Putting
IPv6
to work

North American IPv6 Summit

Grand Hyatt, Denver, Colorado
September 23-25, 2014

Rocky Mountain IPv6 Task Force
RMv6TF

Impacts of IPv6

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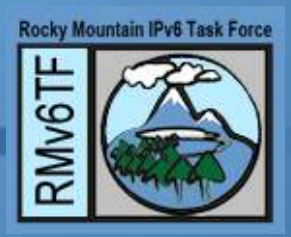
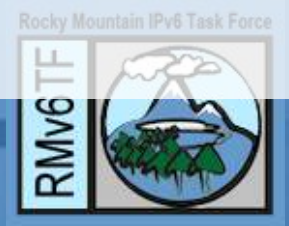


Agenda

1. Introduction.
2. Impacts of IPv4 and IPv6
- Environmental
- Operational (Costs)
- Social
3. Recent documents and news.
4. References.



IP Addresses numbers

- IPv6 - 340,282,366,920,938,463,463,374,607,431,768,211,456 ~ 10^{38}
- IPv4 - 4,294,967,296 ~ 10^{9}
- World Population (2014) 7,183,849,000
- # Lacking IPv4 Addresses 2,888,881,704
- Population in the US (2014) 318,892,103
- Population in Colorado (2013) 5,268,367
- Population in Denver (2013) 649,495
- Tourists in the City thousands +100
- Attendants this Summit +100

*__Source__: www.census.gov in August 2014

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IPv4 Facts: (Today)

IANA Unallocated Address Pool Exhaustion:

03-Feb-2011

Exhausted: Apr - 2011 APNIC

Sep - 2012 RIPE

Jun - 2014 LACNIC

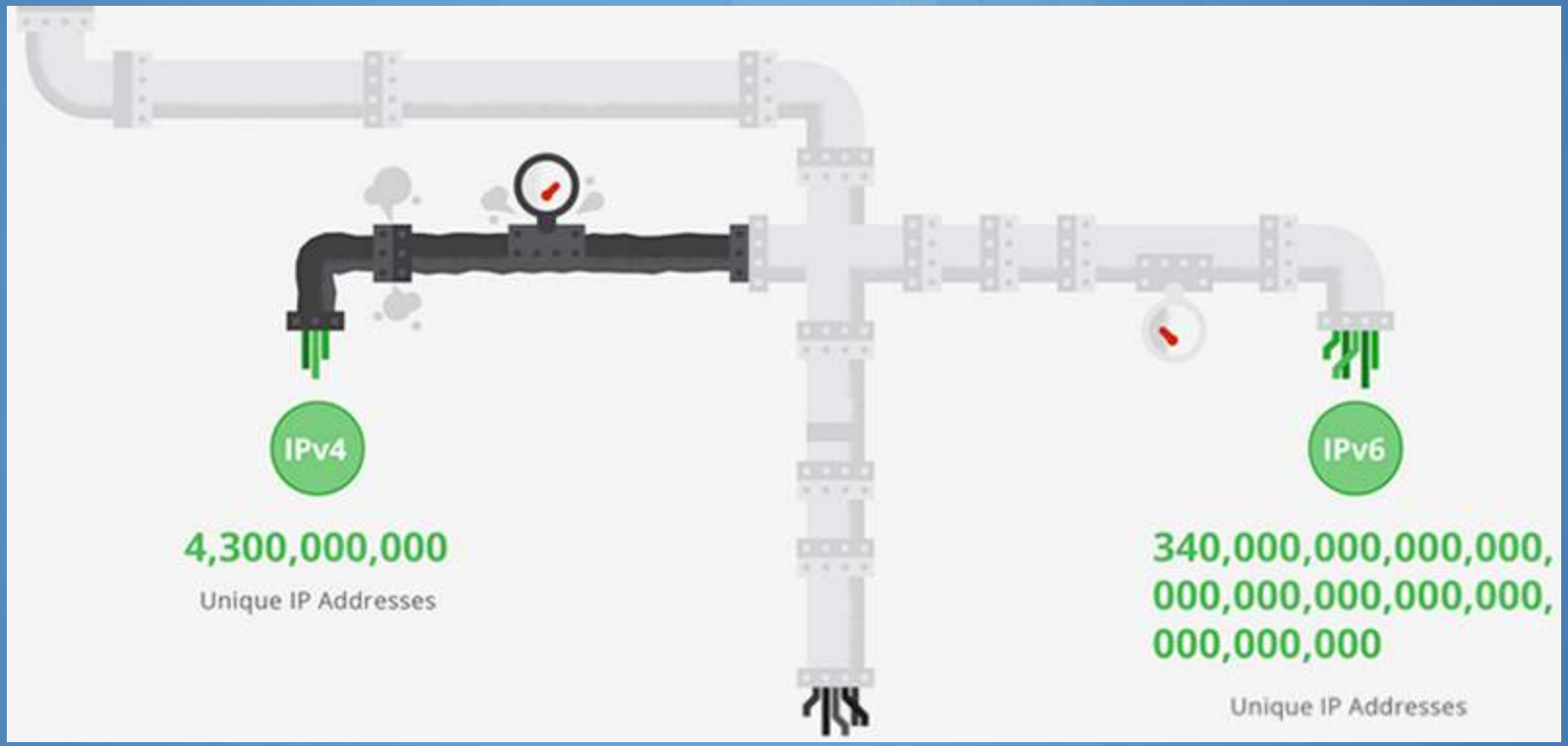
Projected Exhaustion Date:

