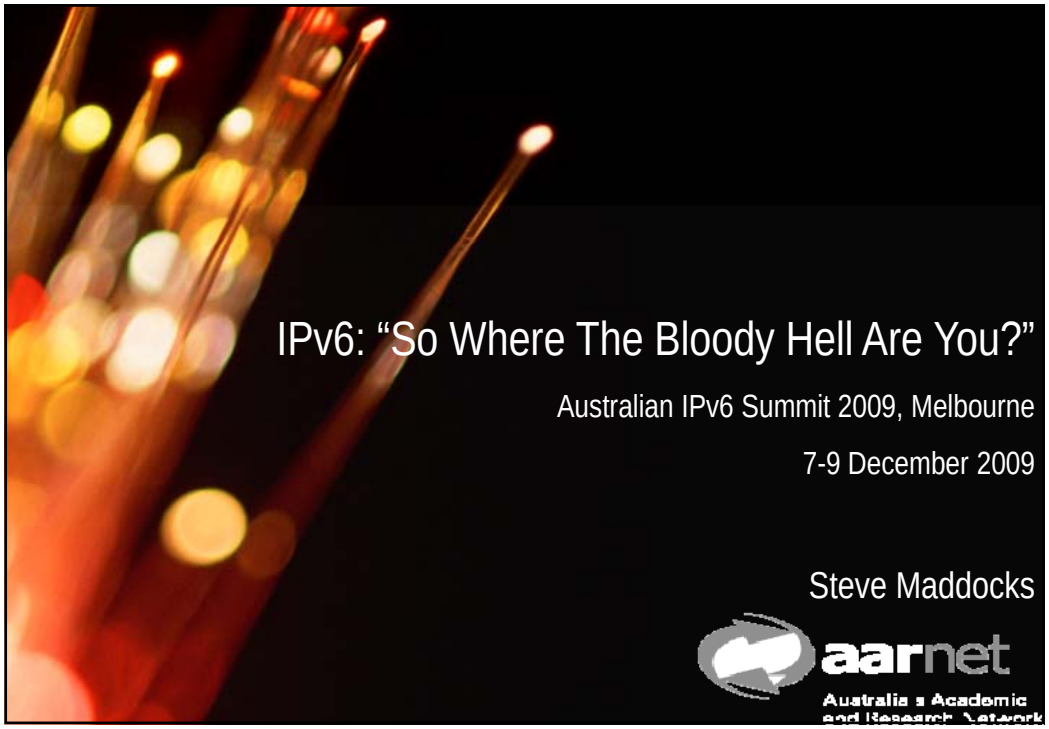
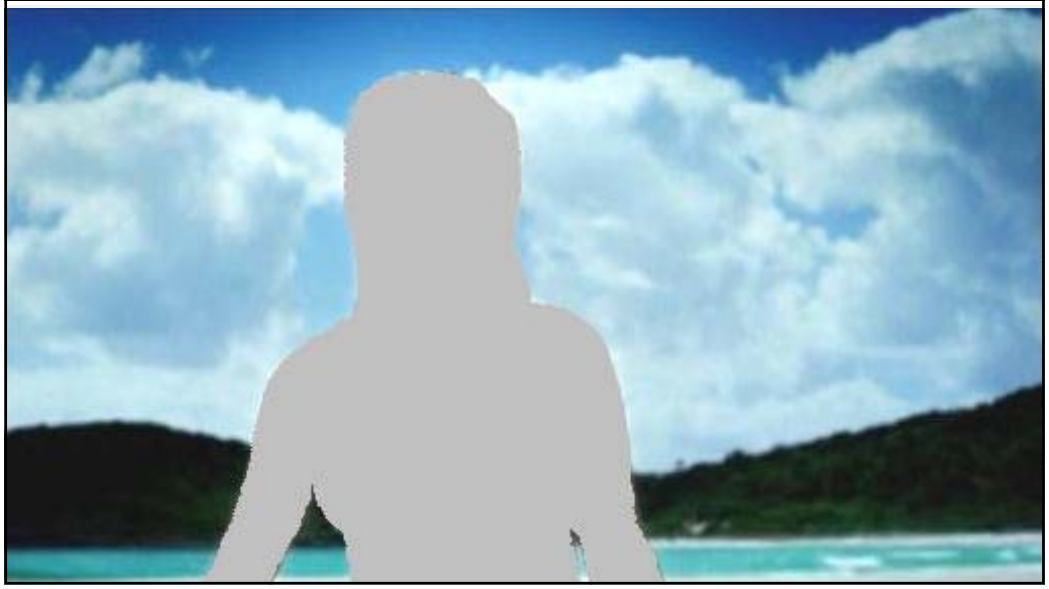



