Slide 1

An overview of the global IPv6 routing table

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Slide 2

Overview

- what's "the global IPv6 routing table"
- numbers & pictures
- observations
- conclusions
- references

Slide 3

What's "the global IPv6 routing table"?

- it's what you get when you hook up to "the IPv6 routing world" using BGP4++
- a mixture of 6bone and RIR IPv6 addresses and networks
- some ASes announce 6bone only, some RIR space only, a few both
- unlike IPv4: most ASes give transit to each other (will change)
- unlike IPv4: still mainly tunnel based - BGP topology does not reflect physical topology

Slide 4

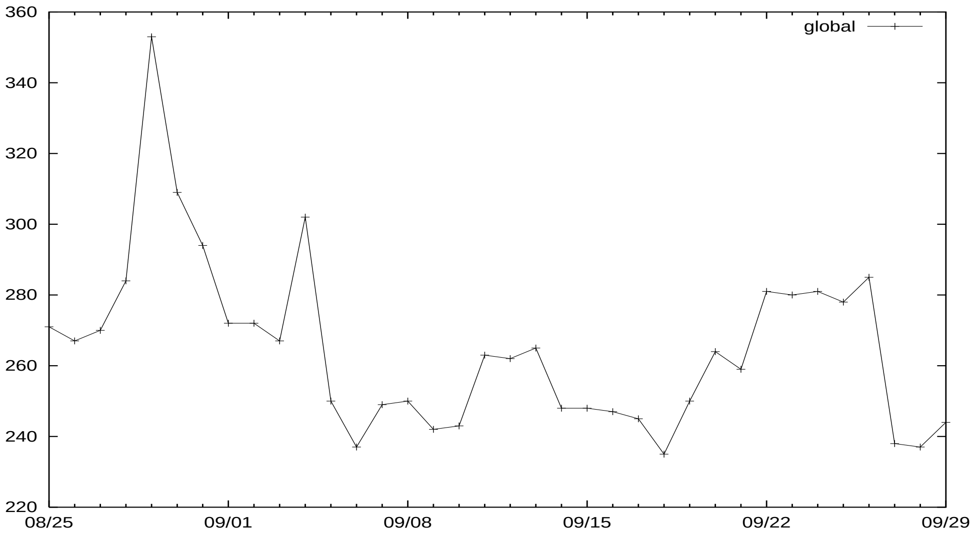
Numbers - Prefixes

As of 2001/09/29: 244 prefixes announced in total

/n	global	RIR space	6bone space
/16	1	0	0
/24	50	0	50
/28	40	0	40
/29	1	1	0
/32	7	0	7
/35	82	82	0
/40	1	0	1
/41	5	5	0
/42	5	4	1
/48	45	19	24
/56	1	1	0
/60	1	1	0
/64	5	2	3

