Beyond IPv4?

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and
The End of the World as We Know It
PredictionData

Total address demand

Advertised addresses

Unadvertised addresses

Data  Prediction

Address Count (x10^6)


Date

Tomorrow
That's 24\textsuperscript{th} January 2011

http://ipv4.potaroo.net
We had a plan ...

IPv4 Pool Size

Size of the Internet

IPv6 Transition using Dual Stack

IPv4 Pool Size

IPv6 Deployment

Time
what's the revised plan?

IPv6 Deployment

IPv4 Pool Size

Size of the Internet

IPv6 Deployment

Time

Today

IPv6 Transition

?
Now what?

Some possible scenarios:

- Rapid IPv6 deployment
- Persist in IPv4 networks using more NATs
- Address markets emerging for IPv4
- Routing fragmentation
- IPv6 transition
Its Just Business:

- This entire network is customer funded
- And customers have absolutely no clue what this IPv6 stuff is about
- So they are not paying!
New Markets for IPv6?

The Universe of Tiny Things?

The world of billions of chattering devices unleashing new rivers of gold into the IP industry?

Or is this just the economy? There is no new money and these billions of chattering devices will generate much the same revenue as we have today

So we have to cram all these billions of new devices trillions of new packets into the same money that we have today.

technology leverage will make tomorrow’s networks 1,000 times CHEAPER to deliver an IP packet than today’s network?

Or have we reached some limit to the economic viability of communications that imply that ever smaller valued transactions can’t be sustained over ever larger networks?

Do RFID and Bluetooth provide a different model of communication that is viable in the universe of things, where the identity is global but the communication is strictly limited in scope and

And if you ever are curious enough to enlarge this slide to see if there is text all the way down the page you will have got yourself to this point, where it becomes obvious that I’ve got nothing more to say and I want to fill up the bottom of the slide with tiny text.
Business Realism

So far IPv6 is a dismal business failure on the supply side

IPv6 adoption represents the marginal benefit of a pretty minor technology change with all the costs of a major forklift upgrade
It's just not looking very good is it?
Scenario A: It's simply a Matter of Faith

The "lets deploy IPv6 now!" option:

The global internet adopts IPv6 universally, before January 2011 and completely quits all use of IPv4 before well before address pool exhaustion.
Faith and Reality

BIG and FAST don't go together!
Faith and Religion

divine intervention required?

I command you: Deploy IPVo NOW!
Scenario B: IPv4 and NATs

The "lets just use more NATs" option

can we continue to deploy more NATs to keep the Internet on IPv4 indefinitely?
NATs on steroids

- Incremental piecemeal deployment is just too seductive to ignore!

  Shift ISP infrastructure to private address realms

  Multi-level NAT deployments both at the customer edge and within the ISP network

  Fun new products to play with: carrier scale NATs?

  New forms of product differentiation to replace the QoS debacle: premium higher margin products without NAT?
NAT Futures

Are NATs just more of the same? Is this the "safe" option?

How far can NATs scale?

How complex can we get with this network?

Are we willing to find out?
Scenario C: Transition to IPv6

- IPv6 is not backward compatible with IPv4 on the wire

- So its "dual stack" or nothing

Either dual stack in the host, or dual stack via protocol translating proxies
Double or Quits?

- Dual Stack transition is an "and" proposition
  
  It's a case of IPv4 and IPv6
  Double the fun and double the cost?

- But for how long?
  
  So we need to stretch IPv4 out to encompass tomorrow's
  Internet, and the day after, and ...

  Using ... NATS?
Making IPv4 Last Longer

- Not every address is "in use"
  End host utilization levels of addresses are estimated to be around 5% — 20% of the address pool

- So could we flush more addresses back into circulation?
  Yes, but you really won't like it!
So what can we do?
What could be useful right now is ...

- Clear and coherent information
- Appreciation of the broader context
- Some pragmatic workable approaches

And an admission that failure is an option; some transitions are not 'natural' for a deregulated industry.
What should we preserve?

The Internet:

- Functionality of applications
- Viability of routing
- Capability to sustain continued growth
- Integrity of the network infrastructure

If we can!
The Fine Print

It is likely that there will be some disruptive aspects of this situation that will impact the entire industry.

the original transition plan is a business failure
resolution of this failure is now going to be tough

This will probably not be seamless nor costless

And will probably involve various forms of regulatory intervention, no matter what direction we might take from here.
Coping with Crises
Coping with Crises

Time

Denial
Confusion
Panic
Anger
Blame Shifting
Bargaining
Acceptance
Revisionism
Recovery

You are here!
Coping with Crises

- Denial
- Confusion
- Panic
- Anger
- Blame Shifting
- Bargaining
- Acceptance
- Revisionism
- Recovery

And here!
Coping with Crises

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And here!
Thank You