## “So Where The Bloody Hell Are You?”



## AARNet Pty Ltd

- Australia's Academic and Research Network
- Not for profit, 38 Universities and CSIRO as shareholders
- High-speed, high-availability, connections
  - Metro, Regional, National and International networks
  - Multiple 1 Gigabit/sec or 10 Gigabit/sec connections
  - Multiple 1 Gigabit/sec or 10 Gigabit/sec private optical circuits
- AARNet connects directly to other Global Research and Education networks; and to The Internet
- Dual PoP sites in all major capital cities plus Singapore, Suva, Hawaii (x2), Seattle, Palo Alto (PAIX), Los Angeles (x2)
- Infrastructure – fibre builds, fibre swaps
  - Work with utilities, transport, Nextgen and other asset owners

3

## Brief History of IPv6 at AARNet

- AARNet was allocated its 2001:388:: prefix in Jan 2002
  - Little or no native IPv6 - mostly experimenting with tunnels
- GrangeNet routed IPv6 natively mid 2003 (April 2004 in VIC)
- AARNet runs both IPv6 tunnel and 'IPv6 Broker' (Hexago appliance) services mid-late 2003 (IPv6 Broker still running)
- AARNet and GrangeNet establish limited IPv6 peering late 2003
- AARNet 3 fully enables native IPv6 mid 2004
  - Peers natively with Internet 2 and other R&E networks in N. America
  - IPv6 transit service from Verio/NTT in Palo Alto and Los Angeles
  - Offers native IPv6 to AARNet 3 customers

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## PacketRocket – Procket Router and IPv6

- AARNet evaluates routers for AARNet 3 in 2003
- Not many routers forwarding IPv6 at wire-speed in 2003
  - All-optical 1 Gigabit and 10 Gigabit interfaces
- Procket 'smashes' the IPv6 Land Speed Record (Internet 2)
  - November 2003
  - Was 983 Megabits/sec (Geneva to Chicago)
  - Procket achieved 3.85 Gigabits/sec – 10Gbps Ethernet & STM-64
  - Throughput limited by servers running at 100%
  - "The routers are not the bottleneck"
- AARNet already committed to Procket – IPv6 LSR a reassuring bonus

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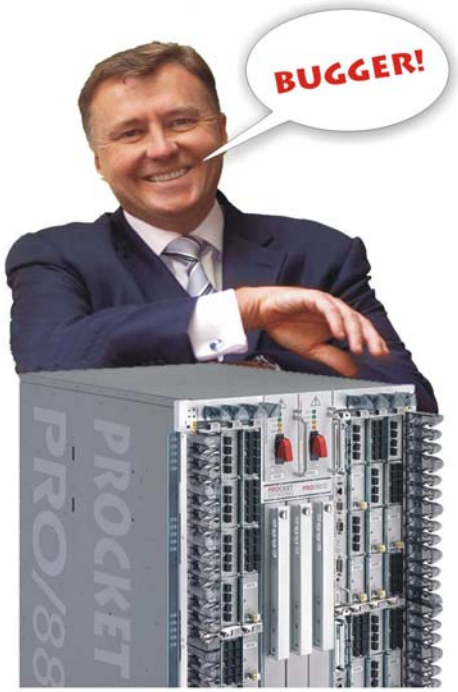
## Cisco acquires Procket

*AARNet CEO: Chris Hancock*




Footnote:
AARNet today sees peaks of several Megabits per second of IPv6 traffic

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# CanalAVIST – HD, Multicast, IPv6

ASEAN Virtual Institute of Science & Technology

"They're broadcasting now on ff7e:130:2001:254:8000::1234 port 8000"