ARIN: 25-Feb-2015

AFRINIC: 22-Jul-2019

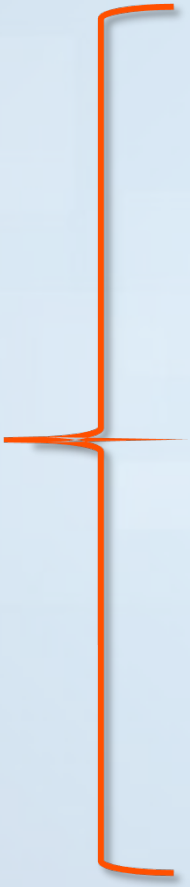
*__Source__: IPv4 Address Report - Geoff Huston

IP Supply



*__Source__: Google – December 2013

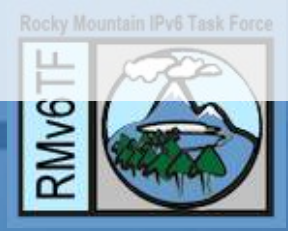
Impacts of IPv4 and IPv6



Environmental

Operational (Costs)

Social



+ IPv6 Footprint

Reduction in the **energy** consumption of mobile devices (**batteries**)

(No NAT-keep-Alive / Yes “long-live”)

Topic of IETF list (January 2014):

“Reducing the battery impact of ND ”

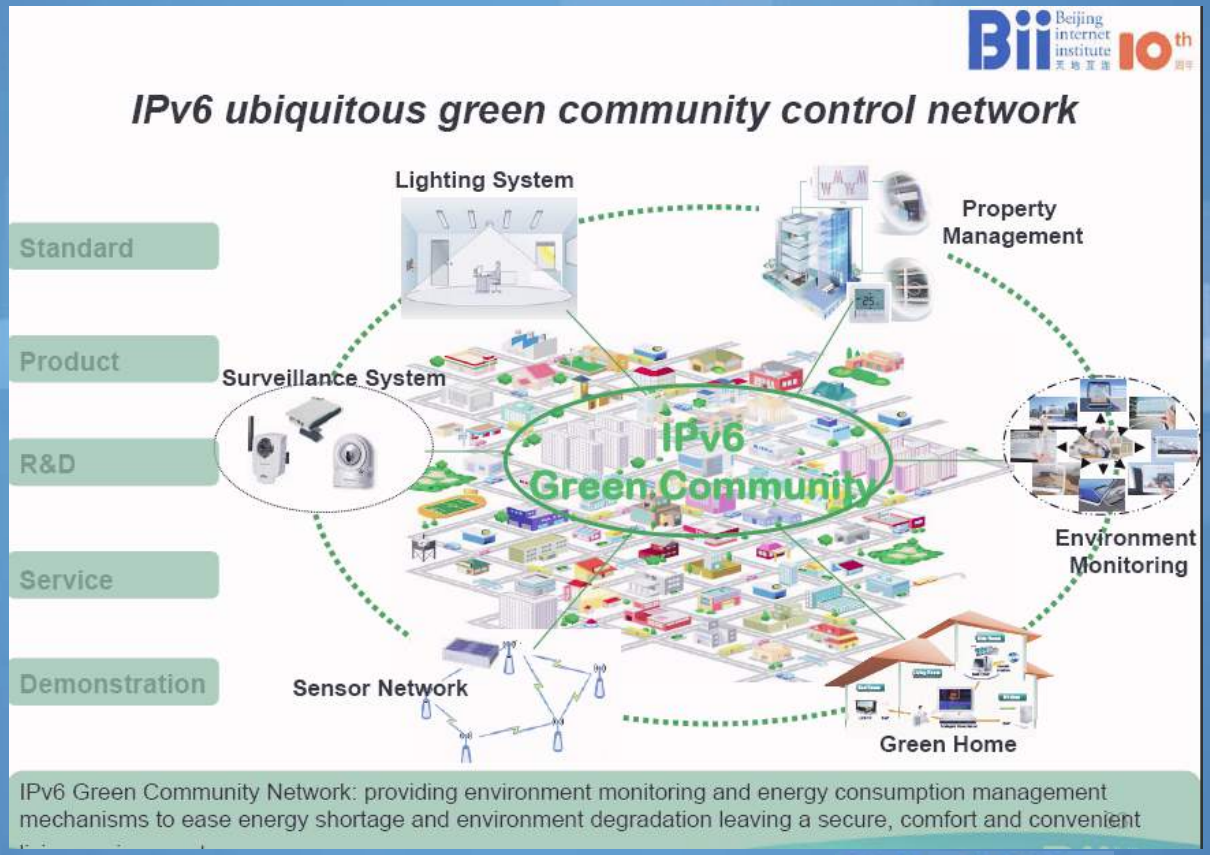
Possible solution:

“respond to router solicitations with Unicast RAs sent to the sender”

+ IPv6 Footprint

- The no fragmentation and the fixed size of the main header could have a positive impact by making more efficient the sending of packets.
- + If it is achieved a reduction in the use of extension headers.
- IPv6 can be faster.
- Monitoring of more devices and environmental variables by sensor networks.

