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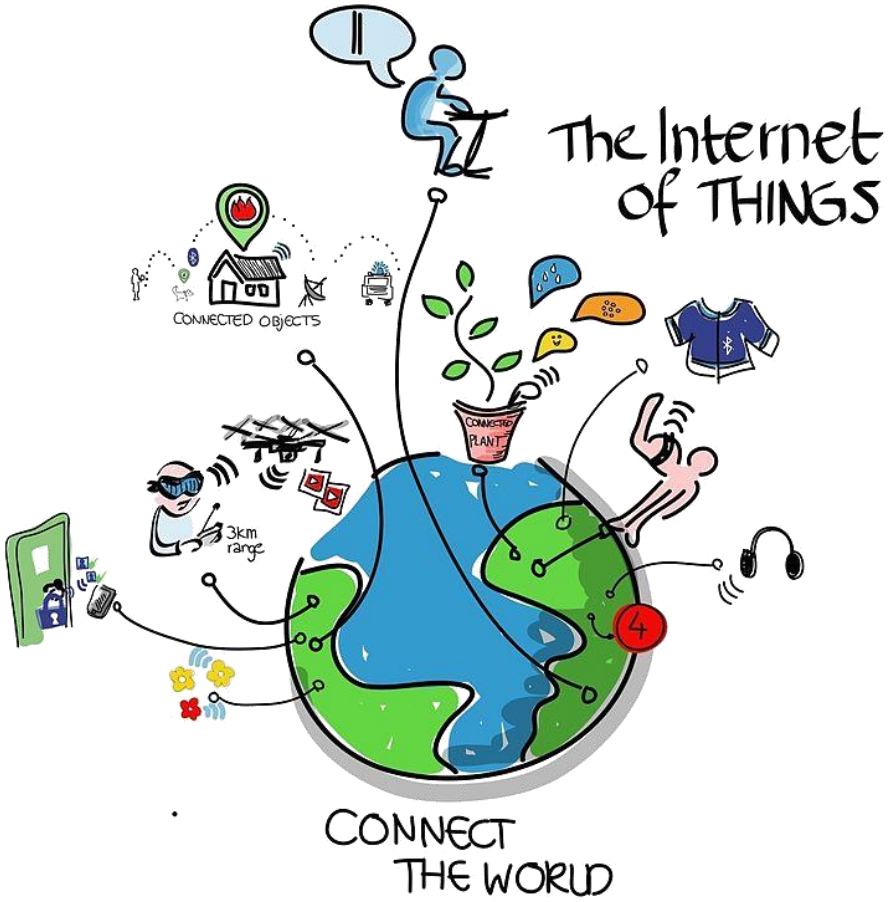
IPv6 Strategy Brief

CIO Forum
March 8, 2016

Agenda

- The IP Address Problem
- Introduce the Solution: IPv6
- Overview of IPv6 Strategy
- Next Steps

