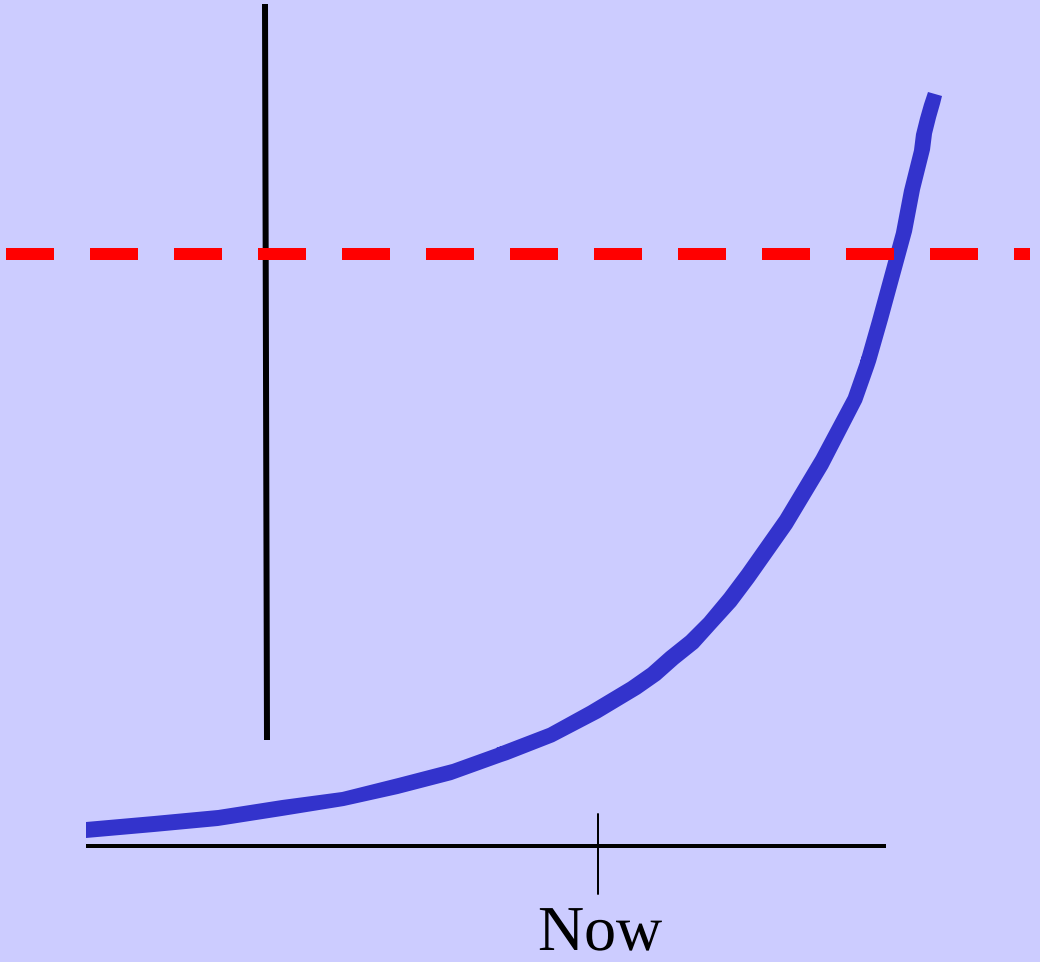
Imminent Collapse of Internet



Slide thanks to Abha Ahuja (who meant it as a parody)

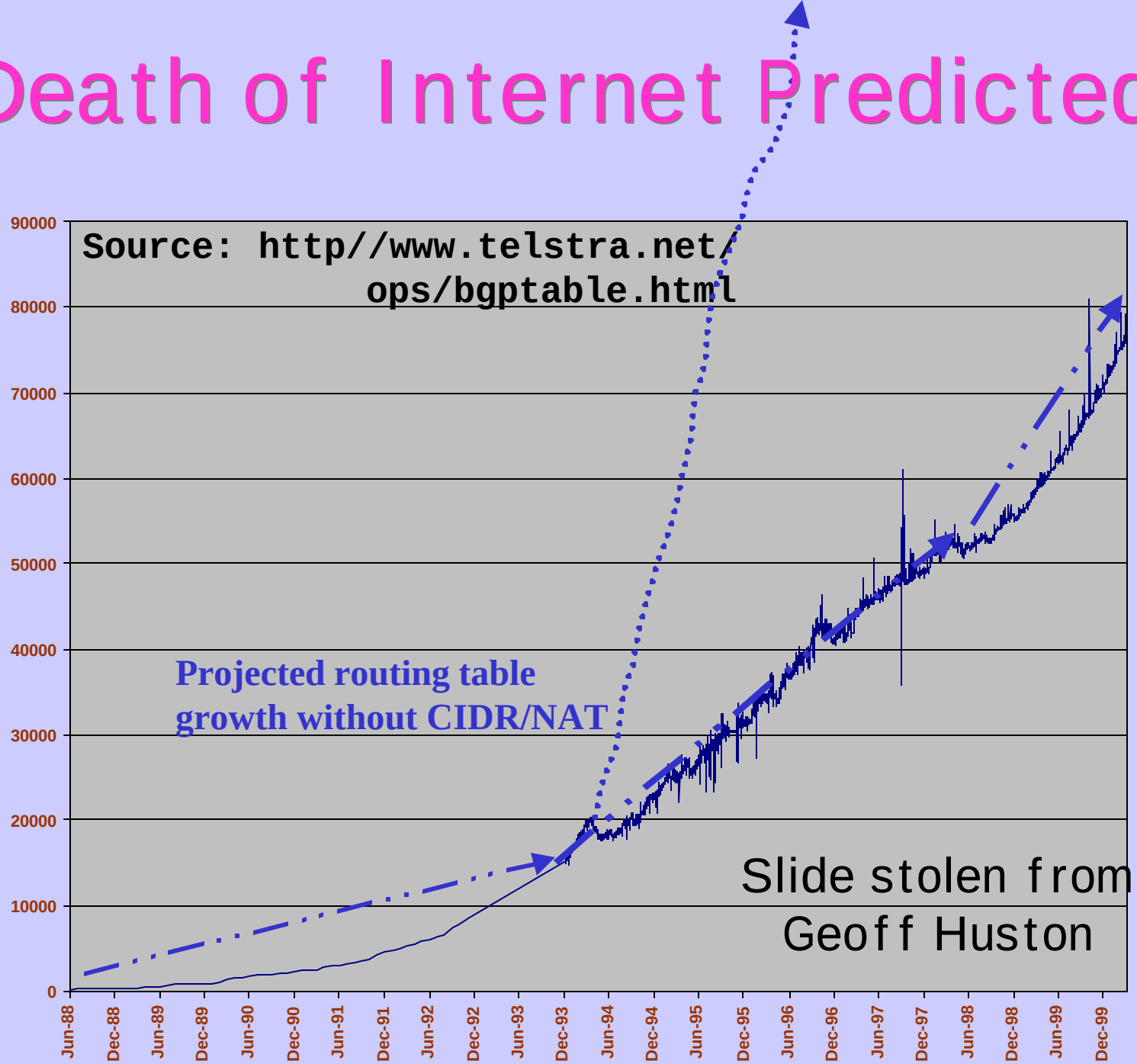
The End is in Sight!

"The existing interdomain routing infrastructure is **rapidly** nearing the end of its useful lifetime."