IPv6 and the Environment



*__Source__: Presentation of Bii in the IPv6 Google event

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IPv6
and the Environment

* Buildings control (sensors y devices).
* Remote control of devices.
* Integration and interconnection of heterogeneous subsystems (RFID tags, Bluetooth, ZigBee, KNX and DLNA).

*__Source__: Smartipv6building.org

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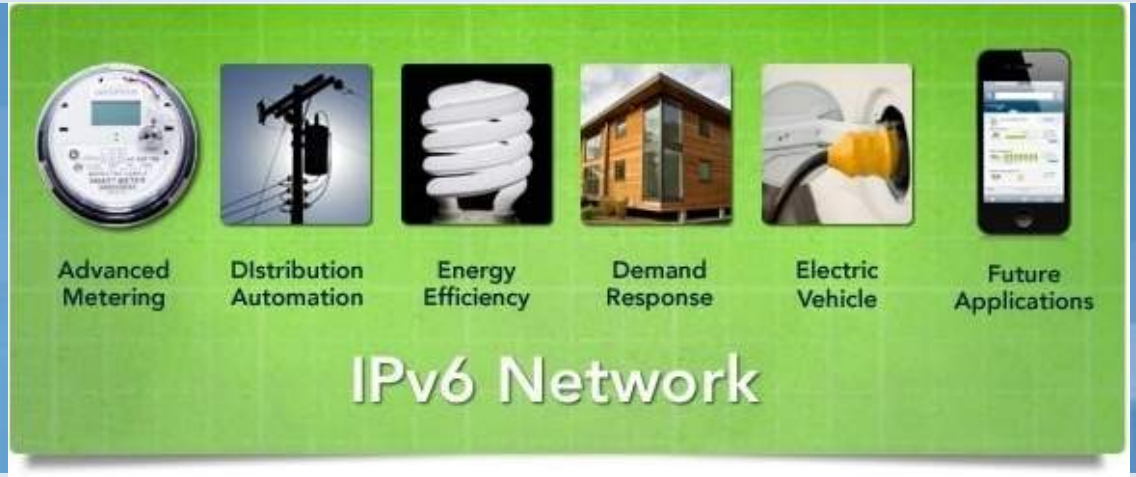
IPv6
and the Environment



- “Standards-based IPv6 network”.
- Smart Grids.
- Street light monitoring system based on IPv6.

*__Source__: Silverspringnet

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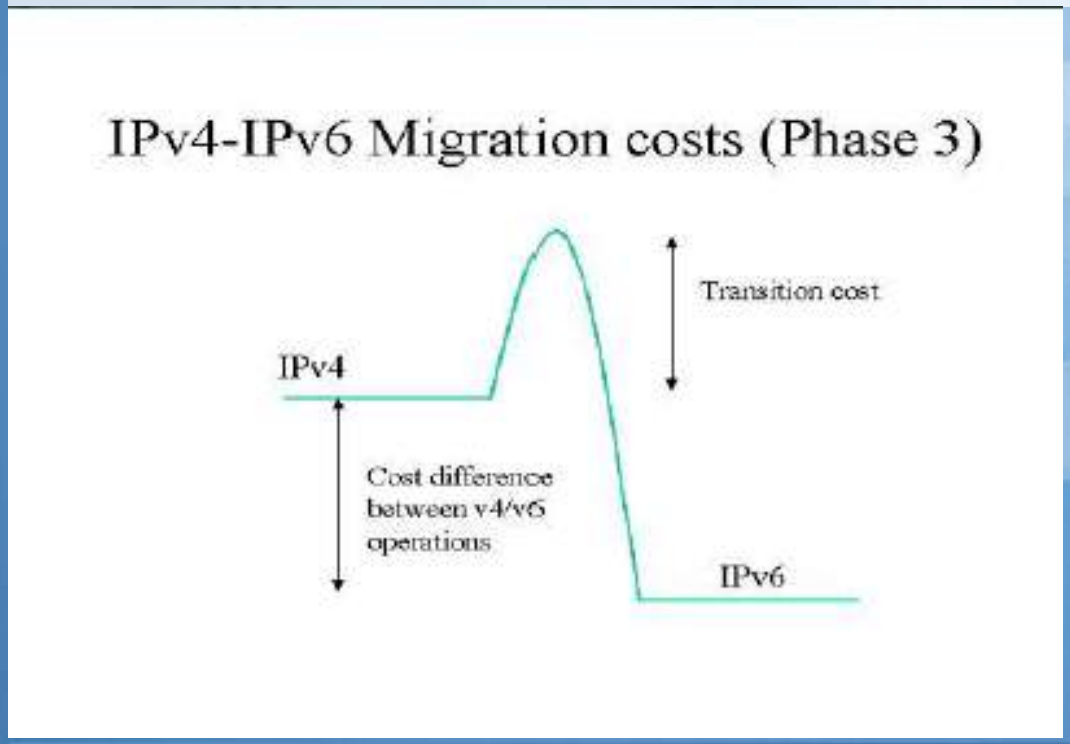
Environmental impact of IPv6

