



# The Need for More IP Addresses

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The views expressed in this presentation are those of the author and do not necessarily reflect the opinions of the ITU or its Membership.

# Internet Generations

ArpaNET	InterNET InterNAT	New InterNET
NCP	IPv4/NAT	IPv6
Pioneers	Innovators NAT engineers	EveryOne Everything
Email, FTP	WWW- Client/Server	Wireless, Streaming Media P2P, GRID
TOURISTS		RESIDENTS
Gov. Internet	Public Internet	Global Internet



# The IPv4 Address Exhausting Debate

Central IANA Pool Registry Pool

**IPv4 Exhaustion Counter**

▼ Now

Reserver blocks (IANA)

**0%**

Until X-day (estimation)

**2011**

Num of IPv4 Addresses

**0/256**

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**IPv4 Exhaustion Counter**

▼ Present Status (RIR)

X-day and Reserved Blocks (Remaining /8)

AfriNIC	Oct 18, 2020	2.99
APNIC	Apr 15, 2011	0.85
ARIN	Apr 16, 2014	2.24
LACNIC	Aug 06, 2014	1.78
RIPE NCC	Sep 14, 2012	0.98

NetCore via IPv4

**v4 Exhaustion**

**IPv4 & IPv6 Statistics**

**RIR v4 IPs Left**

AfriNIC	62,548,690
APNIC	14,341,285
ARIN	35,946,161
LACNIC	38,449,693
RIPE	14,886,328

**v6 ASNs**  
16% (7,199/44,626)

**v6 Ready TLDs**  
88% (281/317)

**v6 Glues**  
15,282

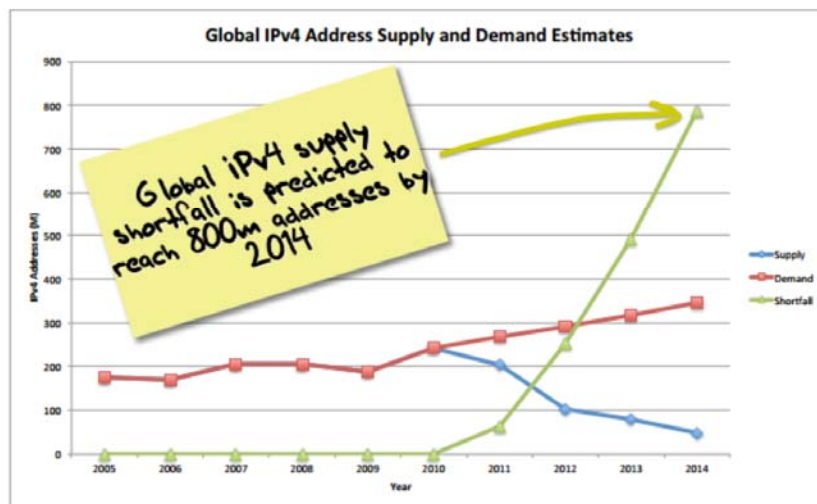
**v6 Domains**  
4,931,943

**0** days remaining  
**IANA exhausted**

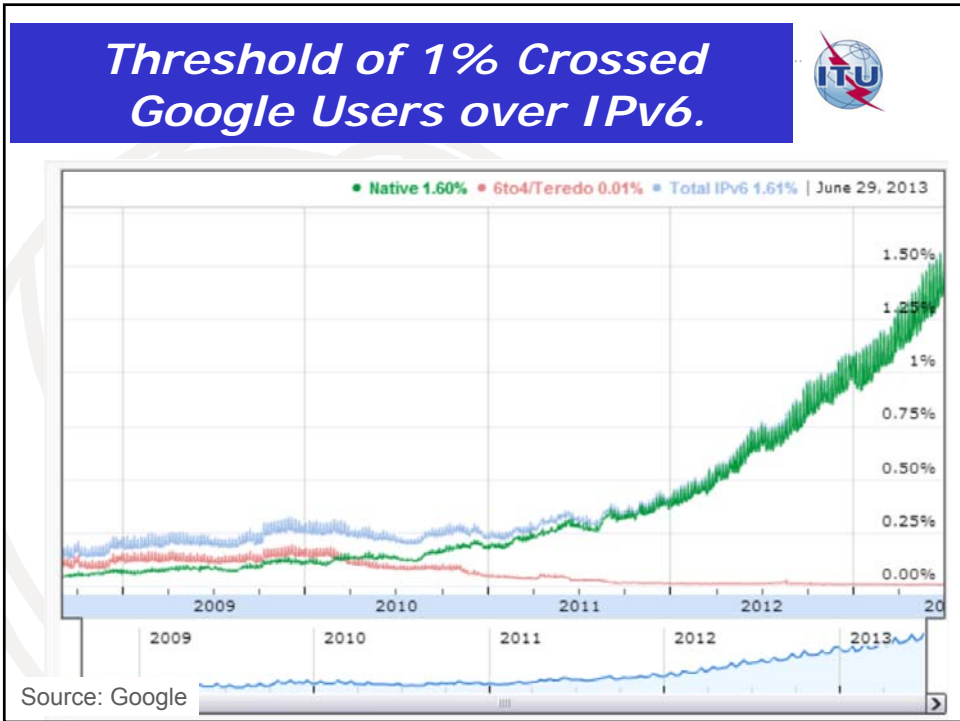
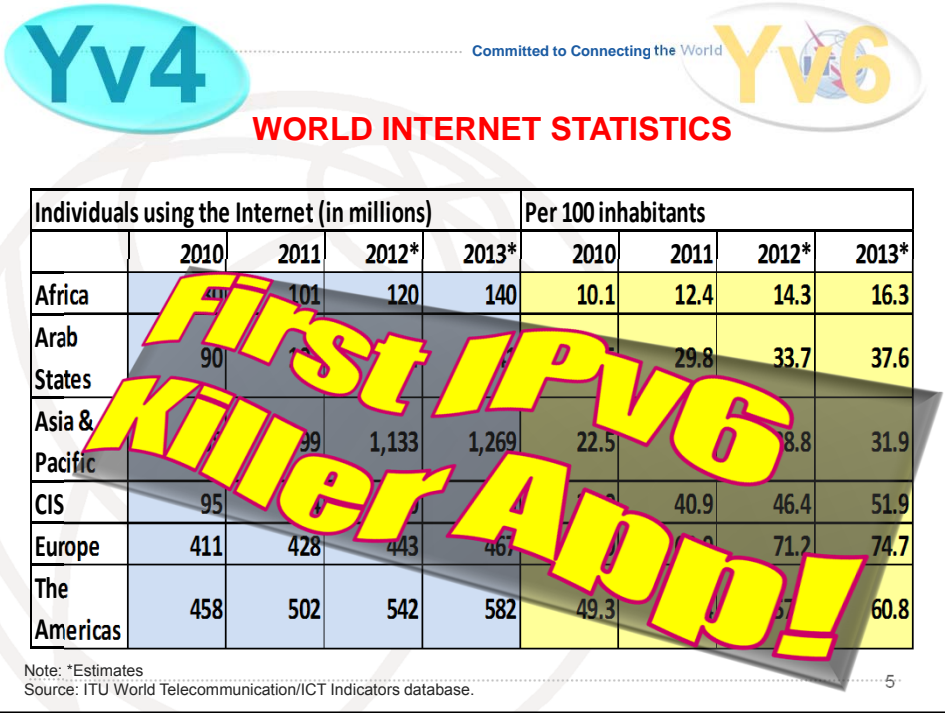
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## Coping with Demand

