



# Tracking the Internet's BGP Table

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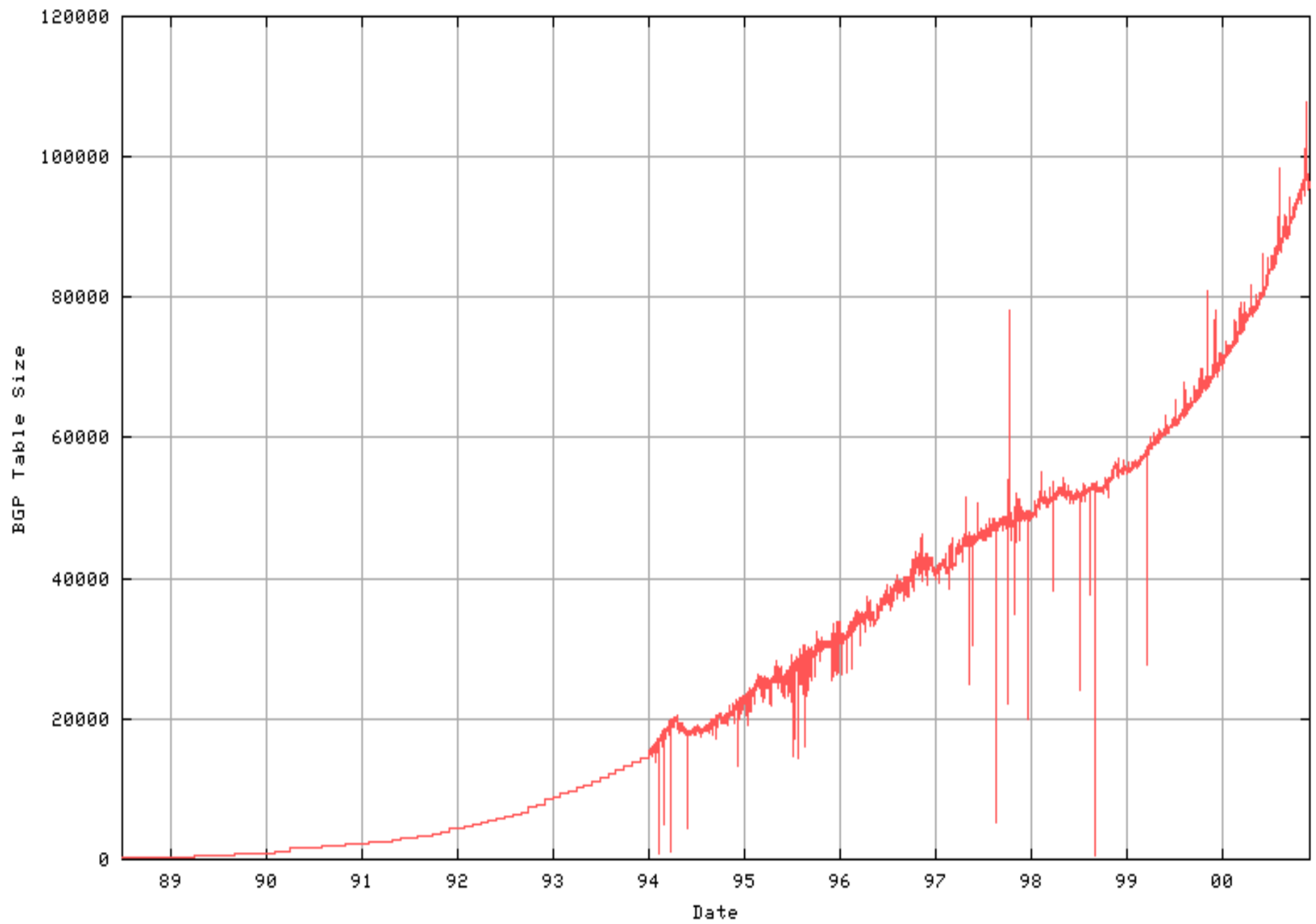
December 2000



