IPv6 Critical Mass
and
Avoiding CGN

...from one cable guy's perspective

Wes George, Time Warner Cable

IETF 83 Paris IEPG meeting

What we know

About IPv4:

- The usage curve has reached stall (as in aircraft)

- We (mostly) have a viable solution for current customers

- Every SP has a different plan to manage exhaustion

- IPv6 is the real solution to this problem, everything else is temporary

What we know

About our customers:

- They expect our service to **just plain work**
  - They **do not care** about details like whether we do IPv6 or CGN
- They own/use things that are not IPv6-capable
- They don't like us telling them to replace equipment that's not "broken"
- We want more of them, and we want them to be happy

What we don't know

When are we really out of IPv4 addresses?

(aka When do we need CGN?)

Depends on:

- Current IPv4 resources
  - and other contention for them
    - opportunity cost by not selling them
    - Mergers and Acquisitions
    - new projects
- **Net** customer growth
  - depends on churn, footprint expansion, etc

What we don't know

When are we really out of IPv4 addresses?

(aka When do we need CGN?)

Depends on:

- (in)Ability to get additional allocations at least once more before ARIN exhaust
  - a function of everyone else's burn rate vs. ours
- Other RIR exhaust
  - will eventually redirect demand to ARIN and the transfer market
- IPv6 penetration (i.e. when we get to critical mass)
- The point at which it's ok to sell IPv6-only service

What we know

About CGNs:
- Problematic logging requirements for LEA/Abuse compliance
- Hard to enforce AUP without impacting multiple customers
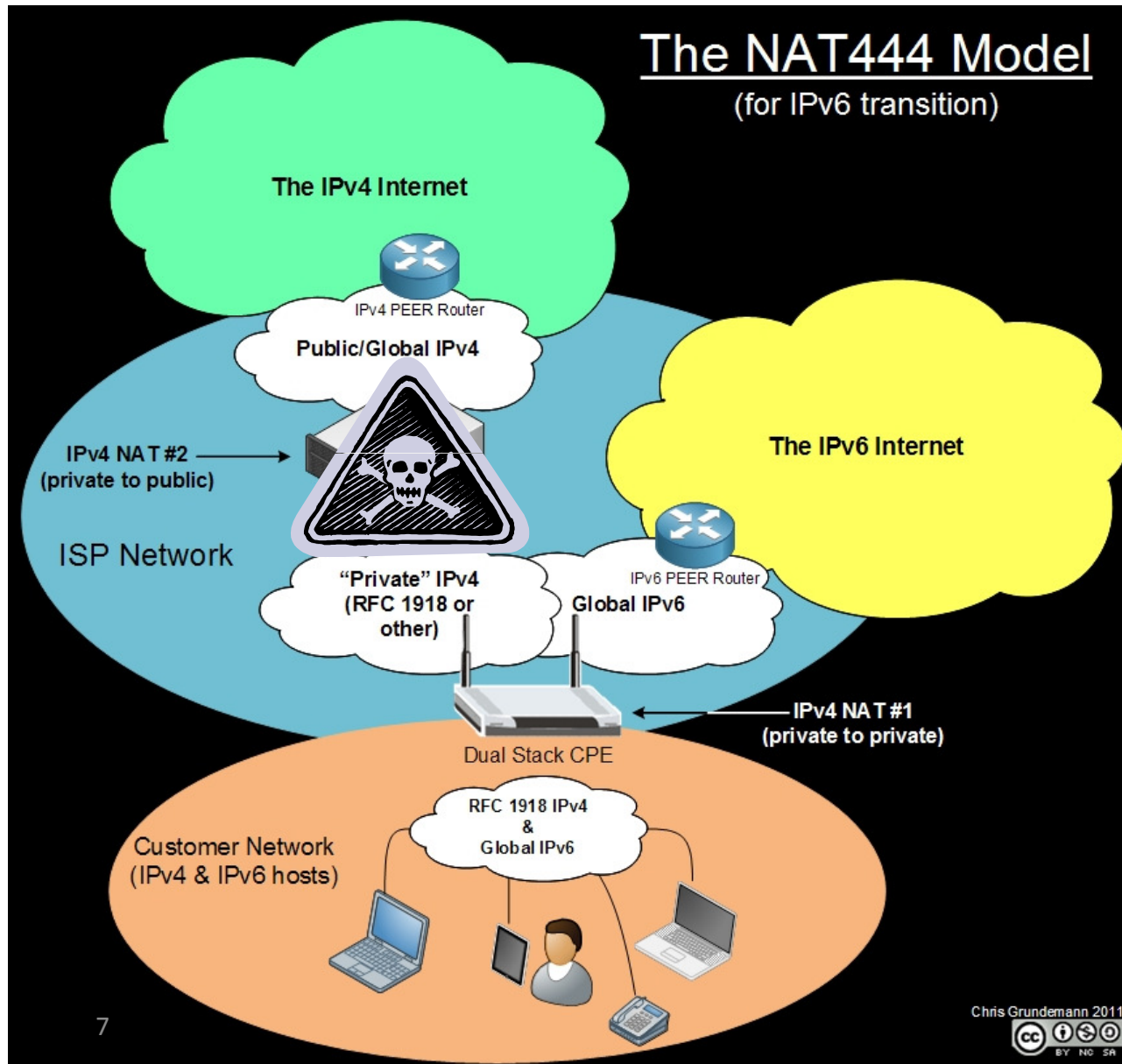
- Expensive
- Likely to break things
- IPv4 Life support

