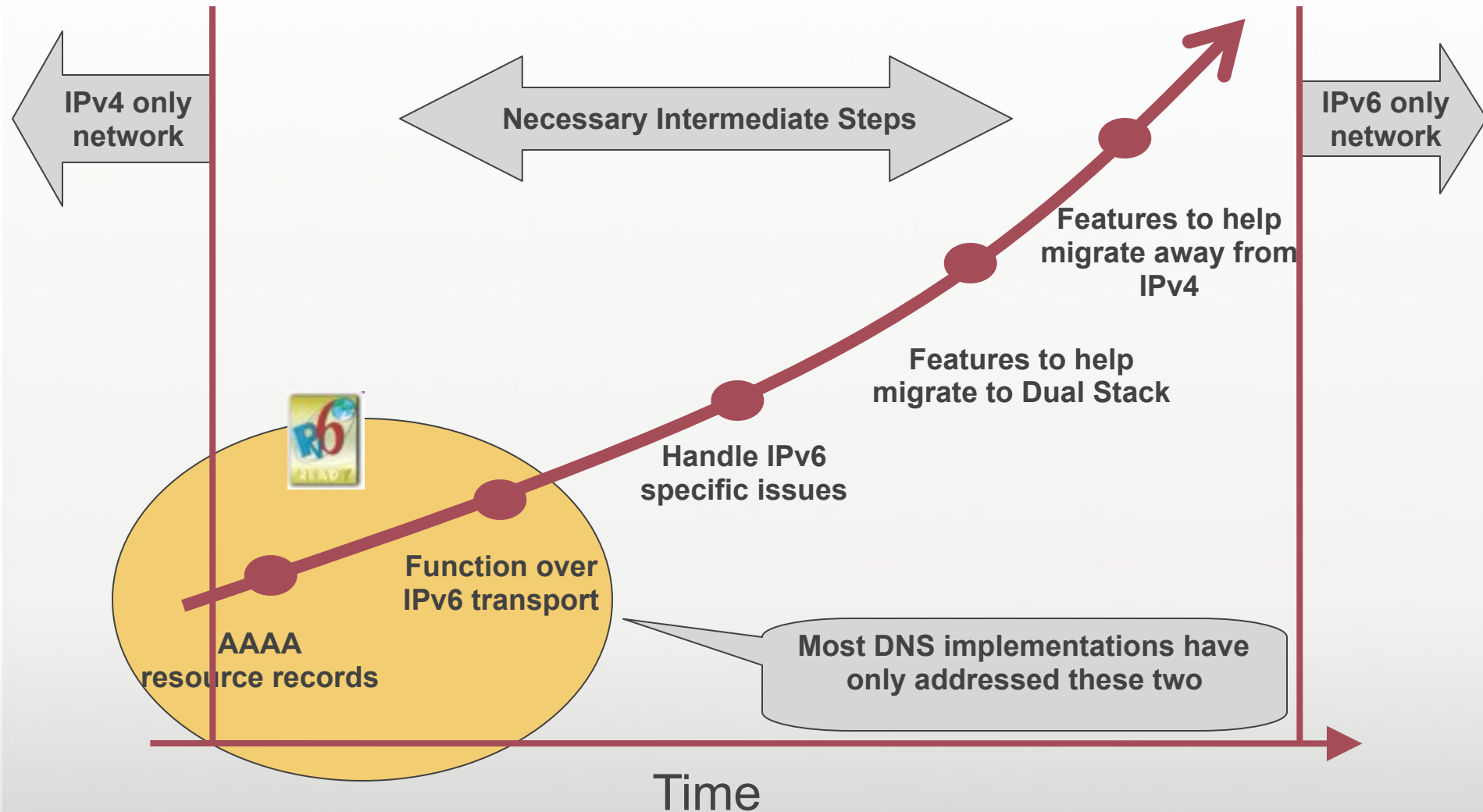


Supporting IPv6 in DNS



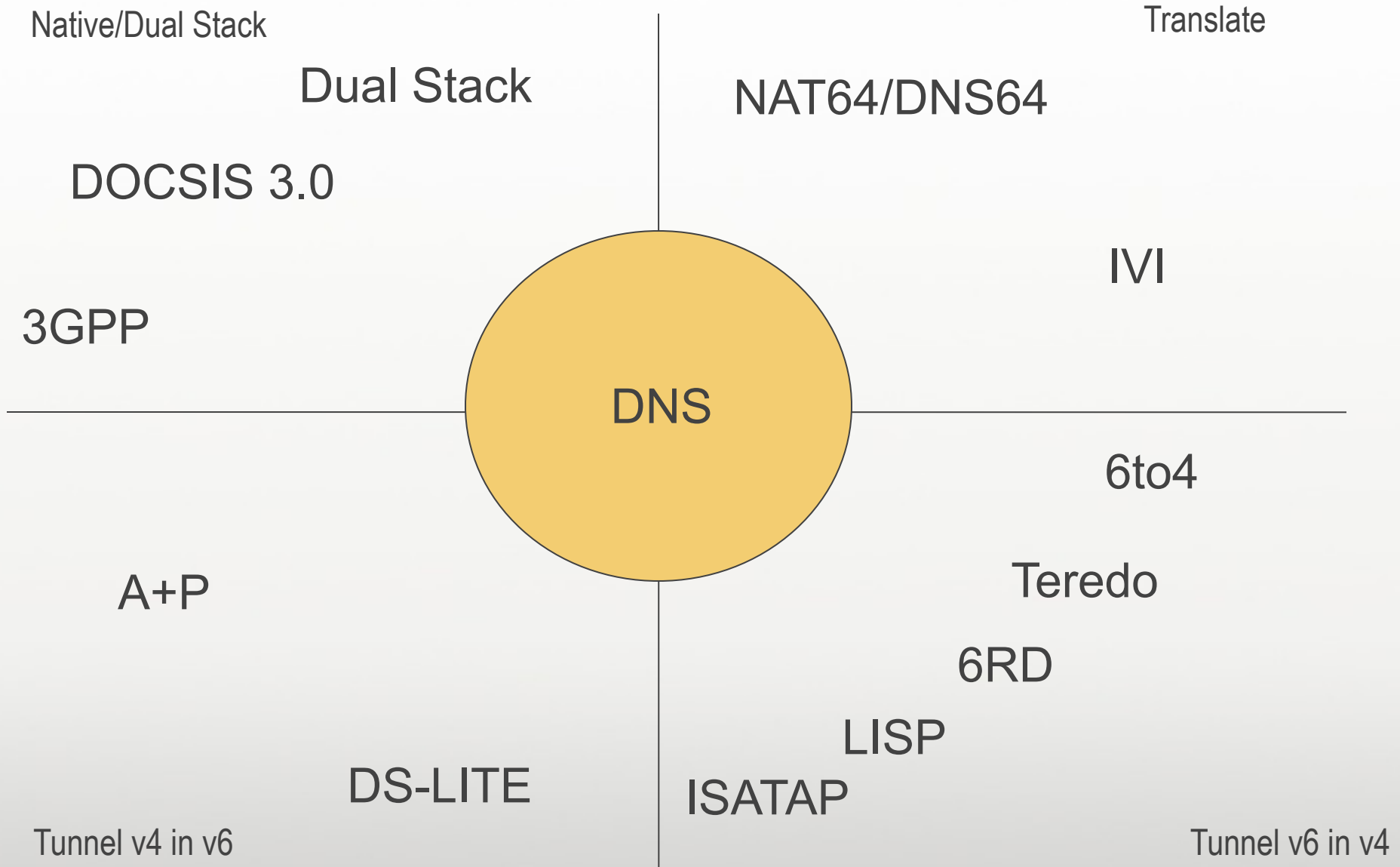
SECURE64



Transition Mechanisms