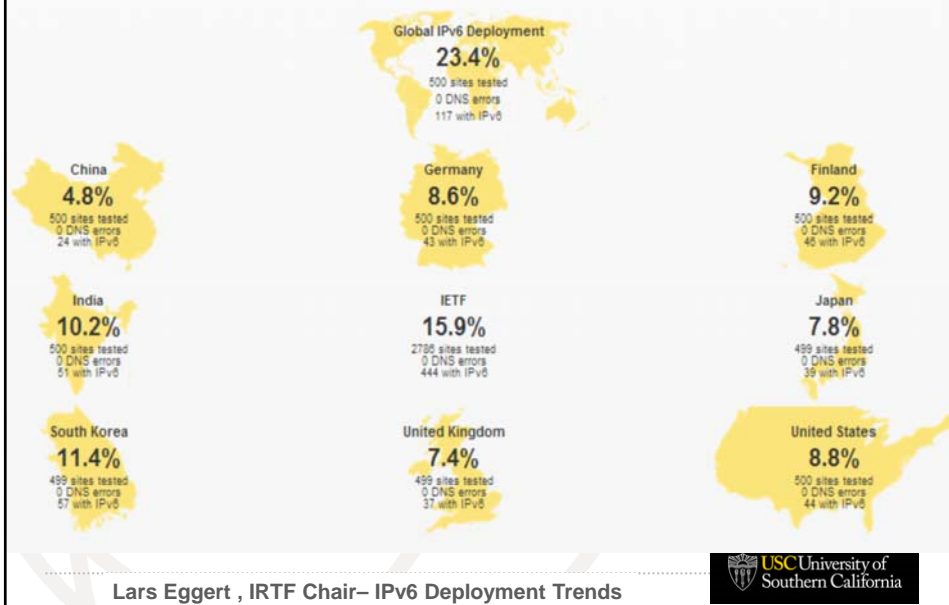


Source: Geoff Huston, APNIC



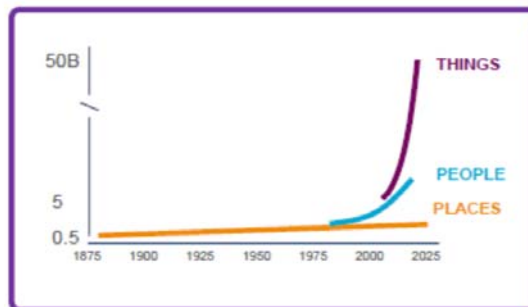
**Key Performance Indicators: 500 Sites Tested**

Committed to Connecting the World



**50 BILLION CONNECTED DEVICES**

Committed to Connecting the World



Everything that benefits from being connected will be connected

Source: Ericsson (Hoson AB 2013 | March 2013 | Page 13)

# The Business Case for IPv6

What is the Value at Stake?



## Selected Governments IPv6 Deployment Roadmaps

Governments	IT Policy -- IPv6 Roadmap -- Adoption Year	Milestones 1	Milestones 2
United States	<ul style="list-style-type: none"> <li>IPv6 Strategy -- Year 2009</li> <li>Refreshed -- Year 2012</li> </ul>	<ul style="list-style-type: none"> <li>Public web sites --2012</li> <li>Result: 35% - May 2013</li> </ul>	<ul style="list-style-type: none"> <li>Complete transition to IPv6 (dual stack) by December 2017</li> </ul>
Australia	<ul style="list-style-type: none"> <li>AGIMO IPv6 Strategy -- Year 2008</li> <li>Stage 1: Preparation (2008-2009)</li> <li>Stage 2: Transition (2010 - 2011)</li> <li>Stage 3: Implementation (2012)</li> </ul>	<ul style="list-style-type: none"> <li>Tasks: Review Procurement Policy.</li> <li>Stocktake of Equipment.</li> <li>Stocktake of Applications.</li> </ul>	<ul style="list-style-type: none"> <li>Government Transition to IPv6: Stage 2: Transition: Jan 2010 -- Dec 2011</li> <li>Implementation: Jan 2012 -- Dec 2012</li> </ul>
Canada	<ul style="list-style-type: none"> <li>IPv6 adoption strategy -- Year 2012</li> </ul>	<ul style="list-style-type: none"> <li>Enabling Phase -- Sep 2013</li> <li>Deployment Phase - 2015</li> </ul>	<ul style="list-style-type: none"> <li>Completion Phase -- 201X?</li> </ul>
India	<ul style="list-style-type: none"> <li>IPv6 Policy -- Year 2010</li> <li>Updated -- Year 2013</li> </ul>	<ul style="list-style-type: none"> <li>Public web sites -- 1.1.2015</li> </ul>	<ul style="list-style-type: none"> <li>Complete transition to IPv6 (dual stack) by December 2017</li> </ul>
China	<ul style="list-style-type: none"> <li>CNGI -- Year 2006</li> <li>NDRC -- Year 2012</li> <li>i2010</li> </ul>	<ul style="list-style-type: none"> <li>8M IPv6 users by 2013</li> </ul>	<ul style="list-style-type: none"> <li>25M IPv6 users by 2014-5</li> </ul>
European Commission	<ul style="list-style-type: none"> <li>EU IPv6 Task Force Year 2001</li> <li>IPv6 Communication 2004</li> <li>2008</li> <li>IPv6 Task Force -- Year 2005</li> <li>Phase 1: 2006 Dissemination, Research</li> </ul>	<ul style="list-style-type: none"> <li>25% IPv6 users by 2010</li> <li>Result: 1%</li> </ul>	
Indonesia	<ul style="list-style-type: none"> <li>Phase 1: 2006 Dissemination, Research</li> </ul>	<ul style="list-style-type: none"> <li>Phase 2: 2007 Development of infrastructure and Content</li> </ul>	<ul style="list-style-type: none"> <li>Phase 3: 2008 - Development of Applications and Transition Process</li> </ul>
Korea (Rep. of)	<ul style="list-style-type: none"> <li>IT839 Strategy-- Year 2004</li> </ul>	<ul style="list-style-type: none"> <li>ISP Readiness</li> </ul>	<ul style="list-style-type: none"> <li>IPv6 service</li> </ul>
Japan	<ul style="list-style-type: none"> <li>U-Japan -- Year 2001</li> </ul>	<ul style="list-style-type: none"> <li>ISP readiness</li> </ul>	<ul style="list-style-type: none"> <li>IPv6 service</li> </ul>