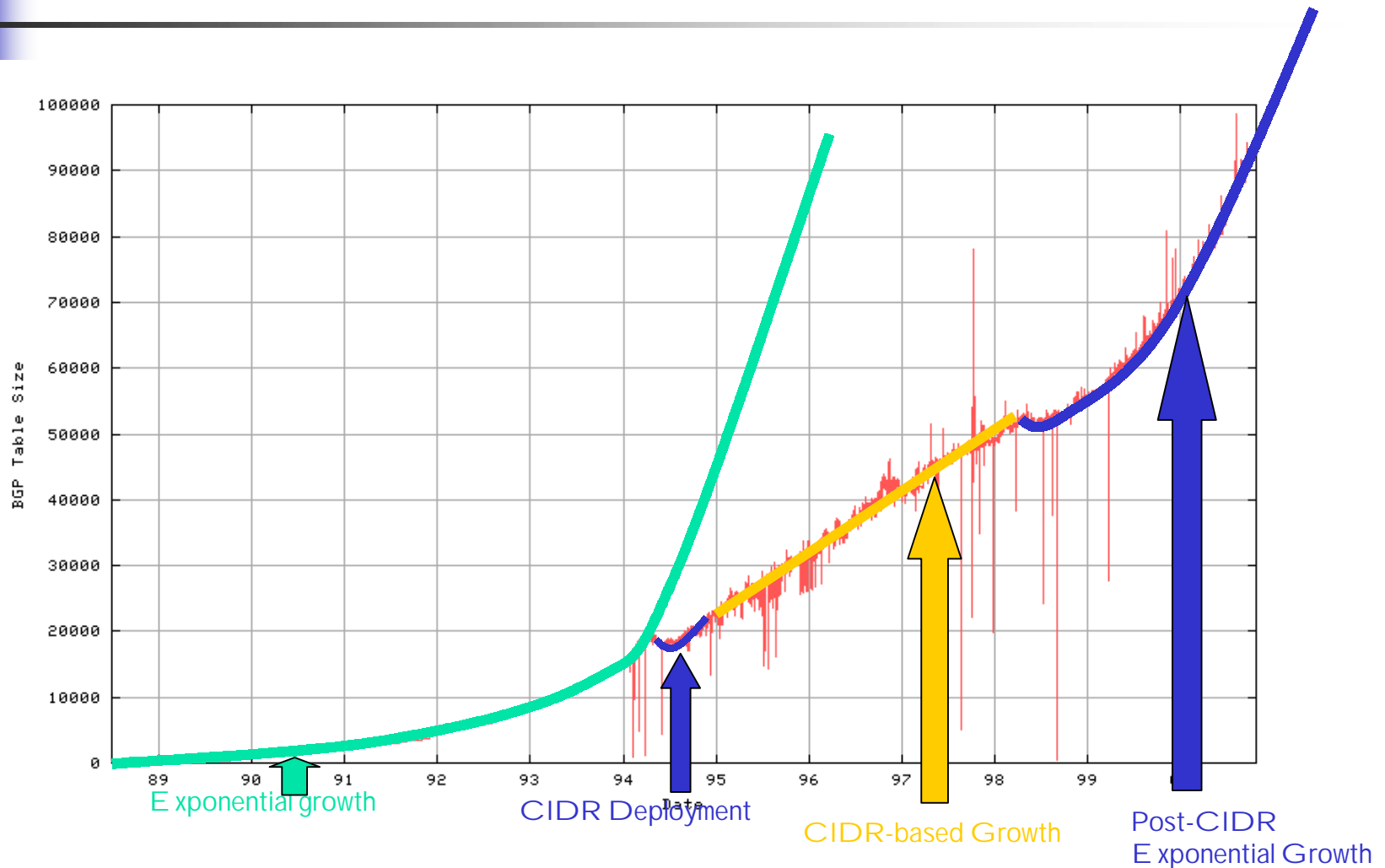
# Methodology

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- The BGP table monitor uses a router at the boundary of AS1221 which has a default-free BGP routing table
  1. Capture the output from “show ip bgp” every hour
  2. Perform analysis of the data  
(and then discard the raw dump!)
  3. Update reports at  
<http://www.telstra.net/ops/bgp>

