APNIC

Apster

-ster *(suffix)* One that is associated with, participates in, makes, or does: *songster.*
Source: ***www.dictionary.com***

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APNIC - Addressing the challenge of responsible Internet resource distribution in the Asia Pacific region

www.apnic.net

IPv6 deployment is here

A year ago, IPv6 was still considered an experimental protocol. However, IPv6 is now being deployed live around the world. Basic Internet infrastructure services, such as DNS, are being adapted to integrate IPv6 support. Currently, there are over 300 IPv6 prefixes on the IPv6 routing table.

In this issue of Apster, IPv6 issues are mentioned in a number of articles, demonstrating the extent to which IPv6 is now an integral part of the Internet protocol suite.

IPv6 and APNIC

APNIC first deployed a test IPv6 network in 1998, connecting to the 6bone via Cisco. APNIC will be deploying whois, web, and email services by the end of December this year. This will enable the APNIC community to access all APNIC resources via IPv6 native networks. In early 2003, APNIC will enable reverse DNS lookups via IPv6 native networks. IPv6 reverse domains can currently be registered in the APNIC Whois Database and accessed via IPv4 DNS servers.

IPv6 and the RIRs

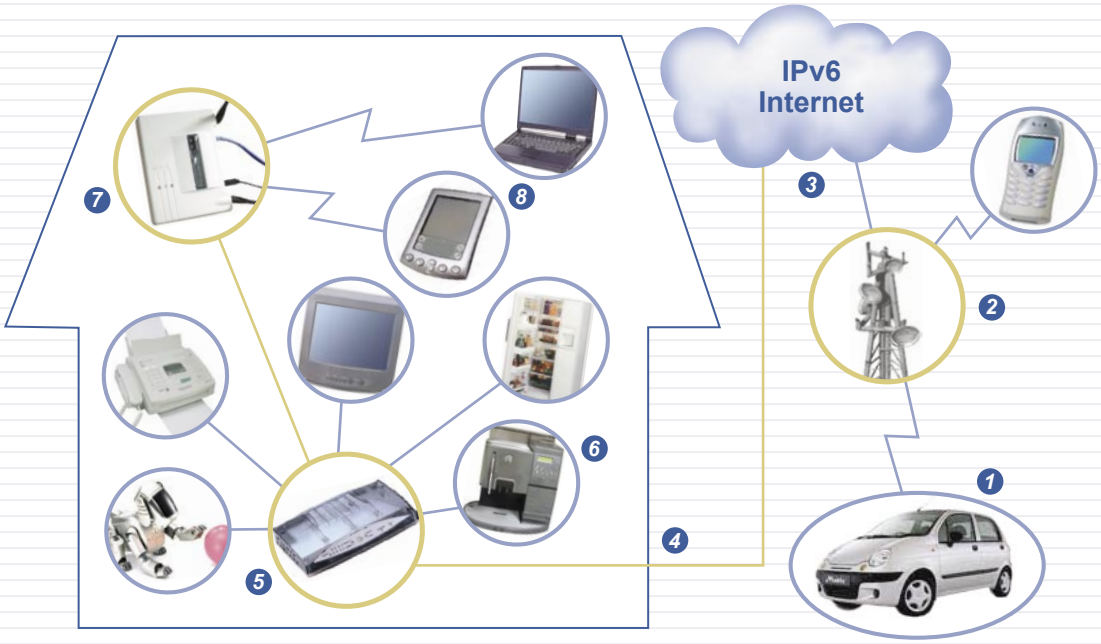
In collaboration with 6bone, APNIC, ARIN, and RIPE NCC recently proposed the integration of experimental 6bone address prefixes into the public Regional Internet Registry database system. This proposal is now being considered by the 6bone community. For more information, see:

- **6bone address registry proposal:**

  www.apnic.net/meetings/14/sigs/policy

- **6bone mailing list:**

  http://mailman.isi.edu/pipermail/6bone



An IPv6-enabled scenario

The IPv6 enabled home network will allow numerous wired and wireless devices to communicate with each other and with networks on the Internet.

A person drives home from work in a car (1). As the car nears home, it connects via a wireless network (2) to the Internet (3) before reaching the home network (4). The home network router (5) forwards messages to devices in the house. The coffee machine (6) receives a message to grind fresh coffee, and messages are relayed via the home's wireless access point (7) to the PDAs and laptops (8) to notify the family that dinner preparations can begin.

▲ Electric town "Akihabara" at night

The Internet in Japan

Japan is the host country for APNIC's 14th Open Policy Meeting (see page 4). Accordingly, in this article we profile the development of the Internet in Japan.

In 1986, an experimental project known as WIDE (Widely Interconnected Distributed Environment) was overseen by a private sector consortium headed by Prof. Jun Murai, one of the founding members of the APNIC Executive Council in 1996. The first world Internet conference, INET92, was held in Kobe by ISOC (the Internet Society). In 1993, the first commercial ISP was launched in Japan by TWICS.

Key dates in Internet development in Japan

1986	WIDE project established
1992	INET92 held in Kobe
1993	First commercial Internet access service established
1996	NTT Labs establish an IPv6 research network
1997	JPNIC established
1998-1999	IPv6 services launched by IIJ over v4 tunnel
1999	i-mode launched
2000	Commercial ADSL services launched
	Commerical FTTH services launched
2001	First commercial quality Asia-USA-Europe IPv6 backbone
	First commercial IPv6 service launched
	Commercial FTTH services launched by NTT
	JPRS (Japan Registry Service) enables users to access websites with Japanese language domain names via Internet Explorer
	3G (Third Generation) mobile phones launched

Since those early years, use of the Internet in Japan has grown from 11.55 million users in 1997 to almost 56 million users in 2001. It is predicted that by the year 2005, over 87.2 million people (68 percent of Japan's population) will be connected to the Internet. Japan is currently leading the world in the development of IPv6 enabled networks and Internet access via mobile phones and other hand-held devices. Despite an initially slow deployment of broadband technologies, Japan is also quickly catching up with the broadband services widely available in other countries.

IPv6

Currently, five ISPs in Japan offer commercial IPv6 services. Another 25 ISPs are offering experimental services. Japanese networks were first allocated IPv6 address ranges in 1999 by APNIC. JPNIC began allocating IPv6 address space to its members in 2000.

To encourage further development of IPv6 enabled networks, the Japanese government has introduced a tax incentive for 2002-2003 for companies that install IPv6 compliant routers. Many other industries are now creating IPv6 enabled products, such as Sony's Playstation 2. The Internet ITS Research Group began testing IPv6 enabled cars in February this year.

i-mode

i-mode, developed by NTT, provides Internet access from mobile telephones to services such as email, online banking, and ticket reservations. One of the reasons for its success is that users are charged by the total amount of data transmitted and received and not by time spent online. In the few years since i-mode's introduction, there are now over 30 million people using it to access the Internet in Japan.

Broadband

Currently, Japan is behind Korea, Hong Kong, Taiwan, and Singapore in terms of broadband market penetration. Despite the initially slow deployment of broadband, however, Japan is predicted to become one of the world's largest broadband markets within the next two years. xDSL is the fastest growing broadband service in Japan today.

