A strategic approach to IPv6

Dave Wilson
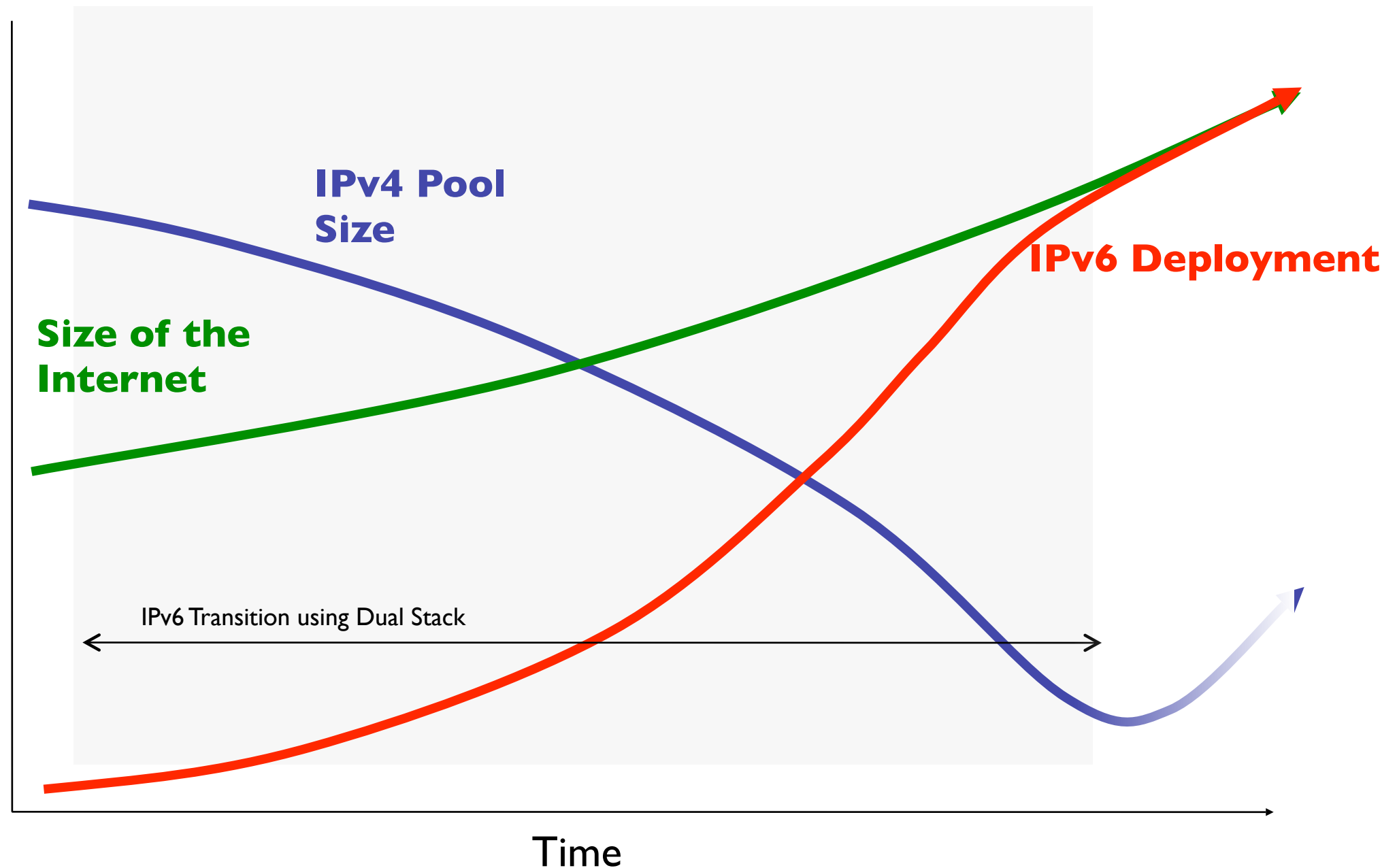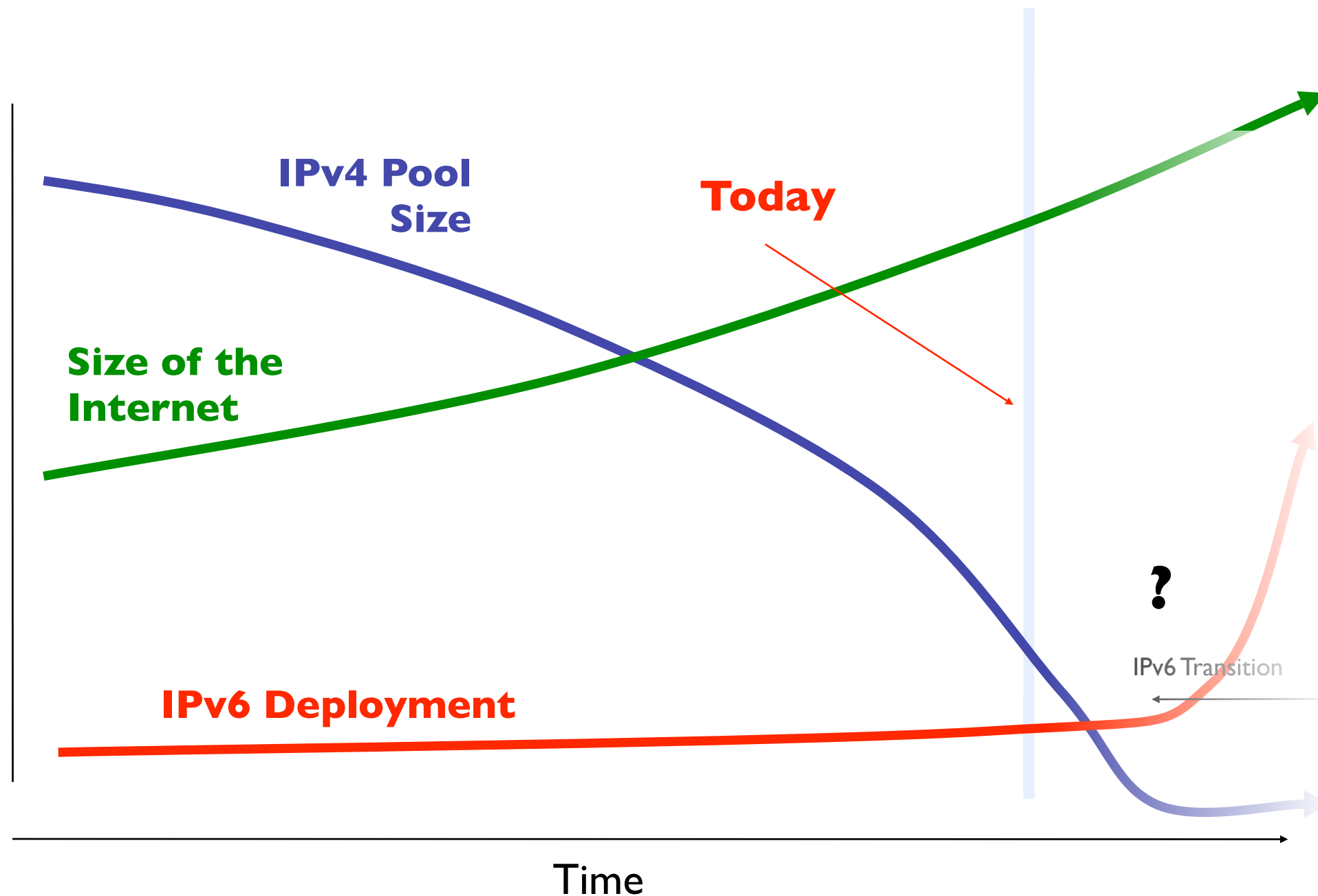
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- This is not a talk about HEAnet's ipv6 deployment
  - We finished.
  - We gave that talk in 2003. It was very good.