- It is an enabler of innovation.
- Facility and savings in the networks management (20%).



*Source: Presentation of Japan

- IPv6 Footprint

- It can have a negative impact by producing "consumerism" and necessities no present before, with more devices on-line (Internet connection).
- Internet uses 10-13% of the energy consumption*.
- If no green energy sources are used.
- More traffic => More energy consumption.

*Source: Google event "Green Internet" June 2013

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- and + social impacts of IPv6

- Negative by producing “consumerism” and necessities no present before.
- More access devices even in the clothes “Wearable Internet”.

Zypad of Arcom Control Systems

*Source: Wikipedia / Apple

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IPv6 in smart glasses ?

Glass of Google ™

SmartGlass of David Alonso Quiroz

HECHO EN MEXICO

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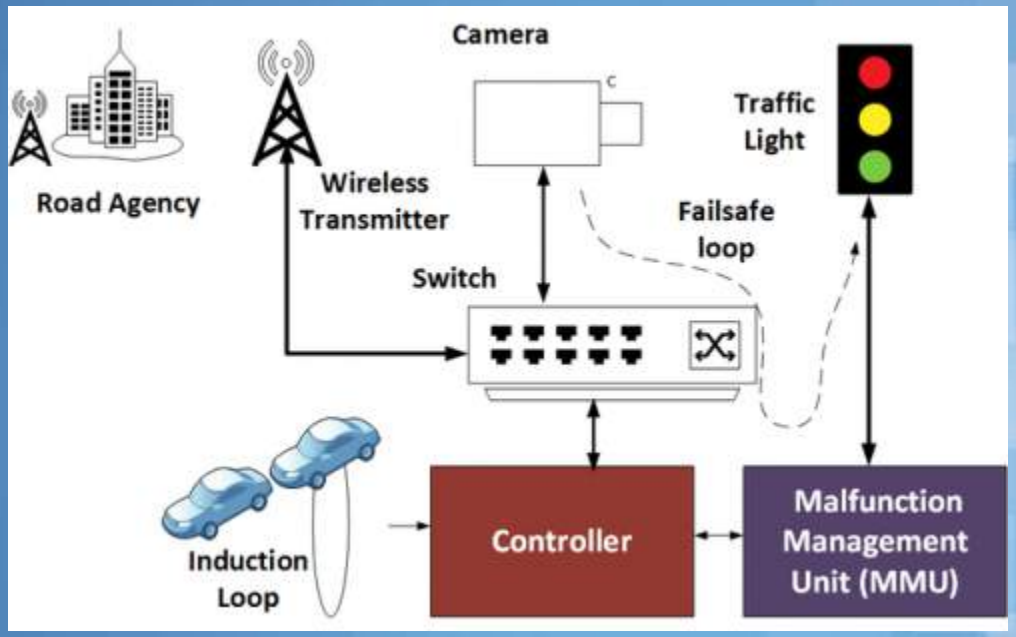
*__Source__: Nosotros / CNN Expansion (August 2013)

IPv6 in traffic signals ?