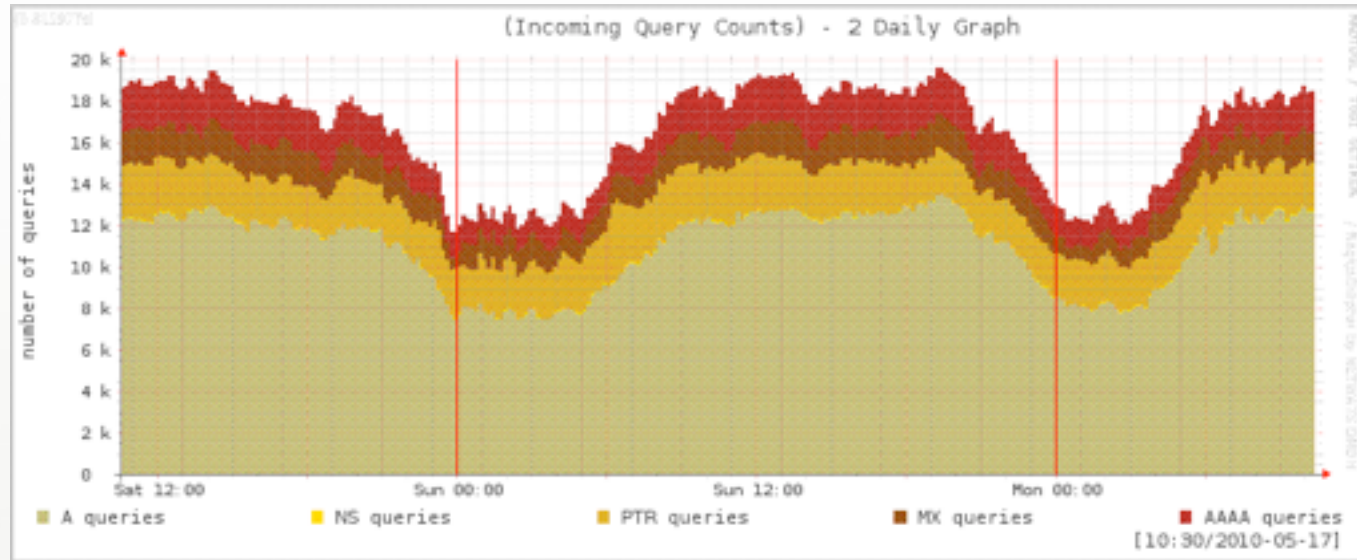
SECURE 64



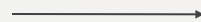
x2 load on DNS



SECURE64



getaddrinfo()