Internet access in Japan*

- Japan has the second largest number of Internet users in the world
- 44% of the population (55.93 million people) are online
- 96.1% of Internet users in Japan access the Internet for email
- 60.5 % of Japanese households are online
- 97.6% of Japanese businesses with over 300 employees are online

Internet access**	Subscribers June 2000	Subscribers June 2002
Dial up telephone line	13.269 million	21.593 million
Mobile phone terminals	12.723 million	54.646 million
xDSL	1,235	3.3 million
Cable	329,000	1.626 million
FTTH (Fibre to the home)	-	68,600

* Statistics from *Information and Communications In Japan White Paper 2002* produced by the Ministry of Public Management, Home Affairs, Posts and Telecommunications, Japan.

** Statistics from *Number of Internet Users (As of June 30, 2002)*, Ministry of Home Management, Public Affairs, Posts and Telecommunications.

Samantha Dickinson, Technical Editor, APNIC <sam@apnic.net>

APRICOT update

The Asia Pacific Regional Internet Conference on Operational Technologies, APRICOT, has been held annually since 1996. APRICOT is now regarded as the Asia Pacific's premier regional Internet summit. The event provides a unique and successful educational forum for Internet builders in the region to learn from their peers and other leaders in the Internet community from around the world.

APRICOT 2003

APRICOT 2003, which is being hosted by the Taiwan Network Information Center (TWNIC), will be held in Taipei, Taiwan in February 2003. APNIC 15 will be held in conjunction with APRCOT 2003, providing one of the conference tracks.

19 - 23 February 2003	**Pre-conference Workshops**
24 - 28 February 2003	**Tutorials and Conference** includes **APNIC 15**

Call for conference presentations and tutorials

The Program Committee is now preparing the schedule for APRICOT 2003 and is seeking contributors to the programme. Contributors are sought to:

- Offer a technical tutorial on an appropriate topic
- Be an instructor at the pre-conference workshops
- Participate in the technical conference sessions as a speaker or chair
- Convene and chair a Birds of a Feather (BOF) session

Details of the conference, call for presentations, and tutorials are available at:

www.apricot2003.net

Proposals should be submitted to <submission@apricot2003.net> by 15 November 2002.

APRICOT 2004 – Call for proposals

Interested parties are encouraged to submit a proposal to the APRICOT organisers to host APRICOT 2004. The call for proposals is now open and can be obtained at:

www.apricot.net

Proposals should be submitted to <apricot-rfp@apricot.net> by 1 October 2002.

Merger of APIA and APRICOT

On 17 July 2002, APRICOT and the APIA (Asia & Pacific Internet Association) announced their merger into one body. This agreement was in response to a proposal by the APIA to provide a legal umbrella for APRICOT to ensure a stable future for the organisation and the quality of the conference.

The operation of APRICOT will now become the responsibility of the APIA Board of Directors. Therefore, the APIA recently called for nominations to fill four vacancies on the Board, and will announce the Board's composition shortly. It will operate on an interim basis until an election is held at the next AGM, during APRICOT 2003.

For more information on the APIA-APRICOT merger see:

www.apia.org

index

▲ Attendees at APRICOT 2002, Bangkok, Thailand

14th APNIC Open Policy Meeting

3-6 September 2002 Kitakyushu, Japan

The 14th APNIC Open Policy Meeting, hosted by the Japan Network Information Center (JPNIC), is being held in Kitakyushu, Japan from 3 to 6 September 2002.

▲ APNIC 13, Bangkok, Thailand

Programme

The meeting programme at APNIC 14 includes the widest range of tutorials ever offered at an APNIC meeting. Tutorials provide a unique opportunity to hear from some of the world's leading experts on very specialised topics relating to the management of Internet infrastructure.

Tutorial highlights

Effective IP Address Management: Asia Pacific Policies & Procedures
Miwa Fujii, George Kuo, Arth Paulite, APNIC

This training course is aimed at APNIC members who have little or no experience in requesting Internet resources from APNIC. It provides an overview of APNIC and address policies and describes how to request and manage Internet resources. It also introduces the APNIC Whois Database and gives an overview of reverse DNS delegations. The course is strongly recommended for all new APNIC members.

Whois v3 - What's new in the APNIC Whois Database?
Champika Wijayatunga, Nurani Nimpuno, APNIC

This tutorial provides an introduction to the functionality and features of the new APNIC Whois Database, which was upgraded to RIPE version 3 software on 20 August 2002.

RPSL - Practical tools for ISPs
Andy Linton

This tutorial introduces RPSL concepts, describes automated tools such as RtConfig used to build router configurations, and uses a case study to examine the benefits of converting from manual configuration of BGP peering policy on routers.

Multihoming using BGP
Philip Smith, CISCO

This tutorial introduces service providers to some of the features available in BGP to aid multihoming to the Internet.

IPv6 - An introduction
Keiichi Shima, Internet Initiative Japan (IIJ)

This tutorial introduces IPv6, describes how it differs from IPv4, and discusses transition mechanisms. It also examines the status of IPv6 deployment and reports on IPv6 in Japan.

Building IXes - An Asia Pacific perspective
Bill Woodcock, Packet Clearing House (PCH)

This tutorial provides a practical introduction to Internet Exchanges and their operation. It also examines routing and engineering issues with a focus on the Asia Pacific region.

DNSSEC - An introduction
David Conrad, Nominum, Bill Manning, Information Sciences Institute (ISI)

This tutorial introduces the basic concepts behind DNSSEC, its operation, and deployment. It also describes the concepts and mechanisms that DNSSEC offers.

Further details of the APNIC 14 programme can be obtained at:

www.apnic.net/meetings

The minutes from APNIC 14 will be published on the meetings website after the meeting. All papers and presentations, including those from the tutorials, will also be archived on the meeting website.

Whois v3 Enquiry Desk

Whois users are invited to visit the Whois v3 Enquiry Desk at APNIC 14 to ask questions about the APNIC Database, which was upgraded to RIPE v3 software on 20 August 2002.

APNIC hostmasters and technical staff will be available at the Enquiry Desk during the morning and afternoon tea breaks and lunches from Wednesday 4 to Friday 6 September 2002.

Whois v3

As the National Internet Registry (NIR) responsible for IP address management within Japan, JPNIC plays a central role in the management of the Internet. By hosting the APNIC Open Policy Meeting, JPNIC is fostering knowledge transfer and dialogue between the global and Japanese Internet communities and is encouraging the ongoing development of the Internet in Japan.

Meeting sponsorships

APNIC wishes to thank all those organisations supporting APNIC 14. Without their valuable contributions it would not be possible to offer a meeting programme of such a high standard.

Gold sponsors

Silver sponsors

Supporting sponsors

APNIC 16 - Call for proposals

APNIC is currently seeking proposals for our 16th Open Policy Meeting, to be held in the Asia Pacific region during September 2003. Parties interested in hosting this meeting should send a complete proposal to <meetings@apnic.net> by 1 December 2002.