- 2-day ICT Forum – August 2008
- Virtual/video venues across Asia
- TEIN2 network joining Asia & Australia
- 9 Asian venues inc NICTA and AARNet
- No MCU – Multicast with IPv6
- 'Higher Definition' DVTS ~34Mbps

# AARNet IPv6 Today

- IPv6 enabled wherever possible
  - customers, peers, transit providers, content providers, CDP
- 24 Customer prefixes
- 4 Customers have their own allocations
  - (CSIRO, DSTO, NICTA & USP)
- Monash, ANU and CSIRO heaviest users
- 104 Domestic prefixes (all through peering)
- 2,456 prefixes in total
  - Heavy peering overseas inc Hurricane Electric and NTT (transit)
- Utilisation – healthy interface bursts > 50 Mbps IPv6
  - Backbone consistently 2 – 3 Mbps, mostly our own traffic

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# Mark Prior's IPv6 Status Survey

**Internet2 International Partners**

| Organisation (domain) | Web | Mail | DNS | NTP | XMPP |
|---|---|---|---|---|---|
| AAIREP (Australia) (aarnet.edu.au) | SUCCESS | FAIL | 0/3/3 | | FAIL |
| ANF (Korea) (anf.ne.kr) | FAIL | FAIL | | | |
| APAN (Korea) (kr.apan.net) | FAIL | FAIL | | | |
| ARNES (Slovenia) (arnes.si) | FAIL | FAIL | 0/3/5 | | |
| BELNET (Belgium) (belnet.be) | SUCCESS | FAIL | 1/1/4 | FAIL | |
| C-DAC (India) (cdac.in) | FAIL | FAIL | 0/0/4 | | |
| CANARIE, Inc. (Canada) (canarie.ca) | FAIL | FAIL | 0/0/2 | | |
| CARNET (Croatia) (carnet.hr) | SUCCESS | FAIL | 0/0/2 | FAIL | FAIL |
| CEDIA (Ecuador) (cedia.org.ec) | FAIL | FAIL | 0/0/3 | | |
| CERNET (China) (cernet.edu.cn) | FAIL | FAIL | 0/0/3 | | |
| CESNET (Czech Republic) (ces.net) | SUCCESS | FAIL | 1/3/3 | | |
| CLARA (Uruguay) (redclara.net) | FAIL | FAIL | 0/0/1 | | |
| CNTI (Venezuela) (cnti.ve) | FAIL | FAIL | 0/0/2 | | |
| CR2NET (Costa Rica) (crnet.cr) | FAIL | FAIL | | | |

http://www.mrp.net/IPv6_Survey.html

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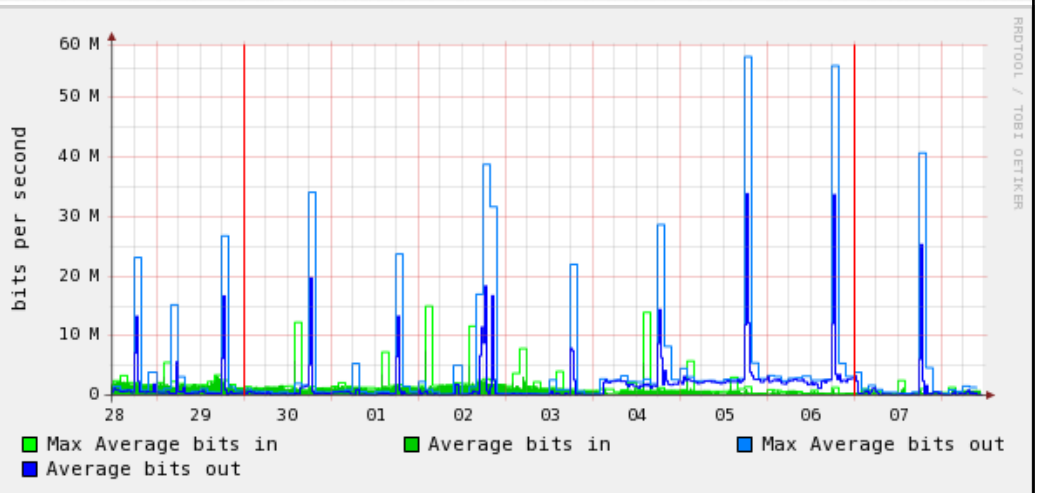
# IPv6 Traffic to TEIN via Singapore

