IPv6 uptake:

most urgent for Asia Pacific Region!

Tony Hill

Asia Pacific IPv6 Task Force
Internet Society of Australia
IPv6 Special Interest Group
IPv6 Forum Australia
www.isoc-au.org.au

Tony Hill

- AP IPv6 Task Force Chair – 2010 ongoing
- Ai Group Software & Services Group Chair – 2011 ongoing
- ISOC-AU President – 2001-2011
- National ICT Industry Alliance – Chair 2005-07
- Australian IPv6 Summit Chair – 2005 ongoing
- Australasian Research Management Society - President 2007
- Capital Hill Consulting Pty Ltd – founder 1999 ongoing
- IPv6 Now Pty Ltd – founder 2007 ongoing

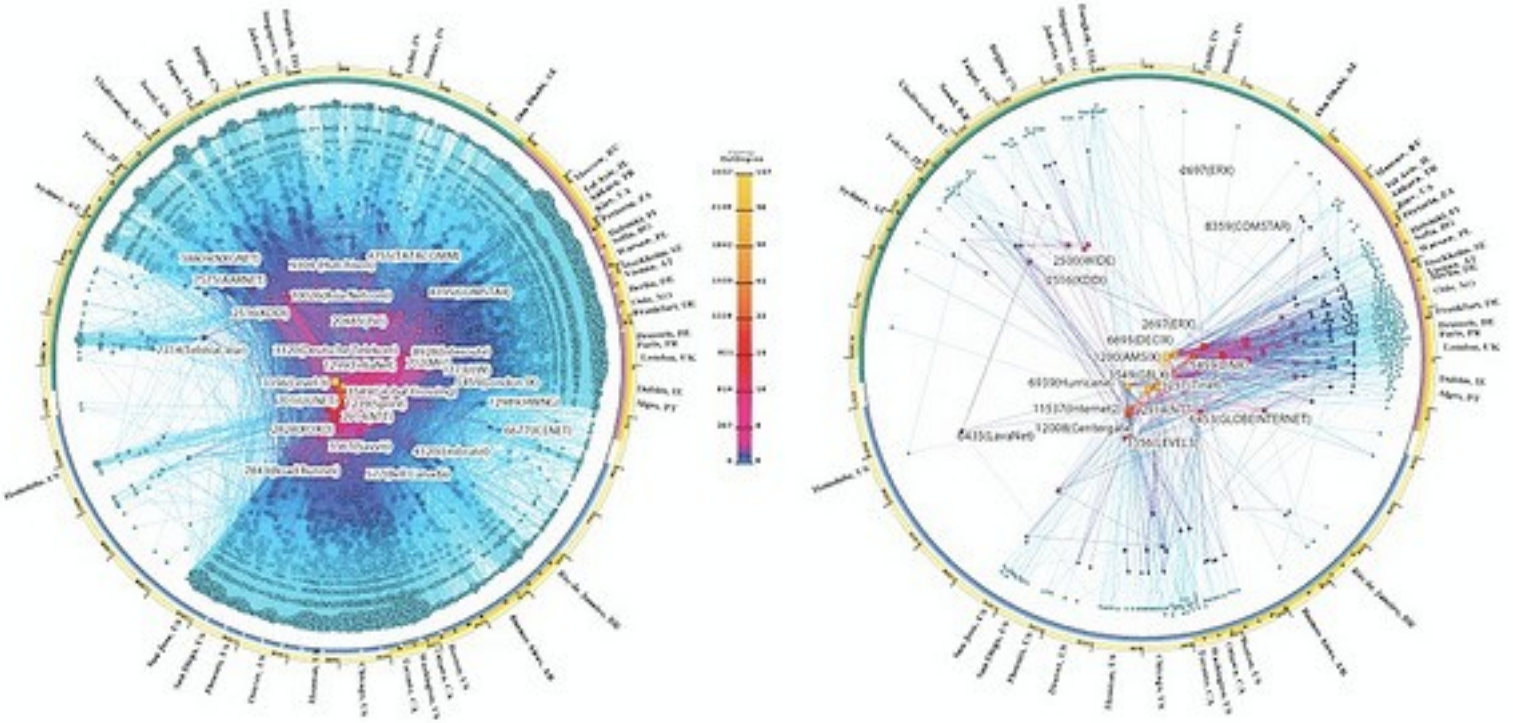
Mike Biber

- IPv6 Forum Downunder President
  – 2001 ongoing
- AARnet IPv6 Working Group
  – Chair 2005-06
- Asia Pacific Networx Pty Ltd – CEO
  – 1992 - 2007
- Gibson Quai – AAS Pty Ltd
  – Senior Consultant 2007 – 2009
- IPv6 Now Pty Ltd – founder 2007 ongoing