-- *widely* distributed email by an IAB member

"The IETF has admitted the internet has failed" -- Circuit-zilla

Death of Internet Predicted



News at Eleven

ptomaine

IETF51 / London

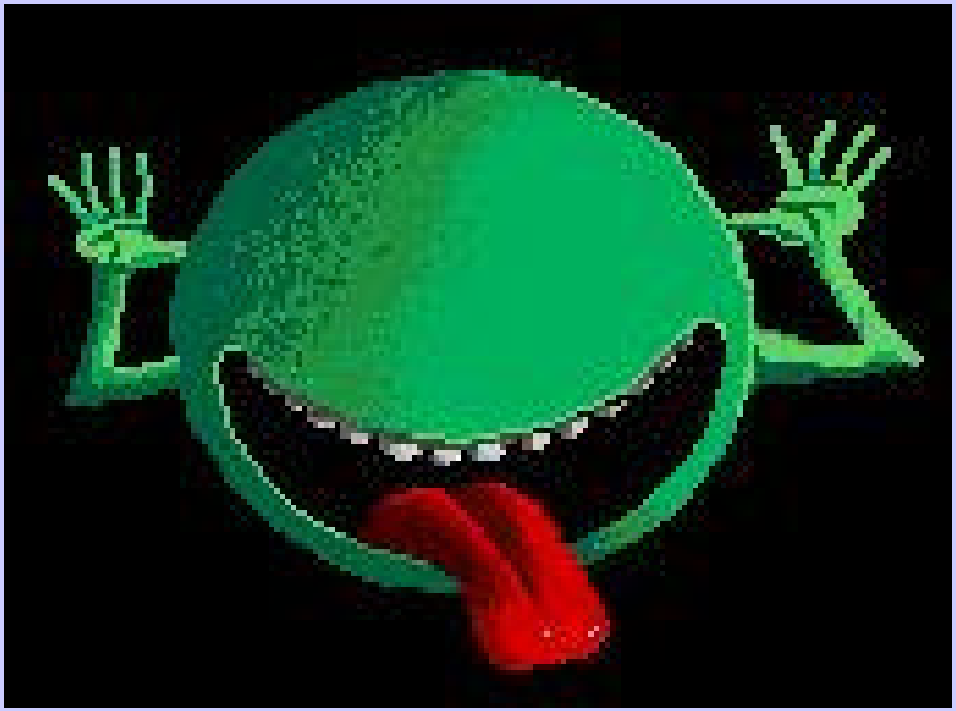
2001.08.09

Jennifer Rexford <jrex@research.att.com>

Tim Griffin <griffin@research.att.com>

Steve Bellovin <smb@research.att.com>

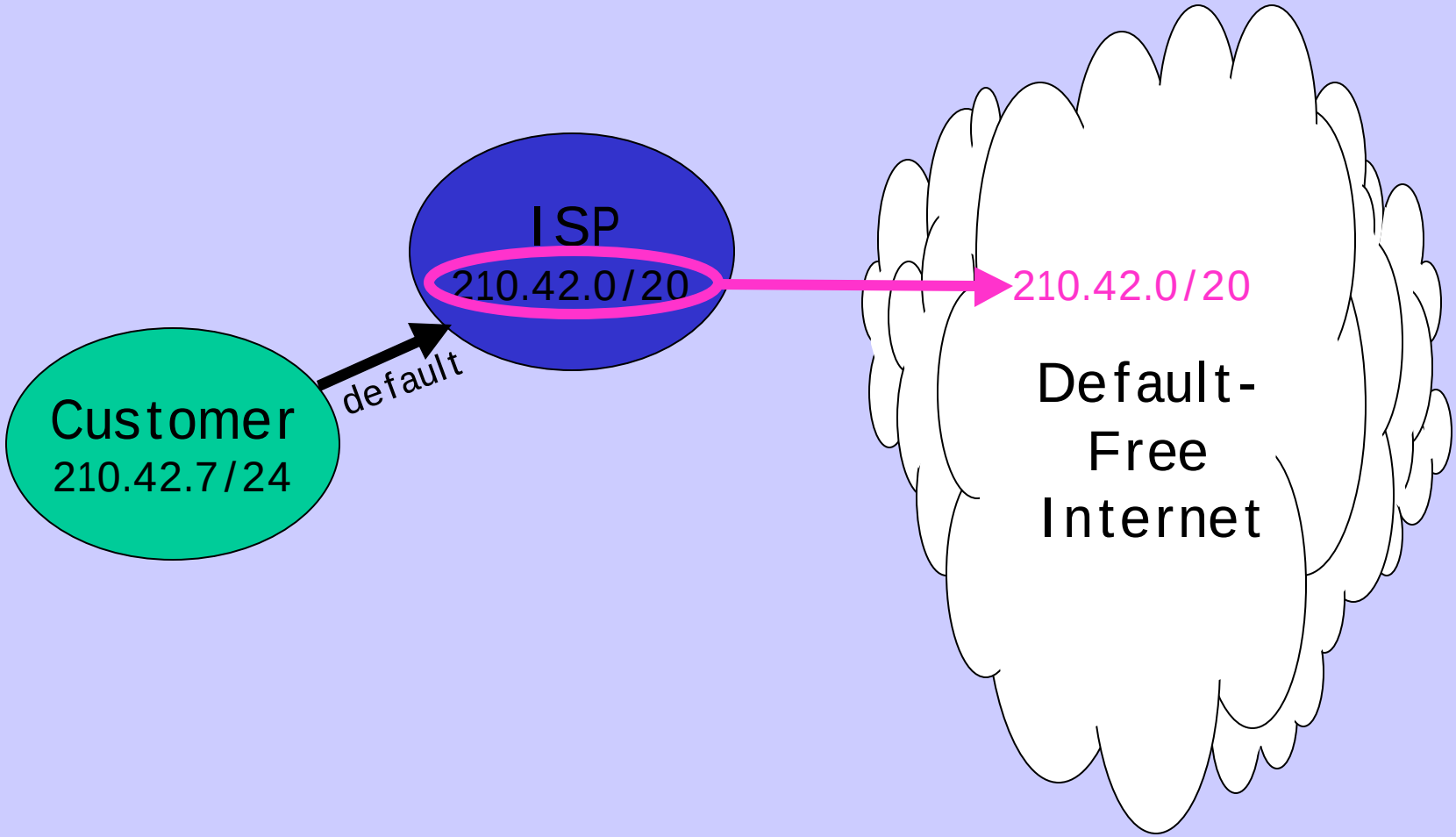
Randy Bush <randy@research.att.com>



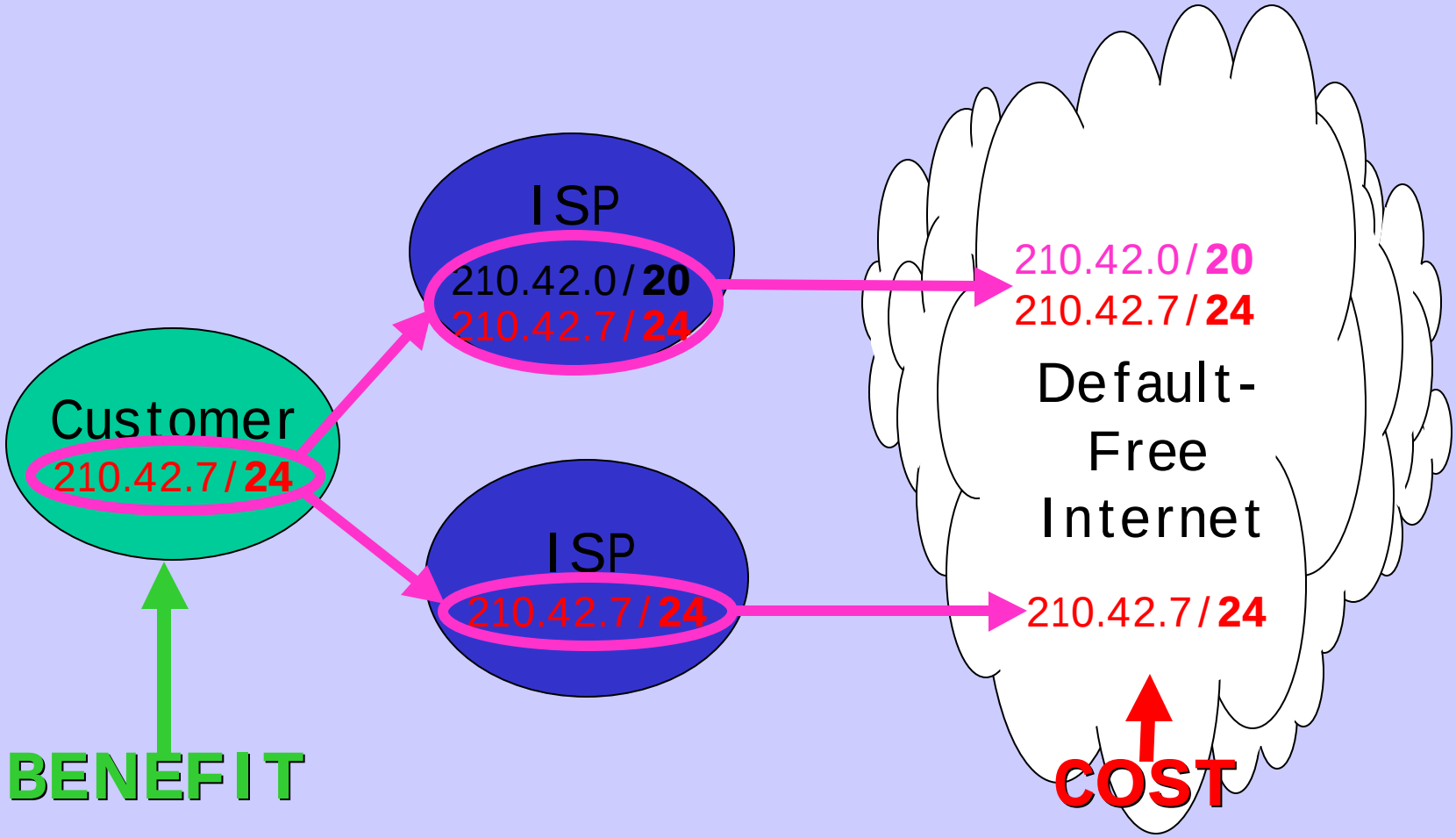
Don’t Panic,

Engineer Prudently

The Simple Life



The Problem of Multihoming



Grazing the Commons

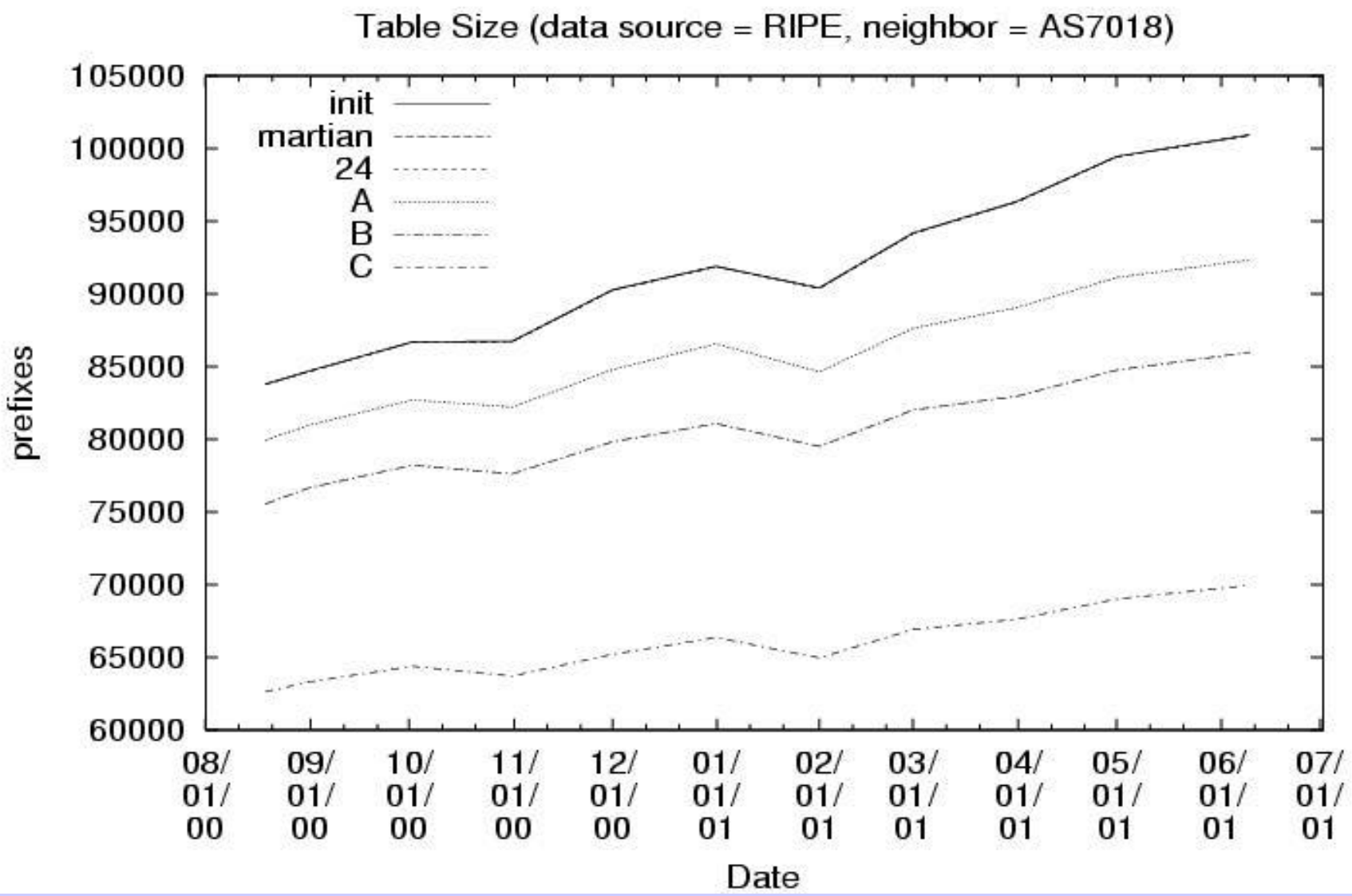