Image courtesy of Jason Fesler

NAT is Evil!

How sure are you that everything will work through multiple layers of NAT?

Do you really want to chance it?

a necessary
NAT is^evil!

Why will access providers use Carrier-grade NAT (CGN)?

- Because they fear losing customers to their competition
  - Which customers?
    - [Net] New customers? By tier? By market/region?
    - With IPv4-only devices
    - After the ISP's local IPv4 exhaustion date

People assume CGN is inevitable, so they plan *for* it, rather than planning *against* it
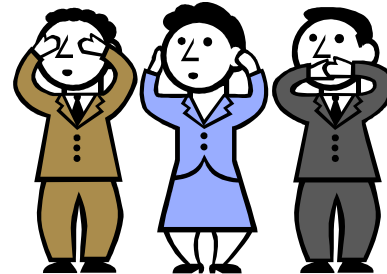
The Big Question

How can we avoid Carrier-Grade NAT?

How do we reduce IPv4-only devices so that IPv6 is a realistic alternative to heavy CGN use?

IPv6 Critical Mass
A: Reach IPv6 critical mass deployment before **the SP's** IPv4 exhaustion event
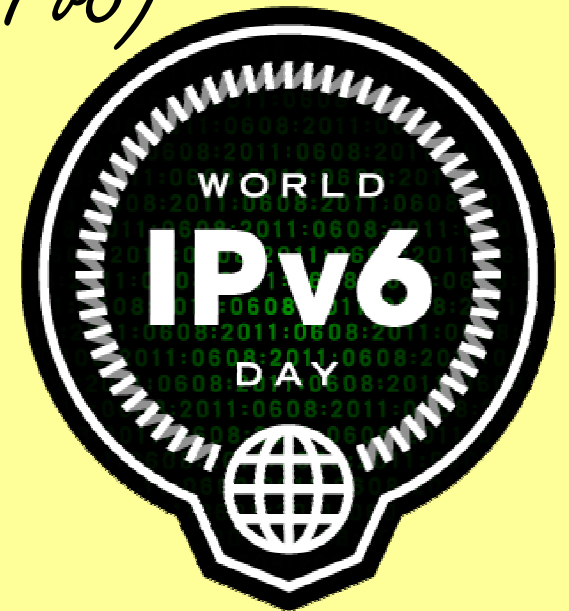
Implementing IPv6 - Content

Dear access providers –

We turned on IPv6 and nobody showed up.

(less than 1% of our traffic over IPv6)

Your turn...