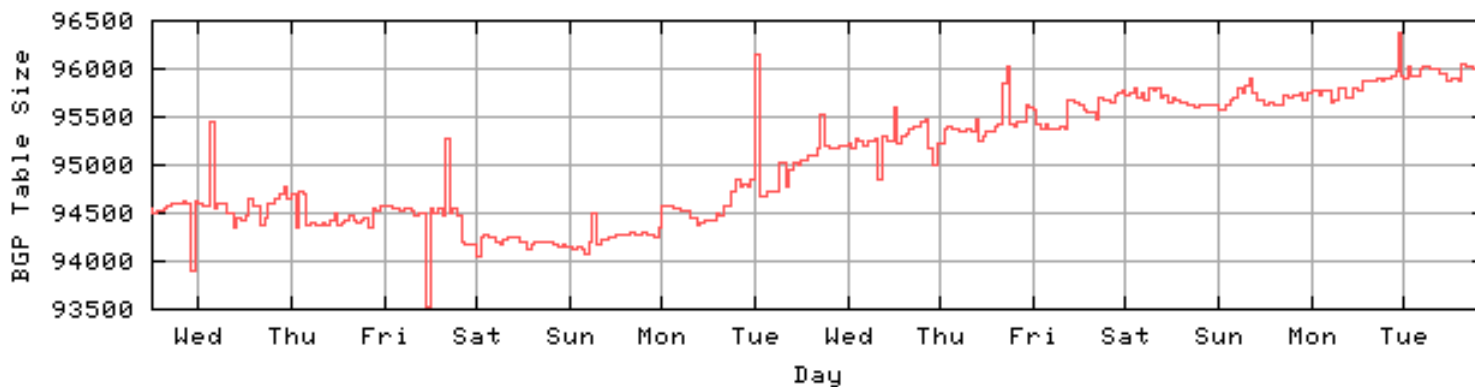


# Phases of Growth

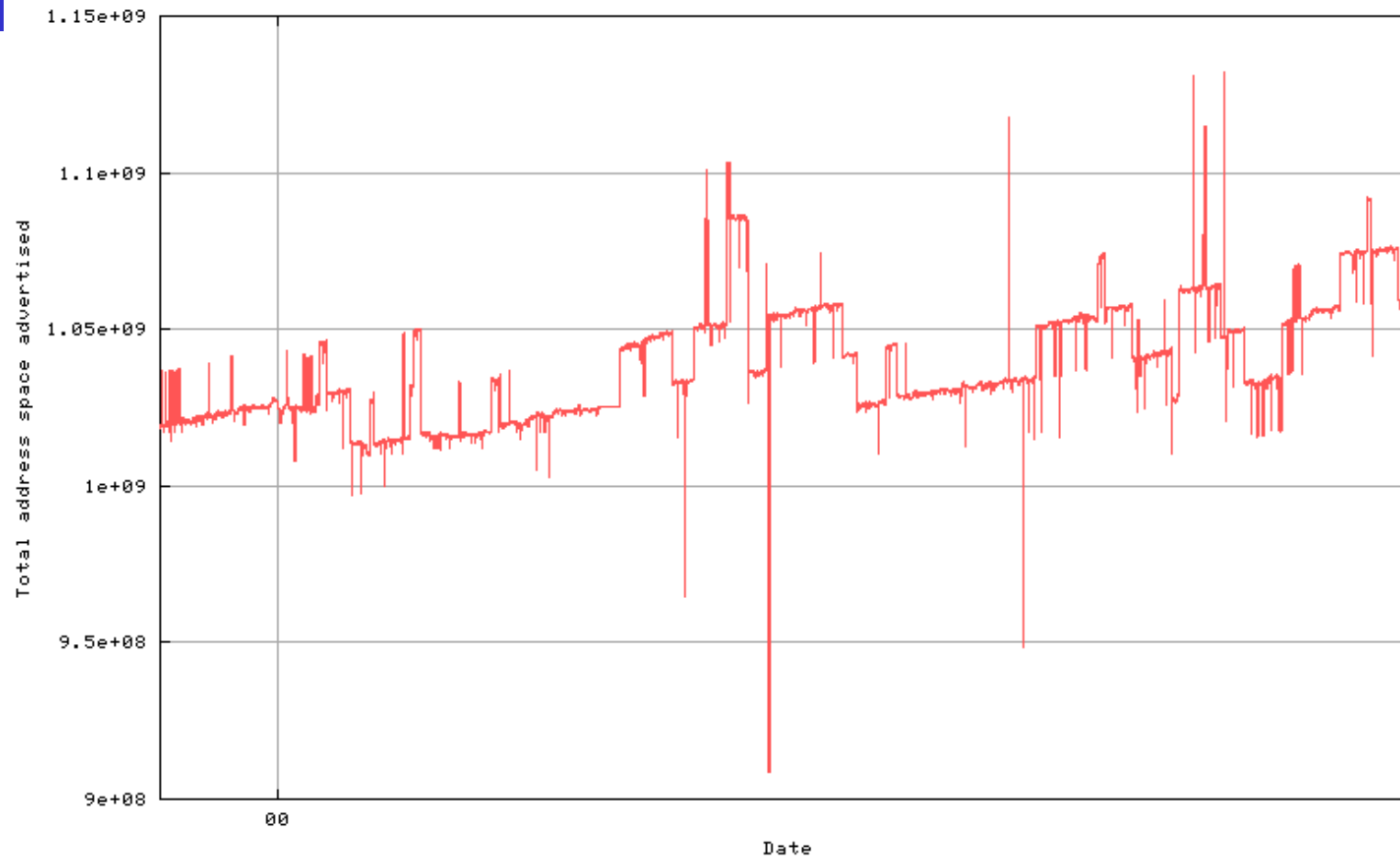


# Growth Characteristics

- Short term route fluctuation is an absolute value (not a % of total routes) of 1,000 – 2,000 routes