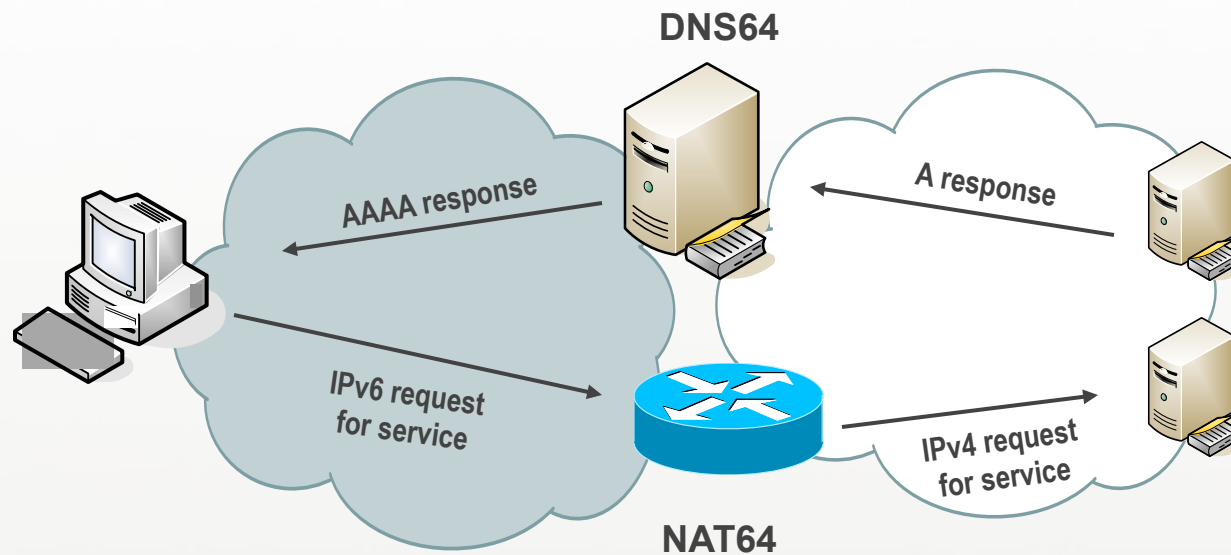
A

AAAA

- Secure64 DNS Cache version 2.5:
 - DNS64
 - Disable AAAA on IPv4 transport (the Yahoo! hack)