Our Best, Content Providers
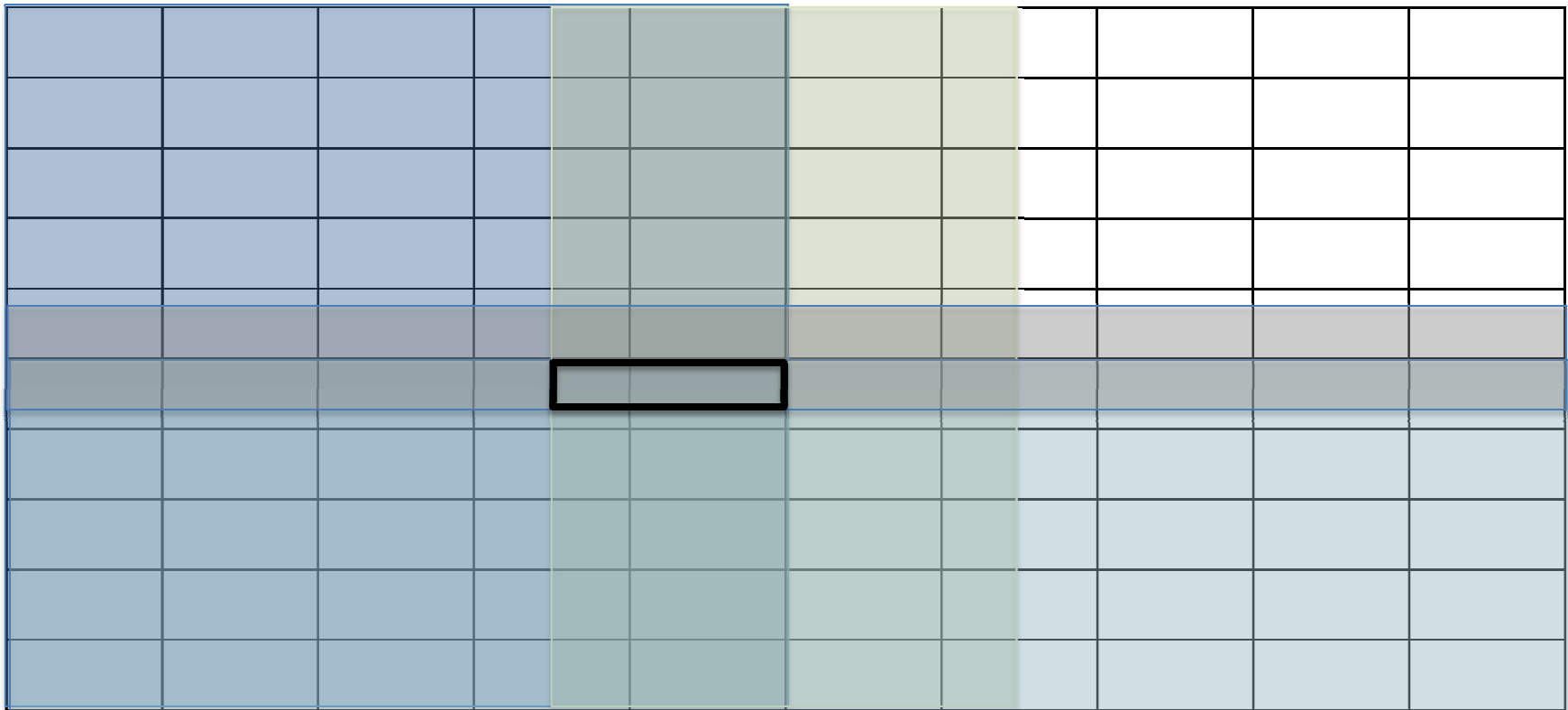
Implementing IPv6 - Access

- World IPv6 Launch

"Access networks … are enabling IPv6 … by 6 June 2012 … enough of their existing subscriber base so that 1% of the subscribers on their networks will be using IPv6 when they visit [IPv6-enabled] websites."
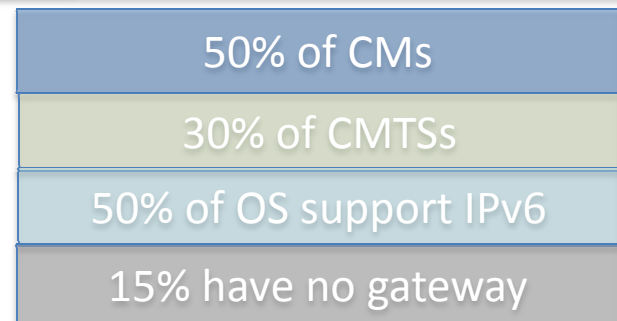
- Participants
  - Comcast, Time Warner Cable, AT&T so far
    - Your name here!
  - Enabled permanently – 1% will keep growing

Implementing IPv6 - Access

Each block represents 1% of users

50% of CMs
30% of CMTSs
50% of OS support IPv6
15% have no gateway

Implementing IPv6 – CPE Gateways

- Majority of broadband customers bring their own Gateway
  - Customers don't replace GWs unless they're broken
  - Very few currently support IPv6
    - Software support ends shortly after end of sale, so upgrades to add IPv6 to older gear are unlikely
- Working with major retailers to explain the importance of IPv6 support
- WVL Participants:
 - Cisco (Linksys)
  - D-Link
  - "This space for rent"

Gateways – How do we accelerate upgrades?

- Encourage vendors to offer IPv6 software for existing devices
- Embrace open-source community for 3rd-party software upgrades?
- Partnerships with major retailers for upgrade events

We're looking for suggestions for upgrade incentives...