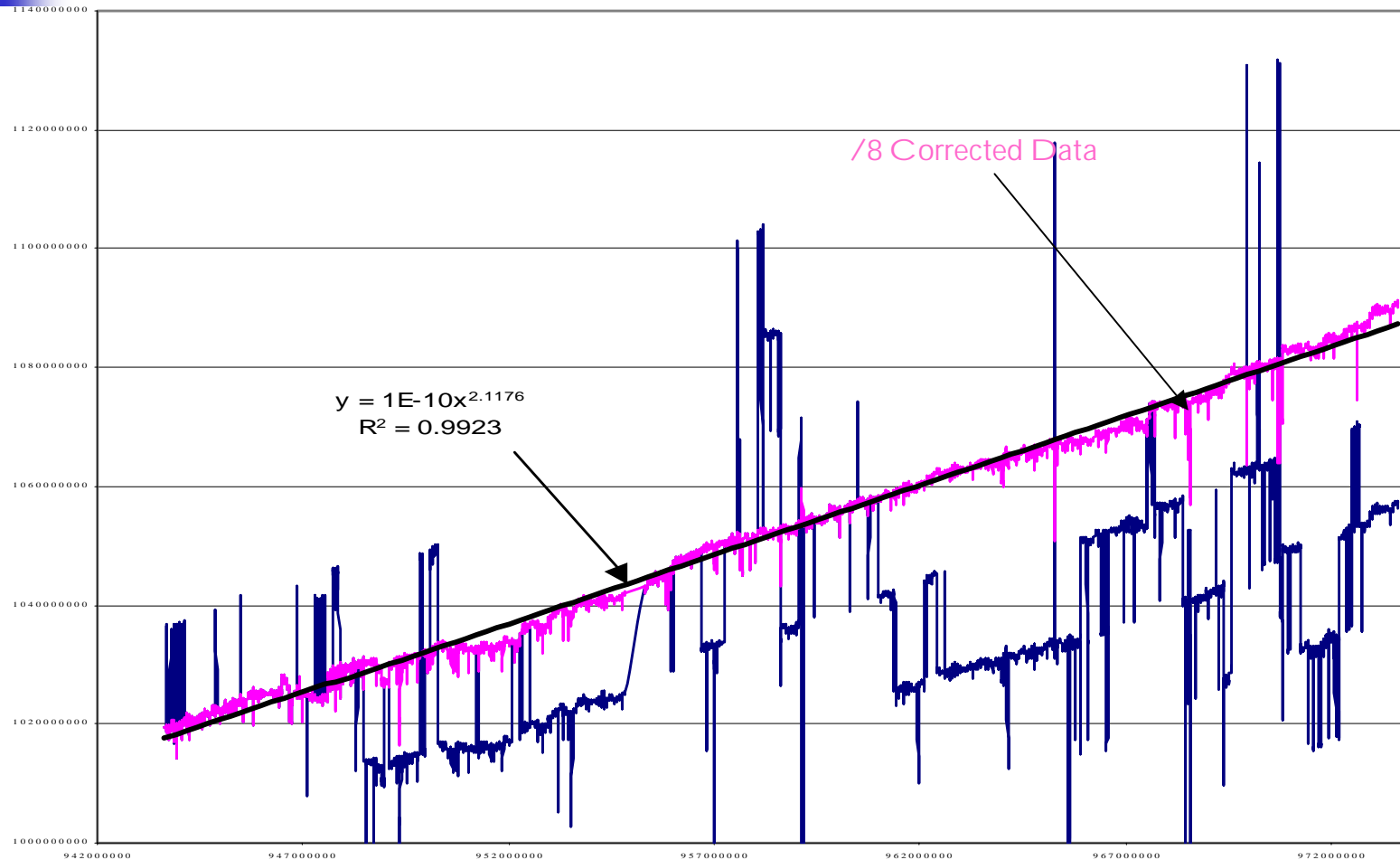


# Routed Address Space



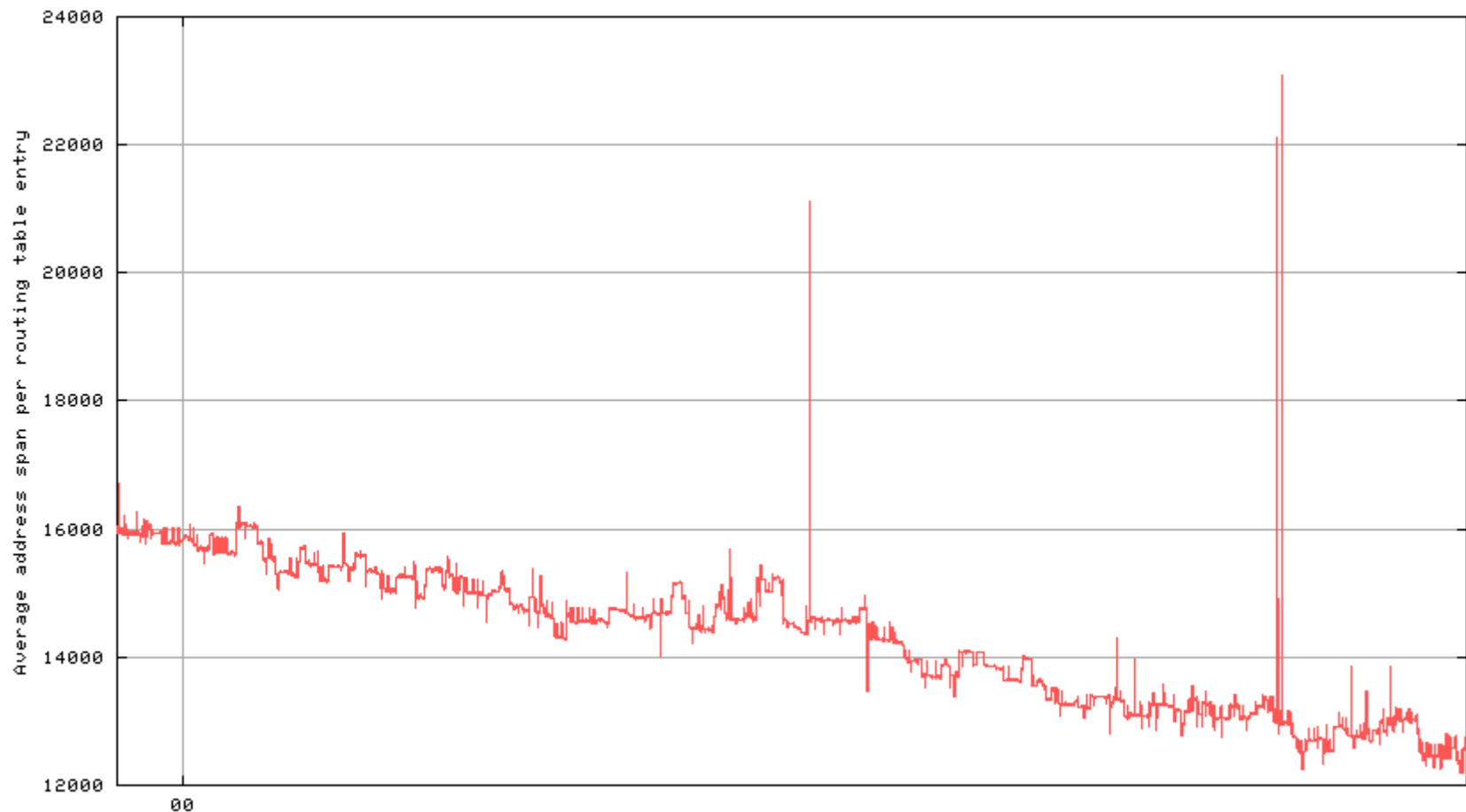
Fluctuation is due to announcement / withdrawals of /8 prefixes  
11 months of data does not provide clear longer growth characteristic