- Future:
 - Reverse Delegation in IPv6
 - ▶ Pre-populating DNS in Ipv6 is impossible
 - ▶ Prefix delegation complicates reverse delegation even further
 - ▶ Dynamic DNS doesn't scale

NAT64 / DNS64 Solution



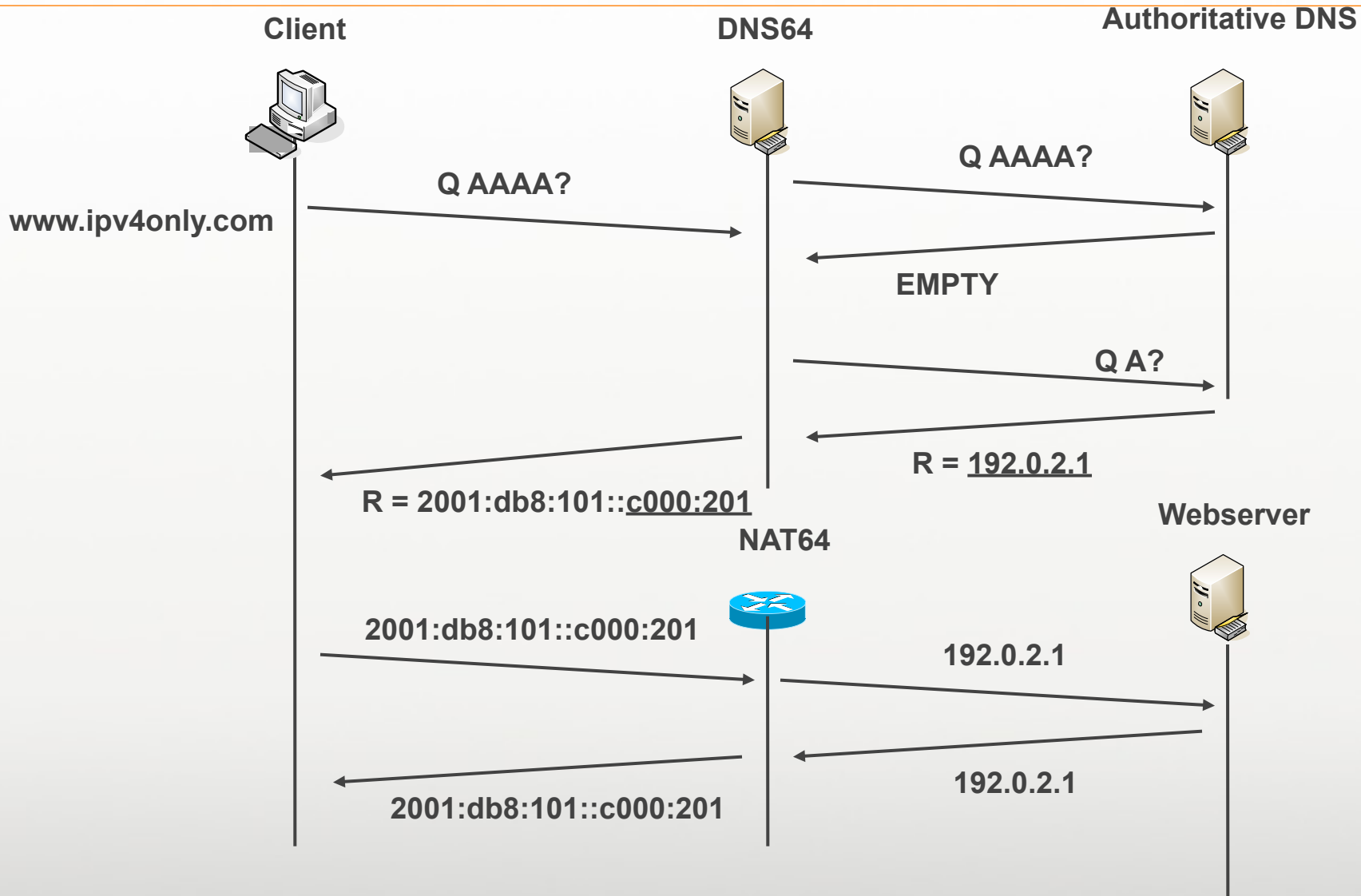
■ Secure64 DNS cache:

```
dns64-prefix list:  
  2001:db8:1::/96  
  2001:db8:2::/96  
  2001:db8:3::/96
```