More than a Year Ago

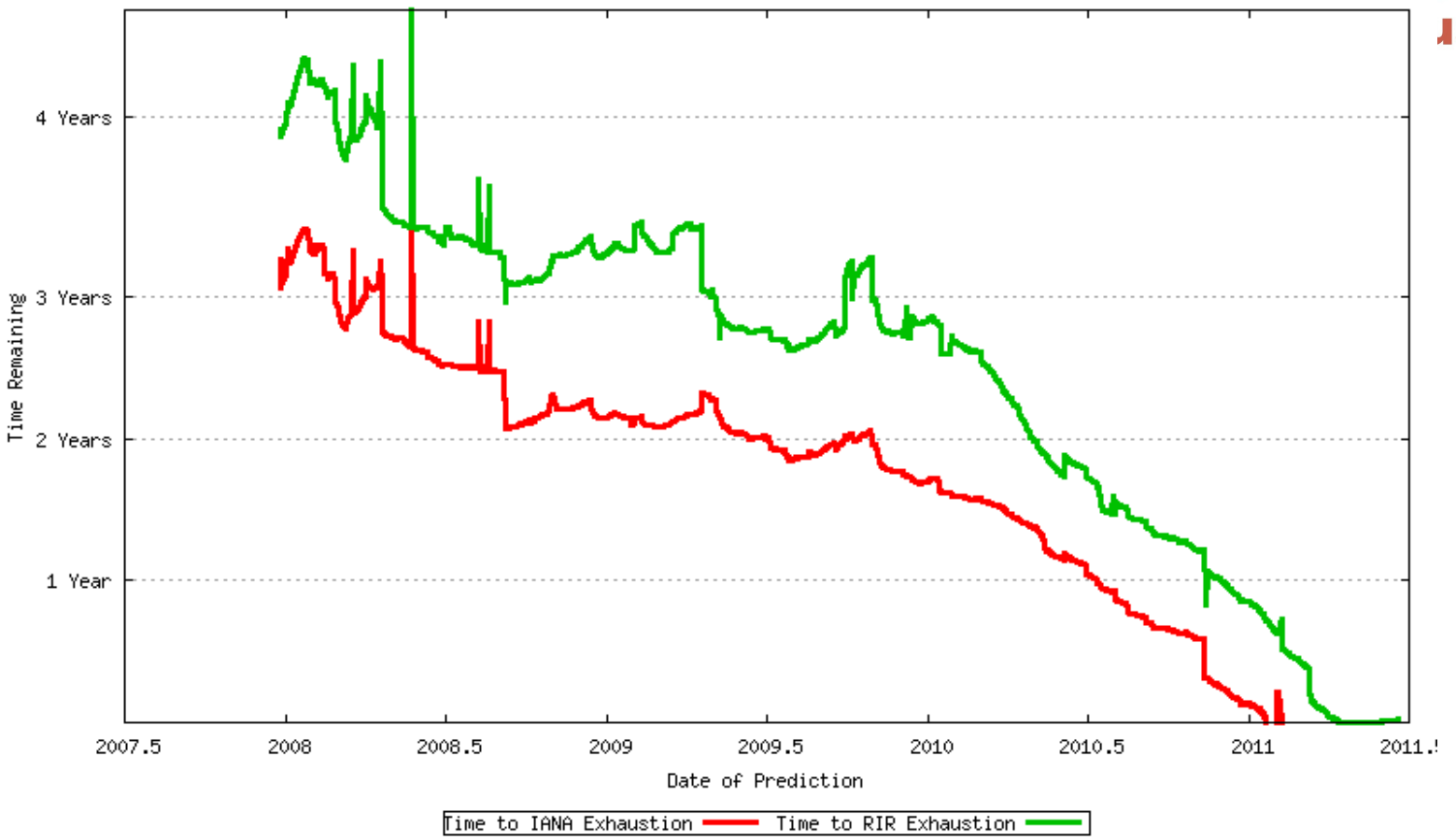
IPv4 & IPv6
INTERNET TOPOLOGY MAP
JANUARY 2009

AS-level INTERNET GRAPH



What is the problem?

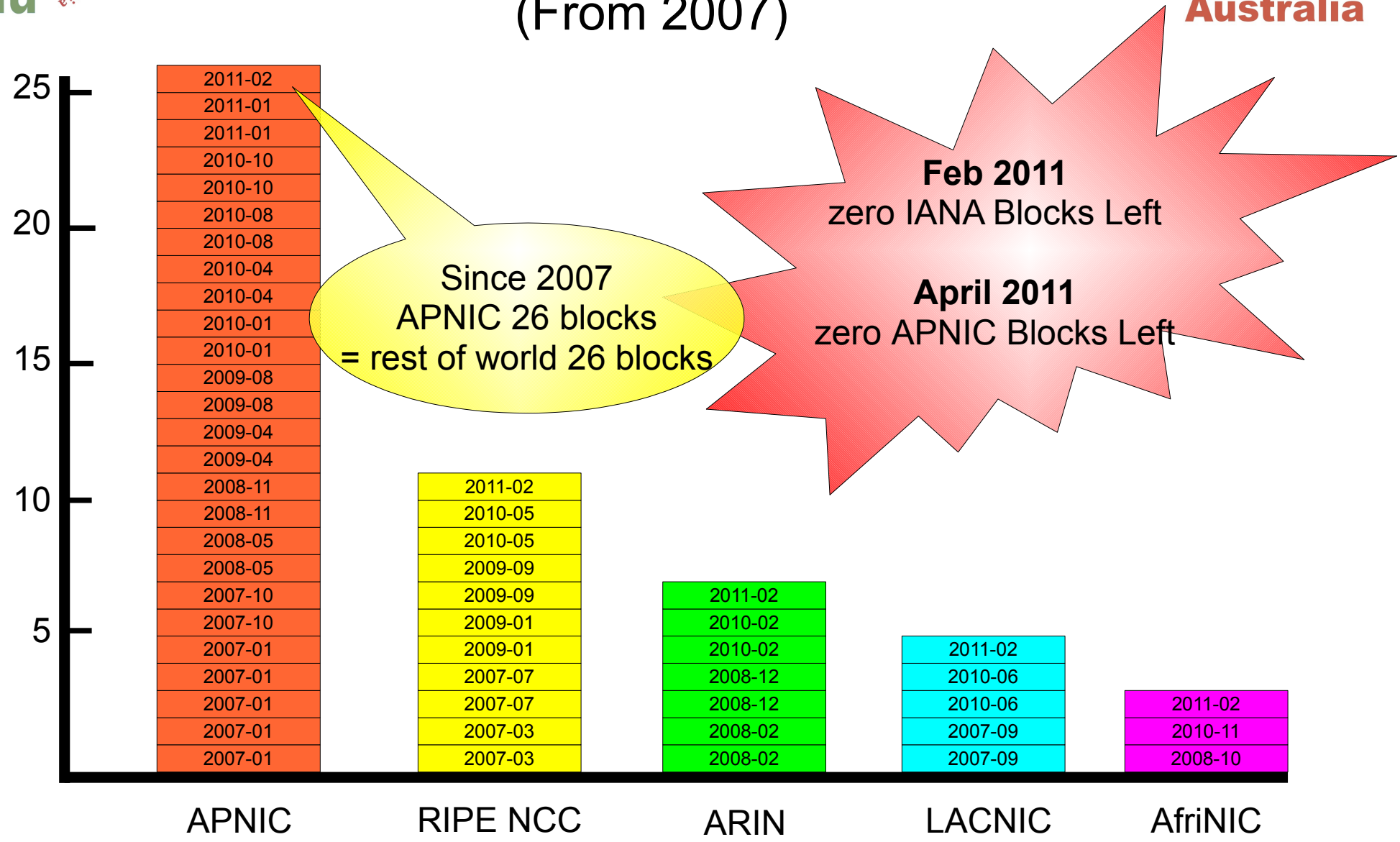
IPv6 – the imperative!