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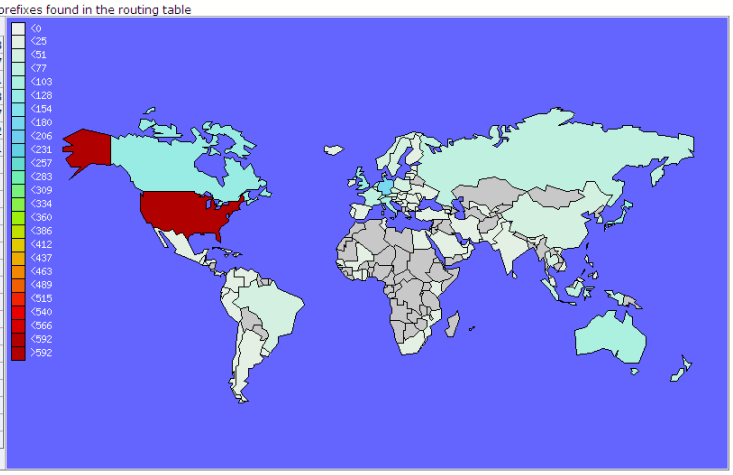
# http://bgpmon.net/

**Prefixes per country**

the number represent the number of unique prefixes found in the routing table

| | | |
|---|---|---|
| 1 | United States | 618 |
| 2 | Germany | 177 |
| 3 | Canada | 111 |
| 4 | United Kingdom | 108 |
| 5 | Japan | 107 |
| 6 | Italy | 102 |
| 7 | Netherlands | 101 |
| 8 | Australia | 83 |
| 9 | France | 66 |
| 10 | Indonesia | 60 |
| 11 | EU | 59 |
| 12 | Switzerland | 58 |
| 13 | Korea, Republic of | 56 |
| 14 | Russian Federation | 54 |
| 15 | New Zealand | 53 |
| 16 | China | 49 |
| 17 | Sweden | 48 |
| 18 | Poland | 41 |
| 19 | Czech Republic | 37 |
| 20 | Austria | 35 |
| 21 | Hong Kong | 31 |
| 22 | Thailand | 27 |
| 23 | Taiwan, Province of China | 25 |
| 24 | Brazil | 25 |

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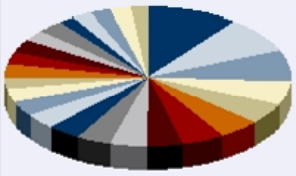
# http://bgpmon.net/ - Top 25 Origin AS numbers (IPv6)



AS29449 -- TPN-AS TopneT Telecomunicazioni S.r.L.
AS1237 -- KREONET-AS-KR Korea Institute of Science and Technology Information
AS12041 -- AFILIAS-NST Afilias Limited
AS15169 -- GOOGLE - Google Inc.
AS42 -- WOODYNET-1 - WoodyNet
AS24863 -- LINKdotNET-AS
AS12654 -- RIPE-NCC-RIS-AS RIPE NCC RIS project
AS8121 -- TCH - TCH Network Services
AS7575 -- AARNET-AS-AP Australian Academic and Reasearch Network (AARNet)
AS23947 -- CEPATNET-AS-ID Internet Service Provider PT.Mora Telematika Indonesia
AS71 -- HP-INTERNET-AS Hewlett-Packard Company
AS34695 -- E4A-AS E4A Primary AS
AS40009 -- BITGRAVITY - BitGravity, Inc.
AS1221 -- ASN-TELSTRA Telstra Pty Ltd
AS3949 -- NTTA-3946 - NTT America, Inc.
AS37944 -- Unknown
AS33517 -- DYNDNS - Dynamic Network Services, Inc.
AS3292 -- TDC TDC Data Networks
AS13768 -- PEER1 - Peer 1 Network Inc.
AS4621 -- UNSPECIFIED UNINET-TH
AS9503 -- FX-PRIMARY-AS FX Networks Limited
AS23902 -- VNNIC-AS-VN Vietnam Internet network information center (VNNIC)
AS23504 -- SPEAKEASY - Speakeasy, Inc.
AS6175 -- Unknown
AS4134 -- CHINANET-BACKBONE No.31,Jin-rong Street