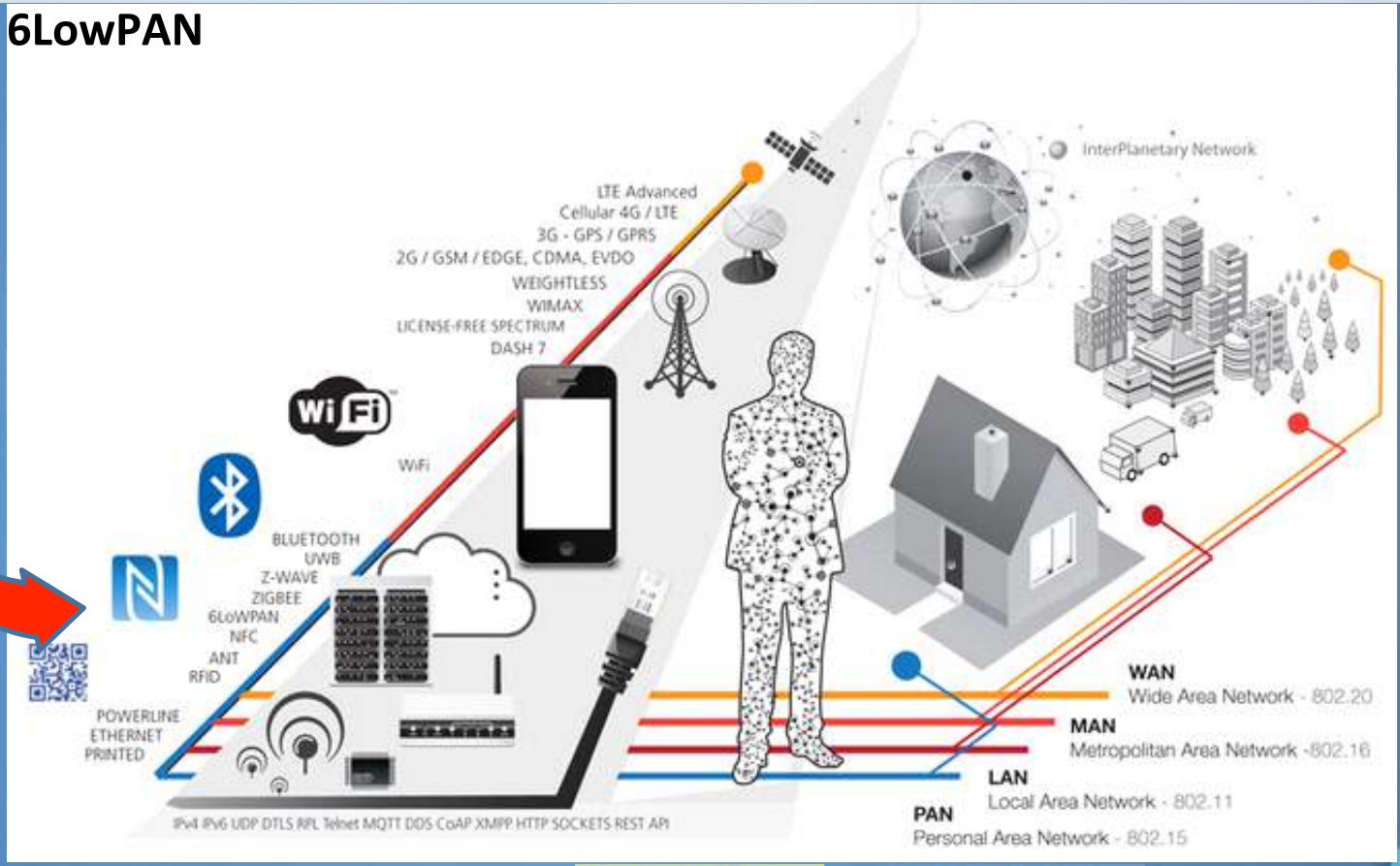
NTCIP (National Transportation Communications for ITS Protocol) Only IPv4 ?

ITS (Intelligent Transportation Systems)

*__Source__: NEMA / phys.org / ntcip.org / CNN Expansion (August 2013)

IPv6 necessary for IoT

6LowPAN



*__Source__: Infographic of Postscapes (March 2014)

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IPv6 and IoT

IoT6 is a 3 years FP7 European research project on the future Internet of Things.