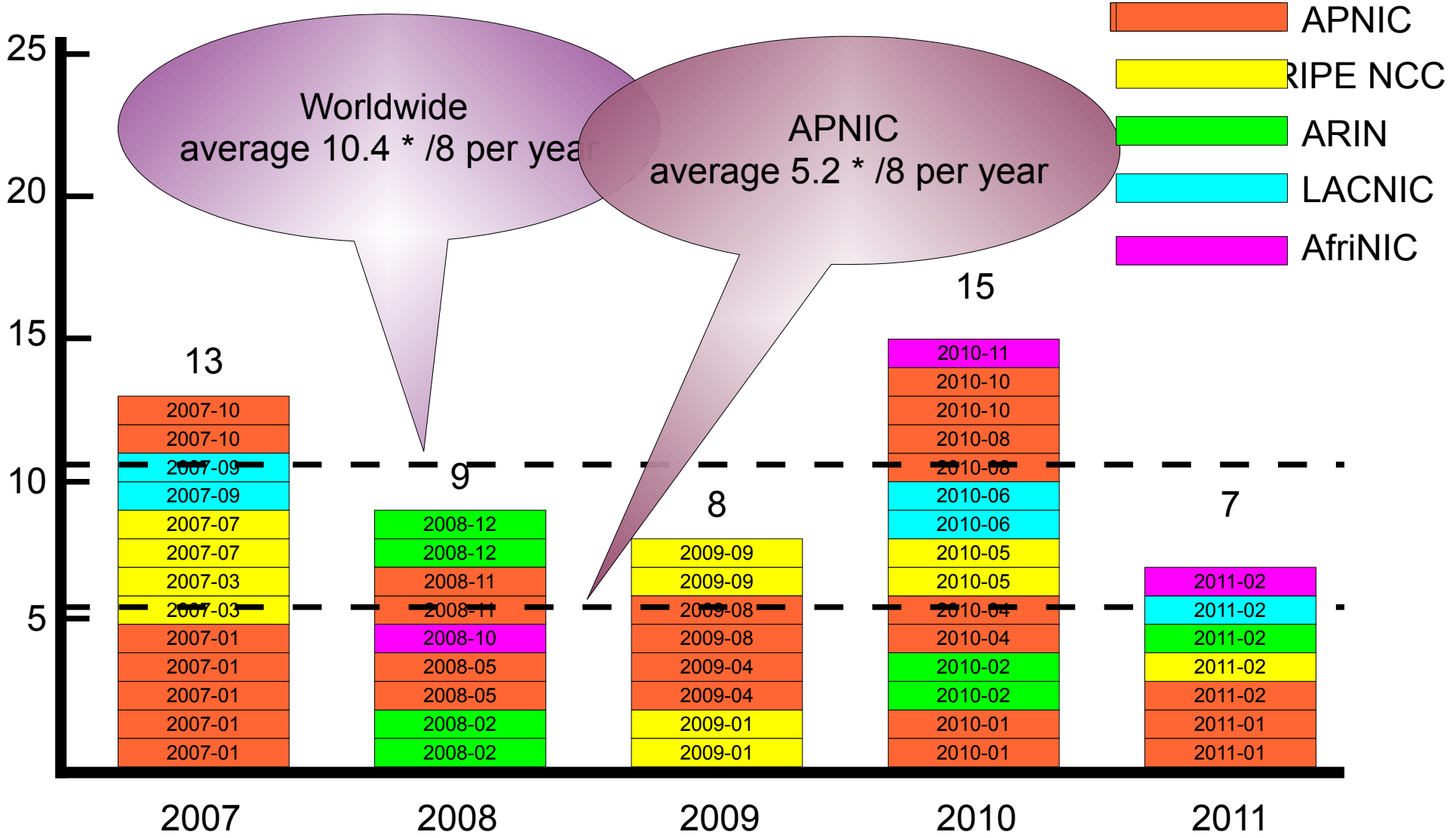
- **IANA Pool Exhausted Feb 3rd, 2011**
- **APNIC Pool Exhausted Apr 15th, 2011 - small allocation for transition available**
- Other RIRs around the world will run out over the next 12-18 months

IPv4 – The Last Few Years

(From 2007)



IPv4 – The Last Years?