NAT64 / DNS64 Under The Hood



SECURE 64



Transition using translators (DNS64)



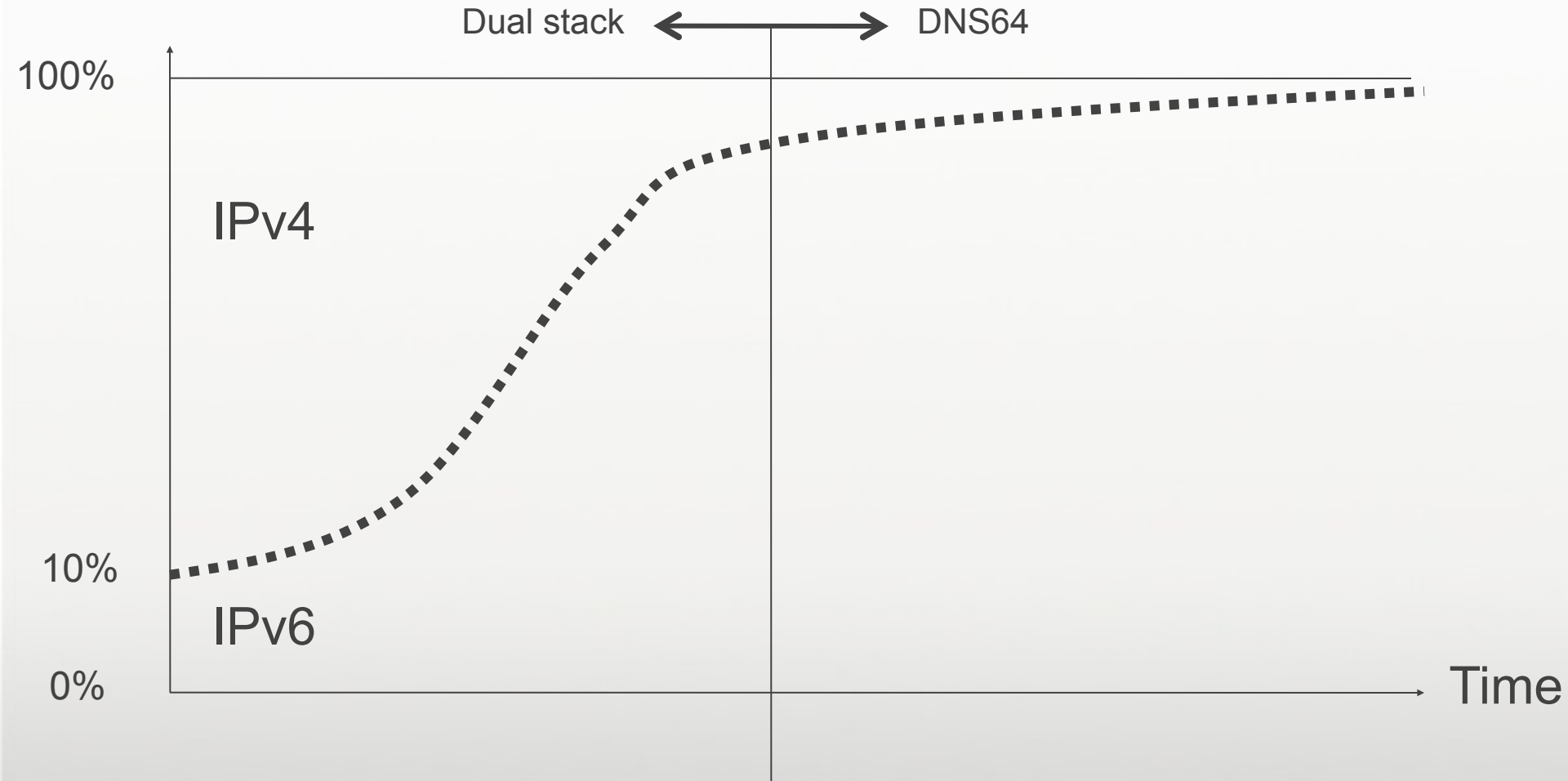
SECURE64

- Good approach if you don't have enough IPv4 addresses for dual stack.
 - IPv6-only network on the client side!
 - User experience with NAT64 is (almost) the same as NAT44
-
- Stuff that's broken doesn't work.
 - Currently an IETF draft.
 - Only one network to maintain. The IPv6 Killer app?