# Routed Address Space (/8 Corrected)



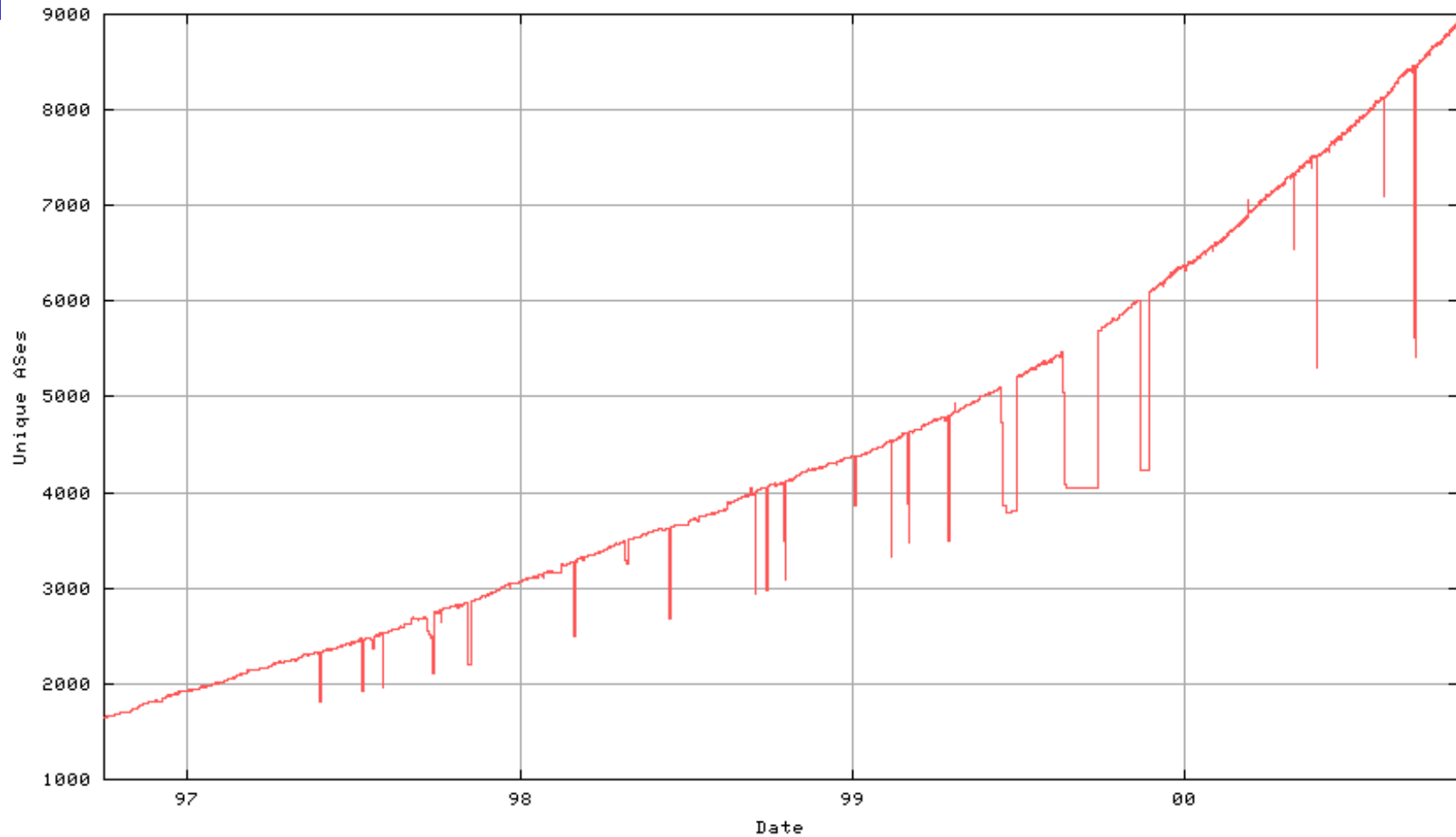
Annual compound growth rate is 107% p.a.