October 2011 until September 2014

*__Source__: www.iot6.eu

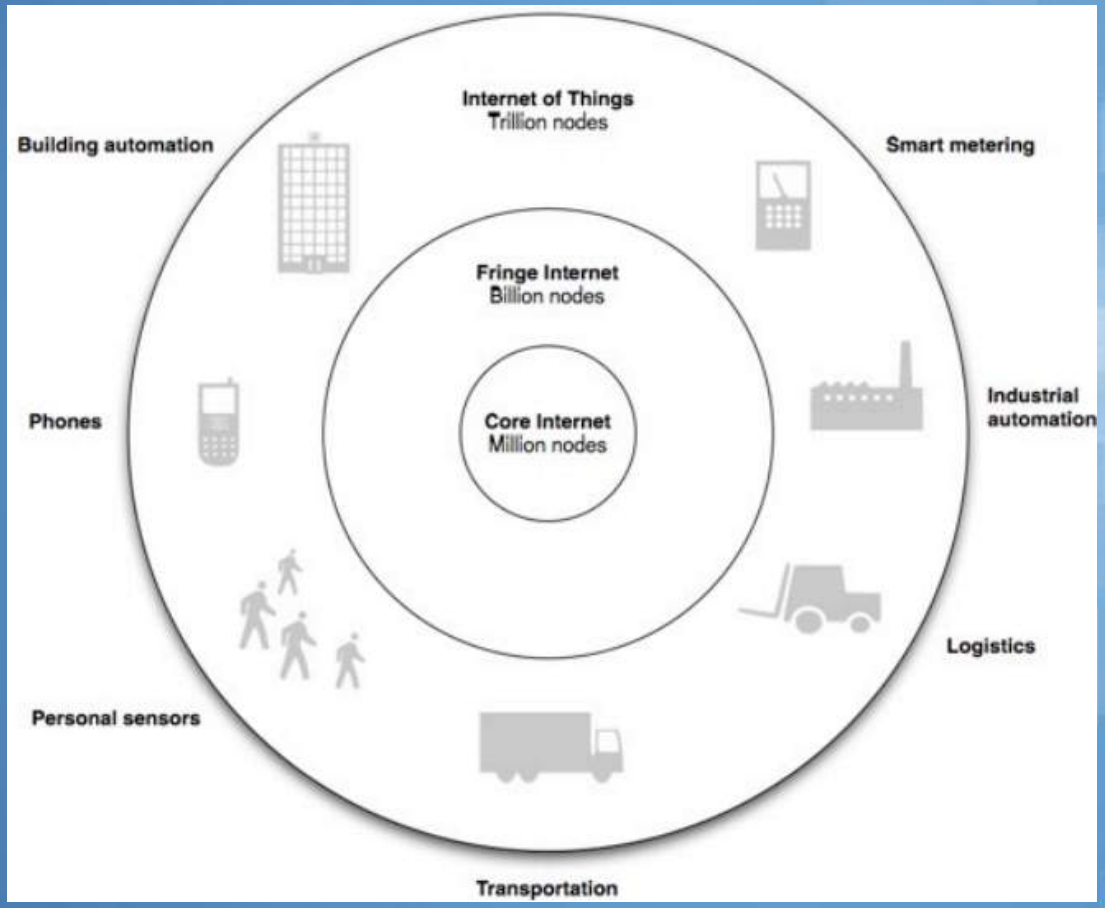
Internet Of Things Consortium

*__Source__: WebPages of ISOC and Blogthinkbig

Operational Impacts of IPv6

- With the lack of IPv4 addresses, continue using NAT can complicate the connectivity and the management of devices that require an IP.
- The NAT use has or could have a high impact in the economy.
- IPv6 has been faster (in some sceneries with no tunnels).

IPv6 Enabler Ecosystems



*Source: 6lowpan.net

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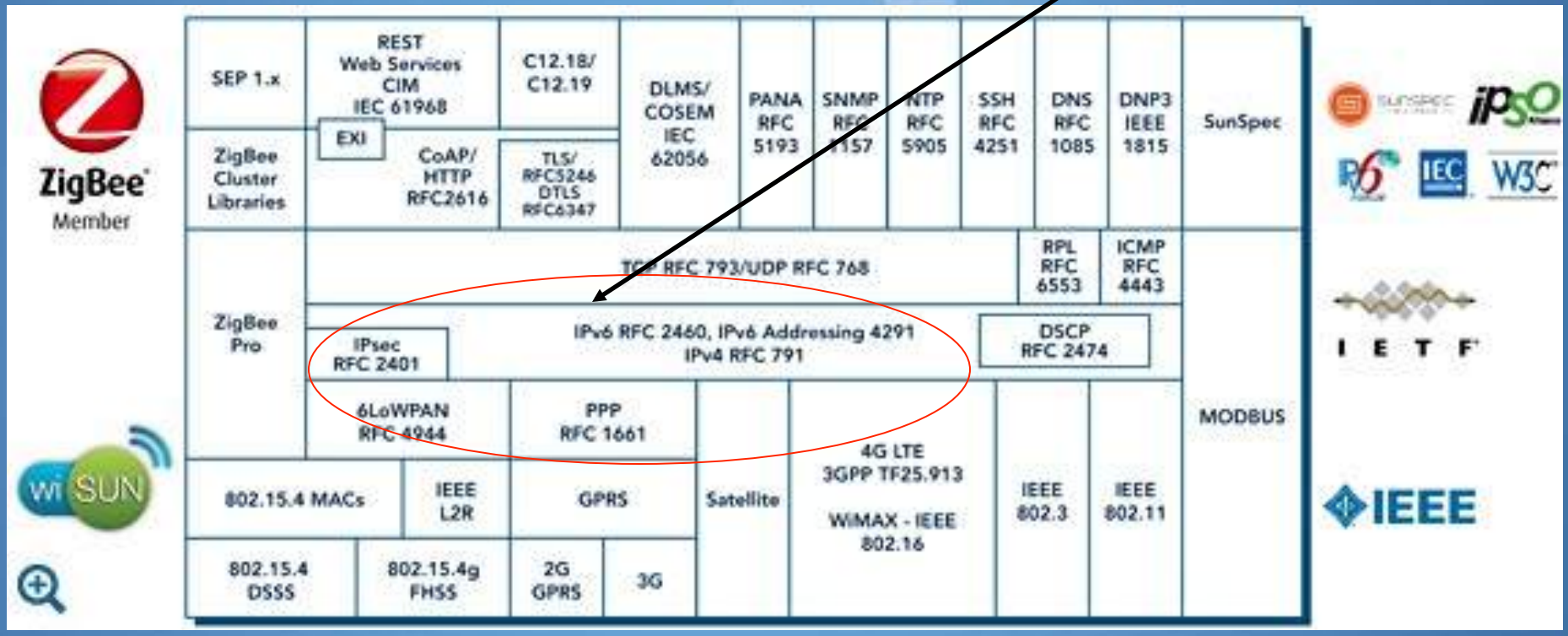
Interoperability of and with IPv6



*Source: Silverspringnet

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+ Operational Impacts of IPv6

- The latter you start to enable and test IPv6, greater will be the costs to invest in areas such as updates in Humanware, Software and Hardware.
- With a good planning, involved costs are part of regular updates of computers and networks.