Call for proposals	6 September 2002
Submission of proposal	1 December 2002
Public announcement	28 February 2003

If you are interested in hosting this meeting, you are encouraged to express your interest as soon as possible, by email to <meetings@apnic.net>. APNIC staff will be happy to answer any questions you may have before submitting a final proposal.

Details of the requirements for hosting the meeting are available from the call for proposal document at:

www.apnic.net/meetings/cfp

Calendar

- **APIA/APOPS Forum 2002**
  2-3 September 2002
  Kitakyushu, Japan
  www.apia.org
- **APNIC 14**
  3-6 September 2002
  Kitakyushu, Japan
  www.apnic.net/meetings
- **RIPE 43**
  9-13 September 2002
  Rhodes, Greece
  www.ripe.net/ripe/meetings
- **ICANN Meeting**
  27-31 October 2002
  Shanghai, China
  www.icann.org/meetings
- **NANOG 26**
  27-29 October 2002
  Eugene, USA
  www.nanog.org
- **ARIN X**
  30 October – 1 November 2002
  Eugene, USA
  www.arin.net/membership/meetings
- **LACNIC III**
  11-12 November 2002
  Mexico City, Mexico
  www.lacnic.org/en/meetings.html
- **IETF 55**
  17-22 November 2002
  Atlanta, USA
  www.ietf.org/meetings/meetings.html
- **ITU Telecom Asia 2002**
  2-7 December 2002
  Hong Kong
  www.itu.int/ASIA2002
- **RIPE 44**
  27-31 January 2003
  Amsterdam, Netherlands
  www.ripe.net/ripe/meetings
- **APRICOT 2003**
  24-28 February 2003
  Taipei, Taiwan
  www.apricot2003.net
- **ICANN Meeting**
  March 2003
  Latin America
  www.icann.org/meetings
- IETF 56
  March or April 2003
  Location TBD
  www.ietf.org/meetings/meetings.html
- **RIPE 45**
  12-16 May 2003
  Barcelona, Spain
  www.ripe.net/ripe/meetings
- **ICANN Meeting**
  June 2003
  North America
  www.icann.org/meetings

The future of IPv6 - How long will it last?

In *The future of IPv6* APNIC's Director General, Paul Wilson, provides some thought-provoking ideas about how the IPv6 Internet might evolve and, more importantly, also discusses how we need to plan for the future Internet. The article was originally commissioned and published by the Japanese IPv6 Journal in April 2002. In it, Paul provides his personal views on what the IPv6 Internet might look like. I'm sure it will prompt further thought and discussion. If you would like to make any comments on the article or would like to contribute an article to *Apster*, please email me.

Robert Winkler, Editor, Apster <*apster@apnic.net*>

IPv6 today and tomorrow

The promise of IPv6 lies in its vastly increased IP address space, and the resulting opportunity for us to abandon Network Address Translation (NAT) and clear the "fog on the Internet" [1] which obscures our vision for global peer-to-peer networking. The true potential of this enormous address space, not to mention restored transparency, is impossible to predict, particularly when such unimaginable numbers and technologies are involved. However, some very impressive examples have already been proposed (and in fact implemented) by the proponents and early adopters of IPv6.

For me, the experiments cited by Professor Jun Murai [2] have been some of the most inspiring; in particular, the example of simple windscreen wiper sensors deployed on cars in several Japanese cities, which in large numbers have given a uniquely fine-grained view of local weather. In a similar vein, tiny sensors and devices are being developed in many forms, which will eventually surround us and provide new ways to both see and control our world. Sony too has recently entered the fray, by announcing [3] that all of its devices will be IPv6-enabled in future. These are surely exciting developments.

Another IPv6 revelation came to me with the understanding that with 3G wireless technologies, the vast majority of connected devices will not be phones at all, but rather data-only devices of many different kinds. This would appear to be the enabling technology, not only for Professor Murai's experiments to be realised on a huge scale, but also for distributed applications requiring substantially more bandwidth.

The advent of Bluetooth for Wireless Personal Area Networking (WPAN) and the proliferation of 802.11 for public access LANs (and indeed, even for "free to air" packet-based metropolitan area networking), are also significant developments. These new wireless delivery technologies give us a fresh glimpse of how IPv6 will be pushed out into the environment around us, as a truly pervasive technology.

Picturing the IPv6 Internet

These revelations paint a picture of the IPv6 Internet connecting people not only with PCs, but with PDAs, cameras, cars, robots, toys, appliances, personal health and medical devices, micromechanical systems, and an unimaginable variety of special-purpose sensors, agents, embedded systems, and similar devices. With mass fabrication of chipsets, IPv6 will be built into every device, machine, and component imaginable. With each generation of general-purpose technology, new devices will naturally acquire the ability to fulfil more and more functions. Indeed, with wired and wireless connections to clusters of neighbouring devices, many such devices will be called on to act as hubs or routers for tiny distributed systems, each fulfilling general or special purposes.

One thing which eludes my imagination for the moment is the question of how all of these devices will be connected to the Internet via service providers. Will we see a small number of mega-carriers, each providing connectivity to an unlimited range of different devices and services; or instead a proliferation of special-purpose network providers deployed to provide connectivity to specific geographical areas, customer groups, specific-brand appliances, services or other divisions of the marketplace? Will we see a resurgence of off the shelf ISP technologies allowing non-Internet companies to provide their own private access services to their own customers? Will corporations and private ISPs use the Internet itself to create a plethora of IPv6 Virtual Private Networks (VPNs), each carrying its own traffic of private and sensitive data? Will our homes and offices be serviced by one or two ISPs, or by literally hundreds?

I fully expect that all of the above will occur in some form or other, in large numbers and in a variety of combinations. And again, there will always be new technologies, implementations, and business models, ready to alter the shape of the landscape yet again. It will never be a question of which technology is objectively the best or most sensible, but of which technologies are the most available, accessible, appealing, flexible and/or cost-effective for their chosen purposes.

The Internet for everyone?

Just as the next generation mobile phone networks will route more data sessions between devices than phone calls between people, the IPv6 Internet will no doubt connect many more embedded and automatic devices than traditional (human) users. This will be a radical change from today's human-user-oriented Internet.

It seems to me, in fact, that the Internet Society's simple but potent motto may in fact need an upgrade in the IPv6 age. Rather than - "The Internet for Everyone" - the new version would surely be "IPv6 for EveryTHING" - to more accurately represent our aspirations for IPv6.

Once our eyes are opened to the potential of an entirely native IPv6 Internet, we can start to see the enormous range of possibilities. Yet we are also acutely aware that the vast majority of these are beyond anticipation, and that the only sure prediction is that many things will happen which haven't been predicted, or even imagined, before.

Our moment in time is certainly unique, but I suppose that our perception of this is quite like the perceptions of many before us, such as the inventors of transistors and microchips, modems, and the IPv4 Internet itself. For these pioneers and revolutionaries, the future was as obscure to them in their time as ours is to us now.

