



Mr Keith Besgrove
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Dear Keith

Thank you for your letter of 24 July 2008 seeking perspectives on the state of transition to IPv6 in Australia.

This letter is responding to the same request sent to the Internet Society of Australia and .au Domain Administration and reflects the views of both organisations. It also reflects the views of the IPv6 Forum in Australia. In some cases individuals are members of both organisations. The activities of the IPv6 Forum Australia are carried out through the IPv6 Special Interest Group of ISOC-AU, which cooperates with auDA in various IPv6 related activities. Some members of these groups are also the founding shareholders of IPv6Now.

We would be happy to provide additional supporting or clarifying information on the following points, or to discuss how we could work with your Department on a more detailed analysis and investigation of these issues.

Yours sincerely

Tony Hill
President
ISOC-AU

Chris Disspain
CEO
auDA



Response by ISOC-AU and auDA
endorsed by IPv6 Forum Downunder
to
Department of Broadcasting, Communications and the Digital Economy
questions re
IPv6 in Australia

What do you believe is the current status of Australian commercial networks IPv6 readiness?

We consider the current status of IPv6 readiness in Australian commercial networks to be in its initial stages, as reflected in the status summary on www.ipv6.org.au and on the analysis provided by Mark Prior, http://www.mrp.net/IPv6_Survey.html.

Some 'wholesale' networks are available with points of presence offering IPv6 in Australia, such as NTT and Vocus, but we understand they have been receiving few requests for commercial supply. The only 'retail' networks that had fully implemented IPv6 prior to 2008 were AARNet, AusRegistry and IPv6Now. Earlier attempts to implement IPv6 on a retail basis have not been sustained by the companies involved. AARNet has been providing IPv6 capability in its network since the establishment of the GrangeNet Project in 2002. AusRegistry enabled the .au DNS registry with IPv6 accessibility and storage as part of the IPv6 for e-Business project in 2006. IPv6Now commenced offering IPv6 hosting of Websites in 2007. IPv6Now has also been offering business grade IPv6 connections since April 2008. In June 2008, Internode became the first current Australian ISP to offer IPv6 retail transit, accessible either by ethernet connection to the Internode network or by their own tunnels infrastructure. In August 2008, Vocus began offering a free IPv6-only wholesale service to ISPs that are co-located with them.

There are also few corporate networks that are IPv6 enabled at this time. The media generally reports on IPv6 enablement of Australian enterprises, including corporations such as Microsoft, Bechtel and mining companies who are trading with Japan.

As of August 2008, some 46 Australian based organisations have obtained allocations of IPv6 addresses from APNIC, including service providers, corporate and government organisations. Currently 17 of these are advertised and routable on the Internet. Telstra and the Australian Department of Defence have obtained two of the three largest IPv6 address allocations in the Asia Pacific region..

Traffic analysis continues to show low percentages of IPv6 traffic in total Internet traffic. APNIC

analysis has shown a range of traffic from around 2% to 14% in various circumstances. An analysis by Arbor Networks, recently announced in Australia, showed less than 1% of traffic. Given that there is limited end-user IPv6 connectivity in Australia and elsewhere, it is not clear whether these estimates include the amount of IPv6 traffic in tunnel mode.

In Australia, what are the major obstacles to IPv6 adoption? What are the major drivers?

- Obstacles

There are no technical obstacles to successful implementation of IPv6 based networks, either as native architectures or as dual-stack networks. Successful implementations have been achieved in a number of situations, including GrangeNet/AARNet, US Defense Research Engineering Network, IPv6Now, Internode, Vocus and other overseas implementations. These implementations prove that IPv6 is a practical platform for IP based networks.

However, for more widespread adoption of IPv6 to proceed, there needs to be a process of assessing what parts of the network are IPv6 capable. More recent routers and other core network technologies have been developed with various levels of IPv6 capability, but they need to be assessed to ensure suitable levels of end to end network performance.

Address allocation can be an obstacle for implementation by corporate networks, where there is no availability of IPv6 from a suitable service provider. The current basis of IPv6 address allocation policy, as enunciated by APNIC, is that address allocations are made from IANA to Regional Internet Registries, and then to Local Internet Registries who make allocations to end-users. This policy depends heavily on the readiness and role of service providers. There is also a policy allowing allocation of "small multihoming assignments". However, unless these allocations are used for multihoming within three months, the policy provides for them to be reclaimed. In a situation where IPv6 services are not available to support a multihoming environment, a three month period is likely to be too short; the organisation will not be in a position to complete its planning and implementation with certainty about the allocation of addresses.

In general, however, the small office/home network market (SOHO) is not well served with IPv6 capable equipment in Australia, particularly including DSL routers, which are in general not IPv6 capable and not software upgradeable. Some manufacturers (D-Link, Billion) have announced IPv6-capable SOHO hardware, but it does not appear to be actually available for purchase yet.