- This is about what comes after.

This is where we are now:

IPv4 Pool Size

Today

Size of the Internet

IPv6 Deployment

?

IPv6 Transition

Time

Geoff Huston, www.potaroo.net

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Three problems
Three separate approaches

1. IPv4 depletion

2. Truly IPv6-only service (with IPv4 interop)

3. Supporting our customers & partners

- We're an NREN

- 150,000-odd third level customers
- 4,000 first and second level schools
- Ethernet-based network built on dark fibre
- Centrally routed core layer 3 network

- PRODUCTION INTERNET SERVICE
  (we don't get to escape this any more than you do)

1

What do we do about IPv4?

Remaining IPv4 address space, 2000 - 2011
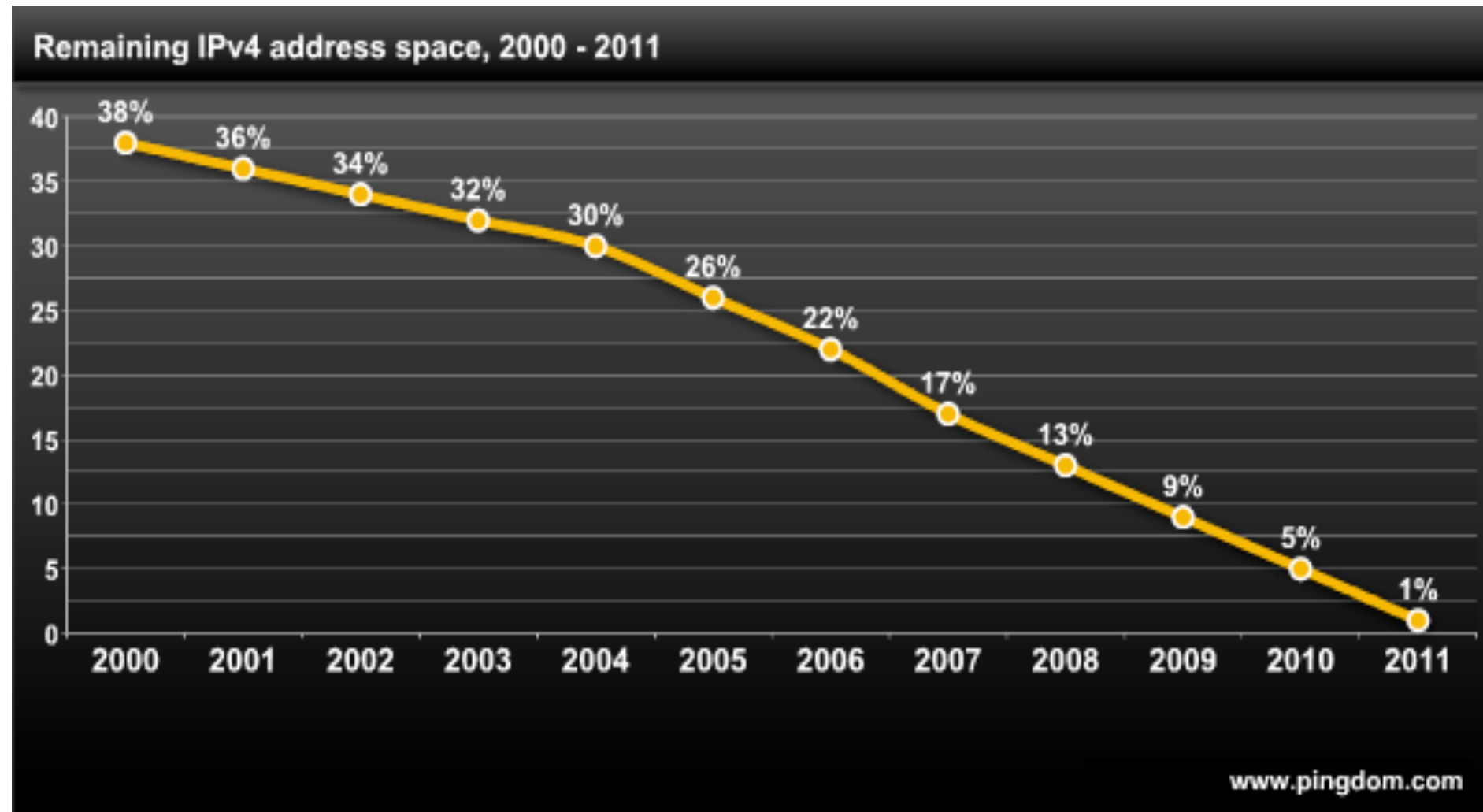
- Projections are converging on ~2011
- Immediacy of the problem depends on rate of usage
- This can escalate into a crisis

- Sure we can find individual solutions for...
  - SSL web servers
  - Videoconferencing
  - Providing VPNs
  - Email for individual customers
    (so one doesn't cause another to be blacklisted)

- Can we really do all this at the same time?

- Our objective is a smooth, stable transition

Plan for this strand is...