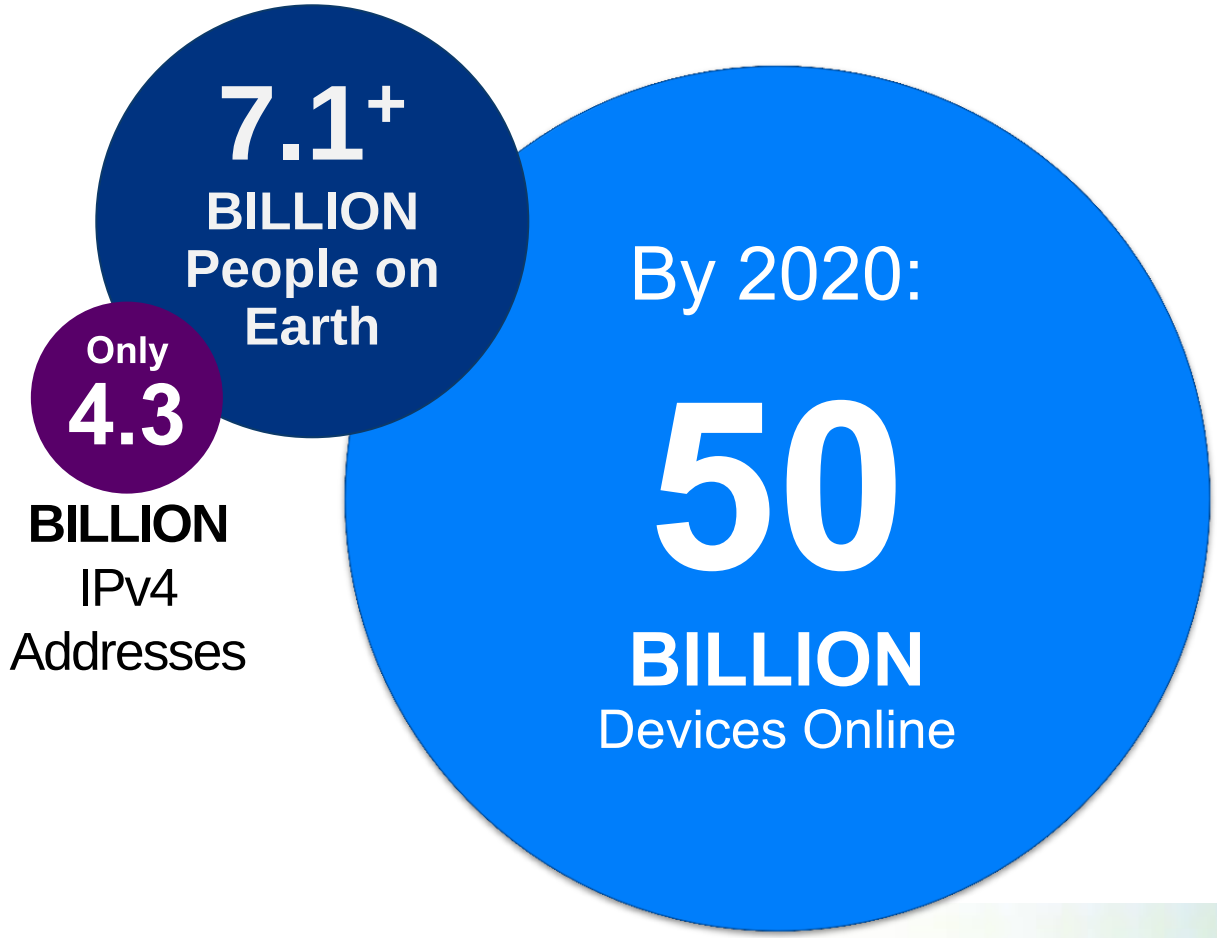
What Is An IP Address?



Every single thing on the Internet and the State Government Network – from mainframes to laptops; mobile phones to fitness trackers; automobiles to drones – has an Internet Protocol (IP) address.

- An IP address is what lets these devices communicate with each other as part of the global Internet.
- Without enough unique IP addresses, the Internet would be a tangled mess and technical innovation would grind to a halt.

The Old System (IPv4) is Running Out Of Room



Past the Tipping Point

- IP addresses are managed and allocated worldwide by five Regional Internet Registries, such as ARIN in North America.
- ARIN allocated the last IPv4 block on September 24, 2015.
- 3.6 BILLION people yet to be connected to the Internet.

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IPv6 To The Rescue!

