

# Internet Routing Table Analysis Update



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# Motivation

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- 1998: No one was publishing any Internet routing table analysis
  - Only CIDR-Report reporting on top 20 contributors to routing table, and top 20 bad aggregators
- With support of APNIC, my weekly reporting report started early 1999:
  - Routing table size
  - CIDR-Report style reporting on a per-RIR basis
  - ...and many other interesting features

# Routing Report 25 April 2005

BGP routing table entries examined:	160566
Prefixes after maximum aggregation:	93383
Unique aggregates announced to Internet:	77305
Total ASes present in the Internet Routing Table:	19478
Origin-only ASes present in the Internet Routing Table:	16943
Origin ASes announcing only one prefix:	7944
Transit ASes present in the Internet Routing Table:	2535
Transit-only ASes present in the Internet Routing Table:	68
Average AS path length visible in the Internet Routing Table:	4.5
Max AS path length visible:	29
Prefixes from unregistered ASNs in the Routing Table:	15
Special use prefixes present in the Routing Table:	0
Prefixes being announced from unallocated address space:	14
Number of addresses announced to Internet:	1401393472
Equivalent to 83 /8s, 135 /16s and 145 /24s	
Percentage of available address space announced:	37.8
Percentage of allocated address space announced:	59.4
Percentage of available address space allocated:	63.7
Total number of prefixes smaller than registry allocations:	75056

## APNIC Region

Prefixes being announced by APNIC Region ASes:	32794
Total APNIC prefixes after maximum aggregation:	15443
Prefixes being announced from the APNIC address blocks:	30725
Unique aggregates announced from the APNIC address blocks:	15495
APNIC Region origin ASes present in the Internet Routing Table:	2249
APNIC Region origin ASes announcing only one prefix:	661
APNIC Region transit ASes present in the Internet Routing Table:	345
Average APNIC Region AS path length visible:	4.4
Max APNIC Region AS path length visible:	15
Number of APNIC addresses announced to Internet:	181963136
Equivalent to 10 /8s, 216 /16s and 137 /24s	
Percentage of available APNIC address space announced:	67.5

APNIC AS Blocks	4608-4864, 7467-7722, 9216-10239, 17408-18431
(pre-ERX allocations)	23552-24575
APNIC Address Blocks	58/7, 60/7, 124/7, 126/8, 202/7, 210/7, 218/7, 220/7 and 222/8

## ARIN Region

Prefixes being announced by ARIN Region ASes:	87200
Total ARIN prefixes after maximum aggregation:	53179
Prefixes being announced from the ARIN address blocks:	68031
Unique aggregates announced from the ARIN address blocks:	25011
ARIN Region origin ASes present in the Internet Routing Table:	9882
ARIN Region origin ASes announcing only one prefix:	3589
ARIN Region transit ASes present in the Internet Routing Table:	933
Average ARIN Region AS path length visible:	4.3
Max ARIN Region AS path length visible:	21
Number of ARIN addresses announced to Internet:	246558464
Equivalent to 14 /8s, 178 /16s and 47 /24s	
Percentage of available ARIN address space announced:	70.0

ARIN AS Blocks	1-1876, 1902-2042, 2044-2046, 2048-2106
(pre-ERX allocations)	2138-2584, 2615-2772, 2823-2829, 2880-3153
	3354-4607, 4865-5119, 5632-6655, 6912-7466
	7723-8191, 10240-12287, 13312-15359, 16384-17407
	18432-20479, 21504-23551, 25600-26591,
	26624-27647, 29696-30719, 31744-33791
	35840-36863
ARIN Address Blocks	24/8, 63/8, 64/6, 68/7, 70/6, 198/7, 204/6,
	208/7 and 216/8

## RIPE NCC Region

Prefixes being announced by RIPE Region ASes:	30499
Total RIPE prefixes after maximum aggregation:	21058
Prefixes being announced from the RIPE address blocks:	27535
Unique aggregates announced from the RIPE address blocks:	18391
RIPE Region origin ASes present in the Internet Routing Table:	6572
RIPE Region origin ASes announcing only one prefix:	3473
RIPE Region transit ASes present in the Internet Routing Table:	1104
Average RIPE Region AS path length visible:	5.2
Max RIPE Region AS path length visible:	29
Number of RIPE addresses announced to Internet:	201827264
Equivalent to 12 /8s, 7 /16s and 163 /24s	
Percentage of available RIPE address space announced:	70.8

RIPE AS Blocks	1877-1901, 2043, 2047, 2107-2136, 2585-2614
(pre-ERX allocations)	2773-2822, 2830-2879, 3154-3353, 5377-5631
	6656-6911, 8192-9215, 12288-13311, 15360-16383
	20480-21503, 24576-25599, 28672-29695
	30720-31743, 33792-35839
RIPE Address Blocks	62/8, 80/5, 88/8, 188/8, 193/8, 194/7, 212/7
	and 217/8