DNS64 everybody will need it



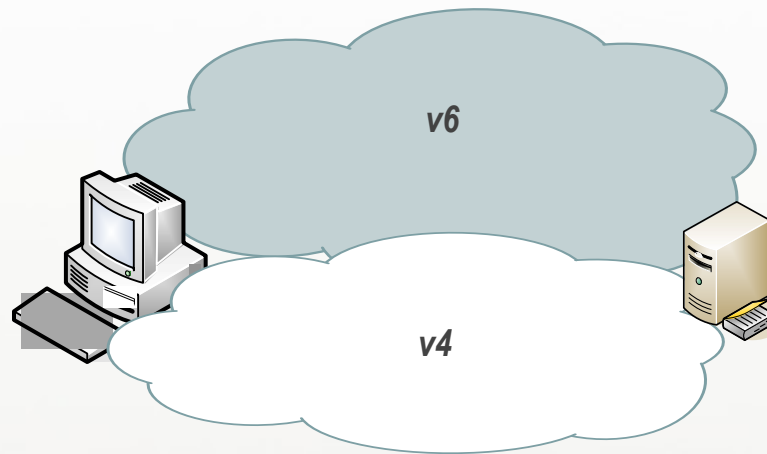
SECURE64



HTTP problem in details



SECURE64



Today some content providers are not giving out AAAA unless you are on their white list because it might break 0.078% of IPv4 clients = could be millions of users and millions in revenue

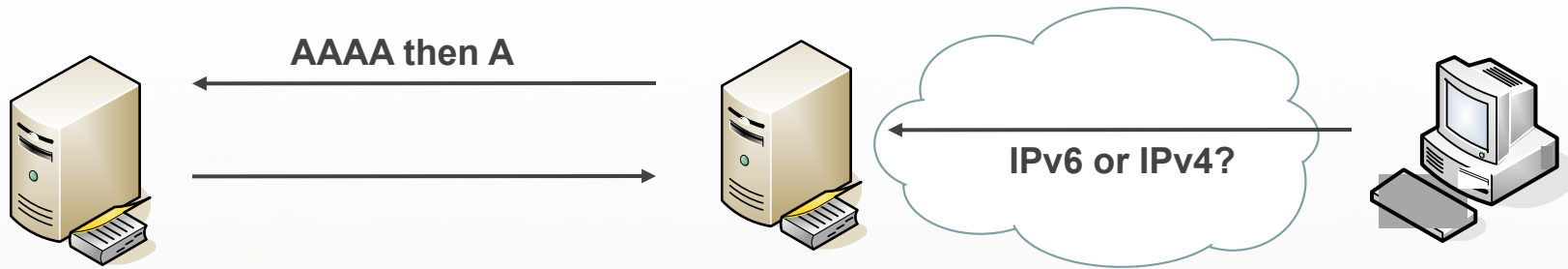
Content providers DNS decides if A or AAAA or both

- There are problems when client IPv6 connection is broken
 - Extreme slowdown as client retries AAAA and then A lookups
- Estimated 0.078% of clients have this problem
 - Some older Opera browsers, some older Apple OSes, etc.
 - Amounts to millions of users for some large content providers like Google, Yahoo, etc.
- This is a HTTP problem, not applicable for other protocols such as DNS and SMTP.

One Proposed Solution Using DNS



SECURE 64



- Caching side (ISP, consumer of content)
 - If query came in over IPv4, respond negatively to the AAAA request and wait for the A request

- Side effects:
 - Breaks DNSSEC
 - Turns off IPv6 for clients that can only do DNS queries over IPv4 (ie Windows XP)

Conclusions



SECURE64

- The migration to IPv6 will increase the load on DNS servers.
- Dual stack is the IETF recommended transition mechanism but not the only one. Consider alternatives such as DNS64/NAT64.
- Web traffic might experience painful timeouts when you migrate to IPv6.
- SMTP mail and DNS are easier to migrate to IPv6 without causing collateral damage.
- Reverse delegation in IPv6 is still a problem area.



Questions?