# Average size of a routing entry



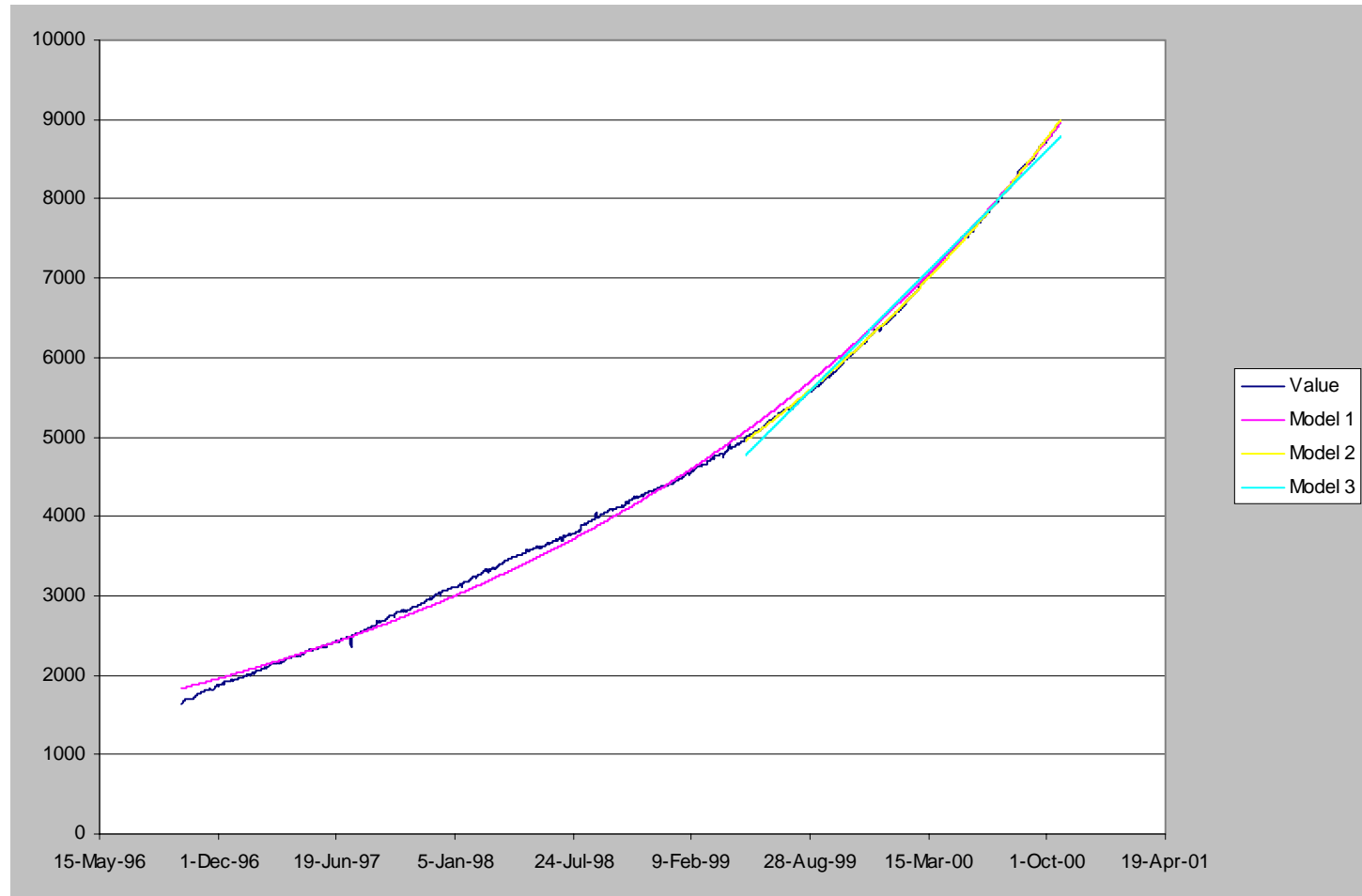
The BGP routing table is growing at a faster rate than the rate of growth of announced address space

# Number of AS's in the table



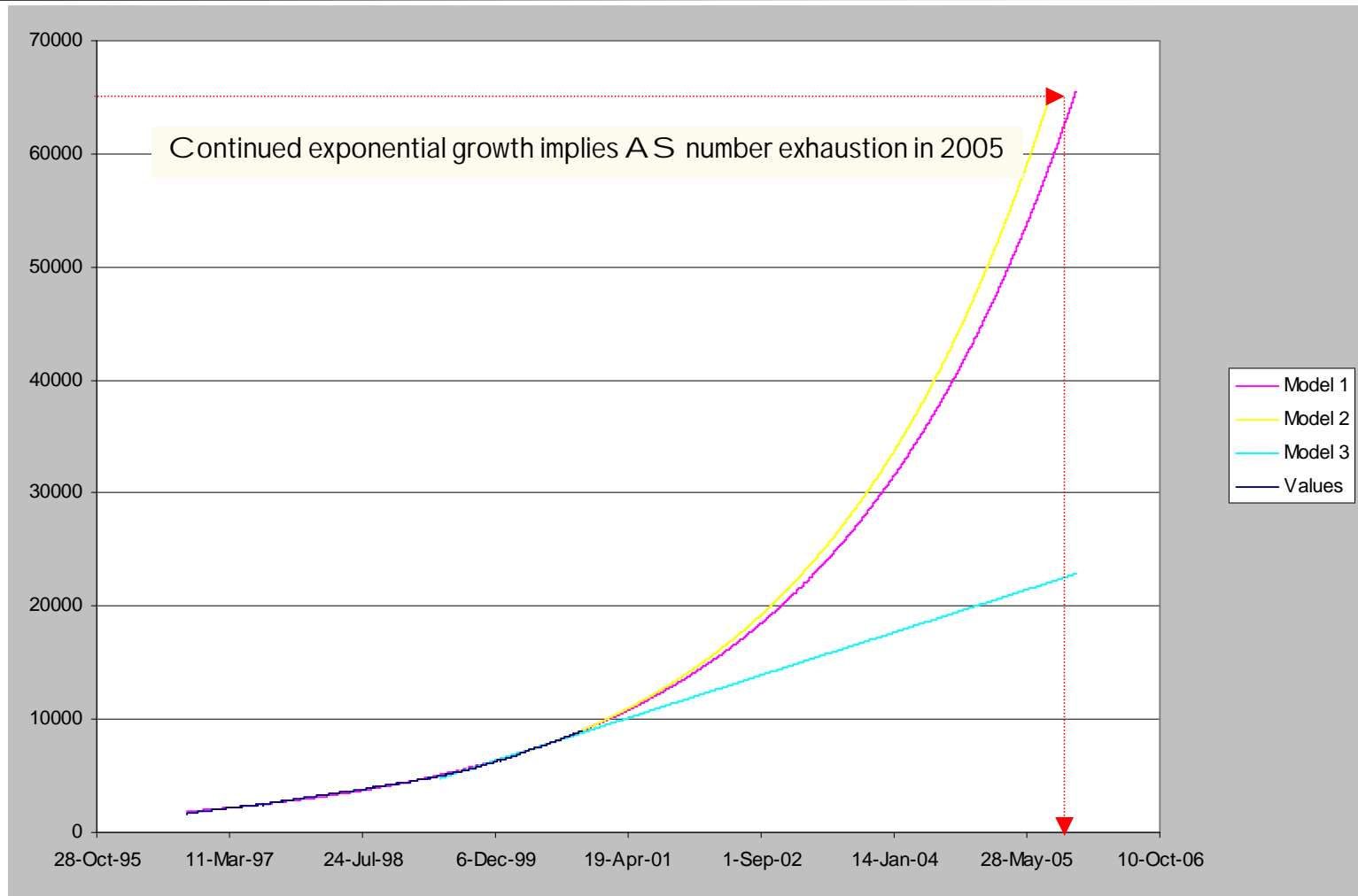
Exponential growth is evident in a longer term view of the AS deployment rate

