

Projecting Future IPv4 Router Requirements from Trends in Dynamic BGP Behaviour

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Role of BGP in today's Internet

- For 17 years the Internet has used Border Gateway Protocol (BGP) to manage inter-Autonomous System (AS) routing
 - A classic distance vector protocol, using an explicitly enumerated path vector as a combined path metric and loop detector.
 - Yet little work done to understand BGP's dynamic behaviour

Summary of IPv4 BGP Data over 2005

146 million updates on AS1221 (Telstra) over 12 months

Prefixes	148,000 - 175,400	+18%	+26,900
Prefix Roots	72,600 - 85,500	+18%	+12,900
More Specifics	77,200 - 88,900	+18%	+14,000
Addresses	80.6 - 88.9 (/8s)	+10%	+8.3 /8s
ASNs	18,600 - 21,300	+14%	2,600



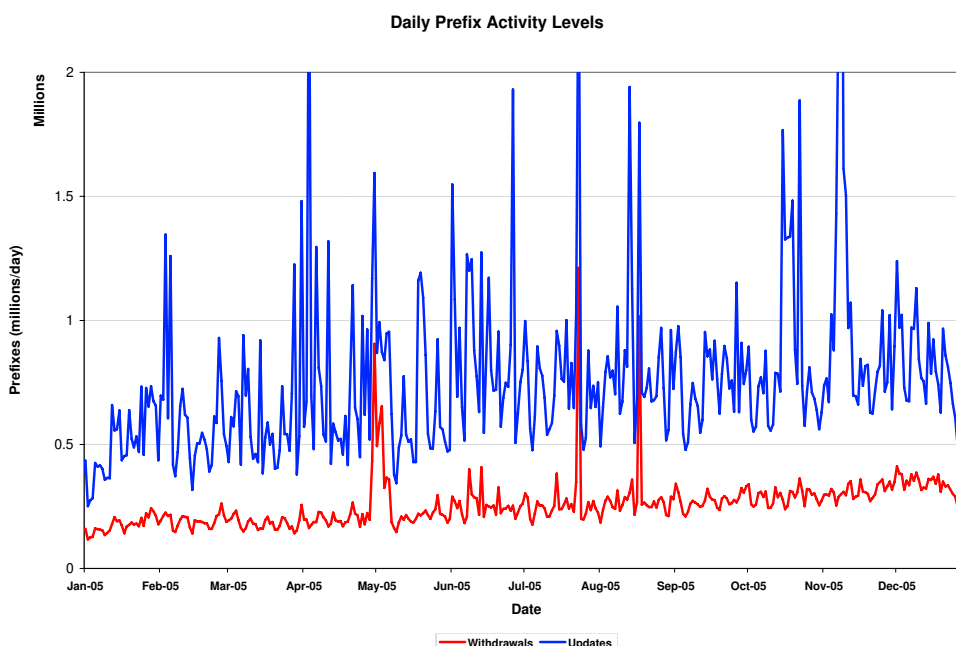
Importance of knowing BGP behaviour

- How big can the Internet grow?
- In the 'core' (default-free zone) the limits include
 - Memory capacity for storing absolute size of Routing Information Base (RIB), proportional to number of prefixes being advertised
 - CPU capacity in core routers for processing BGP updates, proportional to frequency of updates
- Vendors need predictions 3 to 5 years out to properly size their next generation core routers

Prefix Update and Withdrawal rates



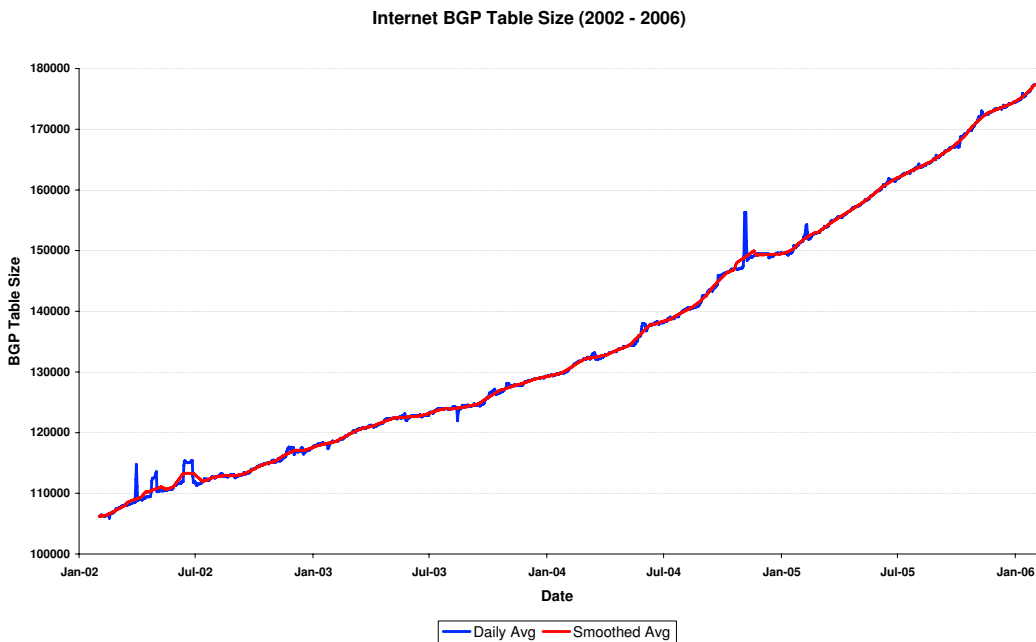
- High update/withdraw: full BGP session resets
- High update/limited withdraw: BGP route updates





