

Blockers to IPv6 Adoption

Lessons from over 19 years of providing IPv6 services

UK IPv6 Council 2017

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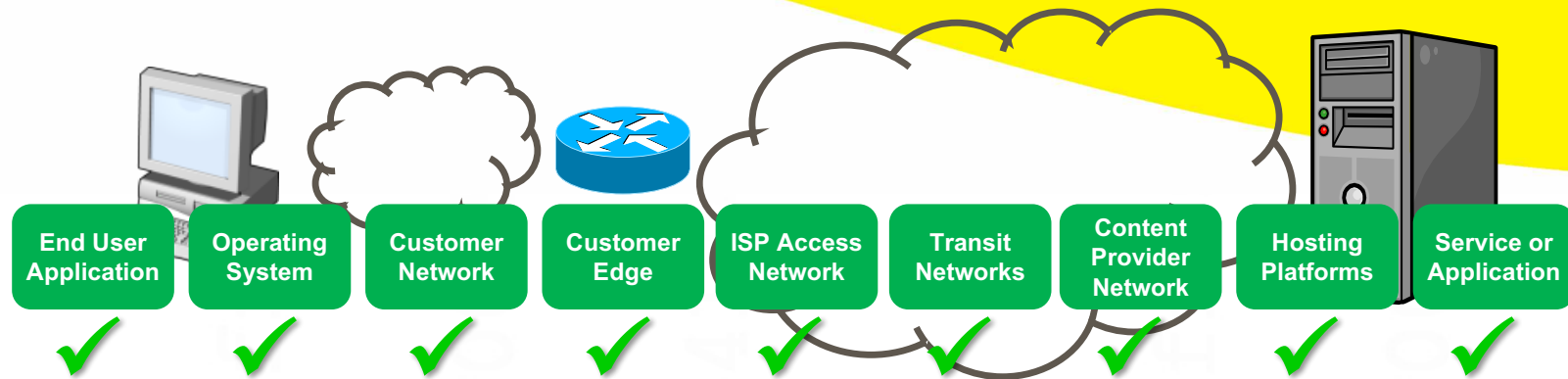
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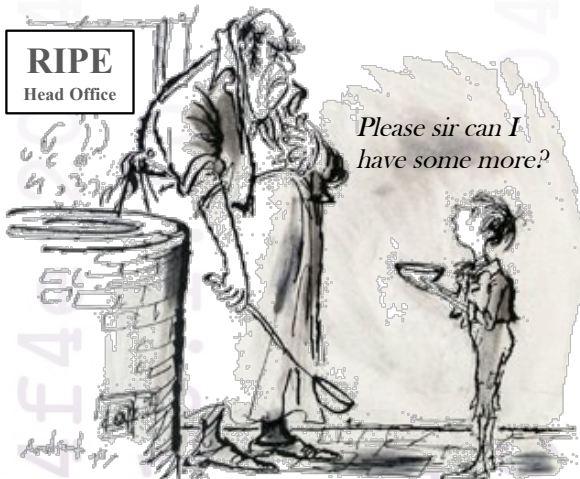
The Problem

Persuading enterprises to adopt IPv6

What We See



- Dual stack users: **75%** of traffic is over IPv6
- Over **16%** of users have IPv6 connectivity
- Over **50%** of top websites are IPv6 enabled
- Annual **doubling** of IPv6 users
- IPv6 is **10-15% faster** than IPv4
- **Almost 100% of nodes are IPv6 capable**