Asia-Pacific **THE** Action Point

- Asia Pacific has been the region of the most action for depletion of IPv4 addresses having used 8 blocks last year and 3 blocks this year
- Internet growth is Asia's problem:
  - Global population: 7 billion people; Asia 60%
  - Citigroup: 9 of 11 global growth countries
- IPv6 is Asia's problem
- Good news: rest of the world also working on it!

What to do?

IPv6 is the only way forward

- From mid 2008, a unanimous view from global bodies:
  - ICANN
  - IANA
  - ISOC
  - IETF
- IPv6 implementation is the way forward

OECD importance of addresses

- “The only sustainable solution to deliver expected economic and social opportunities for the future of the Internet economy is the deployment of IPv6.” - OECD 2007
- Governments should:
  - Work with the private sector re awareness
  - Demonstrate Gov't commitment to IPv6
  - Pursue international cooperation
  - Monitor IPv6 deployment

What is IPv6?

What is IPv6 about?

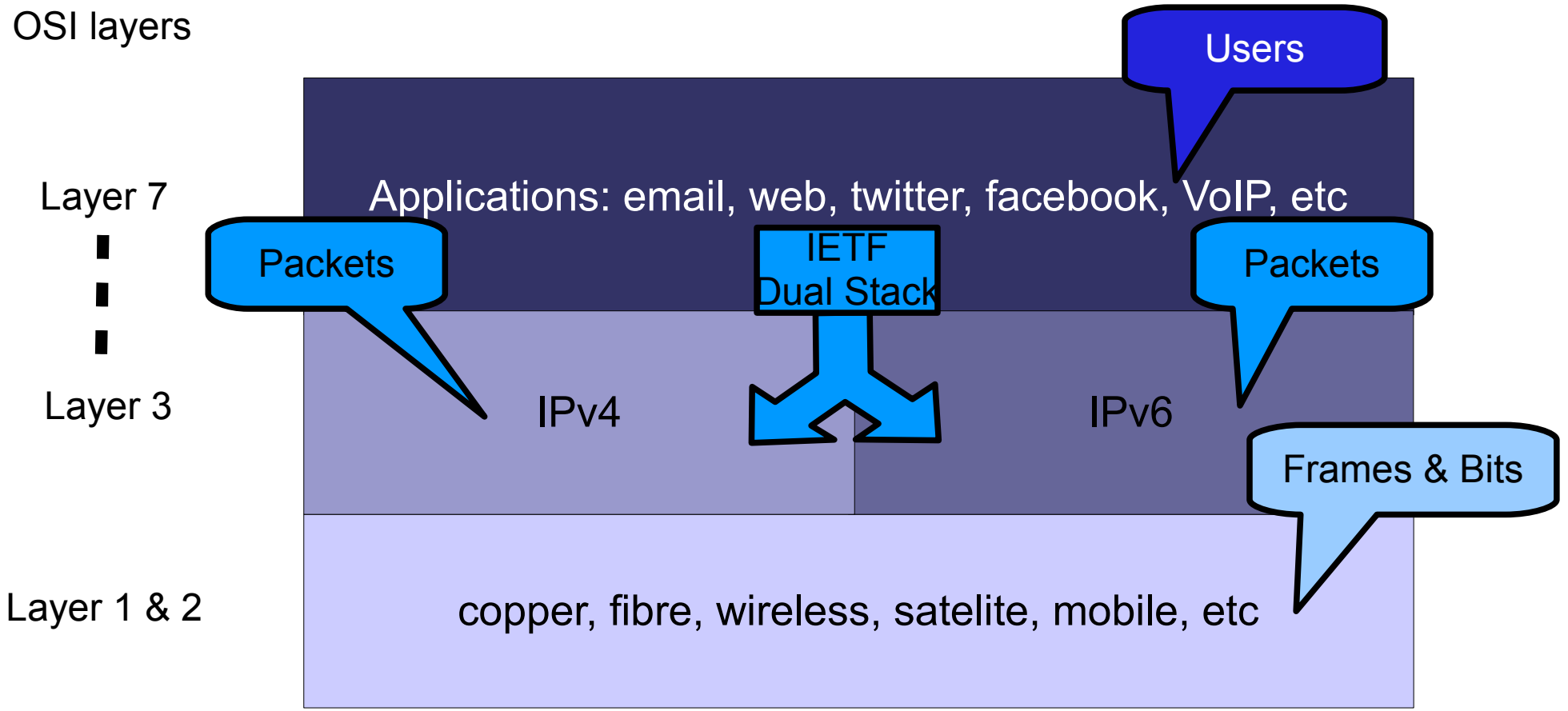
- Domain name: www.ipv6now.com.au
- IPv4: 116.197.146.20
- IPv6: 2406:a000::29

"The Internet is like a 15 storey building, and the domain name system the columns holding it up..."