In this spirit, for the rest of this short article I would like to air some cautionary thoughts about the future of the IPv6 Internet. My concerns relate to the size of the IPv6 Internet and in particular its address space, relative to the gigantic potential of the network to serve everybody, and, potentially, every machine, gadget, appliance, toy, vehicle, and robot which will exist on our planet in 50 years time.

I raise these issues not to promote any kind of restraint in the deployment of the IPv6 Internet today, but rather to urge a view of the IPv6 Internet as something that can continue to grow and serve us very well, and very far into the future.

How many IPv6 addresses are there?

Although it is vast, the IPv6 address space will require management. We all agree that in order to avoid the mistakes of the past, address space should be allocated to those who need it, and certainly not to those who may wish to stockpile it for speculative future gain. For this reason, the amount of address space allocated must be related in some way to the amount of need, otherwise, every IPv6 user may also become a stockpiler. This is a basic principle which may be in conflict with other worthy goals such as ease of management of address space and speed of deployment of networks. Such conflict is inevitable, but will ultimately produce solutions which represent a reasonable balance, while still recognising all of the fundamental principles and priorities involved.

To manage the process of address space allocation, a utilisation metric is needed which relates the need for addresses with the amount of address space allocated. Under IPv4, a simple requirement for 80 percent utilisation has been agreed and used for many years, in spite of being almost prohibitively restrictive for very large networks.

For IPv6, a utilisation metric based on the Host Density ratio (HD-ratio) [4] has recently been adopted, as a more realistic and workable measure. Under this system, the percentage-based utilisation of a block of address space is allowed to reduce rapidly as the address space grows, allowing the complexity of management of larger address spaces to be accommodated. Just as we chose a value of 80 percent for a percentage-based utilisation metric, we must also chose an agreed value for the HD-ratio, to represent a reasonable expectation for address space utilisation.

A specific HD-ratio value of 0.8 has discussed and generally approved by the IPv6 address community. Although this value has been described in [4] as potentially restrictive on network addressing architecture, it has found favour as a prudent compromise between efficiency of utilisation and of address space management.

Considering this accepted HD-ratio value of 0.8, it is worth noting that within the initial allocation of 2000::/3 (formerly known as FP001), a HD ratio of 0.8 will represent a utilisation of 0.195% of that address space. In other words, some 69 billion /48 prefixes will be available in practice, rather than the 35 trillion which is often reported (and which relies on an impossible 100% utilisation rate).

It is also worth noting that according to [4], a value of 0.8 is at the limit of acceptable values which allow “manageability” of the subject address space. However, if a lower value of 0.75 were chosen, the expected density of /48 prefixes in FP001 would be 0.0411%, providing a “mere” 14 billion /48 addresses.

Of course, the figures above consider FP001 only, however we can readily apply the HD-ratio calculation to the entire IPv6 address space (namely 0::/0). Within this 48-bit address space, a HD-ratio value of 0.8 gives a utilisation or 0.1289%, or a total of 363 billion addresses.

So who gets a /48?

According to (legacy) IPv6 nomenclature, a /48 is referred to as a “site address”, a term which presupposes that in an IPv6 network a “site” can be objectively identified and distinguished from other parts of the network. With the IESG-IAB recommendations of RFC3177 [5], a site is effectively defined as a network end-point which may at any time in the future require more than one subnet. The mode of connectivity is not considered relevant, so such a site may be singly or multihomed, and may have intermittent or permanent connectivity to the Internet. The IAB has provided a further recommendation that network end-points requiring only a single subnet should only receive a /64, and those constituting a single device only should receive a /128.

While these guidelines have been laid out in principle, it seems that when we consider likely IPv6 service development, a huge number of network end-points will definitely require a small number of subnets. A mobile device with both Bluetooth and wired connectivity will have more than 1 subnet; a typical car with multiple intelligent systems may have several subnets, and a robot with an internal IP architecture will also have multiple subnets. Such a robot may already exist in Sony’s AIBO; however, the details of the robot’s “OPEN-R” architecture [6] have not been fully released.

Indeed, with the development of embedded IPv6 technologies, it seems most likely that general purpose implementations will be the norm, providing the practical capacity for any such device to support subnets. When that capacity is available, even if not used, the IAB-IESG recommendations would suggest the allocation of a /48. Consequently, the default allocation for all such devices will quickly become a /48 (and perhaps more as explained below).

How big is IPv6 (really)?

Typical debates about the size of IPv6 have compared the address space in /48s with projected human population (for instance 10 billion people in the year 2050). The typical calculation (as quoted in [5]) informs us that, considering FP001 only, there will still be 35,000 /48s per person in 2050. As shown above, the practical figure would be more like 6.9 /48s per person assuming HD-ratio-based utilisation of 0.8. If we consider the entire address space, then this increases to 36.3 /48s per person.

One analysis which is missing here is an assessment of the number of non-human "persons", namely corporations and other legal entitles, which will also require IP address space. Such entities today are the major users of the Internet and will continue to be so, and they should surely be considered in such calculations.

Another analysis which is missing, and a more important one in my opinion, would compare available address space with the number of devices (especially mobile devices and systems) which may be independently connected to the IPv6 Internet in future. In this case, and considering the likely pervasiveness of IPv6, it seems that even 36.3 such devices per person may not be such a large allocation after all.

Another issue worth raising here is that under at least one current multihoming model for IPv6, each multihomed device would receive a separate /48 prefix for each of its direct or indirect upstream providers. Indeed, one motivation for setting a standard site assignment size was to make such multihoming possible. While this model may not be implemented, it does potentially multiply the consumption of /48 prefixes by a very significant factor.

The next transition?

It is notable that the major IPv6 work of the IETF has shifted from the IPNG (IP Next Generation) working group to the NGTRANS (Next Generation Transition) working group. Indeed, the major challenge ahead, namely the transition from IPv4 to IPv6, will certainly continue well after the core IPv6 standards are finalised. As the Internet continues to grow, the eventual cost of this transition is rising, and such is the scale of the work required that its cost must surely rival that of the "Y2K transition" of 2 years ago.

It strikes me vividly that if the transition from v4 to v6 is so critical and costly in these "early days" of the Internet, then the transition from v6 to the next generation IP will be unimaginably complex and cumbersome.

In fact the challenge of the "next NGTRANS" is so unimaginable at this time, that unless we believe in a magical solution, all we can responsibly do is work to ensure that IPv6 lasts indefinitely. So far there is surely very little magic in the v4 to v6 transition, but instead a huge amount of ongoing uncertainty about a task that many argue is now critically urgent.

Long live IPv6!

The IPv4 Internet has lasted for 30 years, and may last another 10 before address space is exhausted. Its nascent form seems truly miniscule compared with the Internet of today or of 2010, and it is clear that its inventors had no idea of what they had created. If we open our minds to the possibilities of IPv6, it is possible to conceive of this cycle repeating, and to imagine that today's Internet will be miniscule compared to that of 2050. However, with the benefit of not only an open mind but also of hindsight, it seems reckless in the extreme to embark on this exciting transition now with any conceivable possibility that the cycle will have to be repeated in another 40 years.