*Source: P

IPv6 Exhaustion Counter Calculation

There are only this many IPv6 addresses left:

340,282,366,920,938,463,463,374,607,431,574,528,660

Projected IPv6 Exhaustion Date

5,395,000,000,000,000,000,000,000,000,000 AD

Alternative Method: /48 Prefix Allocations

There are only this many /48 prefixes left:

281,474,976,430,960.0498

Projected IPv6 Exhaustion Date

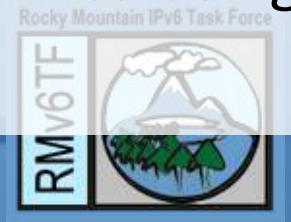
70,370,000,000 AD

*Source: Webpage Sam Bowne

Recent documents

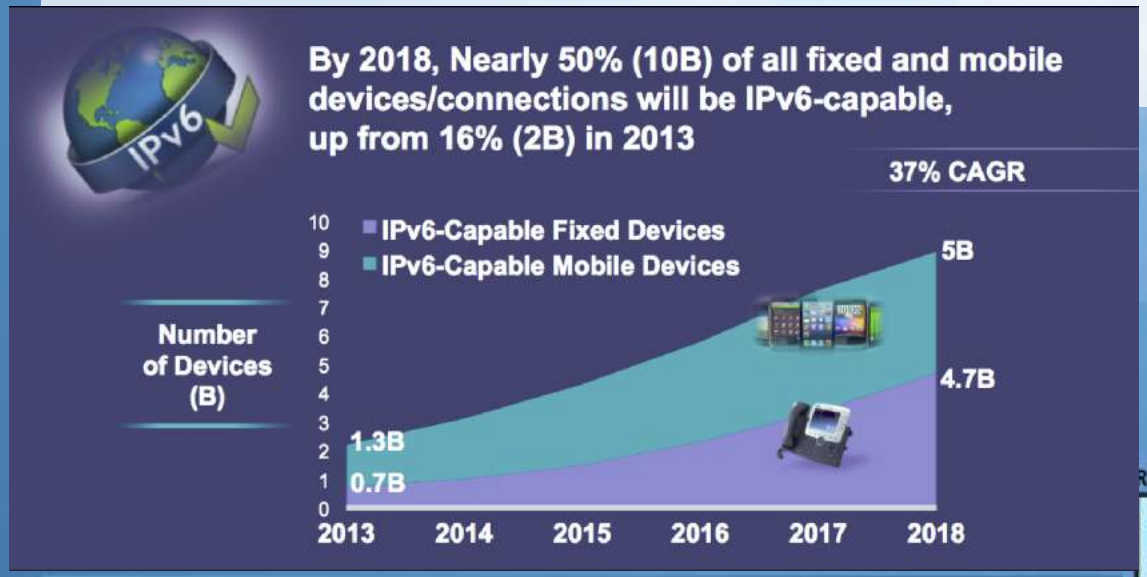
- **RFC 7346** IPv6 Multicast Address Scopes
- **RFC 7341** DHCPv4-over-DHCPv6 (DHCP 4o6) Transport
- **RFC 7283** Handling Unknown DHCPv6 Messages
- **RFC 7278** Extending an IPv6 /64 Prefix from a Third Generation Partnership Project (3GPP) Mobile Interface to a LAN Link
- **RFC 7287** Mobile Multicast Sender Support in Proxy Mobile IPv6 (PMIPv6) Domains
- **RFC 7269** NAT64 Deployment Options and Experience
- **RFC 7222** Quality-of-Service Option for Proxy Mobile IPv6
- **RFC 7225** Discovering NAT64 IPv6 Prefixes Using the Port Control Protocol (PCP)

*Source: IETF



Recent Forecast

- IPv6-capable devices in 2018:
  - 80% smartphones and tablets (3.9 Billion)
  - 94% laptops (797 million)
  - 34% M2M connections (2.4 Billion)



*__Source__: Cisco Blog (VNI Forecast) – September 2014

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Recent News

- "Yea! LinkedIn Joins Facebook And Google In Permanently Enabling IPv6" **Sep. 08th/2014**
- linkedin.com "shows up on IPv6 internet ! **August 13th/2014**
- Comcast reaches key Milestone in launch of IPv6 Broadband Network. **July 22nd/2014**
- OpenWRT gets native IPv6 stroking in major refresh. **July 14th/2014**
- CKLN (Caribbean Knowledge and Learning Network) Implements IPv6. **June 26th/2014**

*__Source__: Internet

Recent News

- Need to move to IPv6 highlighted as Microsoft runs out of US address space (Azure cloud service). **June 24th/2014**
- No more IPv4 addresses in Latin America and the Caribbean. LACNIC. **June 10th/2014**
- Campaign: Turn Off IPv4 on 6 June 2014 for One Day. **June 06th/2014**
- Happy World IPv6 Launchiversary #2 – What Will YOU Do Today To Help Get More IPv6 Deployed? **June 06th/2014**

*__Source__: Internet

Is IPv4 dead ?

