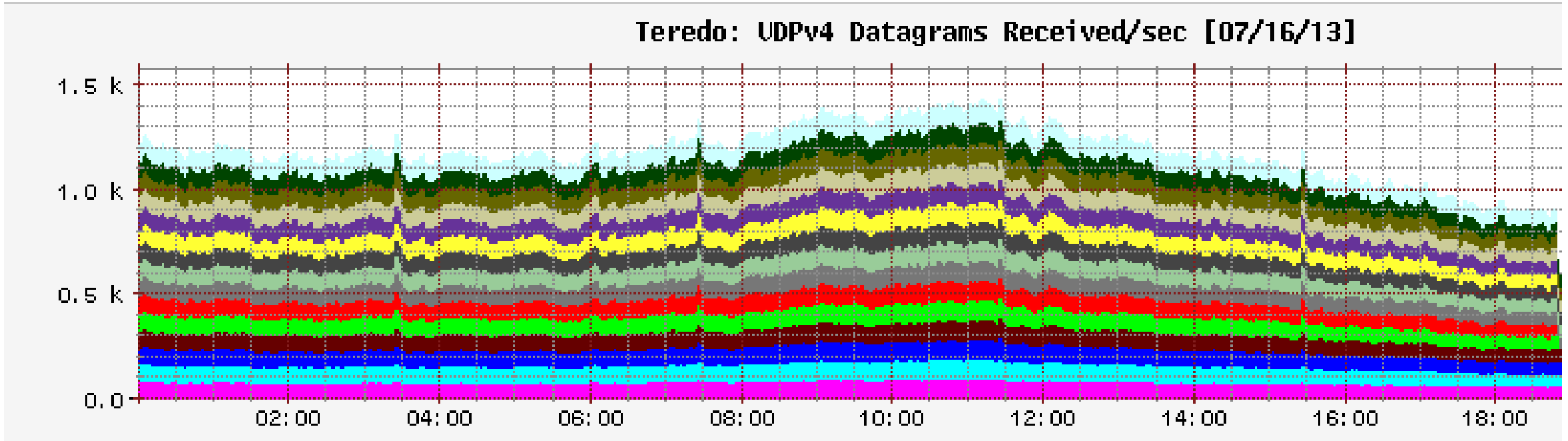
Teredo Sunset Experiment Results

Teredo traffic on AS6939 Hurricane Electric's global teredo relays (24 cities – Asia, North America & Europe)



Courtesy Martin J. Levy (Hurricane Electric)

Teredo Sunset Experiment Results



Only 0.01% of global Teredo traffic manually switched to test.ipv6.microsoft.com

Negligible effect on overall IPv6 traffic

- <http://ipv6.terra.com.br/blog/index.php/estatisticas/>



- <https://www.ams-ix.net/technical/statistics/sflow-stats/ipv6-traffic>
- <http://www.de-cix.net/about/statistics/>
- http://www.vix.at/vix_ipv6_statistics.html?&L=1
- <http://teredo.bit.nl/>

Conclusions

- Good news:
 - The Internet seems to still be working
 - No change to native IPv6 connectivity
 - Generally the technical community has been highly supportive
- Less-Good news:
 - We received reports of network administrators that were alerted to a wave of failed DNS requests (every Windows client hitting a non-existent DNS name)
 - A report of a moderately-popular graphic product having issues since the change.
- Next step is to set the date `teredo.ipv6.microsoft.com` will shut down
 - Send feedback to `teredo@microsoft.com`