To me, our only option is to plan for IPv6 to last indefinitely, or at least until we have an idea of what the next generation IP will look like. By this, I don't mean to suggest that IPv6 should last forever but I certainly urge all of us to consider and plan for an IPv6 lifetime of well over 50 years.

Paul Wilson, Director General, APNIC <*dg@apnic.net*>

REFERENCES

[1] Brian Carpenter, Internet Transparency, March 1999, www.adtech.internet.ibm.com/~bc/transp/transp.htm

[2] Professor Jun Murai, APRICOT 2001 Plenary Session, 27 February 2001

[3] EETIMES, 16 July 2001, www.eetimes.com/story/OEG20010713S0067

[4] Internet Engineering Task Force, RFC3194, www.ietf.org/rfc/rfc3194.txt

[5] Internet Engineering Task Force, RFC3177, www.ietf.org/rfc/rfc3177.txt

[6] Sony Press Release, June 1998, www.sony.co.jp/en/SonyInfo/News/Press/199806/98-052/index.html

Changes to IPv6 reverse DNS delegations

APNIC has recently made some major changes to the way in which reverse DNS delegations are maintained for IPv6 address ranges. These are now maintained within the ip6.arpa domain, specified as the new standard by RFC3152. Previously, reverse DNS delegations were made under the ip6.int domain but use of this domain is being phased out.

Holders of IPv6 address space must now maintain reverse DNS delegations within ip6.arpa. The reverse delegations may also be maintained within ip6.int, which APNIC will continue to support for the time being.

For more information on reverse DNS delegations, see:

www.apnic.net/services/dns_guide.html

For any enquiries about reverse DNS delegations please contact the APNIC Member Services Helpdesk:

- **Phone: +61-7-3858-3188**
- **Email: helpdesk@apnic.net**

ERX project now underway

Transfer of early registration records from ARIN to APNIC and RIPE NCC begins

A major project is now underway to ensure more convenient administration and better long-term management of early Internet resource records.

Internet address resources, such as IP addresses and AS numbers, are now distributed through a well established Regional Internet Registry (RIR) system. But before the RIRs (APNIC, ARIN, and RIPE NCC) were established, resources were allocated to organisations around the world, with their records managed by central Internet registries, DDN NIC and INTERNIC.

When ARIN was established in late 1997, it inherited those "early registration" records, including many that related to resources used outside ARIN's service region. As a result, some organisations now have resource records both in the ARIN database and in the database of their local RIR.

Until now, several organisations which hold a mix of early and current resources have had to contact more than one RIR to modify their records. Eliminating the need to maintain resource records in two separate databases will reduce the overhead of these organisations and should lead to better long-term management of Internet resources.

In response to requests by the community to relocate data management from ARIN to the appropriate regions, the RIRs have been working on the "Early Registration Transfer" (ERX) project. Much of the early work in the ERX project has been to prepare for the transfer, to identify the resources, consult with the regional communities, and ensure that the registration records can be transferred with minimal disruption.

With this work now complete, the actual transfers have commenced. In August 2002, early registration AS numbers were the first resources to be transferred from ARIN to RIPE NCC and APNIC. IP addresses are scheduled to be transferred from September 2002 onwards.

The types of resources subject to transfer in the ERX project include all AS numbers; the former "Class B" network address space of 128/2; and selected former "Class C" networks, namely 192/8, 196/8, and 198/8. Within these ranges, any resources that are registered with a country code outside the ARIN service region will be transferred.

The RIRs will make reasonable efforts to contact resource holders in advance. If any resources have been wrongly identified as outside the ARIN region, the resource holders will be given the opportunity to correct this information and avoid the transfer.

All resource holders who are affected will also be encouraged to check their records as soon as possible. Although the status of allocations and assignments will not be altered by the transfer, the format of records will be automatically converted to reflect the differences in the databases.

In addition to the resource records, ARIN point of contact (POC) records will also be affected. For transfers to the APNIC database, POC records will be converted to person objects protected by maintainers. To receive the password to the new maintainer, contact persons must contact APNIC with suitable documentation of their relationship to organisation shown as holding the resource.

APNIC will contact all organisations affected before the transfer of any early registration records using contact details currently held on record.

Gerard Ross, Documentation Manager, APNIC *<gerard@apnic.net>*

ERX project information

APNIC has ERX project background, contact details, and a project FAQ on our web site at:

www.apnic.net/db/erx

If you have any questions about the ERX project, please email:

er-transfer@apnic.net

Resources to be transferred under the ERX project

"Early registration" records relate to the following resources:

- all AS numbers
- former "Class B" network address space of 128/2
- selected former "Class C" networks, 192/8, 196/8, and 198/8

Only resources that are registered with a country code outside the ARIN service region will be transferred.

Service regions of the RIRs

APNIC (Asia Pacific Network Information Centre)

- Asia Pacific region, from Central and South Asia to Oceania and the Western Pacific

ARIN (American Registry for Internet Numbers)

- North and South America, the Caribbean, and sub-Saharan Africa

RIPE NCC (*Réseaux IP Européens* Network Coordination Centre)

- Europe, The Middle East, The North of Africa, and parts of Central Asia

APNIC Routing Registry coming soon!

The recent upgrade of the APNIC Whois Database has enabled the database to record routing information using Routing Policy Specification Language (RPSL). The APNIC Routing Registry service will begin on 17 December 2002.

Key dates

20 August 2002

APNIC Whois Database upgraded to Whois v3. Upgrade is RPSL compliant.

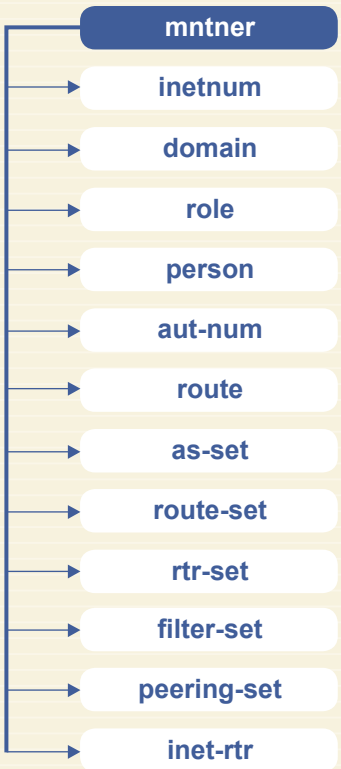
11 November 2002

Test database available for Routing Registry public testing and training.

17 December 2002

APNIC provides fully functioning Routing Registry service to members.

APIRR discontinued.



For easier management of routing and Internet resource objects, use the same maintainer to manage all your objects in APNIC Whois Database.

Internet Routing Registries

An Internet Routing Registry (IRR) contains announced routes and routing policy in a common format that networks can use to configure their backbone routers. An IRR provides a number of benefits to the Internet community, including route filtering, network troubleshooting, router configuration, and a global view of Internet routing.