Paul Twomey, ex CEO, ICANN

... and the Internet Protocol is the foundation on which the whole building stands!

IPv6 vs IPv4 – like mixing oil & water



IPv6 Technical Opportunities

- **Larger address space: Increased address size from 32 bits to 128 bits**, plus
- Streamlined Protocol Header: Improves packet-forwarding efficiency
- Extended Attribute Headers: Multiple integrated service profiles
- Stateless autoconfiguration: The ability for nodes to determine their own address
- Multicast: Increased use of efficient one-to-many communications
- Jumbograms: The ability to have very large packet payloads for greater efficiency
- Network Layer Security: Encryption and authentication of communications
- Quality of service (QoS) capabilities: labels that help identify priority traffic
- Anycast: Redundant services using non-unique addresses
- Mobility: Simpler handling of mobile or roaming nodes

(Note: some aspects re-engineered into IPv4)

How is Asia-Pacific positioned?

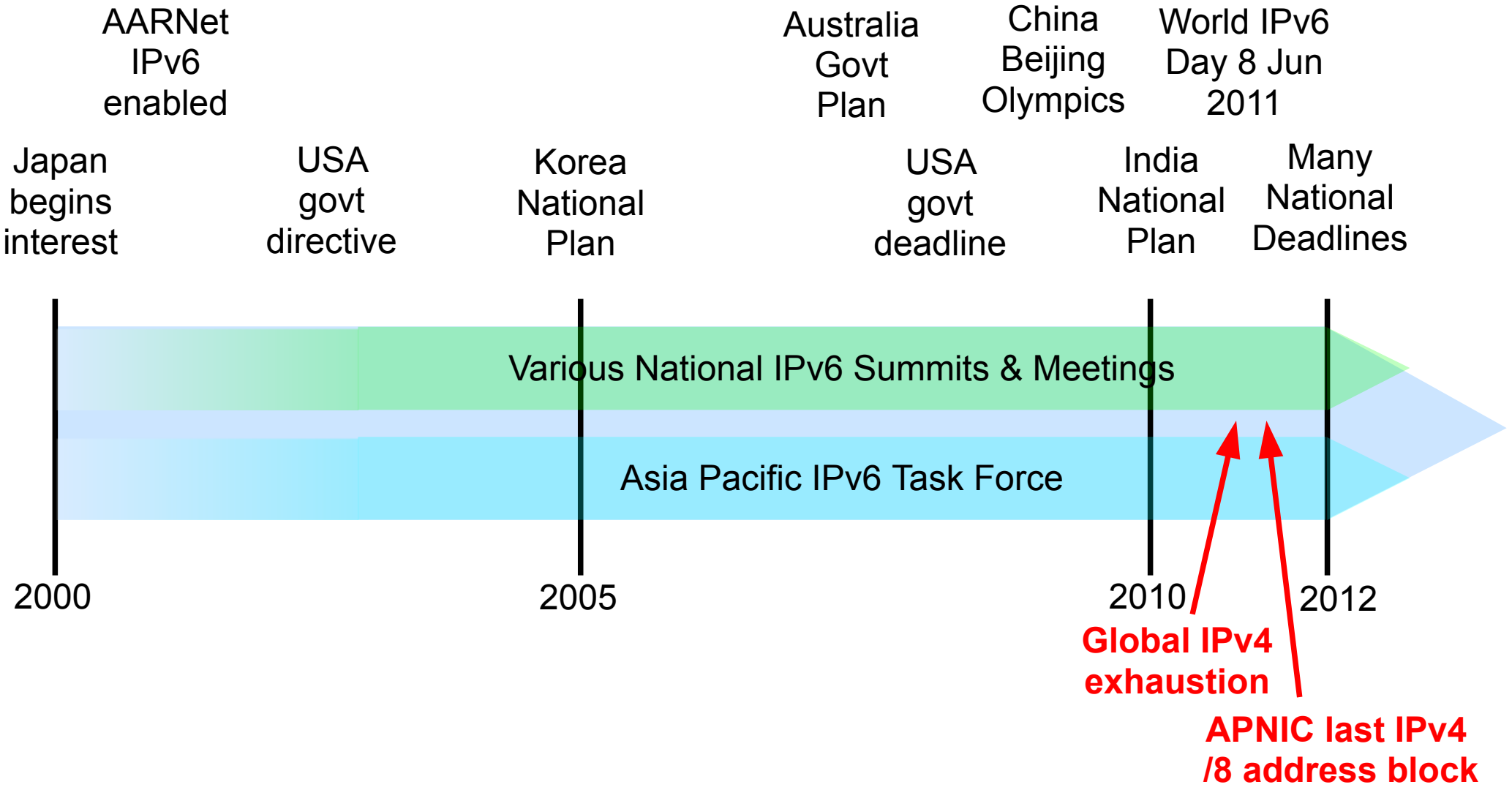
Because it's the Internet...

...everyone makes their own decision!

Why should Asia Pacific be interested in IPv6?

- Trading and strategic reasons
  - Japan
  - Korea
  - China
  - USA
  - Europe
  - India

Asia Pacific IPv6 Timeline



Case Study:
Australian experience

Australia – the facts?