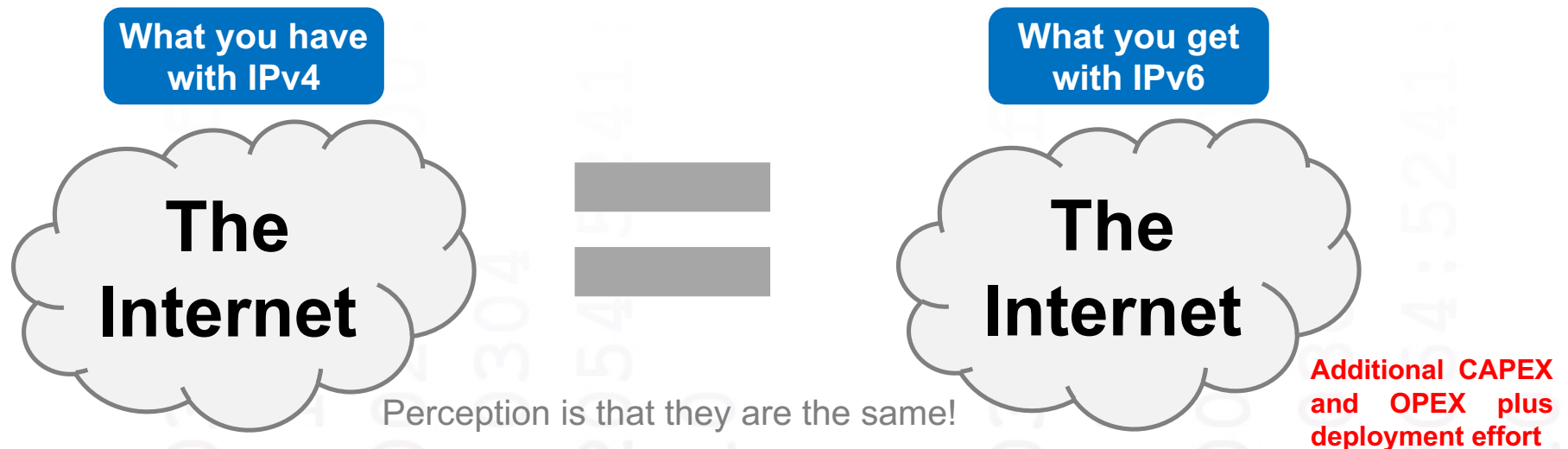


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What They See

“My perception is my reality, but it may not be yours”



“IPv6 is not even on my radar”

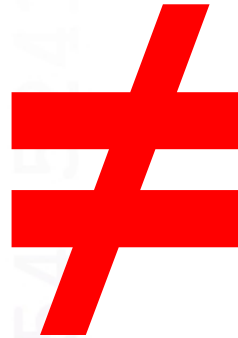
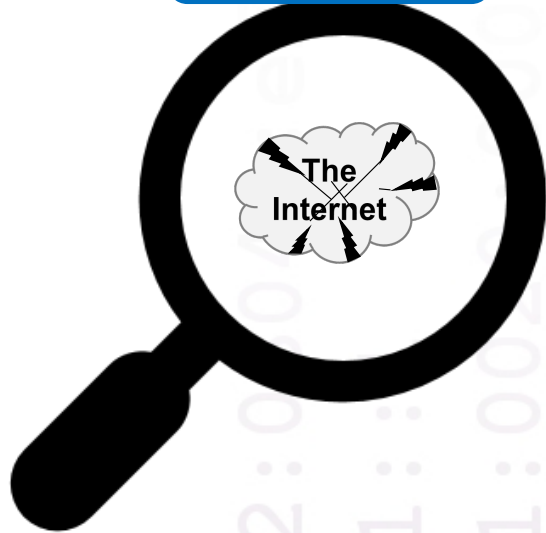
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Reality

“My perception is my reality, but it may not be yours”

What you have
with IPv4

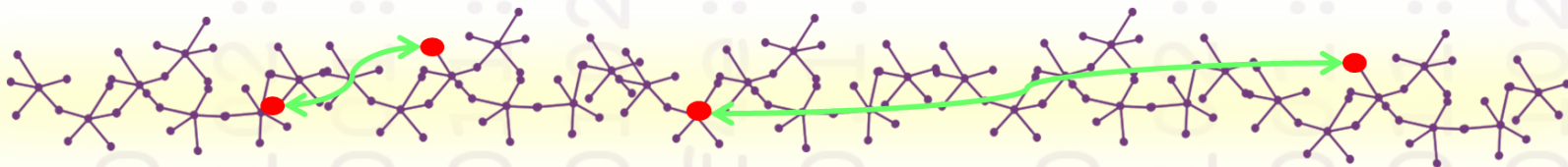


What you get
with IPv6

They are not the same!

Sometimes Justifying IPv6 is Easy

- New ISPs and providers with no stock of IPv4 addresses
- Operators faced with deploying Carrier Grade NAT (CGN)
- Organisations that have exhausted their RFC1918 space
- Organisations that have exhausted their public IPv4 space
- App developers for the Apple App Store
- Organisations with specific peer to peer requirements
- Cyber security organisations
- Those deploying the Internet of Things (IoT)



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Justifying IPv6

- Persuading CTOs is good, but we need to convince the CEOs

The good news is that the problems with the IPv4 internet, that IPv6 solves, can be expressed in language that means something to business managers

- Governance, web analytics, cyber security, legal intercept, performance, reliability, internet presence, impact on customers

Carrier Grade NAT

We have found CGN to be a useful tool in justifying IPv6

- CGN is already acting as a driver for IPv6 adoption
- CGN degrades IPv4 broadband services
- CGN impacts all players
- CGN impacts business processes
- You may have no control over CGN being in the path
- No need to use the term Carrier Grade NAT (CGN)!