Route filtering

Traffic can be filtered based on routes registered in an IRR. This can be used to prevent network problems due to accidental or malicious routing announcements. Routing announcement filtering can be created between:

- **Peering networks**
  Where the peers agree to filter based on registered routes only. If a peer's route is not registered, it will be filtered.
- **Provider and customer networks**
  Where the provider protects its network from accidental routing announcements by the customer. The customer must register its routes before the provider will accept its traffic.

Network troubleshooting

Routes registered in an IRR make it easy to locate routing problems outside your network. Use the contacts for the AS number associated with the problematic route object to resolve traffic problems.

Router configuration

Tools such as IRRToolset can create router configurations. Use these tools to:

- suggest CIDR aggregates
- check aut-num objects and their routes
- perform RPSL syntax checking on Autonomous Systems registered in an IRR

Global view of Internet routing

If all networks registered their routes in IRRs, a global view of routing policy could be mapped. This global picture has the ability to improve the integrity of global Internet routing.

Routing Registries and IPv6

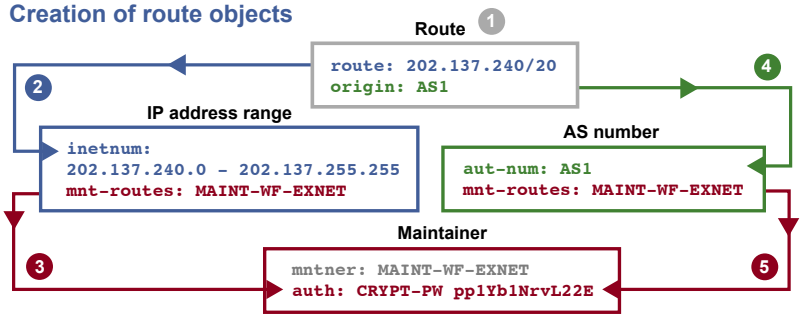
Work is currently underway to extend RPSL to describe policy for multiple protocols such as IPv6 and multicast. At APNIC 13 in Bangkok, a presentation was given in the routing SIG describing RIPE NCC suggestions for extending RPSL:

www.apnic.net/meetings/13/sigs/docs/rpslng.ppt

For more information on current discussions on RPSLng, please see the RIPE rpslng mailing list at:

www.ripe.net/ripe/mail-archives/rpslng/index.html

Creation of route objects



1. Create **route** object and submit it to APNIC Routing Registry.
2. The database checks **inetnum** object matching or encompassing the address range in **route** object's *route* attribute.
3. **Route** object creation must pass authentication method of the **mntner** specified in the **inetnum** object's *mnt-routes* attribute.
4. The database checks **aut-num** object corresponding to the ASN in **route** object's *origin* attribute.
5. **Route** object creation must pass authentication method of the **mntner** specified in the **aut-num** object's *mnt-routes* attribute.

APNIC Routing Registry

Benefits of the APNIC Routing Registry include:

- **Easier maintenance**
  Use one set of maintainer (**mntner**) and person (**person**) objects to manage both Internet resources and routing information.
- **Integrated resource and routing management**
  Before route objects can be registered in the APNIC Routing Registry, APNIC ensures that the address range and AS number are within APNIC resource ranges. In addition, the **mnt-by, mnt-lower, mnt-routes** authentication attributes in **aut-num** and **inetnum** objects ensure that the registered resource holder has control over routing objects that specify their resources.
- **Reduced costs**
  The APNIC Routing Registry service is free to APNIC members.

About the APNIC Routing Registry service

The APNIC Routing Registry will provide the following services:

- **Routing queries**
  Available by querying whois.apnic.net via
  - regular whois clients
  - special purpose programs such as IRRToolSet

    ftp.ripe.net/tools/IRRToolSet
  - APNIC whois web interface

    www.apnic.net/apnic-bin/whois.pl
- **Routing registration and maintenance**
  Creating and updating routing objects is very similar to procedures used to maintain Internet resources
- **Routing Registry help**
  Contact the APNIC hostmasters via e-mail or helpdesk
- **Training**
  Routing Registry topics will be included in APNIC training
- **Mirroring**
  The APNIC Routing Registry will mirror routing registries:
  - within the Asia Pacific region
  - major registries around the world

Routing information currently held by APNIC

In 2001, APNIC launched a pilot Routing Registry called the Asia Pacific Internet Routing Registry (APIRR). All information from the APIRR will be migrated to the APNIC Routing Registry by 17 December 2002. On that date, the APIRR will cease to function.

Some routing objects were created in the APNIC Whois Database prior to the 20 August upgrade. These objects were transferred from RIPE-181 format to RPSL format on 20 August 2002.

Sanjaya, Senior Project Manager, APNIC <sanjaya@apnic.net>
Samantha Dickinson, Technical Editor, APNIC <sam@apnic.net>

Routing objects and Internet resource objects

IPv4 address (**inetnum**) and AS number (**aut-num**) objects in upgraded APNIC Whois Database contain attributes used to control the creation and maintenance of related routing objects. These attributes are:

Object	Routing related attributes
inetnum	mnt-routes
aut-num	mnt-routes member-of cross-mnt cross-nfy mnt-lower

To create routing related objects associated with your Internet resource objects, you must first create the appropriate attributes in the **inetnum** and **aut-num** objects.

When querying an IP address or range, any associated **route** object will be returned with the **inetnum**.

APNIC Routing Registry objects

Objects in the APNIC Whois Database that form the APNIC Routing Registry are:

- **route**
- **aut-num**
- **inet-rtr**
- **as-set**
- **route-set**
- **peering-set**
- **filter-set**
- **rtr-set**

For descriptions of these objects, see:

www.apnic.net/db/ref/db-objects.html

Visiting staff programme

APNIC regularly hosts visitors from the other Regional Internet Registries (RIRs) - ARIN and RIPE NCC - and from the National Internet Registries (NIRs) - APJII, CNNIC, JPNIC, KRNIC, and TWNIC. Staff visiting APNIC undergo training and learn about APNIC's procedures. Since June 2002, APNIC has had visitors from ARIN, APJII, and KRNIC.

ARIN

Michael O'Neill

- Technical liaison
- Discuss software development processes, such as MyAPNIC
- Review operations and software interactions

ARIN

Mohammad Sepehrrad

- Hostmaster exchange of skills and ideas

KRNIC

Moo Ho Cheon

- Hostmaster training

APJII

Ahmad Alkazimy

- Hostmaster training

Please contact <joanne@apnic.net> if you would like to make arrangements to participate in the visiting staff programme.

Joanne Reichardt,
Human Resources Manager, APNIC
<joanne@apnic.net>

New staff

In a effort to provide improved service to our members, APNIC has recently recruited two new hostmasters - Srinivas (Sunny) Chendi and Wita Laksono – to join the Member Services Helpdesk. Hostmasters undergo an intensive induction programme when they join APNIC, so that they are thoroughly familiar with APNIC's policies and procedures.