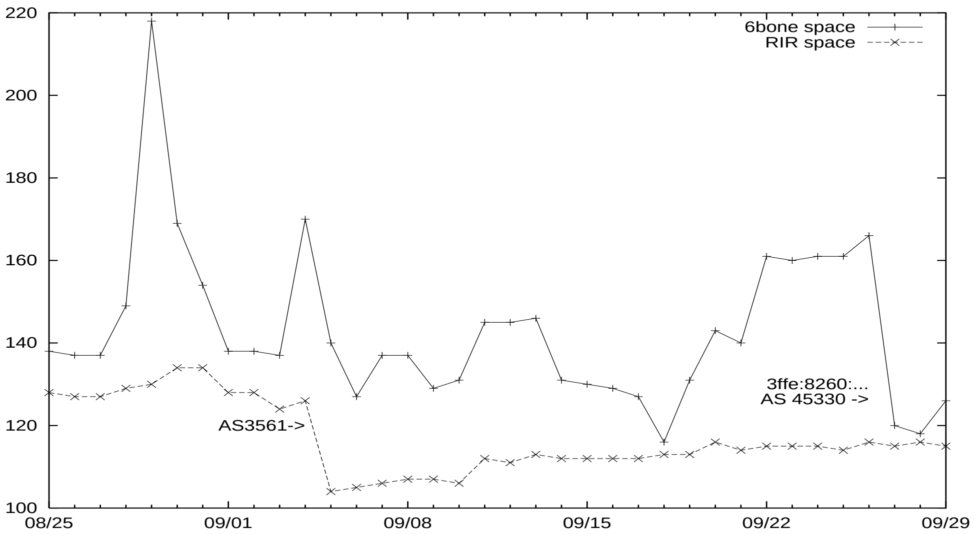
Slide 5

Graphics: Total Prefixes



Slide 6

Graphics: RIR vs. 6Bone Prefixes



Slide 7

Numbers: RIRs, ASes and AS paths

- 82 /35's out of 2001::/16 announced - 103 allocated by RIRs (ARIN: 39, APNIC: 20, RIPE: 44, as of 2001/09/30)
- total unique ASes in the 6bone table (2001/09/30): 171 ASes
- average AS path length (seen from AS5539): 4.08 hops
- average AS path length without 'weirdos': 3.59 hops (all paths with over 12 AS hops seem to be caused by BGP errors, see next slides)
- in comparison: average AS path length in IPv4 table: 3.60 hops
- $\Rightarrow$ BGP mesh is similarily tight, though structure is different ('chaotic mesh via tunnels' as opposed to 'tier-1/backbone network centered')

Slide 8

Interesting Observations (1) - Martians

```
   Network          Next Hop          Path
*> ::194.182.135.0/120
                    2001:608:0:3::3   1122 8933 2852 3263 i

*> 2001::/35        2001:658:0:1::1   8627 4697 1200 1103 4554
          5609 8954 6726 5594 8002 2042 45328 1930 559 8933 513
          20834 278 45584 4558 9 6342 10479 10566 15589 1275 2200 ?
```

2001::/35 hints at a BGP withdrawal bug (there are a few others).

Slide 9

Interesting Observations (2) - Lazy Aggregation

```
   Network          Next Hop            Metric LocPrf Weight Path
*  2001:650::2/128  2001:608:0:3::3        500             0 1122 3561 ?
*>i                 2001:608:0:3::1               100      0 3561 ?
*  2001:650:0:2::4/127
                    2001:608:0:3::3        500             0 1122 3561 ?
*>i                 2001:608:0:3::1               100      0 3561 ?
*  2001:650:0:2::6/127
                    2001:608:0:3::3        500             0 1122 3561 ?
*>i                 2001:608:0:3::1               100      0 3561 ?
*  2001:650:0:2::8/127
                    2001:608:0:3::3        500             0 1122 3561 ?
*>i                 2001:608:0:3::1               100      0 3561 ?
*  2001:650:0:2::C/127
                    2001:608:0:3::3        500             0 1122 3561 ?
*>i                 2001:608:0:3::1               100      0 3561 ?
```

(this was in the table for two full weeks - and there are others!)

Slide 10

Interesting Observations (3) - Invalid AS numbers

```
   Network   Next Hop    Path
*  3FFE:8260:2001::/48
         3FFE:8150:0:1::17
                     9044 5623 6939 2549 6342 45330 45328 45349 46001 i
*        3FFE:1108:40A:FFFF::2:2
                     8319 1275 5609 6939 2549 6342 45586 45584 45605 46257 i
*        3FFE:1108:40A:FFFF::1:2
                     3274 2586 3249 6939 2549 6342 45330 45328 45349 46001 i
*>       3FFE:C00:8023:19::1
                     109 2549 6342 45330 45328 45349 46001 i
*        2001:650:0:2::26
                     3561 1849 5609 6939 2549 6342 45330 45328 45349 46001 i
*        2001:600:4:1D1::1
                     1849 5609 6939 2549 6342 45330 45328 45349 46001 i
```

AS 45330, 45328, 45349, 46001 are **not** assigned by IANA!

Slide 11

Conclusions

- it works!
- interest in IPv6 is growing
- people are very cooperative
- still fairly experimental
- overall stability and professionality has to be improved

Slide 12

References

- Merit 6bone routing report: http://http://www.merit.edu/mail.archives/html/6bone-routing-report/
- List of IPv6 blocks allocated by the RIRs: http://www.ripe.net/cgi-bin/ipv6allocs
- Slides are available at: http//www.space.net/ gert/RIPE40/r40-6table.ps

Slide 13

Questions?

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