## National Regulators IPv6 Deployment Roadmaps

Regulator	IT Policy -- IPv6 Roadmap -- Adoption Year	Milestones	Results
India TRAI	<ul style="list-style-type: none"> <li>IPv6 Recommendation -- Year 2005</li> </ul>	<ul style="list-style-type: none"> <li>DOT – TEC to take over 1.1.2006</li> </ul>	<ul style="list-style-type: none"> <li>IPv6 Strategy &amp; Roadmap published in 2010 and 2013</li> </ul>
Europe	<ul style="list-style-type: none"> <li>Finnish Ficora – Year 2001</li> <li>Austrian RIR Year 2006</li> <li>French ARCEP Year 2002</li> <li>European BEREC</li> </ul>	<ul style="list-style-type: none"> <li>Recommendations In the BEREC board of Regulators 2013 Workprogramme dated December 12, 2012, the board in § 6.5 outlines an action item for IPv6 in relation to Machine to machine ( M2M)</li> </ul>	
Saudi Arabia CICT	<ul style="list-style-type: none"> <li>IPv6 Strategy -- Year 2008</li> <li>3 Studies: IPv6 Readiness Assessment</li> <li>IPv6 Countries Benchmark</li> <li>IPv6 International bodies &amp; Organisations</li> </ul>	<ul style="list-style-type: none"> <li>Infrastructure Track</li> <li>Awareness Track</li> </ul>	<ul style="list-style-type: none"> <li>14 ASNs support IPv6</li> <li>3 ASNs have IPv6 traffic Transition Process</li> </ul>
Oman TRA	<ul style="list-style-type: none"> <li>Oman IPv6 Strategy-- Year 2010</li> </ul>	<ul style="list-style-type: none"> <li>IPv6.om Web Site</li> </ul>	<ul style="list-style-type: none"> <li>OmanTel Testing IPv6</li> </ul>
Morocco ANRT	<ul style="list-style-type: none"> <li>IPv6 Study -- Year 2012</li> </ul>	<ul style="list-style-type: none"> <li>ISP Readiness work</li> </ul>	<ul style="list-style-type: none"> <li>Strategy published in 2013</li> </ul>



## Core IPv6 Policy Recommendations

Recommendations	IT Policy	Objectives	Impact
Top down	<ul style="list-style-type: none"> <li>CEO Round Table</li> </ul>	<ul style="list-style-type: none"> <li>Decision-making on investment</li> </ul>	<ul style="list-style-type: none"> <li>Priority setting for budget</li> </ul>
IPv6 Service	<ul style="list-style-type: none"> <li>Broadband (Fixed &amp; Mobile)</li> </ul>	<ul style="list-style-type: none"> <li>Integrate IPv6 in new broadband infrastructure investment right from the beginning</li> <li>Future proofing investment</li> </ul>	<ul style="list-style-type: none"> <li>IPv6 Service readiness for broadband apps for public services</li> <li>e-Gov; e-Learning; e-Health</li> </ul>
Capacity Building	<ul style="list-style-type: none"> <li>Launch IPv6 Competence Centres, Educational Programs and Test Labs</li> </ul>	<ul style="list-style-type: none"> <li>Build Skills &amp; Expertise</li> <li>IPv6 Skills Contest (see Singapore iDA Program)</li> </ul>	<ul style="list-style-type: none"> <li>High level LOCAL Skills is the cheapest transition tool as 80% of the transition cost is labour.</li> </ul>
National Research	<ul style="list-style-type: none"> <li>Fund IPv6 Research projects</li> </ul>	<ul style="list-style-type: none"> <li>Gain higher level Skills</li> <li>Add IPv6 in Higher education Curriculum</li> </ul>	<ul style="list-style-type: none"> <li>Gain skills parity with international links</li> </ul>
National IPv6 Task Force	<ul style="list-style-type: none"> <li>Bottom-up stakeholder Forum to define a national IPv6 Roadmap</li> </ul>	<ul style="list-style-type: none"> <li>Consensus building PPP-based Objectives</li> <li>See example of Saudi Arabia IPv6 Task Force)</li> </ul>	<ul style="list-style-type: none"> <li>National IPv6 Strategy with key-players involvement</li> <li>Promote DNSSEC</li> </ul>