- What is Australia's position?
  - Hard to tell … 'auNIC' does not exist
  - Australians apply direct to APNIC for addresses
  - Many say 'with 5 years IPv4 available, what is the problem?'
- Australia has two of the three largest Asia Pacific IPv6 blocks

Australian IPv6 Timeline

- pre 2005 – low level interest, ISOC-AU watching brief, AARNet operations, GRANGENET
- 2005 –
  ISOC-AU IPv6 Special Interest Group
  National ICT Industry Alliance endorsement
  Australian IPv6 Summit (commenced)
  IPv6 for e-Business (Aust Government $)
- 2007 – IPv6Now established, Aust Govt Transition
- 2008 – IPv6Now powers StudentNet – 3rd largest education IPv6 network in world
  - global unanimity on adoption of IPv6

Australian IPv6 Timeline

- 2009 – VIC6 testnet established
  - Internode IPv6 over ADSL
- 2010 –
  Emerging interest in IPv6 training
  Record IPv6 Summit attendance
  Anticipation of IPv4 address exhaustion
- 2011 – Growing interest in IPv6 training
  Emerging interest in IPv6 adoption planning
  World IPv6 Day
  Telstra commercial IPv6; NBNCo IPv6 strategy
- 2012 – Australian government IPv6 deadline

Key Australian Strategies

- Central coordination: ISOC-AU SIG jointly with IPv6 Forum
- Industry first:
  National ICT Industry Alliance - 25 members
- Aust Government next – initial funding
- Australian awareness – IPv6 Summit
- Practical balanced information:
  IPv6 for e-Business, ipv6.org.au
- Practical demonstration: VIC6, vic6.net
- Publicity: World IPv6 Day, international engagement

IPv6 in Australia

- Building management
- Sensor networks
- Supply chains
- Emergency services
- Consumer electronics
- Automotive industry
- Education collaboration services
- Internet users end-to-end

Who is already engaged with IPv6?

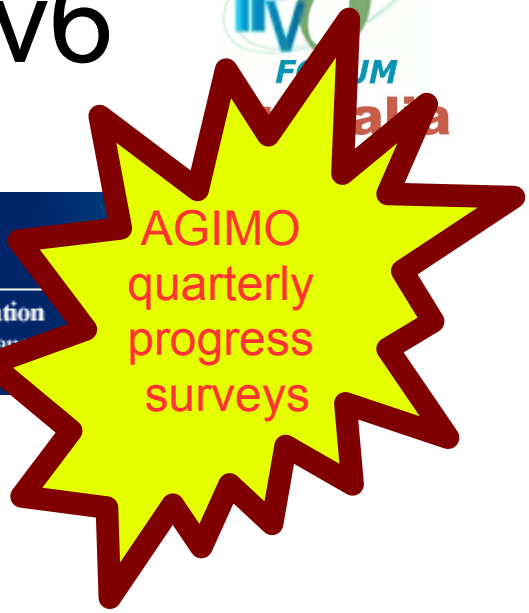
- ISOC-AU IPv6 Special Interest Group joint with IPv6 Forum
  - Australian IPv6 Summit
  - IPv6 for e-Business
- Lead sectors in Australia
  - Research & Education, Defence, Government
  - Victorian government study & testnet
  - Service providers
- National ICT Industry Alliance from 2005
- Australian Government support from 2005

What is happening with IPv6 in Australia?

- IPv6 Info – IPv6 for e-Business
  - www.ipv6.org.au
- IPv6 Summits
  - Latest 17-19 Oct 2011
- ISOC-AU IPv6 Special Interest Group
  - IPv6 Oz Tech list
- Service Providers
- Carriers & ISPs

Federal Government IPv6

- AGIMO Sponsored
- 3 step plan
  - Preparation 2008 – 12/2009
  - Transition 2010 – 12/2011
  - Implementation 01/2012 through 12/2012
- Major Activities
  - Stocktake
  - Threat and Risk Assessment
  - Building IPv6 Awareness
  - IPv6 Backbone
  - v6 Applications
  - Training Needs Analysis
  - Procurement Policy Review
  - I-RAP assessment
  - Dual Stack



IPv6 for e-Business Project

IPv6 for e-Business had four aspects:

- Mapping: to document Australian services, software and technologies currently taking advantage of IPv6 as of July 2006
- Enabling: to develop integrated business models, checklists and tools to enable Australian businesses to easily adopt IPv6
- Awareness: to provide information resources, documents and seminars to build broad awareness of IPv6 opportunities
- Infrastructure: to assess infrastructure support for applications with the IPv6-ready .au Registry testbed

Australia has strong interest in IPv6

IPv6 DFP's per country

Total number of countries: 173

Pos	Flag	Country	V	A	VP
1		United States	909	2216	9.33%
2		Germany	352	563	3.61%
3		Brazil	105	520	1.08%
4		United Kingdom (Great Britain)	216	440	2.22%
5		Australia	117	409	1.20%
6		Russia	182	354	1.87%
7		Netherlands, The	217	334	2.23%
8		Japan	135	319	1.39%
9		France	125	252	1.28%
10		Canada	109	210	1.12%
11		Sweden	104	192	1.07%
12		Switzerland	114	182	1.17%
13		Italy	76	169	0.78%
14		Czech Republic	111	155	1.14%

Default Free Prefixes

- Australia is fifth for allocated DFPs
- Australia is seventh for visible DFPs
- Percapita Australia is number 1

www.sixxs.net/tools/grh/dfp/

Australia's opportunities with IPv6?

- “Wait & see”...waiting for IPv4 exhaustion...

Innovation and IPv6?

...OR...