Prolonging the Current Commons

- A major problem is the DFZ (default-free internet) is being flooded with many small announcements of multi-homers
- We need at least five+ years to design, develop, & deploy a new routing paradigm
- So what would be the effect if peers stopped listening to those long prefixes?
- What happens if we filter anouncements from peers on RIR allocation boundaries?

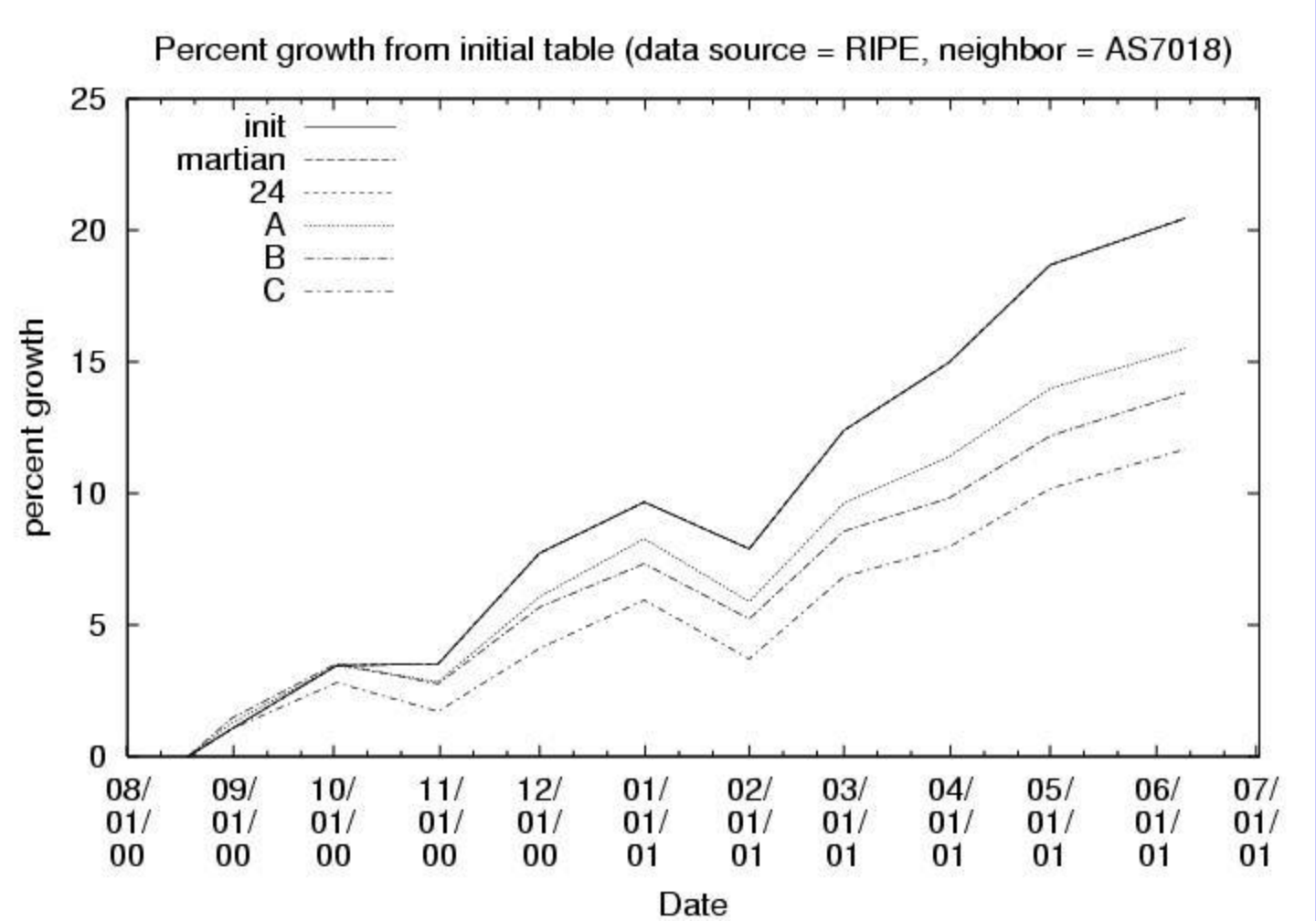
Allocation Boundaries (RIPE) ripe-222

Block	Default	Smallest
62/8	/19	/19
80/8	/20	/20
81/8	/20	/20
193/8	/19	/29
194/8	/19	/29
195/8	/19	/29
212/8	/19	/19
213/8	/19	/19
217/8	/20	/20