See my CGN presentation at NAv6TF 2017 at <https://youtu.be/fbk4H6EmZzl>

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Example: CGN Impact on Analytics and Forensics

Access Network	Routed	NAT44	CGN
Service Provider Logging Requirements	None (fixed record of allocation)	None (fixed record of allocation)	Per session (tens of thousands per user per day): <ul style="list-style-type: none"> •Date and time •Internal IP address (may be dynamic) •Internal source port •External CGN source IP address •External CGN source port number
Logging Requirements at Destination	Source IP address	Source IP address (and source port)	Per session (tens of thousands per user per day): <ul style="list-style-type: none"> •Date and time •Source IP address •Source port number
	 Trivial	 Small	 Potentially Huge (PBs) Depending on CGN configuration

Huge

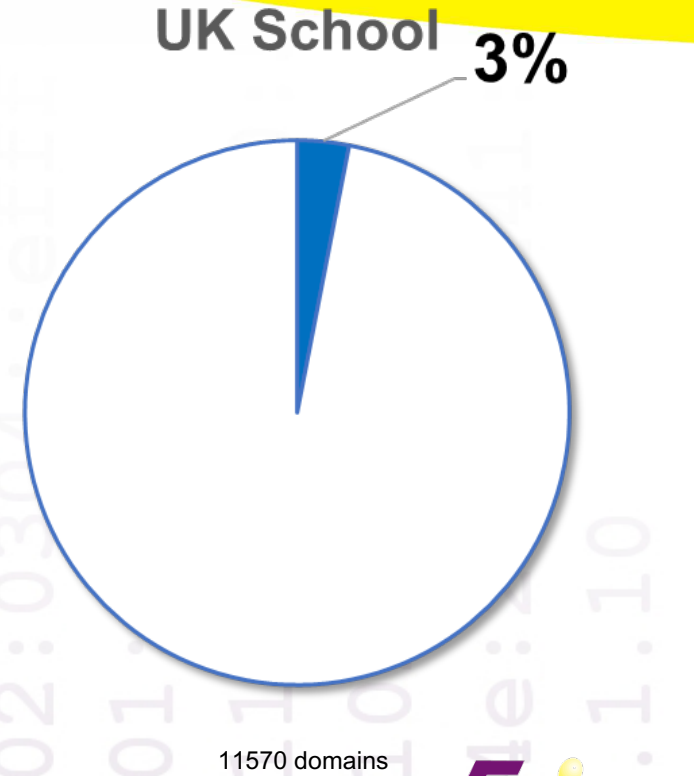
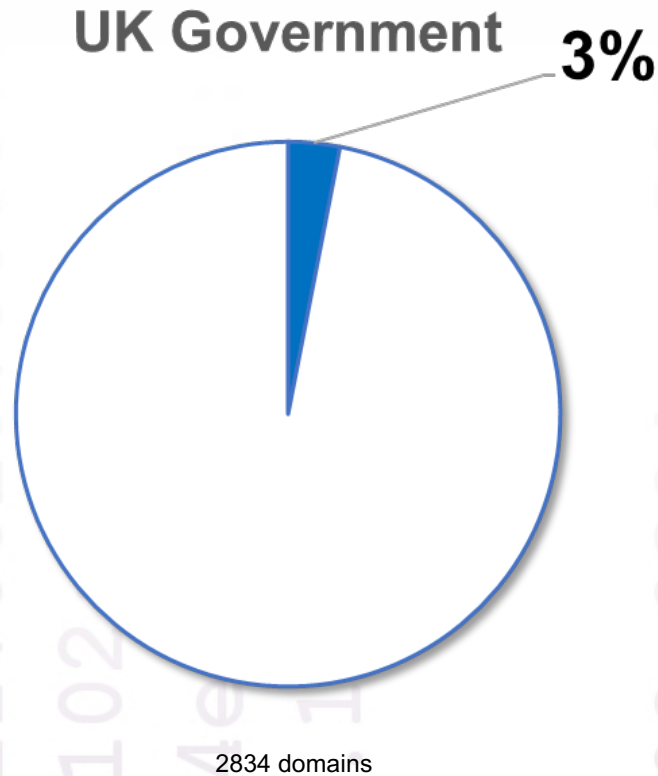
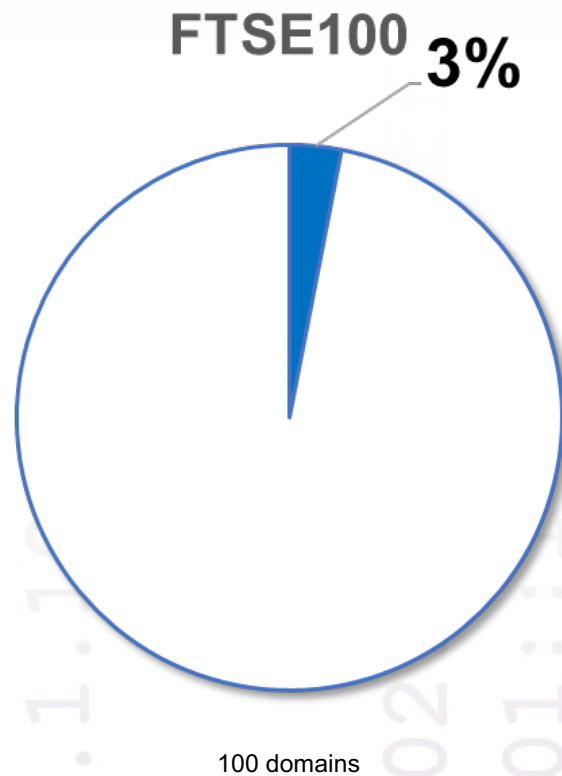
Potential for PBs of logging per million subscribers per year
Plus logging data stream bandwidth will be tens of Mbps