# AS Number Trend Models

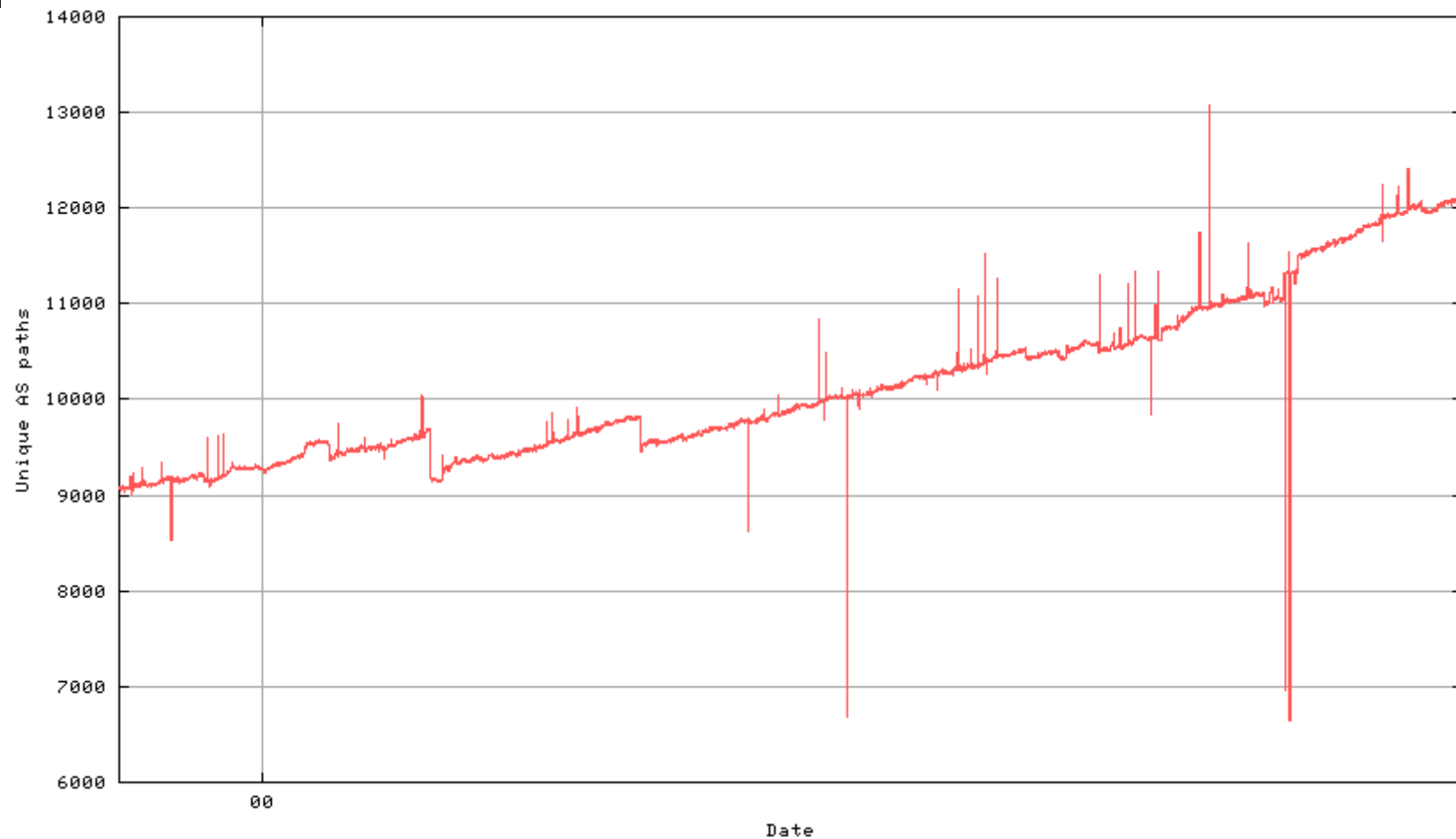


Best fit model is an exponential model using 12 months of data

# AS Number Use - Extrapolation



# Number of distinct AS Paths





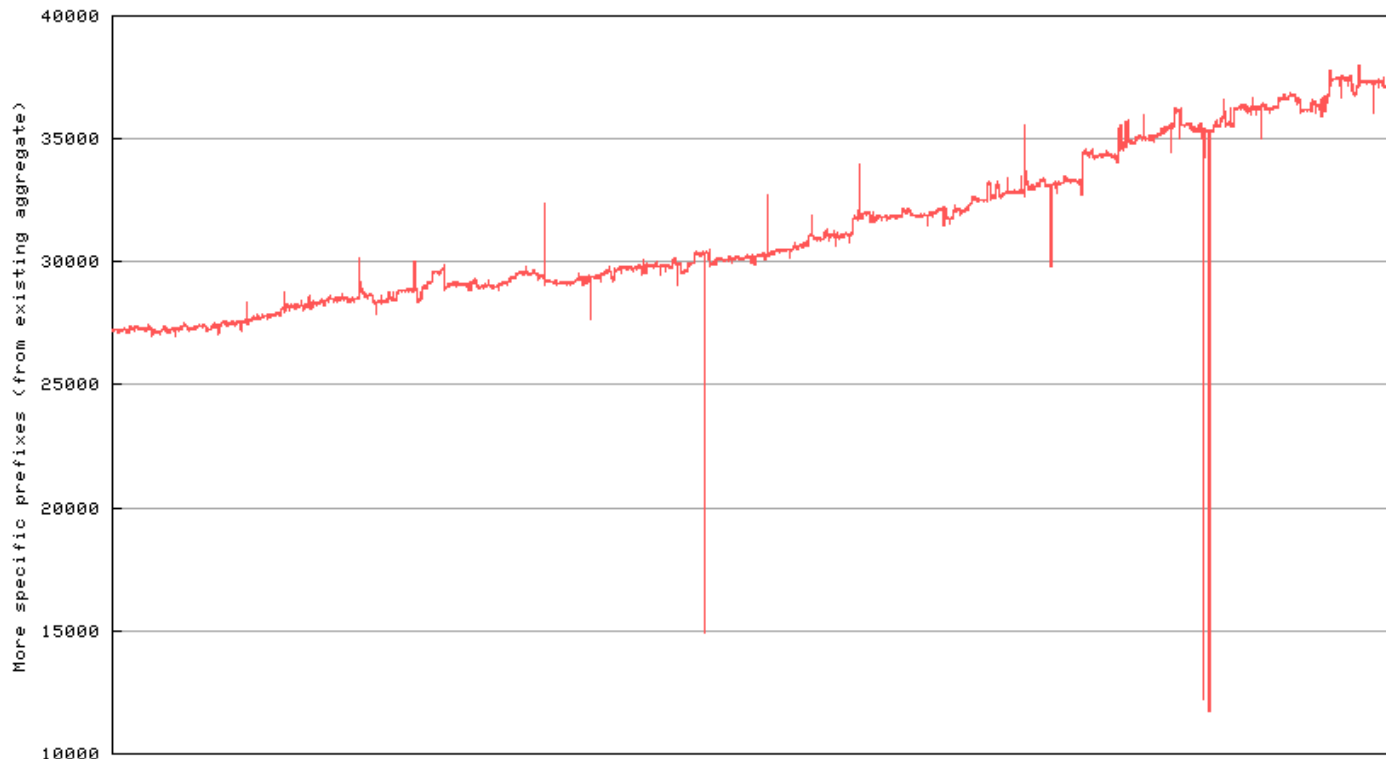
# Observations for 99/00

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- Exponential rise in the number of routed addresses 0.6% growth / month (7% / year)
- Exponential rise in number of AS's  
3.5% growth / month (51% / year)
- Exponential rise in number of route advertisements  
3% growth / month (42% / year)

# Multi-homing on the rise?

- Track rate of CIDR "holes" – currently 35% of all route advertisements are routing 'holes'



This graph tracks the number of address prefix advertisements which are part of an advertised larger address prefix



## Prefix Growth – Aug 00 to Oct 00

/16	6553	->	6670	absolute growth =	117,	relative =	1.79%
/17	889	->	936	absolute growth =	47,	relative =	5.29%
/18	1763	->	1884	absolute growth =	121,	relative =	6.86%
/19	5704	->	5984	absolute growth =	280,	relative =	4.91%
/20	3423	->	3854	absolute growth =	431,	relative =	12.59%
/21	3621	->	3856	absolute growth =	235,	relative =	6.49%
/22	5415	->	5870	absolute growth =	455,	relative =	8.40%
/23	7298	->	7788	absolute growth =	490,	relative =	6.71%
/24	49169	->	52449	absolute growth =	3280,	relative =	6.67%
/25	208	->	436	absolute growth =	228,	relative =	109.62%
/26	334	->	606	absolute growth =	272,	relative =	81.44%
/27	469	->	667	absolute growth =	198,	relative =	42.22%
/28	357	->	452	absolute growth =	95,	relative =	26.61%
/29	579	->	764	absolute growth =	185,	relative =	31.95%
/30	746	->	1026	absolute growth =	280,	relative =	37.53%

The largest significant relative growth in recent times is /20, tracking the allocation policy change in the RIRs

While the absolute number is low, the largest relative growth is in /25 prefixes, and /25 to /30 represent the greatest area of prefix growth in relative terms



## Tentative Conclusions

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BGP table size continues to rise exponentially

- Multi-homing at the edge of the Internet is on the increase
- The interconnectivity mesh is getting denser
  - The number of AS paths is increasing faster than the number of AS's
- AS number deployment growth will exhaust 64K AS number space in 2005 if current growth trends continue



## Tentative Conclusions (Cont)

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- Inter-AS Traffic Engineering is being undertaken through routing discrete prefixes along different paths (the routing mallet!)
- RIR allocation policy (/19, /20) is driving the per-prefix length growth
- Over 12 months average prefix length has shifted from /18.1 to /18.4
- More noise (/25 and greater) in the table, but the absolute level of noise is low (so far)