- Develop IPv6 in new larger networks
  - Our new networks should have IPv6
    eg: National Broadband Network, laptops in schools
  - IPv6 should be considered for **all** new infrastructure
- Use IPv6 as “Platform for Innovation”
  - Creating new business opportunities:
    ICT, other sectors

What do we need to do?

- Learn & develop skills
- Transition planning
- Infrastructure projects
- Supportive government policies

- ...and start to use IPv6 in your own networks

Asia Pacific
IPv6 Task Force

AP IPv6 Task Force

- Linking all economies of the Asia Pacific Region
- Regular gatherings and meetings
  - Effective remote participation
  - Next gathering: India, Feb 2012
- THE forum for exchange of ideas about IPv6
- This 24 months is key for IPv6 implementation
- Open for input from all – issues for discussion?

Between Now and 2012

- There are two Internets: IPv4; IPv6
  - Economies remaining on IPv4-only risk being left behind
- OECD Seoul Meeting June 2008
  - *Internet Address Space* - DSTI/ICCP(2007)20/FINAL
- IPv6 Roadmaps – 2012 deadlines
  - Japan, S Korea, USA, Europe, China, India, Australia
  - Most recent: USA OMB, 28 Sep 2010: external servers IPv6 by 2012

Rebuild the Worldwide Internet

- Dual-stack is the recommended approach
- The global IPv6 mesh is beginning to close
  - IPv6 traffic could approach 5% soon
- Higher end equipment is dual stack
  - Some CPE is beginning to be IPv6 capable
- New skills are required!
  - The 'IPv4 cookbook' approach won't work here
- Services and support are available

Tools and Skills

- Network Design & Engineering
- Network Administration
- System Administration & Security
- Applications Development
- Compliance & Testing
- Network Management Tools
- Audit of Hardware & Software
- Consultancy & Support

Transition! or Adoption?

- Transition = move from IPv4 to IPv6
- Adoption = uptake of IPv6
- Will IPv6 replace IPv4? When will that happen?
- All economies (and businesses, organisations and individuals) need an adoption strategy!

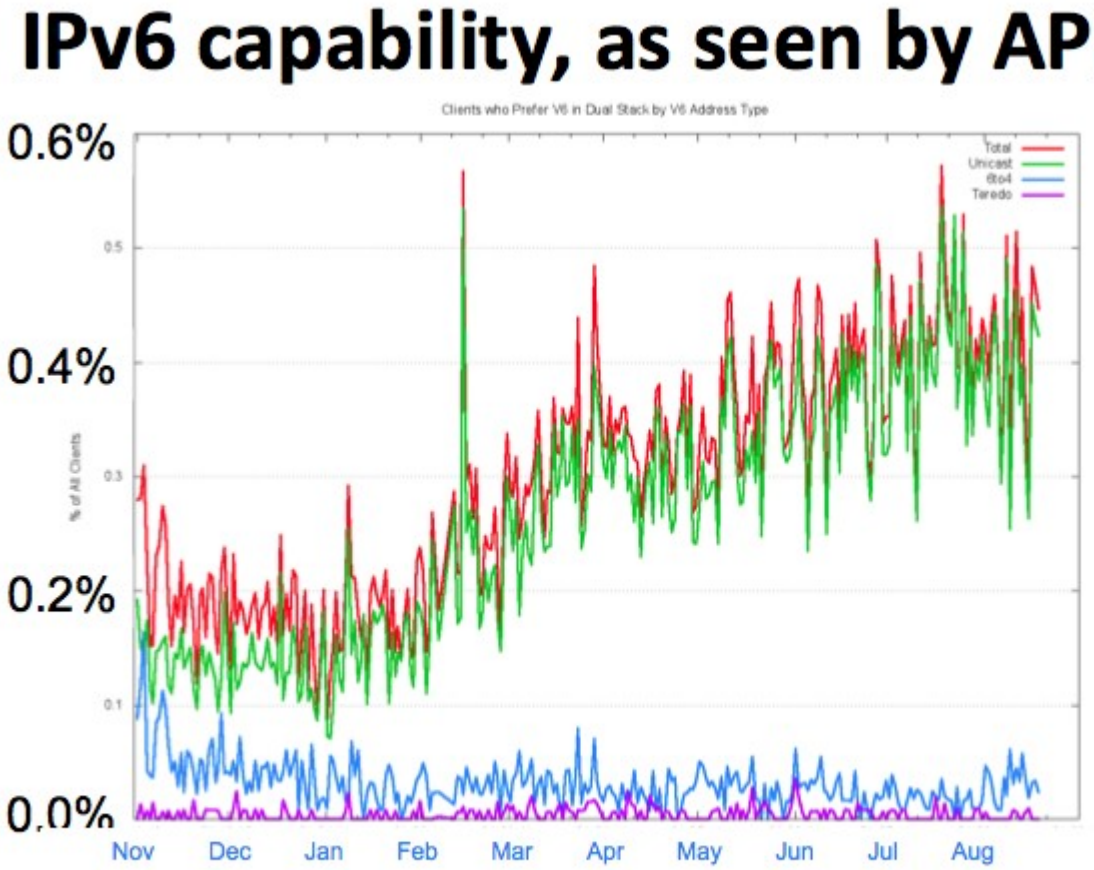
What is the real IPv6 experience?