- Difficult (or impossible) to meet lawful intercept obligations

The Solution

Tell enterprises how the degrading
IPv4 internet is affecting business
processes

IPv6 Website Statistics



Summary

Perception

No benefit from IPv6

Reality

IPv4 internet is deteriorating

Message

IPv6 solves business problems

Questions and Discussion

Further Information

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<http://www.erion.co.uk>

IPv6 Training

<http://www.ipv6training.com>

IPv6 Consultancy

<http://www.ipv6consultancy.com>

IPv6 Blog

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IPv6 Training 



29th Jan – 2nd Feb 2018 London

[Implementing and Securing IPv6](#)

NEW

New for 2018

[IPv6 Forensics](#)

Closed on-site courses available worldwide

Many other IPv6 courses and IPv6 security courses available



Profile: David Holder

- CEO and Chief Consultant Erion Ltd
- Author of numerous reports and whitepapers
- Chairman of IPv6 Task Force Scotland
- Regular speaker on IPv6
- Extensive experience of IPv6 spanning over 19 years



Extra Slides

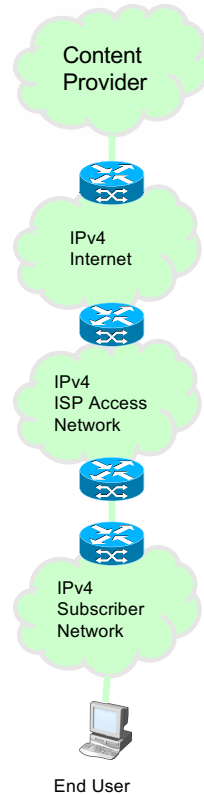
A Brief History of NAT & CGN

Pre NAT44

Post NAT44

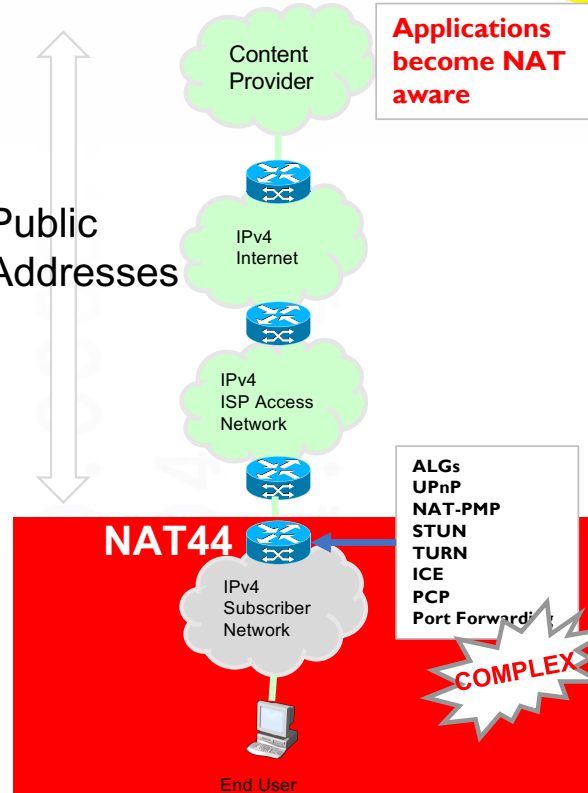
Post CGN

Public