## Reasons for Low Take-up and Utilisation

- Universities and CSIRO have LOTS of IPv4 addresses
  ... but schools and TAFEs don't
- Firewalls, DPI, Rate-limiters, Load Balancers, SPAM filters
- Back-end systems, internal Internet accounting, charging and quotas
- Too much to do, not enough time to do it
  - Focus on the priorities
  - 'If it's not broken, don't fix it'
- But NOT because their service provider DOESN'T do IPv6 ☺

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## IPv6 – Problems and Difficulties

- Not too many, actually
- Measurement – lack of SNMP MIBs (interface counters)
  - Scripted terminal sessions and screen scraping
- Nothing similar to NetFlow v5 for IPv6
  - Aggregation records only, lack granularity
- Some issues with services and Geo-location
  - Using IPv6 (and SSL) results in Chinese web pages from Taiwan
  - Fixed

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## IPv6 ‘Carrots and Sticks’

- AARNet DOESN’T meter IPv6 traffic
- At least one research organisation says ‘Great!’

  ... And shifts bucket-loads of data coast-to-coast with IPv6

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## IPv6 Carrots and Sticks

**http://www.ipv6porn.co.nz/**

**Sorry! You don't have IPv6 Connectivity**

If you are seeing this webpage then you do not have a IPv6 connection and you are missing out on the free porn on this website. If you are wanting to get this free porn then you need to get connected with IPv6.