World IPv6 Day
8 June 2011

IPv6 Real Experience

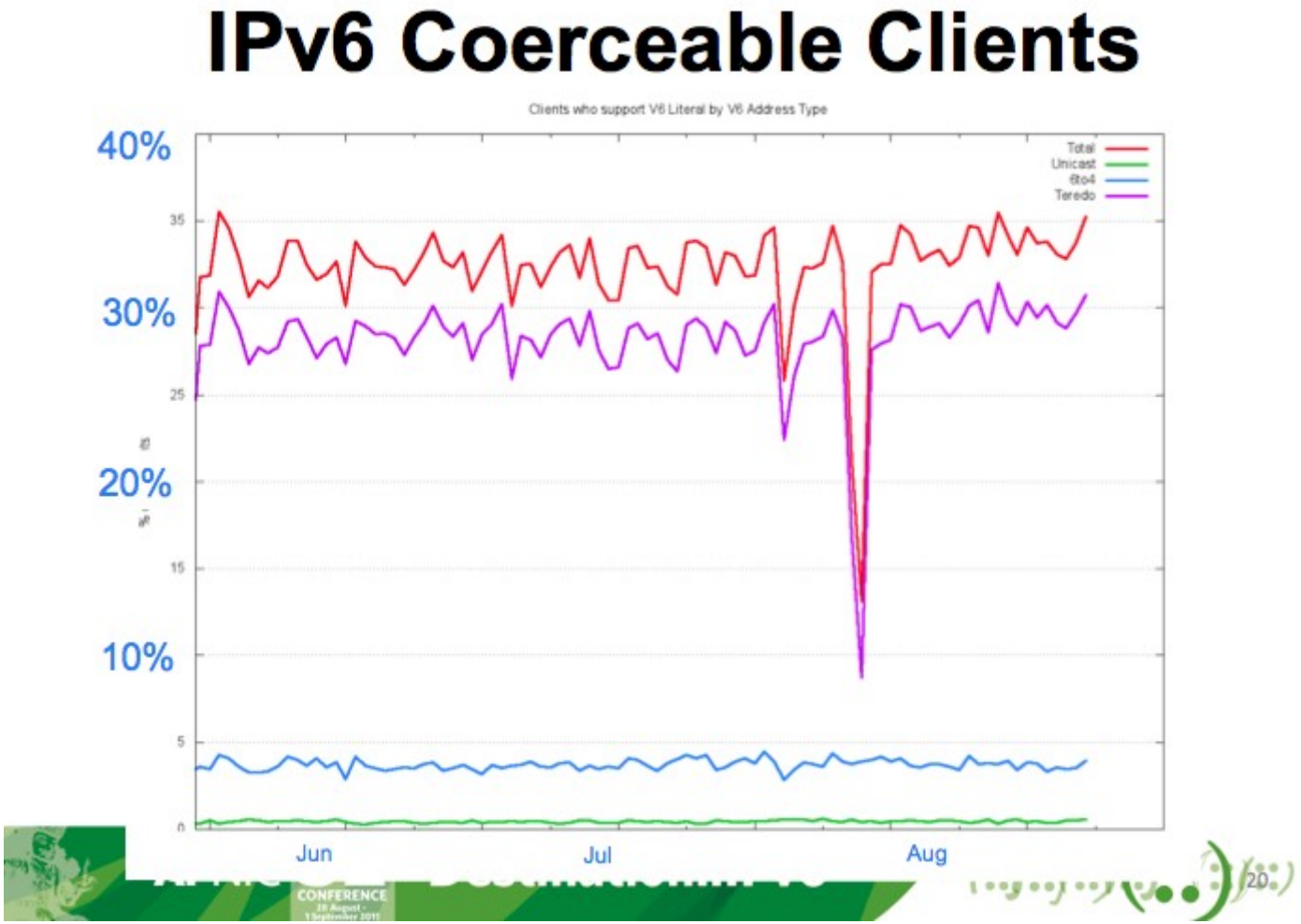
- World IPv6 Day
  - First international coordinated trial of IPv6 on the REAL INTERNET
- Expectation:
  - 0.05% of users will break
- Experience:
  - 0.02% of users did break
- Result: FUD reduced

IPv6 Traffic



Courtesy: Geoff Huston, APNIC – IPv6 Forum, APNIC32, Busan
http://meetings.apnic.net/32/program/ipv6

IPv6 Capability



Courtesy: Geoff Huston, APNIC – IPv6 Forum, APNIC32, Busan
http://meetings.apnic.net/32/program/ipv6

and now a word from our sponsors!

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This presentation is brought to you by the letters **I**, **P** and **v** and the number **6**

...as well as IPv6Now Pty Ltd

Business Areas

All you need to get started in IPv6Now:

PLANNING

- Strategic Analysis
- Transition Planning
- International alliances
- Joint product development

IMPLEMENTATION

- Training
- Operations
- Services
- Product supply and integration

IPv6Now Major Implementations

- VIC6 – industry testnet for IPv6
  - up to four core nodes: Ballarat
  - industry nodes
  - virtual access via IPv6Now tunnels
- StudentNet – 11K school students in NSW
- Freenet6 – 1 of 3 nodes worldwide, 5K users
  - gogoNet: gogonet.gogo6.com
- Try6 – free, single IPv6 address tunnels

Key References

- www.ipv6.org.au
- www.ipv6.org.au/summit
- www.ipv6now.com.au
- www.vic6.net

Questions?

- Asia Pacific IPv6 Task Force
  - www.ap-ipv6tf.org
- Internet Society of Australia
  - www.isoc-au.org.au
  - president@isoc-au.org.au
- IPv6 Forum
  - www.ipv6forum.org.au
  - president@ipv6forum.org.au