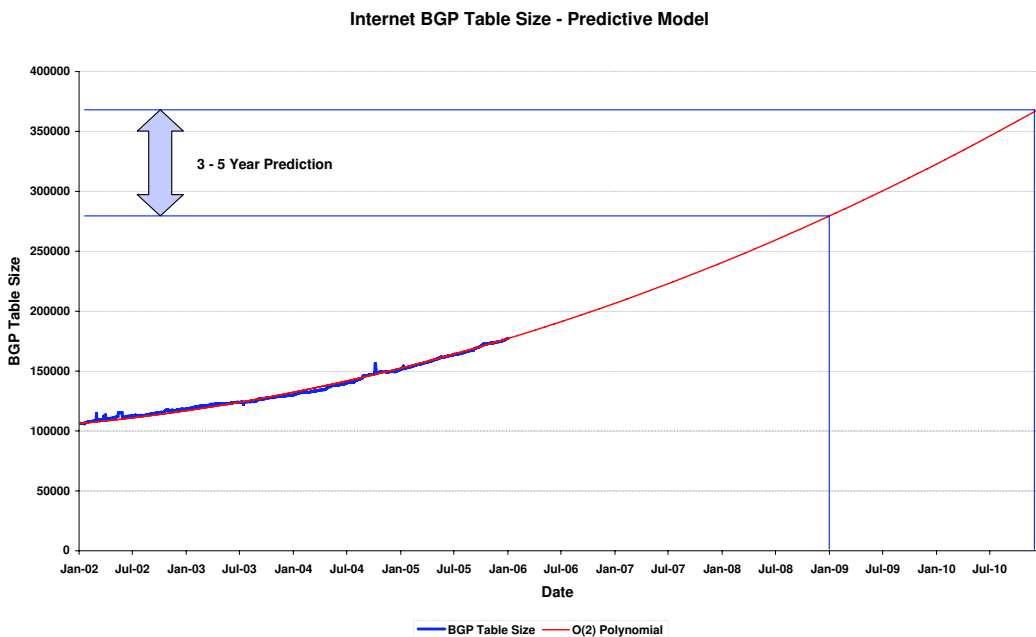
BGP Table growth to early 2006

- BGP table size growth from 2002 to 2006 (hourly snapshots in blue)



BGP Table growth projection to 2010

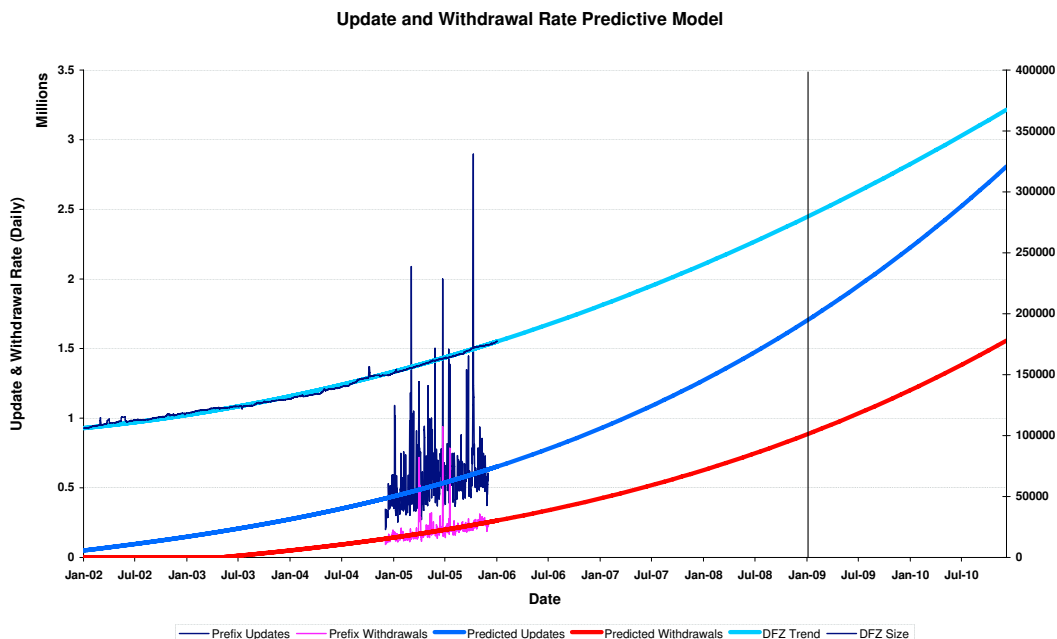
- Projections to 2010 using 2002-2006 curve





BGP update activity projection to 2010

- Projecting the update/withdrawal rate to 2010 from 2005's curve



Impact of BGP activity growth to 2010

- Processing load:
 - Demand for CPU cycles (processing update messages) is growing faster than memory requirements and forwarding decision structure (RIB size)
 - Router engine processing capacity will need to grow substantially to cope with the projected BGP load over the coming 3 to 5 years

Date	BGP Table Size	Daily Prefix Updates	Daily Prefix Withdrawals
End 2005	176,000	700,000	400,000
End 2008	275,000	1,700,000	900,000
End 2010	370,000	2,800,000	1,600,000