Two key business-related obstacles currently slow the implementation of IPv6. First, the availability of IPv4 addresses has been sufficient for the operation of most service provider and corporate networks in Australia. Second, transition to IPv6 requires an investment in planning, training and infrastructure, which ISPs have been unable to justify in terms of return on investment. In addition, there are two 'chicken vs. egg' dilemmas with IPv6 adoption that are commonly recognised. One relates to the interaction of network *and* IPv6-capable applications. Many basic applications are IPv6 capable, including in a dual stack network environment, such as email readers and Web browsers. However, there is a massive shortfall in availability of IPv6-only applications compared to availability of network hardware, particularly. The other relates to the cycle between service providers and users. Service providers commonly say that they will not invest in IPv6 capability until there is customer demand, while users say that they cannot explore the opportunities

with IPv6 until services are available.

- Drivers

The key drivers of IPv6 take up are the international transitions that are under way in Australia's leading trading and strategic partners, the potential for innovation based on the more powerful capabilities of IPv6 based networks, and the imminent exhaustion of IPv4 address pools. A recent summary of the address exhaustion situation is provided in the *Australian Financial Review* on 26 August 2008, titled "Time to address a very serious problem". More detailed data is available from APNIC, see www.apnic.org.

What is the general level of IPv6 awareness / planning / readiness among membership of ISOC-AU and auDA?

- Awareness

Awareness among the membership of ISOC-AU and auDA is high. The activities conducted during the IPv6 for e-Business project created increased awareness of IPv6 and its Australian implications for the membership of both organisations, particularly through establishment of a unified body of reference material online at www.ipv6.org.au. In addition, the process of Australian IPv6 Summits was begun in 2005 and has continued on an annual basis. These summits have allowed Australian discussion of IPv6 related issues, including among the membership of both organisations and invited international experts. The support of the Australian Government in pursuing both of these activities is strongly acknowledged and would be welcomed in the future.

ISOC-AU is the Australian chapter of the worldwide Internet Society (ISOC), which in turn is the umbrella organisation for the Internet Engineering Task Force (IETF). IETF is the process that generates all Internet standards, including IPv6. IETF has been developing IPv6 and associated transition strategies since the early 1990s and the membership of both organisations are well connected with this process. For instance, ISOC-AU has hosted regular briefing sessions on IPv6 at numerous events since 2001, including a briefing by the chair of the IETF, Fred Baker, on IPv6 in Melbourne. That briefing was updated by Fred on 11 August 2008 in Melbourne. ISOC-AU has also arranged discussions with various international organisations in Australia and overseas, for example the meeting between Per Blixt of the European Commission and ISOC-AU members in March 2008.

- Planning

Planning among the Internet community has been proceeding steadily since the formation of an IPv6 Special Interest Group by ISOC-AU in cooperation with the IPv6 Forum Downunder, in 2005. The IPv6 Forum Australia (known also as the IPv6 Forum Downunder) is the Australian representative of the worldwide IPv6 Forum, which is endorsed by the IETF as the worldwide body for promotion of IPv6. These links have allowed Australia to become part of the world and regional IPv6 planning processes, including participation in the Asia-Pacific IPv6 Task Force on a regular basis since 2006. In particular, Tony Hill, President of ISOC-AU has represented Australia at numerous international events, including European IPv6 Day on 30 May 2008. Members of the ISOC-AU SIG constitute the membership for the local chapter of the IPv6 Forum

(www.ipv6forum.com). Michael Biber, President of the IPv6 Forum Australia endorses the content of this document.

ICANN is the international body governing allocation of IP addresses and domain names. In 2007, its board concluded that the Internet engineering community had formed a consensus that transition to IPv6 was necessary and imminent. ISOC-AU, auDA and our members continue to participate strongly in many of the forums of ICANN, including as office holders in many instances. In particular, ISOC-AU is endorsed as a regional at-large organisation in the Asia Pacific region, where we are represented by the ISOC-AU Treasurer, Cheryl Langdon-Orr. The at-large group has been fostering regional planning discussions of IPv6.

auDA CEO, Chris Disspain is Chair of the Country Code Name Supporting Organisation (ccNSO). The ccTLD manager members of the ccNSO have held and continue to hold regular discussions of the state of IPv6 planning and readiness around the world. Vast differences exist in both with some territories rapidly deploying IPv6 addresses and others with no plans to become IPv6 capable in the near term.

Chris Disspain is also a member of the United Nations Secretary General's Internet Governance Forum (IGF) Advisory Group. There was an initial reluctance to discuss the topic of transition from IPv4 to IPv6 at the IGF because of a belief that it was an intensely technical subject. This has now been overcome and a number of activities at the IGF in Hyderabad in December 2008 will be IPv6 related.

ISOC-AU and auDA are members of the National ICT Industry Alliance (NICTIA). In 2005, ISOC-AU presented NICTIA with the case for Australian discussion to build awareness and planning for IPv6. NICTIA has continued to endorse this discussion, particularly through the process of IPv6 Summits, that are now joint hosted by ISOC-AU, Ai Group, auDA and ADIESA, and endorsed by the IPv6 Forum, ISOC, NICTIA, ACS and the IPv6 Forum Downunder. In 2007, NICTIA launched its 10 year strategic vision for the Australian ICT sector, which included making IPv6 a priority under its comments on infrastructure.