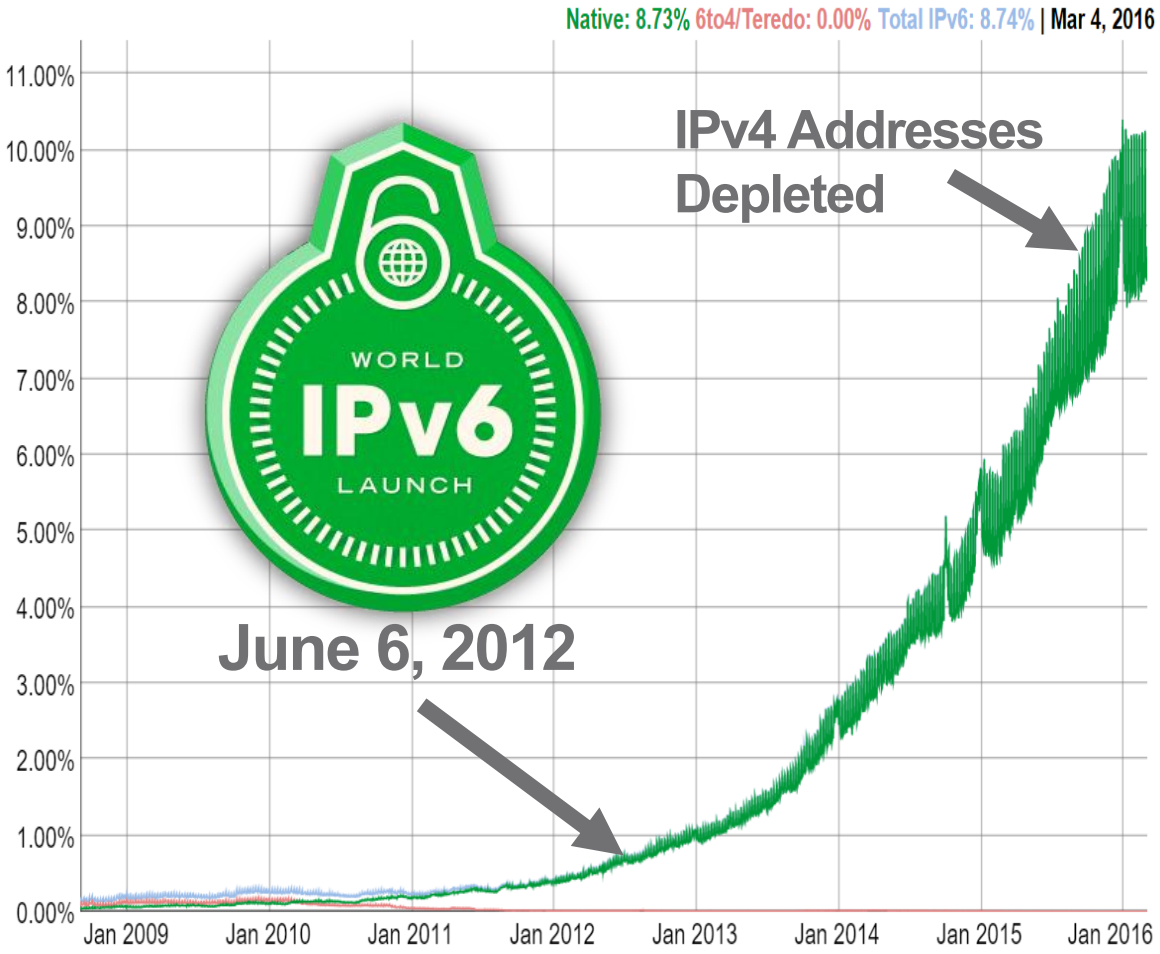
The Next Generation of the IP Standard

IPv4 = 4.3×10^9, 4.3 Billion Addresses

IPv6 = 3.4×10^{38}, 340 Undecillion Addresses

An entire IPv4 Internet for every star in the Universe!

IPv6 Adoption



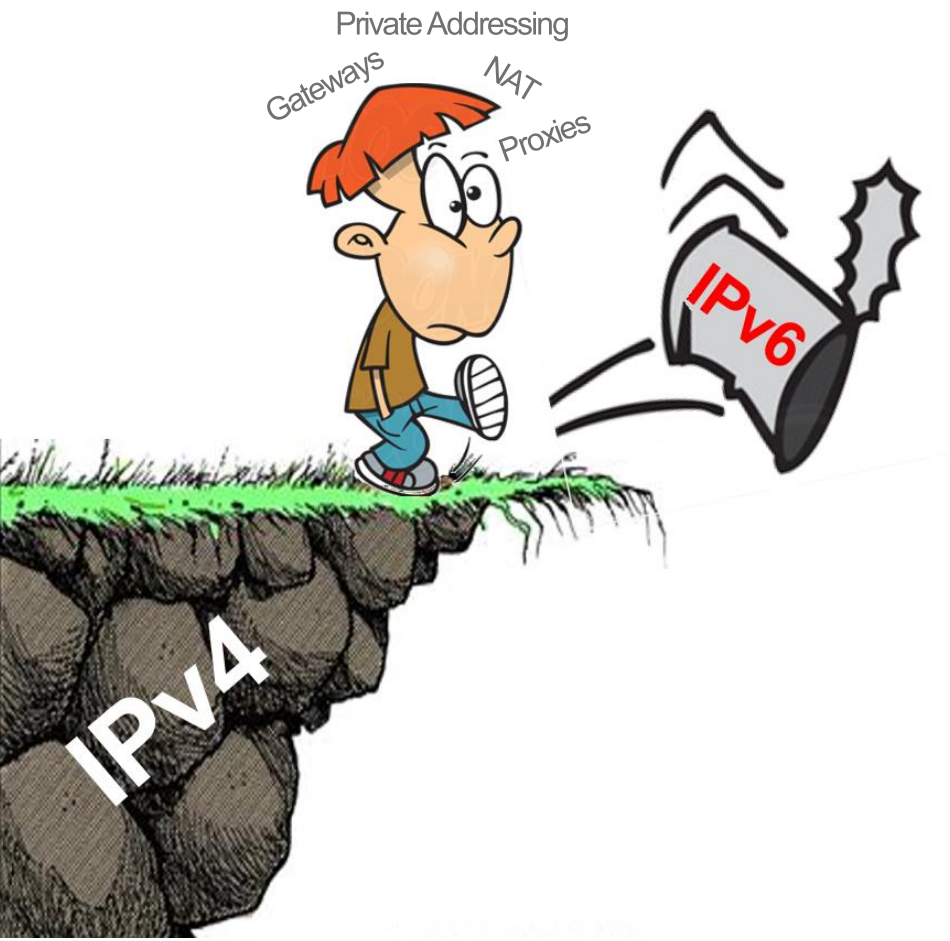
Rank	Ipv6%	Country
1	39.9%	Belgium
2	25.7%	Switzerland
3	23.7%	United States of America
4	23.0%	Portugal
5	21.7%	Germany
6	21.3%	Greece
7	17.2%	Luxembourg
8	16.0%	Peru
9	13.4%	Ecuador
10	10.4%	Estonia