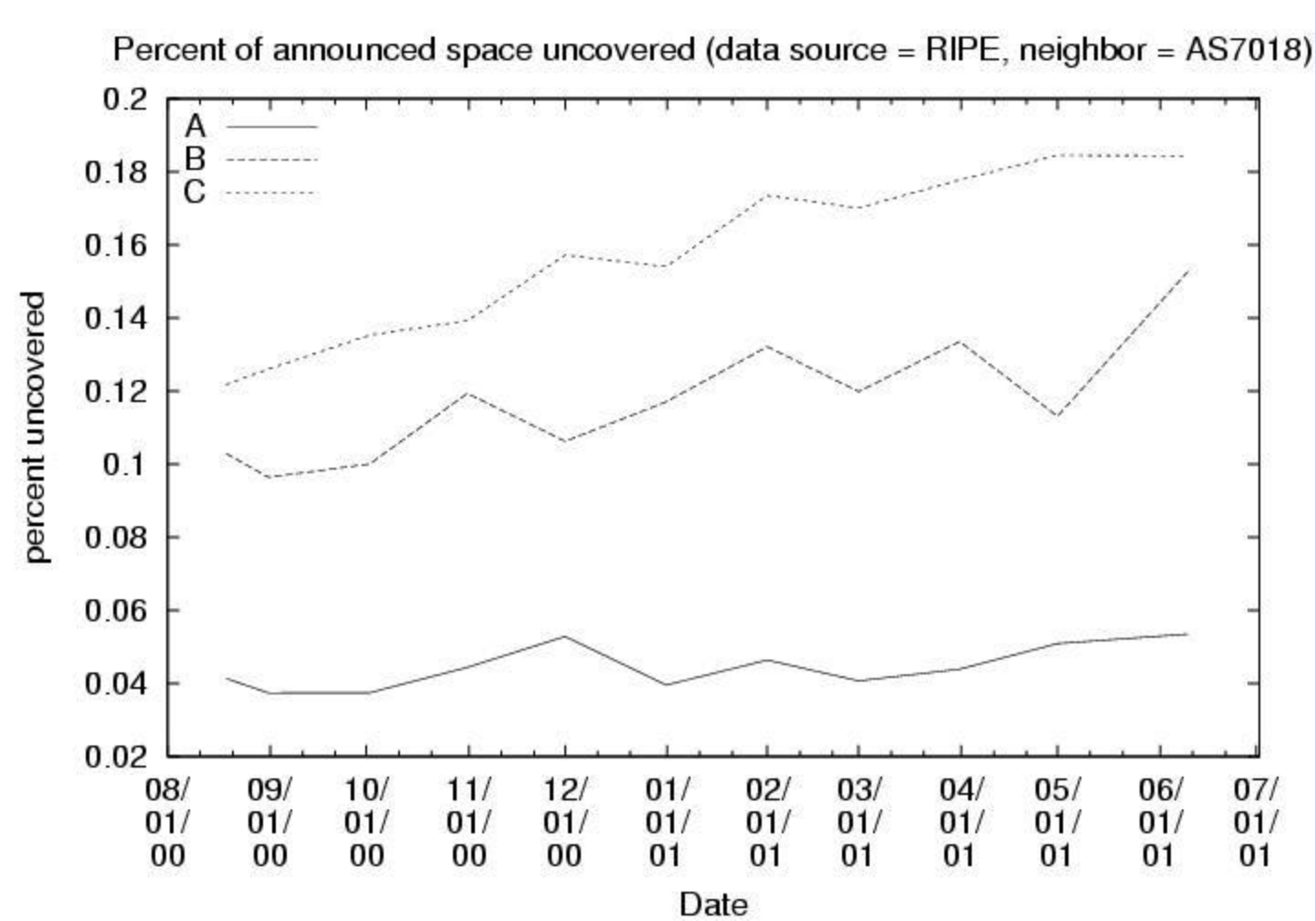
Worldnet (1) at RIPE



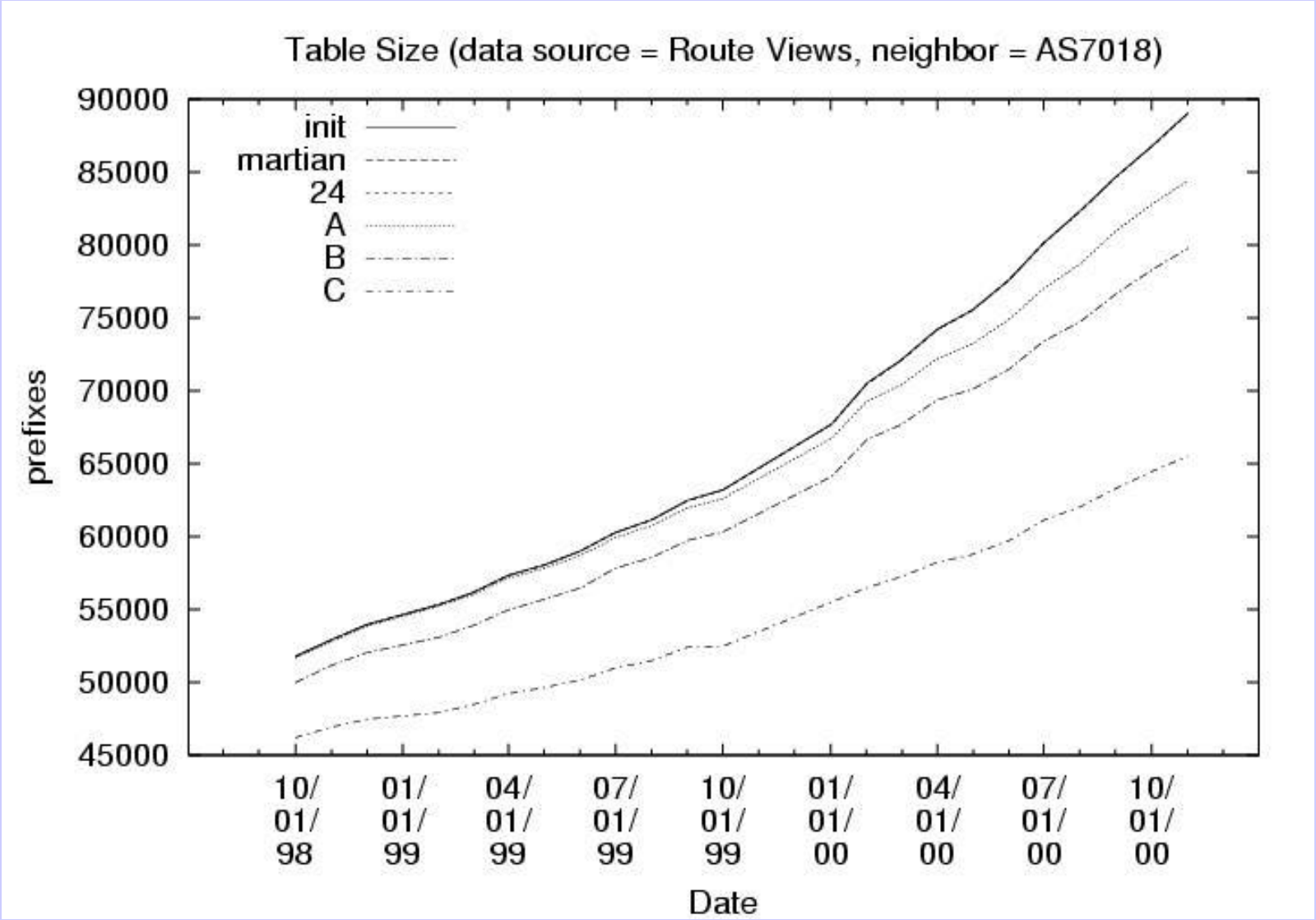
Worldnet (2) at Ripe



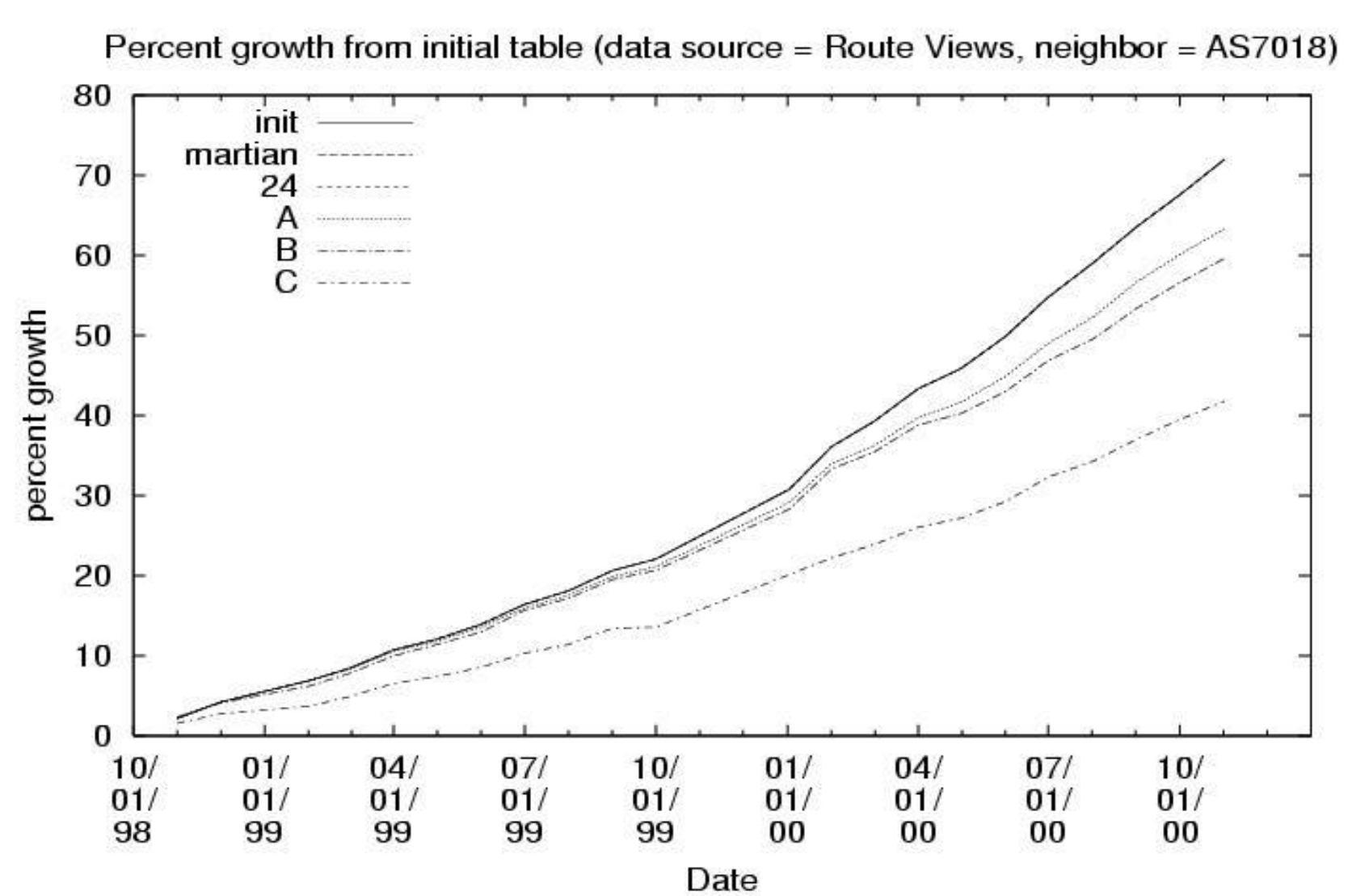
Worldnet (3) at Ripe



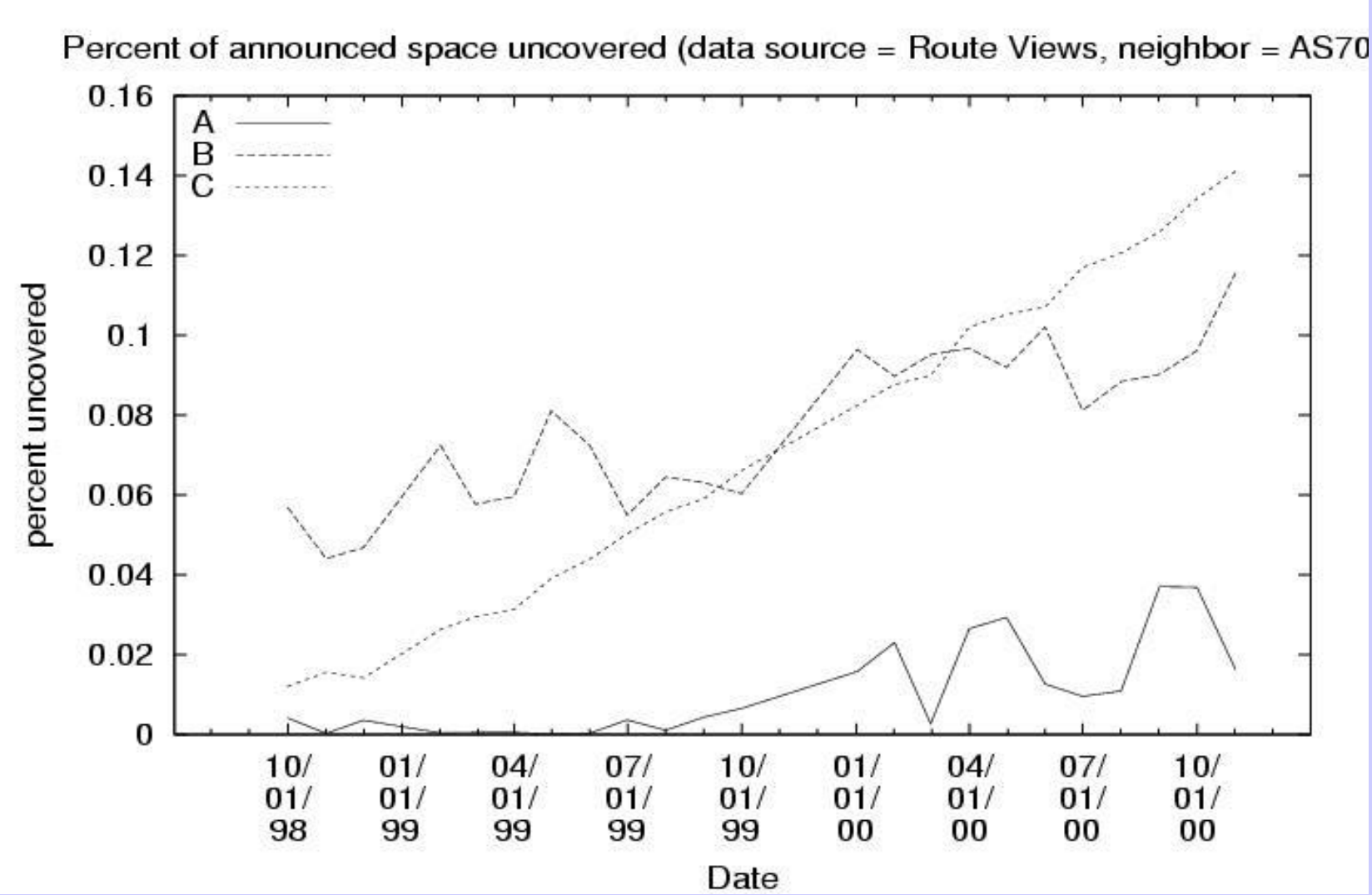
Worldnet (1) at Route-Views



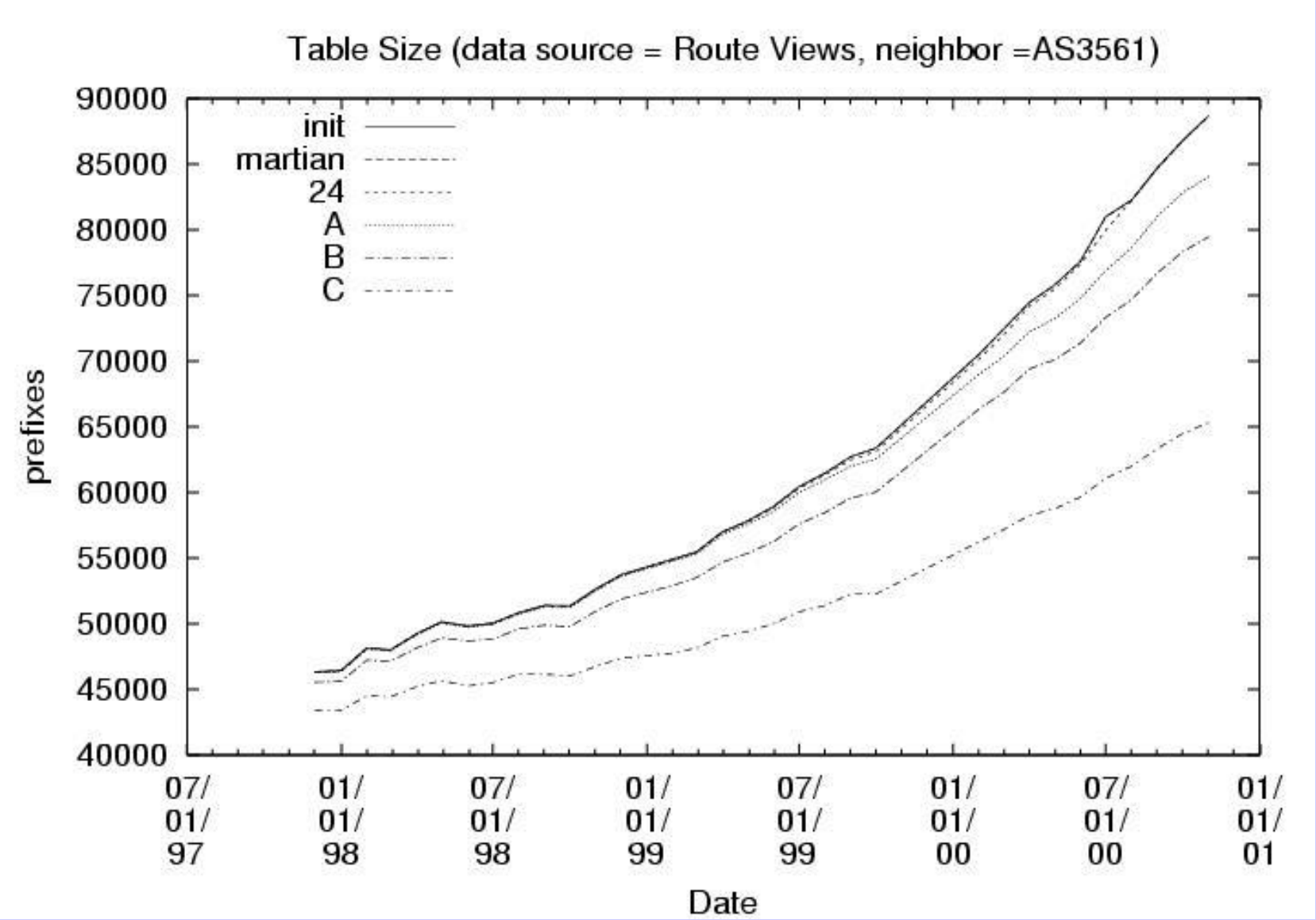
Worldnet (2) at Route-Views



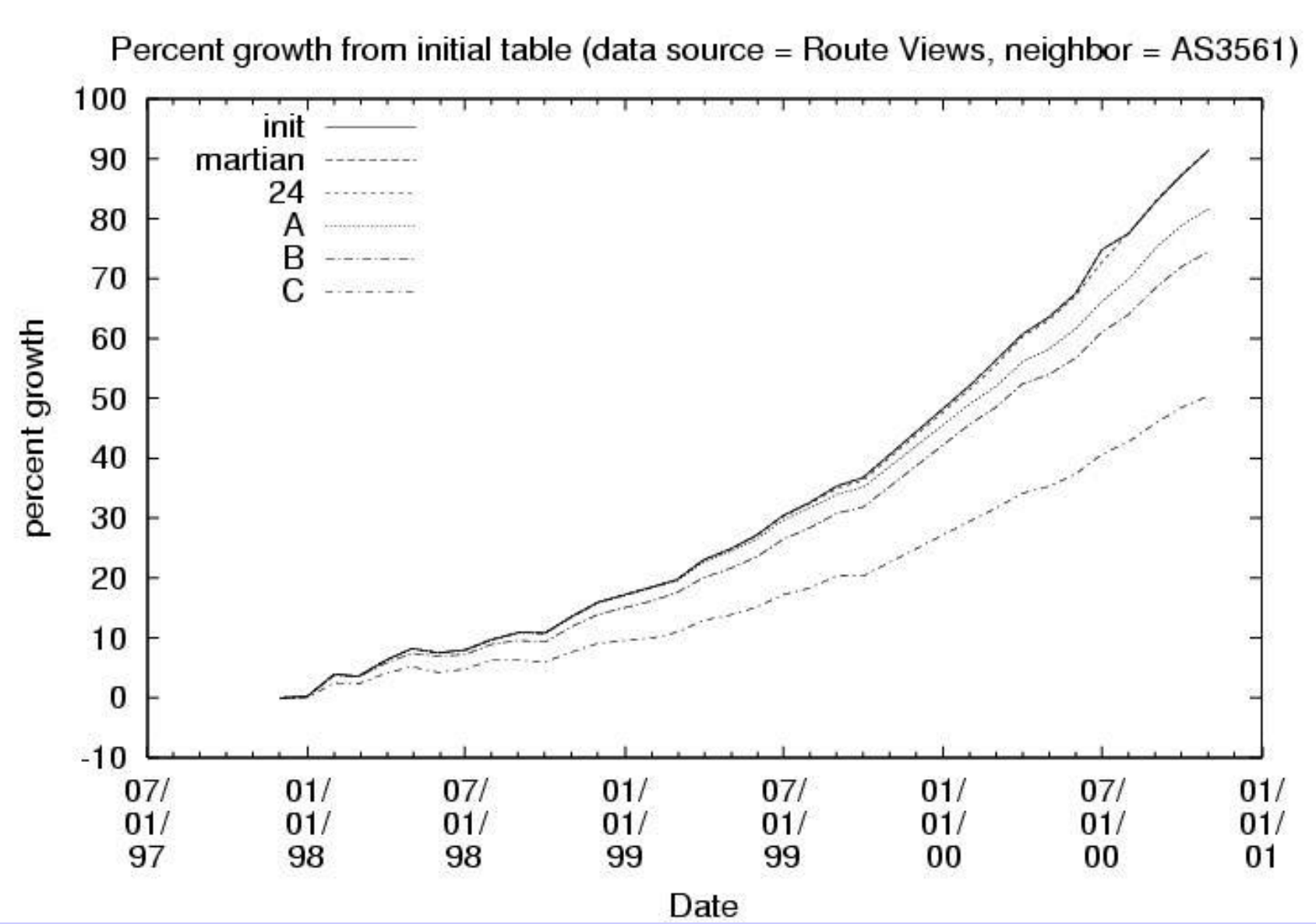
Worldnet (3) at Route-Views



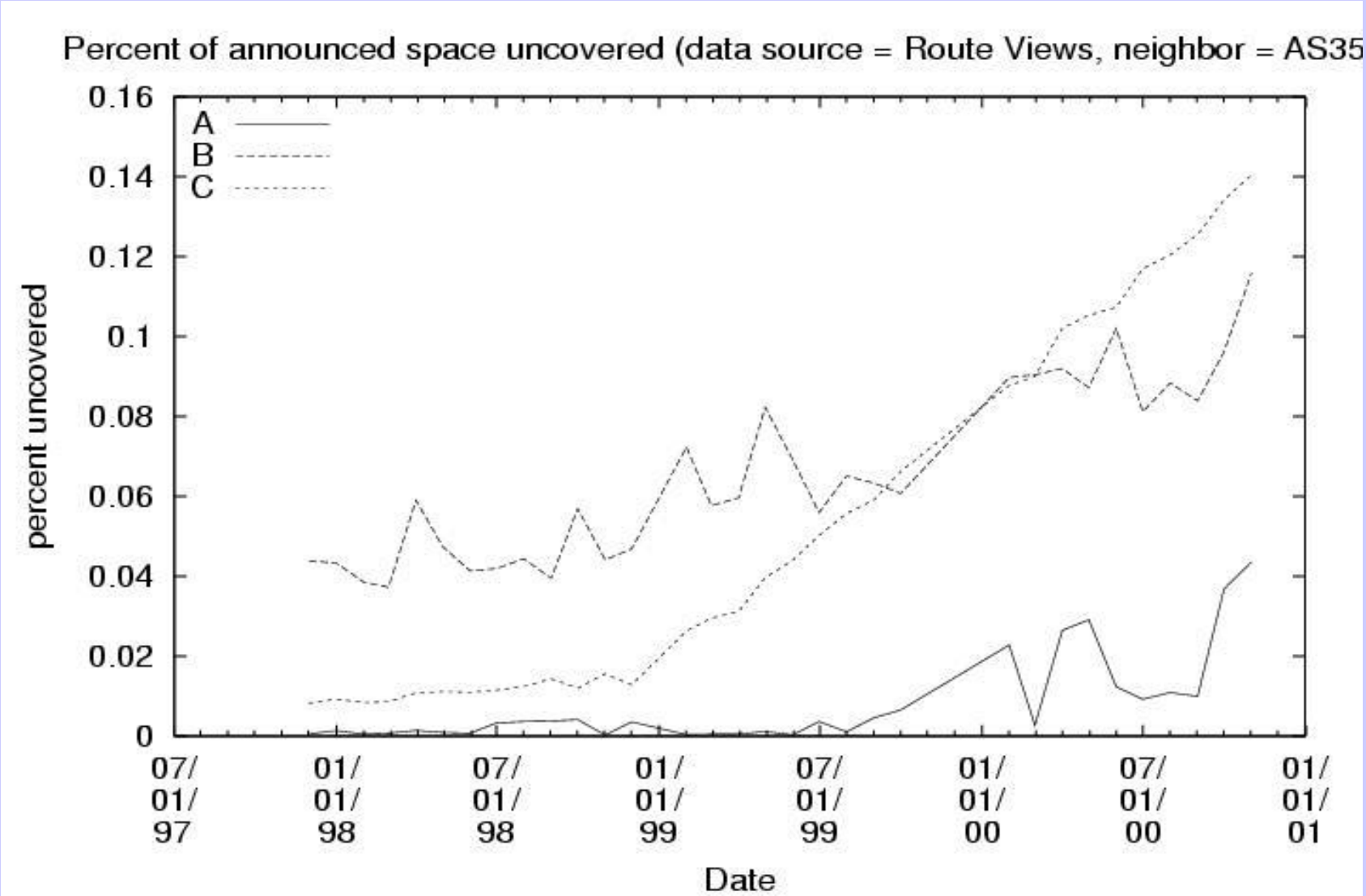
C&W (1) at Route-Views



