IPv6 Address Planning Considerations for the Enterprise

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The Problem

- I know I need to get started, but how?
- What kind of addressing do I need, and how much?
- That's so much space, where do I begin?
- 128 bit addressing is intimidating to my team!

- Assumptions in this presentation:
  Ability to secure adequately sized address block
  Your mileage will vary

Begin With a Structured Approach
- Design Goals and Requirements

- The obvious –
  Reduce possibility of readdressing
  Maximize potential for route aggregation, reduce fragmentation
  Eliminate overlapping private ranges with M&A

- New considerations or opportunities –
  Reduce or eliminate most custom addressing design work
  Maximize potential for design replication and automation
  Simplify ease of understanding and readability
  Uncouple IPv6 from IPv4 addressing

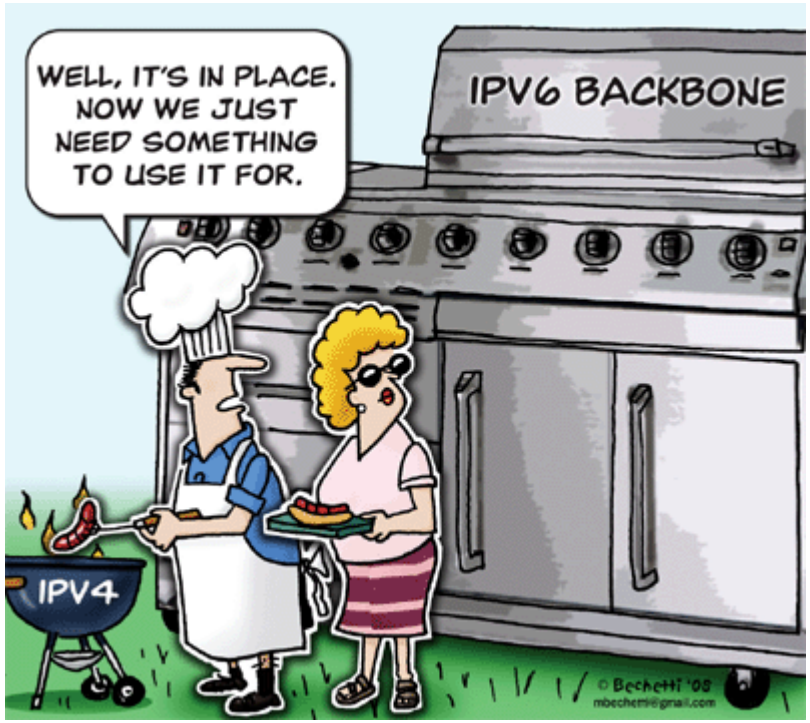
- Challenge what worked and what didn't in the past!

Begin With a Structured Approach
- Design Goals and Requirements

- Often hear, “What’s the business case for IPv6?”

Usual Response -
Outside market opportunity
Customers can’t reach me

What about new opportunities?
Enough internal benefit alone?



Begin With a Structured Approach
- Design Goals and Requirements

- One IPv4 challenge – significant custom design work
- Regions, sites, applications, subnets, all custom sized
- If you guessed too high
  Wasted space, a luxury you may not have
  May be difficult to reclaim later on
- If you guess too low
  Subjected to painful and expensive readdressing exercise
  Fragmentation in plan, difficult to follow
  Route aggregation issues

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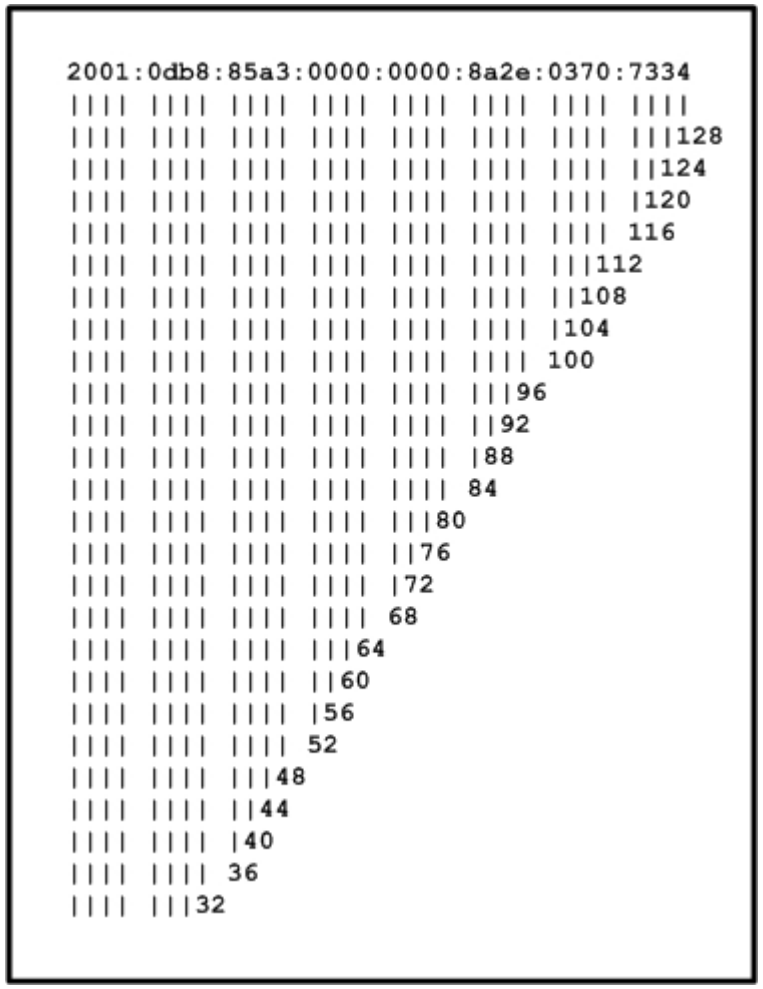
IPv6 Major Bit Boundaries