Google, March 4, 2016

Why IPv6 Now?

- Public Internet resources are transitioning to IPv6
- Mandate for US government agencies (IPv6 Web Site)
- >48% of mobile content sites already IPv6 enabled
  - Google
  - Netflix
  - Facebook
  - YouTube
  - Many more …
- Mobile & Infrastructure providers default to IPv6
  - Verizon (68%)
  - Google Fiber (62%)
  - AT&T (53%)
  - T-Mobile USA (49% - IPv6 only!)
  - Comcast (42%)
  - Time Warner (26%)
- Apple iOS9 – IPv6 preferred
  - IPv6 support required for all iOS9 apps

Not Yet an Emergency, but the Time to Act is Now



- Time to get serious - similar to Y2K effort
- IPv6 is not backward compatible with IPv4 – Significant education will be required
- Enterprise architectural and planning effort – new design required for statewide IP addressing and management
- All hardware and software, from every agency, must be inventoried, tested, and possibly upgraded to be IPv6 ready
- All new hardware/software procurements should mandate IPv6 support

Gartner IPv6 Roadmap Recommendations

- Establish an Enterprise Cross-Functional IPv6 Planning Team
  - Networking
  - Security
  - Desktop / Server Platforms
  - Application Development
  - Web Hosting / Content Development
- Establish Enterprise wide IPv6 Standards and Addressing Scheme
- Inventory and Gap Analysis
  - Applications
  - Platforms
  - Network Hardware
  - Security Systems
- Register public IPv6 Address Space (WaTech purchased address space early 2015)
  - 79.2 Octillion (79.2×10^{27}) addresses
  - 1.2 Septillion (1.2×10^{24}) addresses for each agency (up to 65,536)
- Implementation and Deployment
  - Phase 1: External customer-facing services, e.g. security, DMZ services
  - Phase 2: Intranet WANs and LANs
  - Phase 3: The data center

Guidance: Don't Underestimate the Importance of Network Management and Visibility (security)

Next Steps

1. Identify an IPv6 Project Leader
2. Establish an Enterprise, Cross-Functional IPv6 Transition Team
   a) Disseminate IPv6 education and training
   b) Develop enterprise IPv6 policies and standards (OCIO Policy #185)
   c) Develop enterprise IPv6 architecture and address allocation scheme
3. Each Agency Performs Inventory and Gap Analysis
   a) Focus on external-facing applications and services
   b) Determine IPv6 readiness (e.g. eliminate hard-coded IP addresses)
   c) Identify potential budget impacts

Key Points to Take Away

- IPv4 address are depleted worldwide - IPv6 is already here, is mature, and has more unique addresses than all the stars in the visible universe
- Not an emergency for us yet, but need to start planning NOW
- Begin migration by establishing an enterprise project and a cross-functional planning team to set enterprise policies and standards
- IPv6 is most critical in customer-facing systems, network management and security – required for mobile apps
- Agencies will need to assess all applications and hardware for IPv6 readiness – all new IT procurements should mandate IPv6 support

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Questions?

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