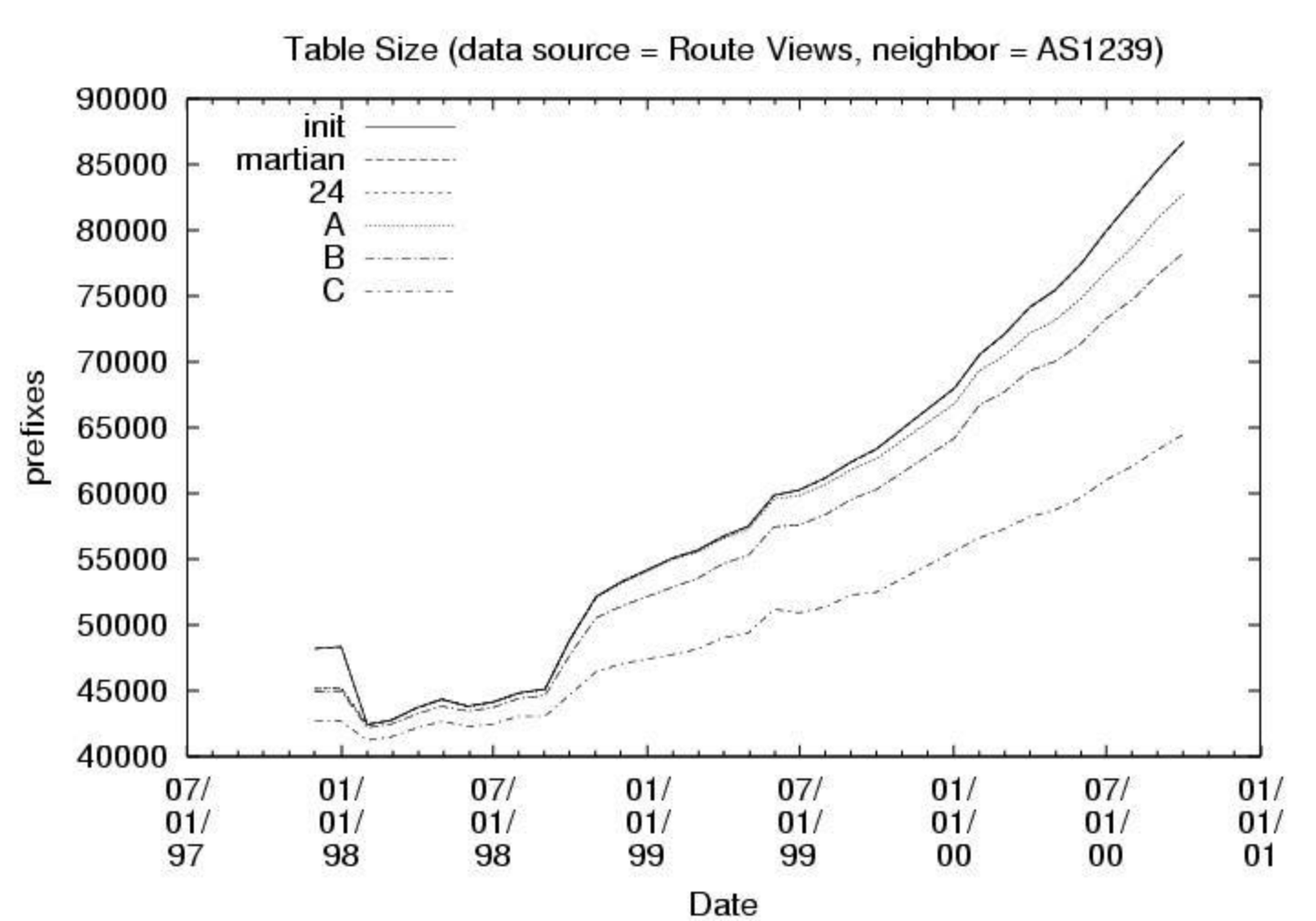
C&W (2) at Route-Views



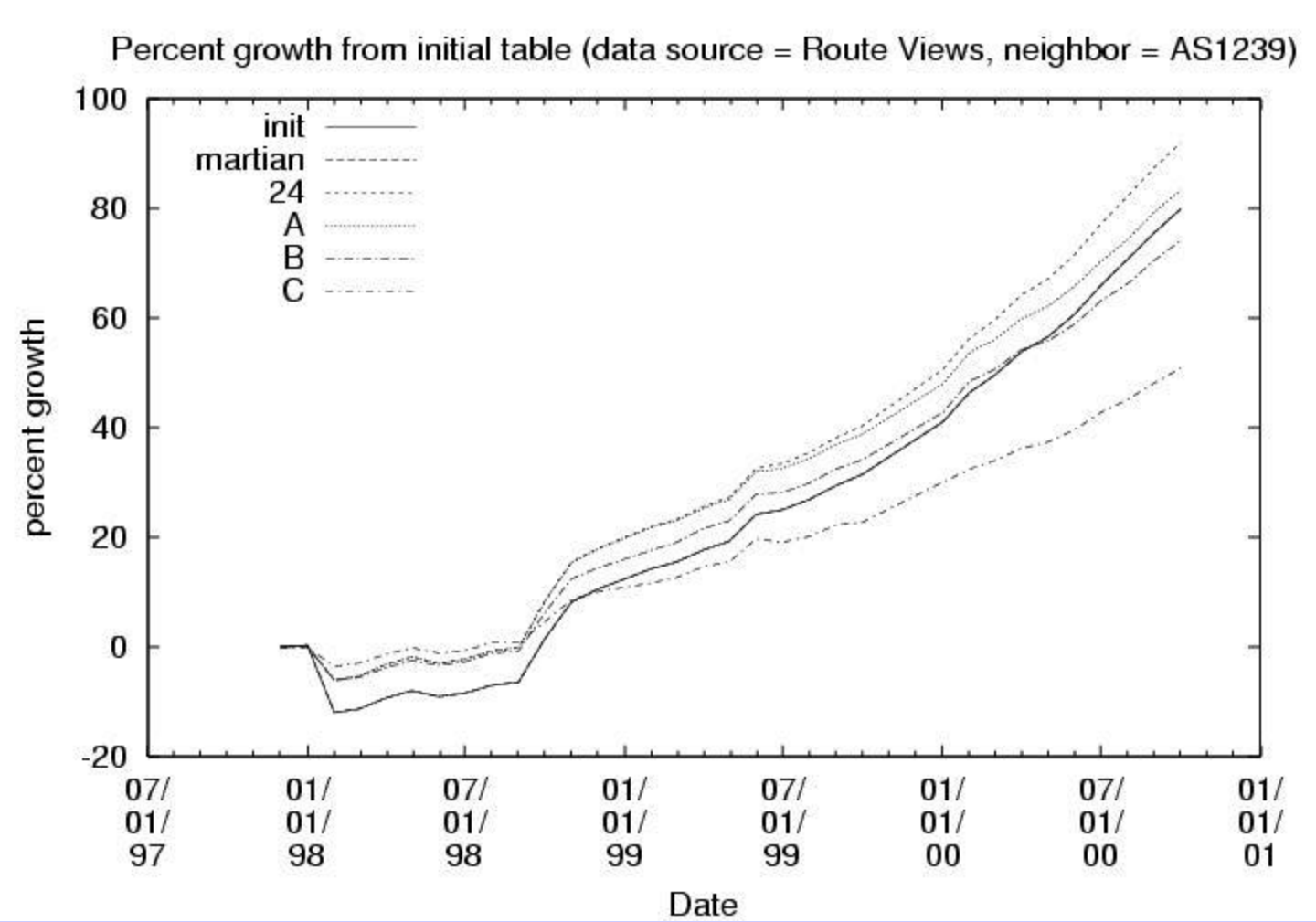
C&W (3) at Route-Views



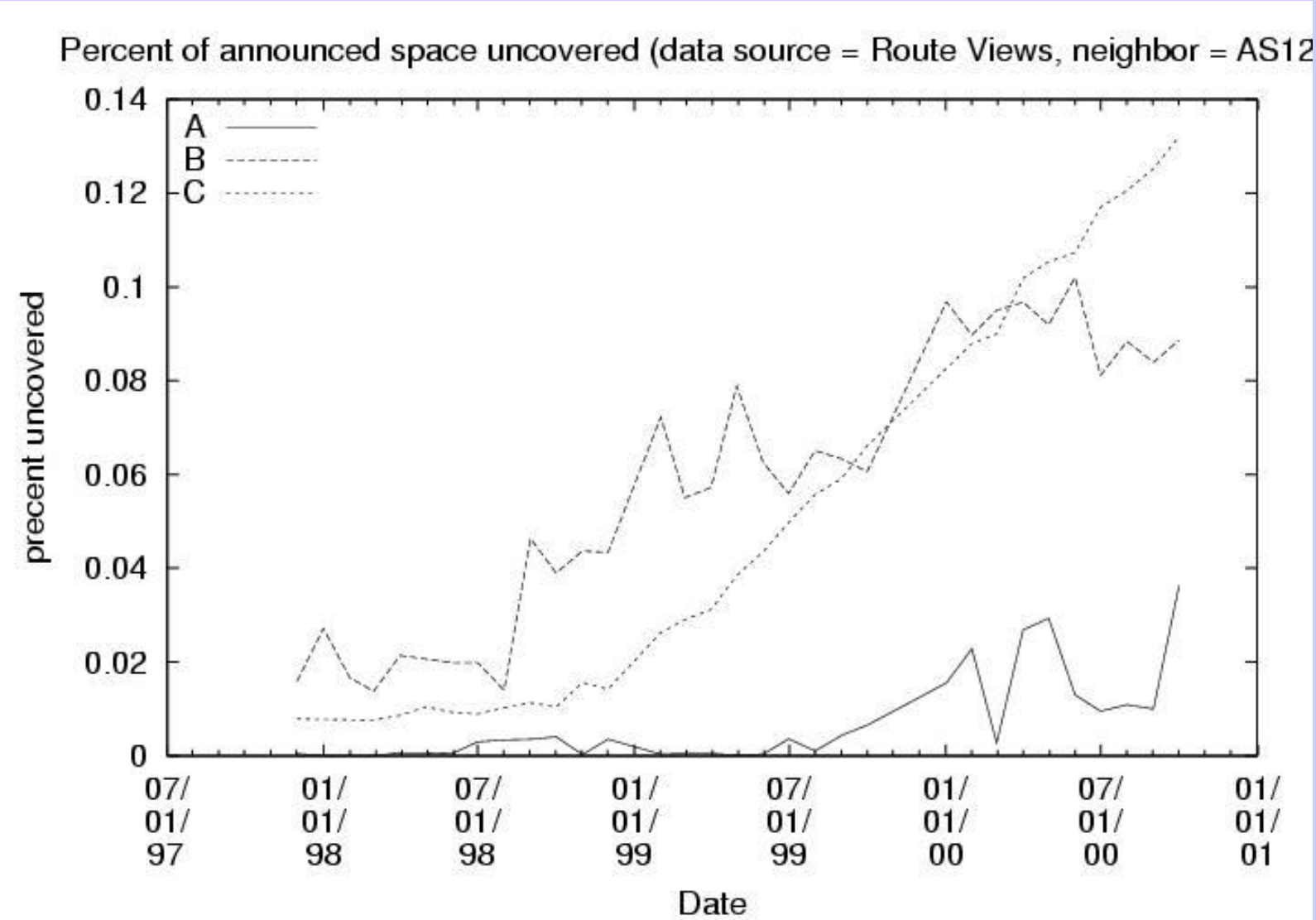
Sprint (1) at Route-Views



Sprint (2) at Route-Views



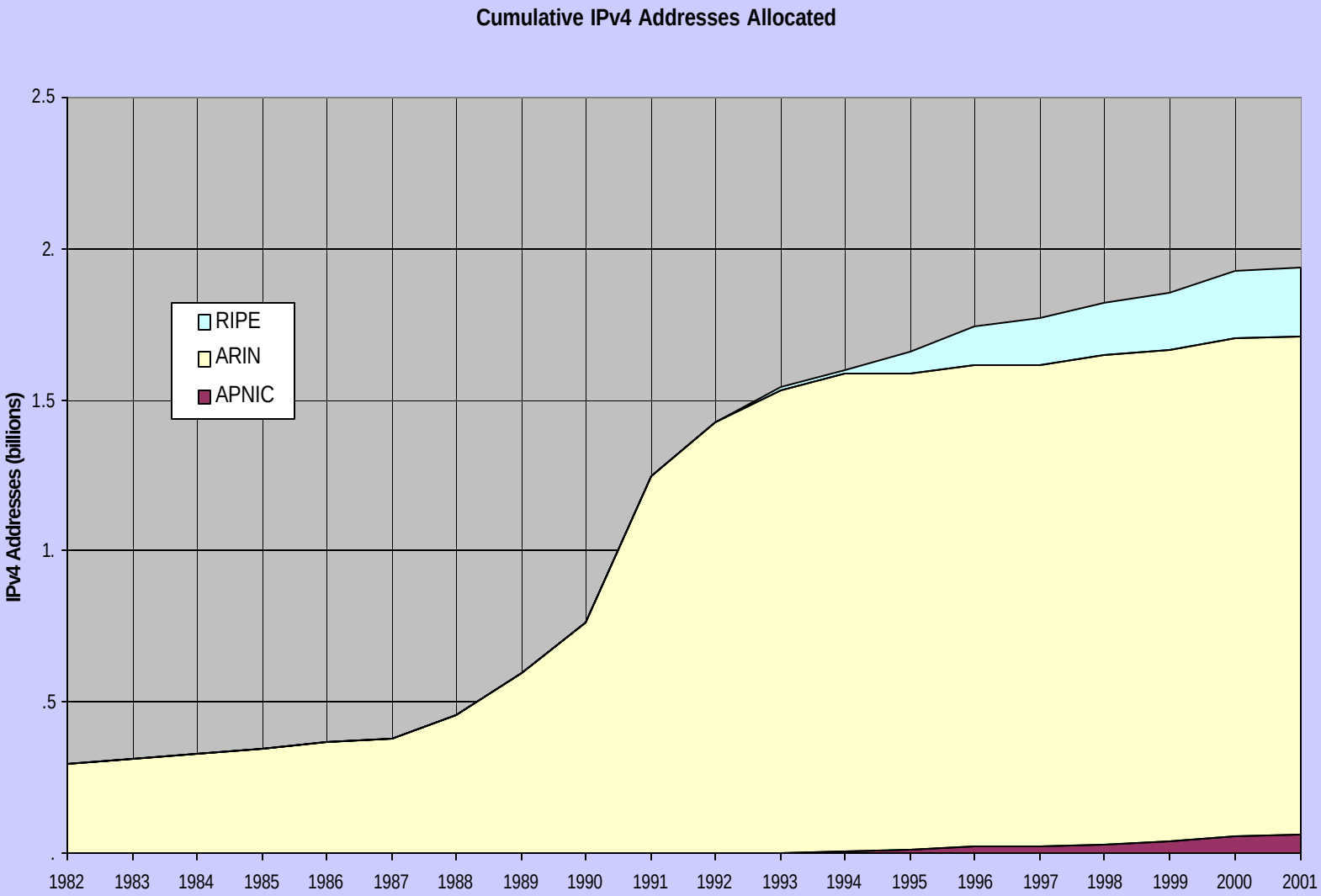
Sprint (3) at Route-Views



So How Long?

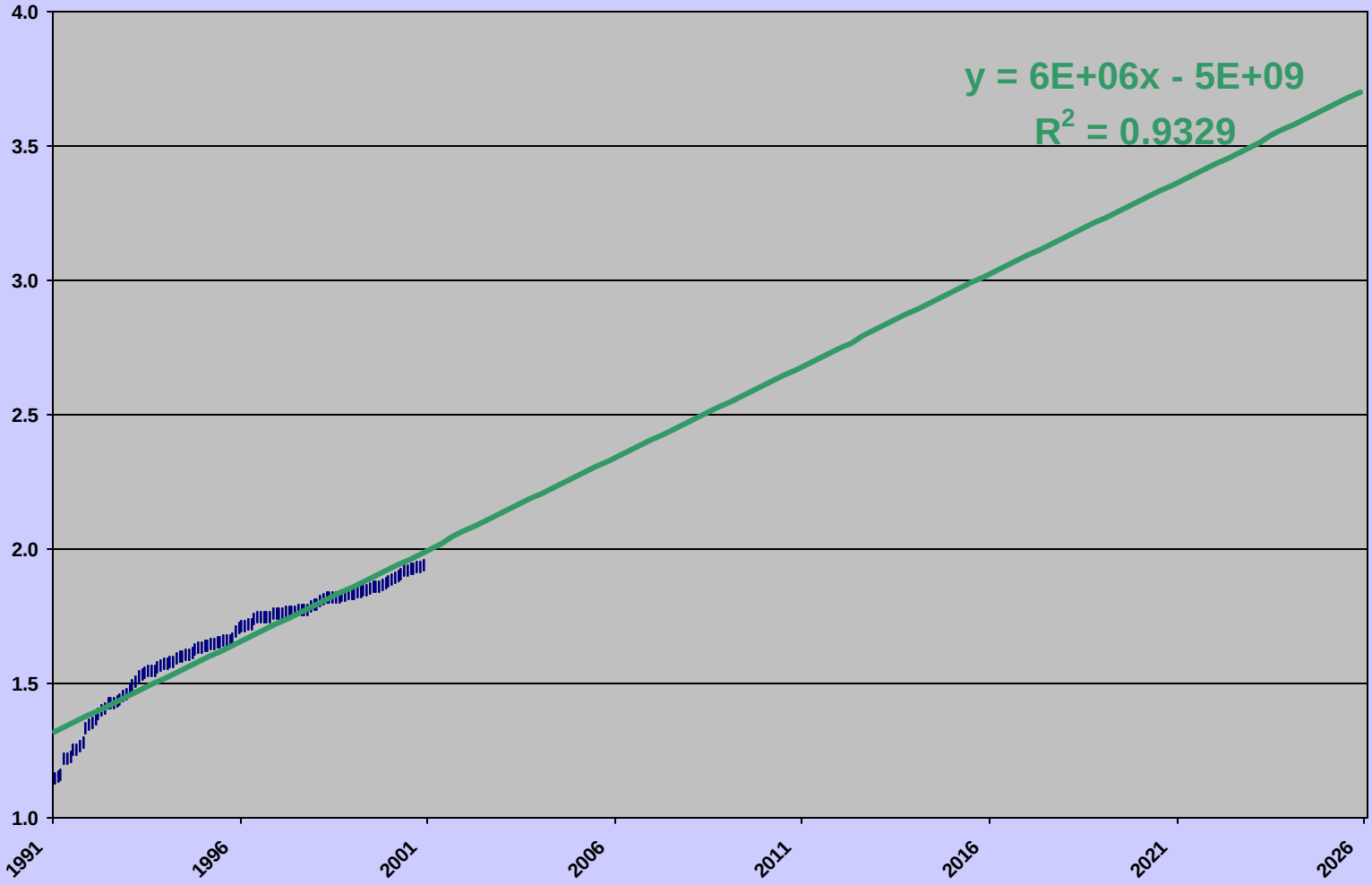
- If all v4 space is announced as /20s (very pessimistic) 2^20 = 1,048,576