Lead adoption sectors in Australia are the research and education sector, Australian defence and the Australian government more generally. As noted above, AARNet has made IPv6 available to its users for some years and has begun fostering a more extensive roll out of IPv6 on university campuses through a special working group established this year. The Australian Department of Defence has established 2012 as the target date for completion of transition to IPv6.

The Australian Government Information Management Office (AGIMO) has developed one of the first full transition plans to IPv6 for the whole Australian Government, with 2015 as the target date for completion. In reviewing the timetable of the plan, ISOC-AU has formed the view that the AGIMO transition plan is not well timed to synchronise with the projected exhaustion of IPv4 addresses and the internal deadlines in the plan should be moved forward.

- Readiness

Australia is in the initial stages of transition to IPv6 compared to some other nations who are well advanced. Japan already has major service provider networks that are IPv6 enabled with paying

customers. Europe has a number of ISPs who provide IPv6 as an optional extra and has set itself the target of achieving 25% of Internet users accessing IPv6 by 2010. South Korea has a national target of achieving civilian adoption of IPv6 by 2010. In the USA, 25 government agencies achieved an implementation of IPv6 in backbone networks by the target date of June 2008. China is reported to have spent substantial sums to ensure that the China Next Generation Internet built out an IPv6 backbone in time for the Olympics, and the Beijing Olympics Website was accessible via IPv6 (as well as IPv4).

In Australia, many of the parameters for IPv6 adoption have been established because of the activities described above, so that:

- training is currently being provided by AARNet and APNIC, and is now available on a commercial basis from IPv6Now and some vendors
- the .au DNS is IPv6 operational
- IPv6 access is available from IPv6Now and Internode, and wholesale providers such as NTT and Vocus
- In the last 12 to 18 months a few commercial providers of IPv6 hosting have emerged
- IPv6 peering is becoming available at various peering points, particularly including WAIX
- The Australian Government has begun transition planning, with activity by AGIMO and Department of Defence, including the TIPSTEEL interoperability test network

However, corporate and SOHO transition to IPv6 is still to begin in earnest.

In Australia, do you believe that market forces will facilitate a smooth transition to IPv6 in the commercial market place?

Australian industry is beginning to become aware of the issues of transition to IPv6 and, as identified by OECD, is likely to need government support to effect a smooth transition. The costs of transition have tended to be seen in isolation, and in particular without considering the cost of *non*-transition.

The worst case scenario maybe that over the next three to five years many businesses will experience “sudden” address shortages, and will seek quick fixes. It is highly likely that some network operators will take advantage of the situation to provide usable, but mutually incompatible, “walled garden” solutions. There is thus a high risk of a “Balkanisation” of the local and even the global Internet as a result.

However, with government support these possibilities may be avoided, in particular, Government coordination in mandating open standards and effective interoperability.

What role do you identify for government in the deployment of IPv6 in Australia?

We see the role of Government as being leadership, in three areas:

- in the area of standards and interoperability
- by making Government content accessible via IPv6
- by supporting industry education and awareness in concrete ways

Priorities

The key priorities that we have identified for Australia's IPv6 transition are:

- Skills – development of IPv6 skills at all levels from technical to executive
- Transition planning – national coordination of transition planning efforts
- Infrastructure projects – incorporating IPv6 capacity into all major infrastructure
- Supportive government policies – align government policies as part of national IPv6 innovation

Supportive Government Policies

As part of its analysis of IPv6 in support of future development of the Internet Economy, the OECD identified a central role for governments and a range of potential areas of government action. In Australia, government has shown a willingness to participate in supporting transition to new platform standards and technologies, such as the announcement of a range of activities related to the transition to digital television.

The key policy areas in which government could support Australia's transition to IPv6 are to:

- Fund an Australian IPv6 roadmap and establish a funded Australian IPv6 transition strategy
- Work with industry and research to develop strategic IPv6 opportunities
- In ISOC-AU's view accelerate the dates for government transition to IPv6 to be in line with projected IPv4 address exhaustion
- Incorporate IPv6 into infrastructure projects, such as the FTTx network, NBN, SmartGrid, computers for schools, and other government supported projects
- Incorporate IPv6 solutions in government, industry and community, such as Green Computing initiatives
- Foster innovation around IPv6 by 'whole of government' approaches to supporting the NICTIA 10 Year Strategic Vision for the Australian ICT industry
- Provide funding for national coordination of IPv6 transition, including international interoperability trials in e-business and e-government
- Fund development of industry capability for strategic assessment of IPv6-based opportunities and skills development
- Play a role as a sponsor of forums for joint industry and government discussion, such as the Australian IPv6 Summit
- Support the attendance of industry and government representatives at International regulatory and standardisation meetings, in order to foster Australian interests at these events.