5-year replacement cycle for IPv6-capable hardware

■ Encouraged Growth
■ Natural Growth
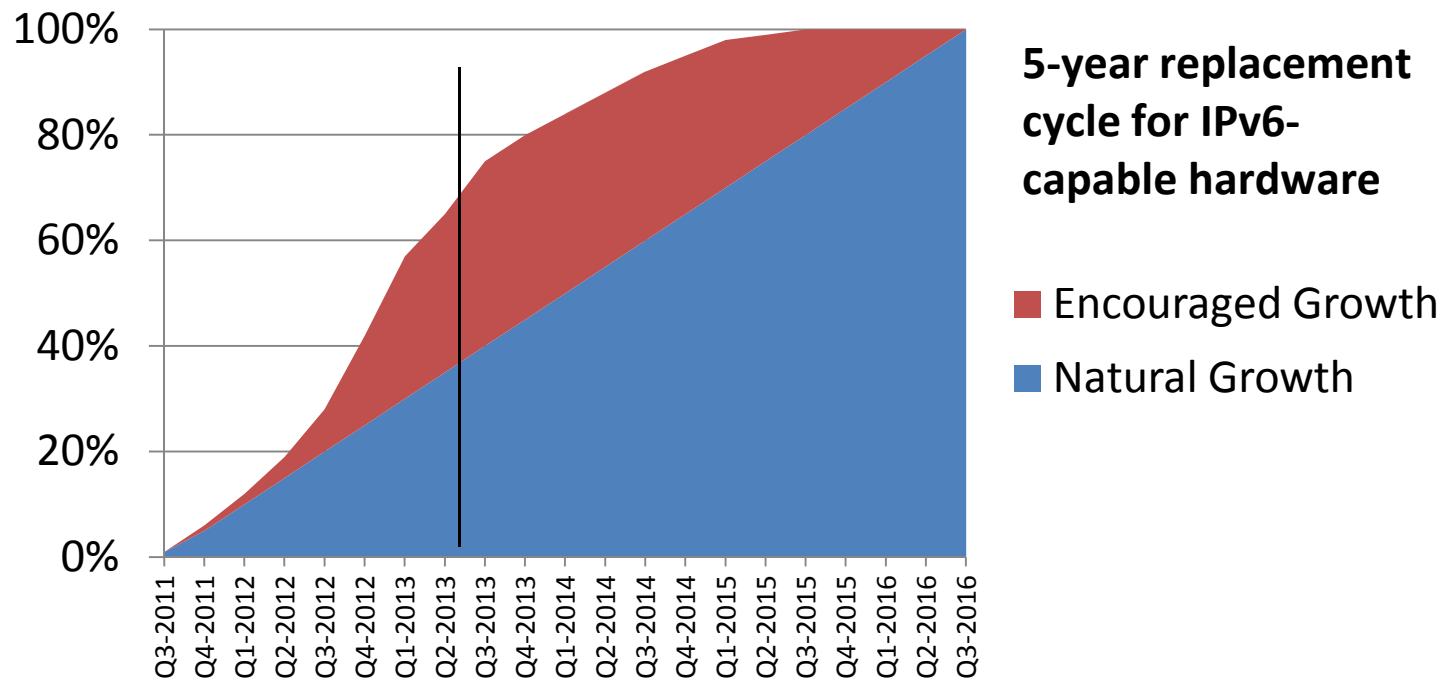
Consumer Electronics – How do we accelerate upgrades?

Device	US (120M) household penetration
XBox 360	21%
PlayStation 3	11%
Blu-ray player	42%
Smart TV	15%??
Wii	35%
Apple TV	6%

Other common devices:
- Wi-Fi webcams
- Video/audio streaming boxes
- A/V receivers
- Smart appliances/meters
- Sensors/Home Security
- DVR (especially multi-room)
- Handheld gaming
- Remote control/remote access

So now what?

- Work towards IPv6 critical mass
  - CPE routers
  - Consumer Electronics
  - Top 10 sites by traffic volume, then the next 10...
- Get comfortable with the idea of IPv6-only
  - Starts with internal stuff, expands outward
  - the guiding principle is "v4 is legacy, v6 is default, we only put v4 addresses on things that have to interoperate in a backward-compatible sort of way"

Goal: Majority IPv6 ASAP

- IPv6 support **everywhere**
- Maximize IPv6 usage
- Minimize IPv4 (CGN)
- Minimize customer pain

Circular diagram labels:
- IPv6 traffic increases
- Content available via IPv6
- Access supports IPv6
- CE uses IPv6
- Happy Customers
- "It just works"

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