- How can this be simplified?

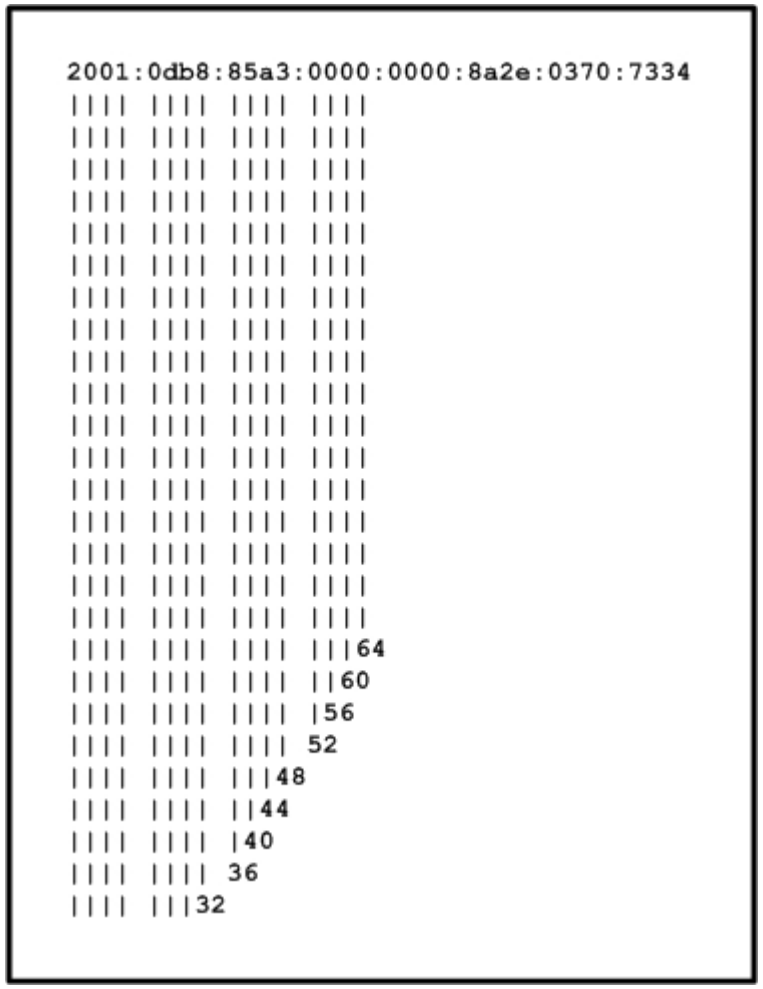


IPv6 Major Bit Boundaries

- How can this be simplified?