*__Source__: Technologyreview

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IPv6 ≈ VCR ?

IPvcr4 vs. “IPDVx6”

*__Source__: Networkingnerd.net / gettyimages.com

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IPv6 – The Sky Really is Falling !

*__Source__: Twitter de @ARIN _ July 30th 2014

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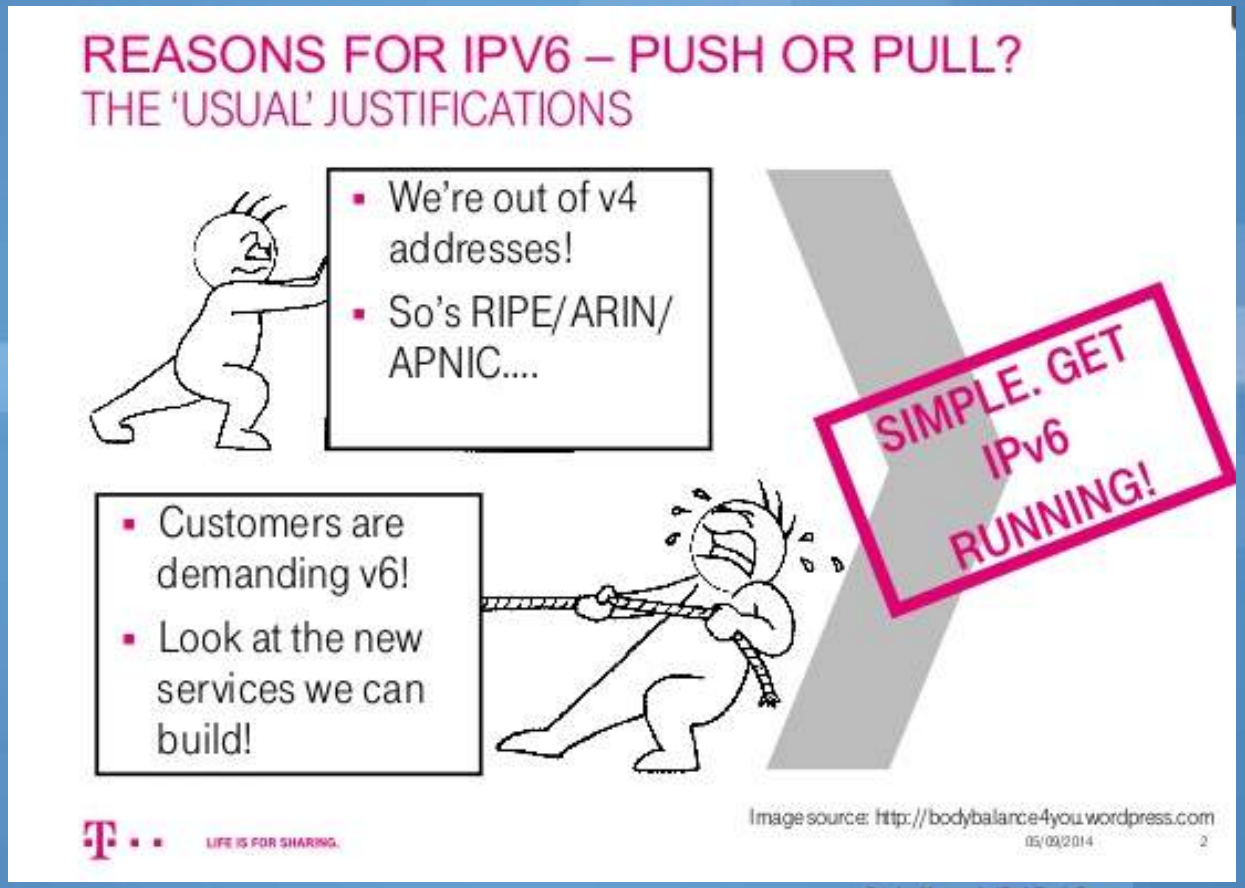
What if the ipv6 pushmi-pullyu doesn't exist? - Ian Farrer



*__Source__: ION Belfast - IPv6 Success Stories _ Sep. 2014

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IPv6 already on the road ?

*__Courtesy__: Karen Wucher

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www.ipv6.unam.mx/site

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www.ipv6forum.com.mx

Twitter: foroipv6mx

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Thank you
Gracias

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