Hostmaster Department

Sunny Chendi - Internet Resource Analyst

Sunny joined APNIC in May 2002, bringing with him an extensive background in technical support roles in ISPs. Sunny has both business and IT qualifications, having completed his studies in India and Australia. He has now completed his hostmaster induction and is a very active member of the Helpdesk team. Sunny speaks both Hindi and Telugu and any members wishing to communicate in these languages should ask for him when contacting the Helpdesk. Sunny also assisted with the recent APNIC Training seminar held in Chennai, India.

Wita Laksono - Internet Resource Analyst

Wita joined APNIC in August 2002, relocating to Brisbane from Indonesia where he previously worked for ISPs, gaining extensive skills and experience in technical support and systems administration roles. Wita completed his studies in computer science in Indonesia and will be a valuable asset to the Helpdesk. Wita speaks Bahasa Indonesia and will be available for member enquiries once his hostmaster induction has been completed.

Member Services Helpdesk

+61 7 3858 3188

With the addition of two new staff, APNIC now has eight hostmasters in the Member Services Helpdesk, as well as the Manager of the Department, Son Tran. Hostmasters provide key services to APNIC members including the processing of requests for address space. Consequently, APNIC is very pleased that the Helpdesk staff responsible for this critical member service come from a diverse range of cultural backgrounds. There are eight nationalities represented and APNIC members can now communicate with the Helpdesk in ten different languages:

- Bahasa Indonesia
- Cantonese
- English
- Filipino (Tagalog)
- Hindi
- Japanese
- Mandarin
- Telugu
- Thai
- Vietnamese

All member enquiries can be made to the Helpdesk, which can be contacted directly using a dedicated telephone number (+61 7 3858 3188). The Helpdesk also has extended hours of operation from 9 am to 7 pm AEST (UTC +10) from Monday to Friday.

Hours of operation
9:00 am to 7:00 pm
AEST (UTC + 10)
Monday - Friday

APNIC
Member Services Helpdesk
helpdesk@apnic.net
www.apnic.net/helpdesk
+61 7 3858 3188
+61 7 3858 3199

APNIC in the Pacific

As the Regional Internet Registry serving the Asia Pacific, APNIC liaises with the Internet community over a vast geographic area made up of a multitude of different social and cultural environments. The Pacific presents particular challenges for APNIC because of the vast distances involved and the great diversity of the region.

▲ Training in Suva, Fiji, July 2002

The Pacific Islands

The Pacific Islands are a group of island economies scattered across the Pacific Ocean. Many have very small land masses and populations. Vast distances separate the Pacific Islands and consequently there are huge differences between the smaller and larger economies. Fragmented land masses and dispersed populations frustrate transport and communications industries even among the small internal markets of each country.

Of the sixty-two economies APNIC currently serves in the Asia Pacific, twenty-four are from the Pacific with a collective population close to 8 million. The smallest, Pitcairn Island, has a population of only 50, while the largest two, Papua New Guinea and Fiji, have about 5 million and 800,000 people, respectively.

Telecommunications services

Not surprisingly, telecommunications services are viewed as a lifeline for the islands. Historically, government departments ran joint postal and telecommunications services but most of the island telcos are now wholly corporatised and offer a variety of services, including Internet access. For many Pacific Islands, satellites provide the only means of connection to the outside world and terrestrial microwave links connect the islands within an administration. Quite a few rely on satellites for national calls due to the long distances between islands.

Development of the Internet

The Internet has been around for less than 10 years in the Pacific. Preexisting infrastructure and the availability of technical staff meant that the telecommunications carriers were the ones to establish and operate the ISPs. Because of the small size of many of the Pacific Island economies the telco-operated ISP service is often the only one available. Internet services are still perceived as costly for some, mainly because of high satellite access costs and the high capital costs of network infrastructure.

Outreach seminar in Fiji

For ISPs in the Pacific, small staff numbers and costly and time consuming travel make it difficult for them to participate in APNIC events such as training and outreach seminars. Therefore, in July, APNIC collaborated with the Pacific Islands Telecommunications Association (PITA) to hold an outreach seminar in Fiji in conjunction with a PITA workshop. Almost fifty executives from telcos, ISPs, and other organisations, including government regulators from the Pacific, attended the seminar, the most successful conducted by APNIC in the Pacific.

Seminar participants gained a better understanding of APNIC and its role. The seminar also provided an opportunity for APNIC to elaborate on Internet address policies. Some participants expressed concerns that, because of their relatively small networks, they cannot satisfy the minimum criteria to receive a slow start allocation of /20 under current APNIC policies. However, APNIC encourages any network operators in the Pacific needing address space to contact APNIC to discuss their individual circumstances and to obtain advice on Internet address policies.

Many participants at the seminar also felt that there is a need for the Pacific Island members to appoint a representative to participate in APNIC forums and policy discussions. APNIC invited participants to attend the upcoming 14th APNIC Open Policy Meeting in Japan. APNIC is also planning training sessions in the Pacific in 2003.

Save Vocea, Research and Liaison Officer (Pacific Islands), APNIC
<save@apnic.net>

MyAPNIC

Development of MyAPNIC, a secure members-only service, is continuing. Members can now access the resource information contained in the MyAPNIC prototype on a read-only basis. Eventually members will be able to update their records using the secure web interface.

To access the MyAPNIC prototype, an APNIC client certificate must be installed in the user's browser.

1. To apply for an APNIC client certificate go to:

   www.apnic.net/ca

2. MyAPNIC can then be accessed at:

   https://my.apnic.net

APNIC expects to launch the MyAPNIC service (Release 1.0) at the 14th APNIC Open Policy Meeting, 3-6 September 2002 in Kitakyushu, Japan.

If you have any comments or feedback about MyAPNIC please send them to the Project Manager, Sanjaya, at <sanjaya@apnic.net>.

Korea fights spam

Spam is a growing and vexatious problem for Internet Service Providers (ISPs) and users alike. Spam clogs networks and frustrates users worldwide with unwanted email in their inboxes. Spam is costly for ISPs whose networks have to be dimensioned to cope with the enormous flood of email. Users too bear the costs of spam, not only with delays in downloading their emails and in the extra time taken to delete unwanted messages, but also because all users share in the cost of maintaining the Internet.

Mr Yong-Wan Ju

IP Address Manager at KRNIC

Yong-Wan Ju also chairs the IPv6 Forum Korea Working Group and the Korea Internet Service Provider Association (KISPA) IP Tech Sub-division Committee. Prior to joining KRNIC in December 1999, Mr Ju worked at the National Computerization Agency (NCA), part of the Korean Ministry of Information & Communication (MIC), as a Senior Researcher.

The Korean Government has acknowledged the serious consequences arising from growing volumes of spam and, because of concerns that Korea's image was being tarnished by spam problems, has taken a strong anti-spam stance, recently introducing regulations designed to stop the flow. According to the Korean Information Security Agency (KISA), complaints about spam have grown rapidly in Korea, from 325 in 2000 to 11,621 to the end of May 2002.

In this article, I describe the action taken so far by the Ministry of Information and Communication (MIC). Although the initiatives have only been in place for a short time, there are early indications that the tough multi-pronged approach is starting to have a positive effect.