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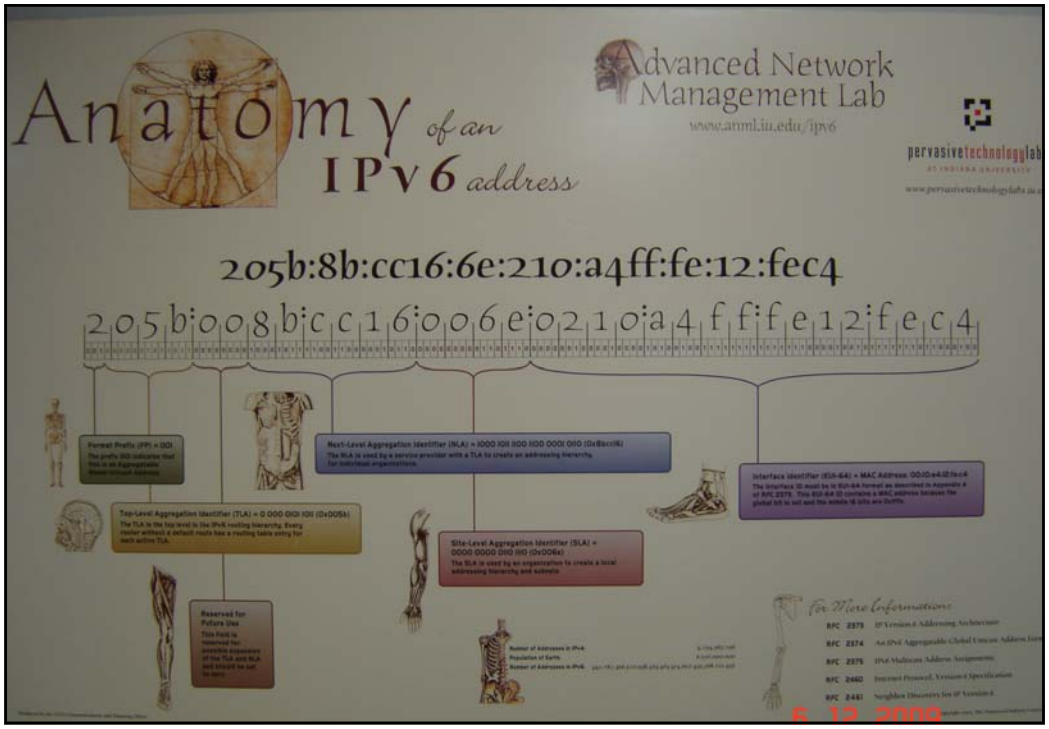
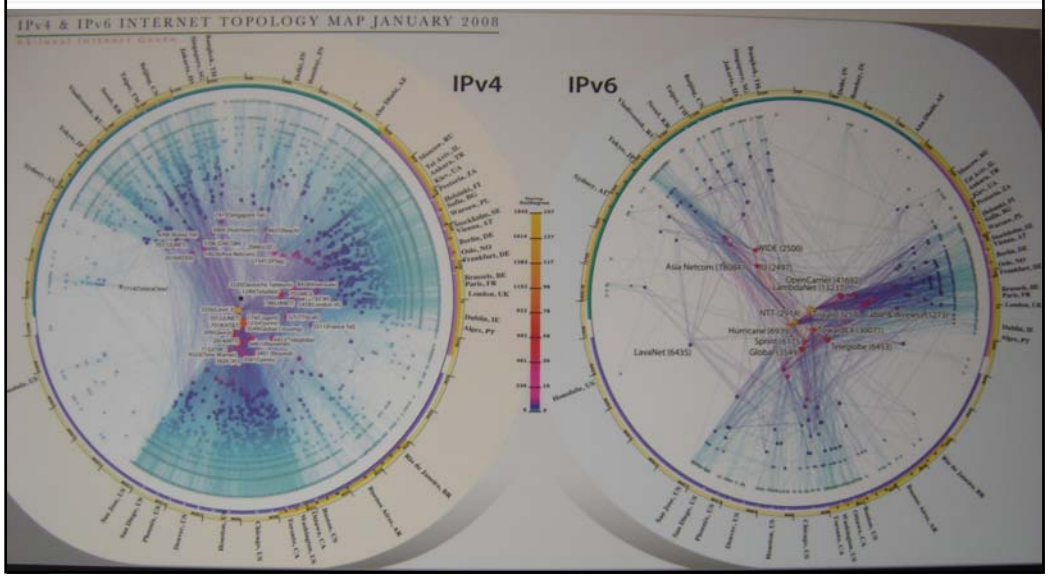
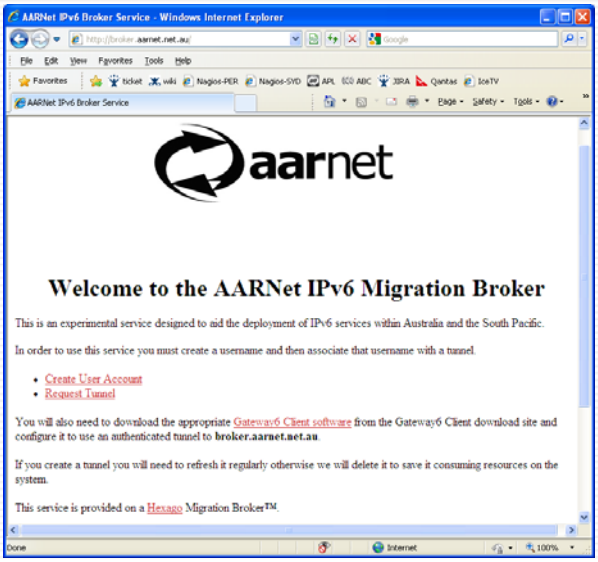



# IPv4 & IPv6 Internet Topology Map



# http://broker.aarnet.net.au/

"This is an experimental service designed to aid the deployment of IPv6 services within Australia and the South Pacific."

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# Interesting IPv6 Addresses (Hexspeak)

Hexspeak

From Wikipedia, the free encyclopedia

Hexspeak, like leetspeak, is a novelty form of variant English spelling.

Hexspeak was created by programmers who wanted a magic number, a clear and unique identifier with which to mark memory or data. Using hexadecimal notation, which includes the digits 0123456789ABCDEF, it is possible to create small words with the digit "0" representing the letter "O", "1" representing the letter "I", "5" representing "S", and "6" or "9" representing "G" or "g" respectively.

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## Interesting IPv6 Addresses (Hexspeak)

**DEAD : BEEF : CAFE : FEED**

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