Addresses



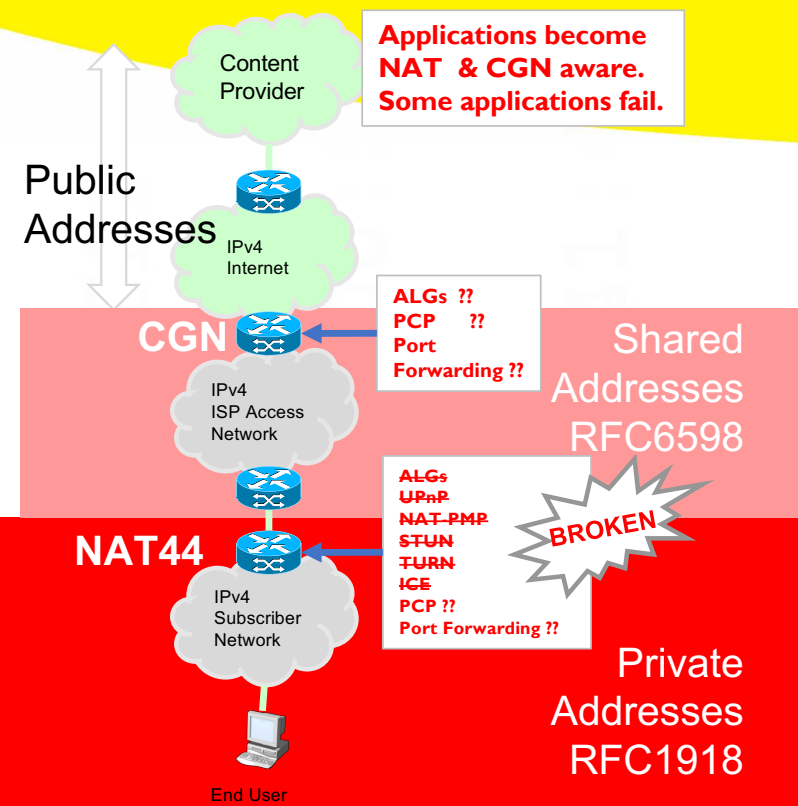
One IP = ONE Node

Public
Addresses



One IP = ONE End User Network

Public
Addresses



One IP = MANY End User
NETWORKS

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The Big Misconception

✗ IPv6 is IPv4 with longer addresses

Prefix (64 bits)	Interface ID (64 bits)
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- **It isn't**; many complex & subtle differences from IPv4
- **Even** addresses are very different:
 - NEW** New attributes: length, scope and lifetimes
 - NEW** Normal for IPv6 interfaces to have multiple addresses
 - NEW** IPv6 addresses can change over time
 - DIFFERENT** Multicast is very important in IPv6
 - NEW** Large number of methods for assigning interface identifiers
 - DIFFERENT** How addresses are used and managed is different
 - DIFFERENT** Global addresses are normal

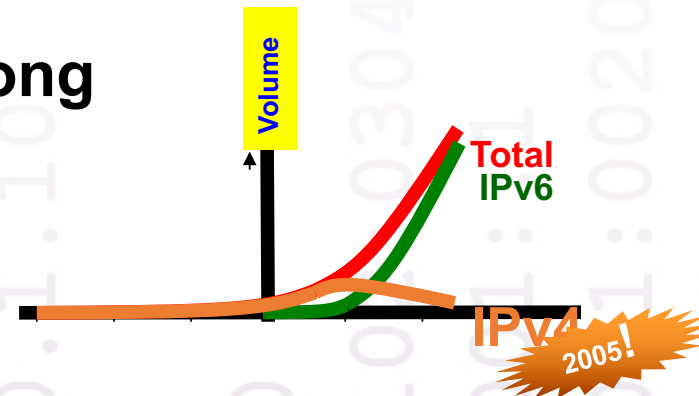
Where we go Wrong

Making IPv6 “better” than IPv4

- No one is interested
- Can make things worse
- Don't “improve” IPv6 in ways that make it worse than IPv4
- IPv4 is becoming worse than IPv6

Making predictions that are wrong

- It's hard predicting the future



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