- At recent allocation (not announcement) rates, that's 2010++ and a million prefixes
- This is three doublings in 9+ years, i.e. well under Moore's Law
- And we will be at the end of the v4 space

Cumulative IPv4 Allocations



Stolen from Scott Marcus

IPv4 Allocations: Linear Fit



Stolen from Scott Marcus

IPv6 != Silver Bullet

- IPv6 gives us a lot more address space
- So the allocation curve continues
- But IPv6 does not yet have new routing or multi-homing paradigms
- IPv6 without a routing paradigm change exacerbates the routing problem!
- This is not new news
- multi6 and ptomaine are working on the short-term stall
- IRTF rrg and others for the long-term

Conclusion

- Rumors of the Imminent Death of the Internet have been greatly exaggerated (remember the address space panic in '93-'94?)
- Prudent operational practice can continue to keep us going for well over five years
  - Filtering
  - BGP tweaks
- But, as prudent engineers, we, the IETF, **must** spend this window developing a new routing paradigm. And time's a wastin'!

Fun Things to Do

- Come to ptomain BOF tommorrow
  - more detailed data from this study
  - a completely independent research group seems to be coming to a similar conclusion
  - discuss some knobs and hacks to do all this
- Operators, filter please
- Tell your friends
- http://psg.com/~randy/010809.ptomaine.pdf
- http://www.research.att.com/~jrex/papers/filter.(pdf|ps)