1) Use standard /64 prefixes

Debate this on next slide



IPv6 Major Bit Boundaries

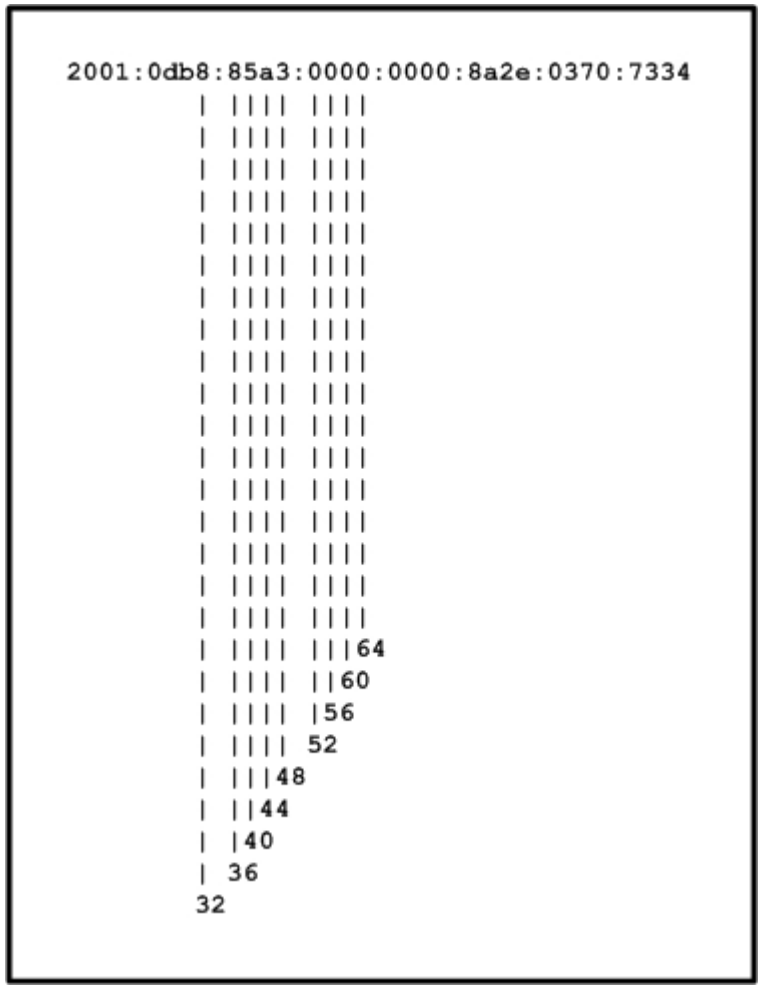
- How can this be simplified?

1) Use standard /64 prefixes

Debate this on next slide

2) Disregard most significant bits

Identical for every prefix



IPv6 Major Bit Boundaries

- How can this be simplified?

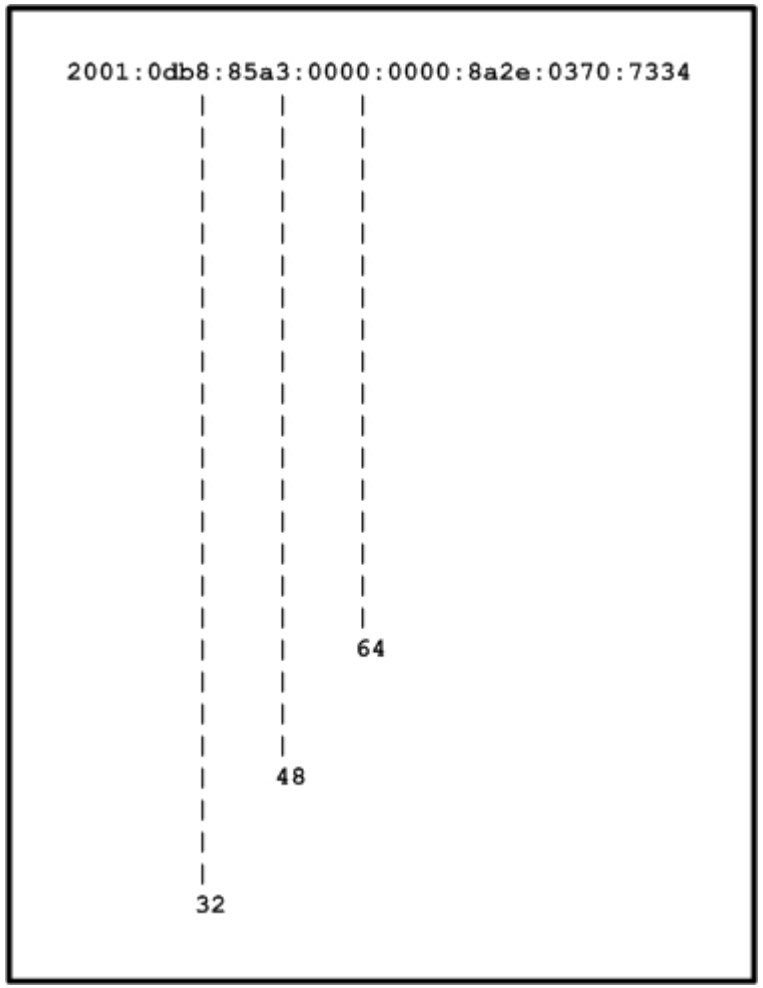
1) Use standard /64 prefixes

   Debate this on next slide

2) Disregard most significant bits

   Identical for every prefix

3) Standardize regional blocks, sites, prefixes on major bits!