Ministry of Information and Communication initiatives

The MIC drew up a comprehensive plan in May 2002 to discourage the spread of spam, resulting in:

- the Enforcement Regulations on Information and Communication Network Use Promotion and Information Security, which became effective on 11th July 2002
- the Anti-Spam Guideline for email service providers and related organisations, which became effective on 31 July 2002

The MIC has also taken action to prevent Korean web servers being used by spammers to relay spam. Security problems were found with many servers in Korean schools and the MIC has helped the schools to fix these.

The MIC has also set up a Spam Mail Complaint Center, administered by KISA, so that users can report spam and receive help with spam problems. Individual users can even lodge compensation claims for mental and physical damage experienced as a result of receiving unsolicited email. These are heard by a government-led information dispute arbitration committee.

Korea Network Information Center (KRNIC) support

To support these regulations, KRNIC's President, Dr Kwan Ho Song, committed KRNIC's IP Department to membership of the advisory committee responsible for implementing the anti-spam regulations. KRNIC has also promoted the KRNIC Whois Database to related public organisations such as the National Intelligence Service, the National Police Agency and KISA to assist them take effective measures to fight network abuse and spam.

Anti-spam guideline for email service providers

According to the new MIC guidelines, web mail service providers and related organisations should:

- adopt real-name email transmissions
- install programs to block unsolicited mail

The MIC encourages web site operators to encrypt the addresses of those who post messages to bulletin boards and is also developing and distributing software designed to prevent unauthorised mining of email addresses by automated email address extractors or email aggregators.

Useful links

- **Ministry of Information and Communication**
  www.mic.go.kr
- **Korea Information Security Agency (KISA)**
  www.kisa.or.kr
- **Spam Mail Complaint Center**
  www.spamcop.or.kr
- **Korea Network Information Center**
  whois.nic.or.kr

Online marketers must also place “Advertisement” or “Adult advertisement” in the subject line and must show their IP address on the header of the message so that recipients can filter spam easily and, if violations occur, the originators can then be tracked.

To assist foreign Internet users, the MIC also requires that commercial email must contain information in Korean and English to allow recipients to opt out. The sender’s address and contact information should also be provided in both Korean and English.

The MIC is backing up the regulations with fines of up to 5 million Won (US$4,200) for offenders violating the anti-spam regulations by placing misleading information in message headers. The MIC recently fined six Korean companies as persistent spam offenders.

The full impact of the new regulations on spam has yet to be seen. However, the MIC released statistics in July 2002 showing that the volume of spam originating from outside Korea and being routed through Korean servers has fallen dramatically. In May 2002 an average of 1,100 cases a week of this type of spam occurred but by July 2002 this had fallen to about 100 a week.

Yong-Wan Ju, IP Address Manager, KRNIC <ywju@nic.or.kr>

Transfer of ccNIC.net domain names

APNIC holds a number of domain names in the form “ccNIC.net”, for country-codes in the Asia Pacific region. These were registered by APNIC in 1994 in an effort to protect the names from speculators who may have registered the names and attempted to sell them on to IP address or DNS registries in this region.

The APNIC Executive Council decided recently that it is no longer appropriate for APNIC to hold these names, and that the names should be allowed to expire at the end of the current registration period (March 2003 in most cases). Prior to expiry, however, APNIC will honour any request to transfer any of these names to the corresponding CCTLD domain name registry.

Administrators of CCTLD registries wishing to transfer the corresponding “ccNIC.net” name from APNIC for use in the administration of their registries, should contact APNIC at <ccnic-transfer@apnic.net>.

No charges apply to the transfer; however, please note that as this is a voluntary activity, domain name transfers may take some time. Requests will be dealt with strictly in the order of receipt, and no guarantee or commitment as to response time in processing requests can be made.

Paul Wilson, Director General, APNIC <dg@apnic.net>

Spam in the Asia Pacific region

Discuss spam and network abuse at APNIC 14

A network abuse BOF will be held on Thursday 5 September to discuss the role of networks in the Asia Pacific region in preventing and dealing with network abuse issues. The Open NIR Meeting will also discuss spam in relation to networks with resources allocated by NIRs. For more information, see:

www.apnic.net/meetings/14/programme

Sources of spam related information in the Asia Pacific

Hong Kong

Hong Kong Internet Service Providers’ Association spam resources at:

www.hkispa.org.hk/antispam

China

CNCERT/CC anti-spam contact addresses at:

www.cert.org.cn/certabout/contact.htm

CCERT anti-spam resources at:

www.ccert.edu.cn/spam/index_en.htm

Australia

CAUBE-AU anti-spam information at:

www.caube.org.au/australia.htm

NOIE spam resources at:

www.noie.gov.au/Projects/consumer/Spam

Malaysia

MyCERT spam resources at:

www.mycert.mimos.my/emailabuse.htm

India

CAUCE India spam resources at:

www.india.cauce.org

Worldwide

For more general information on spam, see:

www.cauce.org

Training schedule

2002

September

- Kitakyushu, Japan
- Ho Chi Minh City, Vietnam
- Manila, Philippines

October

- Karachi, Pakistan
- Bangkok, Thailand

November

- Beijing, China

December

- Kuala Lumpur, Malaysia

2003

January

- Singapore

February

- India
- Taiwan

March

- Hong Kong
- New Zealand

April

- Australia
- Bangladesh
- Nepal

May

- China
- Mongolia
- Pacific Islands

June

- Philippines
- Thailand

The APNIC training schedule is provisional and subject to change. Please check the website for regular updates at:

http://www.apnic.net/training

If your organisation is interested in sponsoring APNIC training sessions, please contact us at:

training@apnic.net

How to contact APNIC

Street address	Level 1, 33 Park Road, Milton, Brisbane, QLD 4064, Australia
Postal address	PO Box 2131, Milton QLD 4064, Australia
Phone	+61-7-3858-3100
Fax	+61-7-3858-3199
Web site	http://www.apnic.net
General enquiries	info@apnic.net
Hostmaster (filtered)*	hostmaster@apnic.net
Helpdesk	helpdesk@apnic.net
Training	training@apnic.net
Webmaster	webmaster@apnic.net
Apster	apster@apnic.net

* To improve services to members, the Hostmaster mailbox is filtered. All email to the Hostmaster mailbox must include a valid account name in the subject line. The account name must be enclosed in brackets or parentheses in the subject field - [XXXXX-YY] or (XXXXX-YY), where XXXXX is based on the member name and YY is the country code. If you are unsure of your exact account name, contact <billing@apnic.net>.

▶ The Member Services Helpdesk provides APNIC members and clients with direct access to APNIC Hostmasters.

Helpdesk Hours
9:00 am to 7:00 pm
(UTC + 10 hours)
Monday - Friday

Feedback

To ensure that *Apster* meets your needs, please provide us with feedback on the newsletter articles or provide suggestions for articles for future issues.

- **Fax: +61-7-3858-3199**
- **Email: apster@apnic.net**

Name:

Position:

Organisation:

Member Account Name (If applicable)**:**

Phone:

Fax:

Email:

Comments/Suggestions: