

IPv6 – Now or Never?

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We've all heard that:

- IPv4 is running out of addresses
- The technology folk have spent over a decade developing a successor technology in IP version 6
- IPv6 is now “ready”
 - IPv6 is supported in most Windows and Unix platforms
 - IPv6 is supported in most router implementations
 - IPv6 supports better quality of service, better security, better auto-configuration
 - IPv6 addresses are available
 - IPv6 is deployed as an operational global network



And yet...

- The industry response to IPv6 so far has been one of general apathy
 - Research networks, and some carrier and industry ISPs have commenced IPv6 deployment
 - Most sectors of the industry are still taking little notice of IPv6

At the start of 2006 IPv6 has 3% of the network providers, 0.4% of the address announcements, and around 0.0001% of the traffic volumes as compared to IPv4

Back to the question...

- Is IPv6 a **now** activity?
 - Should you be looking at gearing up to support IPv6-based services on your network in 2006
- Is IPv6 a **later** activity?
 - Is this an activity that is below the threshold at present, but one that cannot be completely ignored
- Or **never**?
 - It just won't happen within the current planning horizon for the industry

IPv6 Now?

- Its very challenging to make a case that deployment of IPv6 network services should be part of the industry's 2006 priorities
- Indeed, its easier to make the case that it should NOT!
 - This is not a costless exercise – there are additional capital costs, operational costs and service support costs
 - But it is a revenueless exercise – customers will not pay a premium for IPv6 services
 - Internet access services already operate at low revenue margins – IPv6 deployment will further erode service margins
 - There is no external forcing function - we do not appear to be about to run out of IPv4 addresses in 2006



IPv6 Never?

- Its equally challenging to make the case that we can continue to fuel the Internet on IPv4 for the indefinite future and that there is no need for IPv6
 - We will exhaust the IPv4 address pool in the coming years - it's definitely a case of 'when' rather than a case of 'if'
 - NATs will not scale forever – they are a source of operational fragility, and cannot provide limitless room for network expansion
 - IPv4 networks are accumulating cost at the same rate that they accumulate network complexity
 - There is the opportunity for price competition here - if IPv6 can provide similar functionality to IPv4, but at a unit cost of less than 10% of current IPv4 service delivery costs, then IPv4 will rapidly decline in relative market share

IPv6 Later?

- Its not “now”, and probably not “never”
- So “later” looks like the most likely scenario for IPv6
- **When** is later?

What is the trigger for change?

- At what point, and under what conditions, does a common position of “later” become a common position of “now”?
- So far we have no clear answer from industry on this question

Pressure for Change?

- The pain of deployment complexity is not shared uniformly:
 - ISPs are not application authors -- thank god!
 - ISPs are not device manufacturers -- also a good thing!
- There appear to be no clear “early adopter” rewards for IPv6
 - Existing players have strong motivations to defer expenditure decisions -- because their share price is plummeting
 - New players have no compelling motivations to leap too far ahead of their seed capital
 - All players see no incremental benefit in early adoption
 - And many players short term interests lie in deferral of additional expenditure
 - The return on investment in the IPv6 business case is simply not evident in today’s ISP industry

The Case for IPv6

- IPv4 address scarcity is already driving network service provision.
 - Network designs are based on address scarcity
 - Application designs are based on address scarcity
- We can probably support cheaper networks and more capable applications in networks that support clear and coherent end-to-end packet transit
- IPv6 is a conservative, well-tested technology
- IPv6 has already achieved network deployment, end host deployment, and fielded application support

But....

- But we are not sending the right signals that this is ‘cooked and ready’ - we are still playing with:
 - The Address Plan
 - Aspects of Stateless auto-configuration
 - Unique Local Addresses (whatever they may be today!)
 - Flow Label
 - QoS
 - Security
 - Mobility
 - Multi-addressing
 - Multi-homing
 - Routing capabilities
 - Revisiting endpoint identity and network locator semantics

The Business Obstacles for IPv6

- Deployment by regulation or fiat has not worked in the past – repeatedly
 - GOSIP anyone?
- There are no network effects that drive differentials at the edge
 - its still email and still the web
- There is today a robust supply industry based on network complexity, address scarcity, and insecurity
 - And they are not going to go away quietly or quickly
- There is the prospect of further revenue erosion from simpler cheaper network models
 - Further share price erosion in an already gutted industry

More Business Obstacles for IPv6

- Having already reinvested large sums in packet-based data communications over the past decade there is little investor interest in still further infrastructure investment at present
 - The only money around these days is to fund MPLS fantasies!
- There is no current incremental revenue model to match incremental costs
 - Oops!
- IPv6 promotion may have been too much too early – these days IPv6 may be seen as tired not wired
 - Too much powerpoint animation!
- Short term individual interests do not match long term common imperatives
 - The market response is never an intelligent one
- “Everything over HTTP” has proved far more viable than it should have

Maybe it's just deregulation

- Near term business pressures simply support the case for further deferral of IPv6 infrastructure investment
- There is insufficient linkage between the added cost, complexity and fragility of NAT-based applications at the edge and the costs of infrastructure deployment of IPv6 in the middle
 - Deregulated markets are not perfect information markets – pain becomes isolated from potential remedy

Learning from IPv4

- IPv4 leveraged:
 - Significantly cheaper switching technologies
 - Massive shift to efficient network use
 - Significantly lower operational costs
 - Structural cost transferral
- IPv4 represented a compelling and revolutionary business case of delivery of stunningly cheaper and better services to end consumers

IPv6?

- IPv6 represents an opportunity to embrace the communications requirements of a device-dense world
 - Way much more than PCs
 - Device population that is at least some 2 – 3 orders of magnitude larger than today's Internet. We are talking of a networked environment servicing hundreds of billions of chattering devices

From iPod to iPot



If we are seriously looking towards a world of billions of chattering devices then we need to look at an evolved IPv6 communications service industry that understands the full implications of the words “commodity” and “utility”



The IPv6 Condition

- There are no compelling technical feature levers in IPv6 that are driving new investments in existing IP service platforms
- There are no compelling revenue levers in IPv6 that are driving drive new investments in existing IP service platforms
- The silicon industry has made the shift from value to volume years ago
- What will drive IPv6 deployment in a device rich world is also a radical and **revolutionary** value to volume shift in the IP packet carriage industry

IPv6 Leverage

- Volume over Value

- Supporting a network infrastructure that can push down unit cost of packet delivery by orders of magnitude
- Commodity volume economics can push the industry into providing
 - even “thicker” transmission systems
 - simpler, faster switching systems
 - utility-based provider industry
 - Lightweight application transaction models

Another turn of the screw?

- IPv4 forced a reluctant communications industry to transition to a new industry profile with:
 - More players
 - Less control
 - More services
 - Lower margins
 - Greater uncertainty
- So it looks like the IPv6 future may well be **one** where IPv6 is forced into direct customer competition with existing IPv4+NAT networks
 - And the primary leverage here is one of cheaper and bigger, and not necessarily *better*

IPv6 Later

Maybe IPv6 is the catalyst towards shifting a reluctant Internet infrastructure industry one further giant leap into a future of commodity utility plumbing

But this is likely to be a process that will take a further 5 to 10 years to unfold – in which case “later” might look like a reasonable business decision for IPv6 in 2006



Thank you