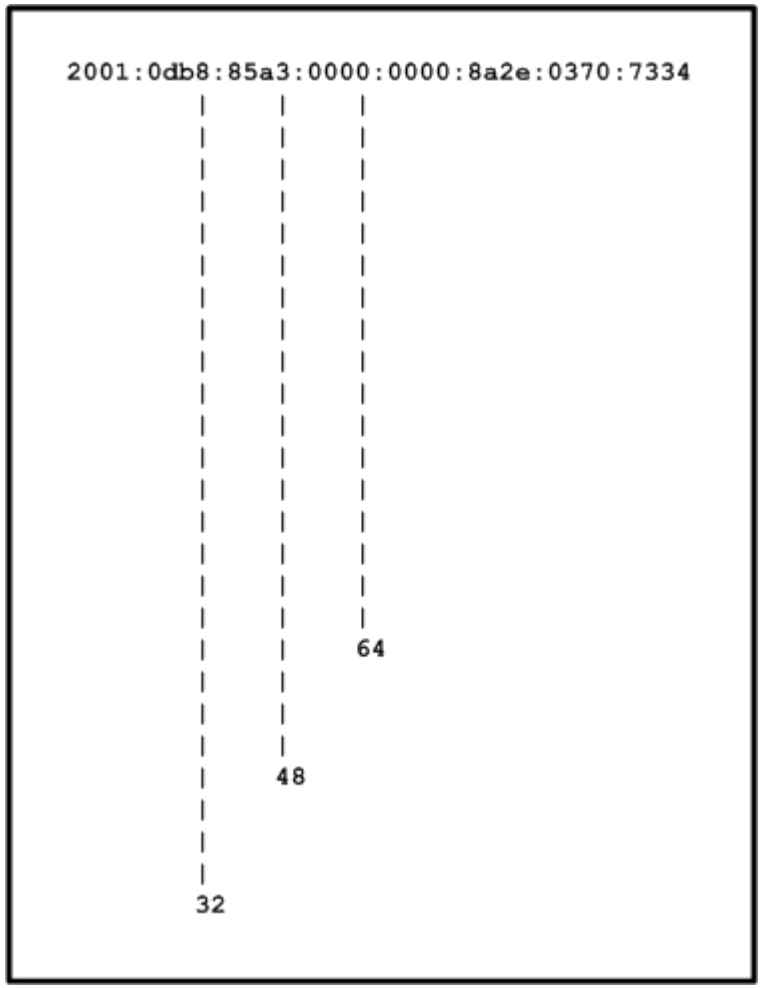


To Cheat or Not on /64 Prefixes

- It appears to be very wasteful
  - Can we use /126s for PTP Links?
  - What do you gain?
  - Can you still aggregate routes?
- Is space conservation still a primary design objective?
- It is the standard
  - May break some things like SLAAC
  - Cheating greatly complicates the math!

Judge for yourself

Your mileage may vary



What Kind of Addresses Do I Need?

- Easy to obtain a /48 from your Service Provider
  - May subject you to readdressing later on
- Consider Global Unicast Provider Independent (PI)
  - May help to preserve your design options
- Might hedge your bets with some of each
- What about private addressing?
  - Is it still necessary?
  - Recommend avoiding it

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Math Examples

Examples of various allocation and standardized site sizes

Standard Site Size	/48 Sites	/52 Sites	/56 Sites	/60 Sites
/48 Company Allocation	1 site w/ 65,536 x /64's	16 sites w/ 4,096 x /64's each	256 sites w/ 256 x /64's each	4,096 sites w/ 16 x /64's each
/40 Company Allocation	256 sites w/ 65,536 x /64's each	4,096 sites w/ 4,096 x /64's each	65,536 sites w/ 256 x /64's each	1,048,576 sites w/ 16 x /64's each
/32 Company Allocation	65,536 sites w/ 65,536 x /64's each	1,048,576 sites w/ 4,096 x /64's each	16,777,216 sites w/ 256 x /64's each	268,435,456 sites w/ 16 x /64's each

Lessons in Address Planning

- Do not underestimate:
  Time to secure address space
  Time to build consensus
  Organizational challenges, resources, and priorities
  Training required

- Consider the human factor, keep it simple!

Summary

- Challenge your preconceived ideas from IPv4
- Look for new opportunities
- Standardize wherever possible
- Keep the math simple for success!
- Get started

Go Oracle in the 34th America's Cup San Francisco!

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