- List everything we do

- Work out its needs for coming five years

	A	B	C Responsible team	D Responsible person	E Future address requirements known	F Workarounds required	G Workarounds implemented
1							
2	IP Transit						
3		Service Resilience	NetOps/MNS	GL + ?			
4		Commodity IP transit	NetOps/MNS	OB + GL	88 x /30 (calc available on request)		
5		Colocation IP transit	NetOps/MNS	GM + ?			
6	Colocation	High performance storage		JH			
7		KVM access		JH			
8		PDU control		KD			
9	Website hosting			JB			
10		Website failover protection		JB			
11	Website hot standby			OB			
12	Software Mirroring			RG			
13	LIR IPv4 function			BB			
14	Traffic graphs (throughput, latency)		NetOps	COC			
15	Sixxs Tunnels			OMG			
16	LISTSERV			JB			
17	.ie DNS registration			RG			
18	DNS hosting			RG			
19	Usenet news			JB			
20	NTP		NetOps/MNS	BN + RG			
21	DNS Resolving			RG			
22	Antispam RBL		NetOps	BN			
23	Security scanning			AC			
24	Secure certificate service			AC			
25	IPv4 Multicast		NetOps	DL			

- Pick a workaround if we can't meet those needs

- Then make all the workarounds mutually achieveable

- Obviously these plans will be subject to change
  - Business opportunities, pressures, changes
  - Winds of time and fate
  - "Oh, I forgot about that"

- Gets us a first look at how we're doing compared to the availability of space

- Gets us thinking about what might have to go, or what might have to change

I

What do we do about IPv4?

2

What do we need to do with IPv6?

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Remember the IPV6 hour at RIPE56 in Berlin?
How did that go for you?

- We have reached a technical milestone
  - Our services are capable of running on IPv6

- This is not endgame. Endgame is a working service.

- We can define this service:
  - A working IPv6 internet service, end-to-end, with clients, routing and services, which interoperates with the IPv4 internet

- Then we can start to unpick it

HEAnet
IRELAND'S NATIONAL EDUCATION & RESEARCH NETWORK

- We have a lot of these pieces in place

- Some of us even managed to reach Google during IPv6 hour in Berlin

- So first step to finding the missing pieces - make a lab
  - Back to the old days - an IPv6 lab back in the office
  - New goal: working access with no IPv4
  - Identify the bits you need, try them out
  - Find what breaks and fix them

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  It is the definition of our end game. Working service.

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- Unless we plan for this, we will never reach
  a network independent of IPv4.

- Ok, so this one does have some more dependencies
  - not as many as you might think, though

- To get to the prototype, we need to find systems that will make this work end to end.
  - Working OS, working NAT/PT, stuff like that

- To get to production, we need to refine those systems
  - Role for "customer demand" here
  - This is bugfixes, most of the bits already exist

Strand 2

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- Step 5: meet the targets and go production

2

What do we need to do with IPv6?

3

What do we need to do about the rest of the world?

- This is where all those dependencies we stripped out of earlier strands start to clutter

- But it also gets the benefit of the work being done in the other two strands
  - It's already started. Hopefully some of you are already making spreadsheets with your IPv4 services.
  - Start to think in terms of compromises on v4 service
  - Start to show measurable progress on a plan toward a real IPv6 only service

- We've been focusing heavily on straw men
    - "I'll deploy IPv6 when www.google.com has a AAAA record"
    - "Well, our tender doesn't strictly require IPv6, but it's strongly encouraged that you at least have a roadmap"
    - "We support IPv6 (please read small print)"
    - "We'll support IPv6 when market demand..."
    - "If only there was [material of dubious academic value] for free on IPv6, then it would take off"

- The thing that's missing here is any kind of strategy - by which I mean, some plan to reach a goal

My least favourite question

My least favourite question

What's the business case?

My least favourite question

How do I make money from this?

My least favourite question

- Why you do something
- What are the options
- What are the benefits and disbenefits
- What are the timescales and costs
- What are the risks

- We're pretty good at cooperating technically
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- We're pretty good at cooperating technically
  - anyone want a tunnel? BGP peering? 6to4 relay? WHOIS DB entries? AAAA glue records?

- We're pretty bad at cooperating strategically
  - Juvenile example:
    "If we put X popular website on IPv6, you deliver Y home DSL users who can use it, and we'll both put pressure on our mutual firewall vendors to support the service"

- There are at least 14 problems with that example

- But maybe it's not so juvenile

- To make a BUSINESS CASE, we don't always need to show how to turn a profit immediately

- We do need to make a plan, with our partners, with some fairly meaningful milestones we can hit.

- The IPv6 task forces are probably a good place for this - but not in their current makeup

- We - the people in this room - need to think in terms of high level targets that we can't achieve on our own

- We need to work out the costs and benefits of meeting those targets, and present them upward

- Then get them talking and agreeing to commit resources

- We're working out the compromises in advance if we have no more IPv4 addrs

- We're working out what lies between us and an IPv6 service our customers can use

- Given these, we're working out how to help our customers and suppliers justify the change

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Business case

Thank you!

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