## LACNIC Region

Prefixes being announced by LACNIC Region ASes:	8623
Total LACNIC prefixes after maximum aggregation:	2999
Prefixes being announced from the LACNIC address blocks:	7041
Unique aggregates announced from the LACNIC address blocks:	4068
LACNIC Region origin ASes present in the Internet Routing Table:	611
LACNIC Region origin ASes announcing only one prefix:	195
LACNIC Region transit ASes present in the Internet Routing Table:	110
Average LACNIC Region AS path length visible:	5.2
Max LACNIC Region AS path length visible:	21
Number of LACNIC addresses announced to Internet:	18441472
Equivalent to 1 /8s, 25 /16s and 101 /24s	
Percentage of available LACNIC address space announced:	55.0

LACNIC AS Blocks	26592-26623, 27648-28671, plus ERX transfers
LACNIC Address Blocks	200/7

## AfriNIC Region

Prefixes being announced by AfriNIC Region ASes:	1433
Total AfriNIC prefixes after maximum aggregation:	704
Prefixes being announced from the AfriNIC address blocks:	940
Unique aggregates announced from the AfriNIC address blocks:	744
AfriNIC Region origin ASes present in the Internet Routing Table:	99
AfriNIC Region origin ASes announcing only one prefix:	26
AfriNIC Region transit ASes present in the Internet Routing Table:	13
Average AfriNIC Region AS path length visible:	4.6
Max AfriNIC Region AS path length visible:	13
Number of AfriNIC addresses announced to Internet:	2206976
Equivalent to 0 /8s, 33 /16s and 173 /24s	
Percentage of available AfriNIC address space announced:	6.6

AfriNIC AS Blocks           36864-37887 & ERX transfers

AfriNIC Address Blocks 41/8, 196/8



## Global per AS prefix count summary

ASN	No of nets	/20 equiv	Max Agg	Description
7018	1482	6515	958	AT&T WorldNet Services
174	1137	5604	969	Cogent Communications
721	1106	21747	312	DLA Systems Automation Center
4323	1100	665	224	Time Warner Telecom
701	1003	8282	857	UUNET Technologies, Inc.
1239	916	2876	663	Sprint
4134	901	5101	182	CHINANET-BACKBONE
6197	893	388	414	BellSouth Network Solutions,
2386	840	532	622	AT&T Data Communications Serv
18566	792	224	7	Covad Communications
1221	771	1192	548	Telstra Pty Ltd
9583	719	52	67	Sify Limited
209	650	3459	497	Qwest
20115	608	502	309	Charter Communications
702	593	2002	485	UUNET - Commercial IP service
4766	584	3413	275	Korea Telecom (KIX)
3356	583	10836	437	Level 3 Communications, LLC
4755	545	243	112	Videsh Sanchar Nigam Ltd. Aut
3561	541	2361	414	Savvis
852	531	1095	393	Telus Advanced Communications

## Global Aggregation Savings Summary

ASN	No of Nets	Net Savings	Description
4323	1100	876	Time Warner Telecom
721	1106	794	DLA Systems Automation Center
18566	792	785	Covad Communications
4134	901	719	CHINANET-BACKBONE
9583	719	652	Sify Limited
27364	518	500	Armstrong Cable Services
6197	893	479	BellSouth Network Solutions,
5668	489	464	CenturyTel Internet Holdings,
22773	479	458	Cox Communications, Inc.
4755	545	433	Videsh Sanchar Nigam Ltd. Aut
7545	487	417	TPG Internet Pty Ltd
3602	506	412	Sprint Canada, Inc.
6467	442	407	E.Spire Communications, Inc.
17676	430	358	Softbank BB Corp.
6140	399	327	ImpSat
9929	357	313	China Netcom Corp.
4766	584	309	Korea Telecom (KIX)
20115	608	299	Charter Communications
9443	369	294	Primus Telecommunications

## List of Unregistered AS's

Bad AS	Designation	Network	Transit AS	Description
65503	PRIVATE	193.125.183.0/24	3217	SIMBIRSK
30999	UNALLOCATED	196.192.80.0/24	6774	BELGACOM
33771	UNALLOCATED	196.201.208.0/24	12491	IPPlanet
33771	UNALLOCATED	196.201.208.0/23	12491	IPPlanet
65004	PRIVATE	200.0.113.0/24	28477	Universidad Autonoma
65004	PRIVATE	200.4.0.0/24	28477	Universidad Autonoma
65004	PRIVATE	200.4.1.0/24	28477	Universidad Autonoma
65004	PRIVATE	200.4.2.0/24	28477	Universidad Autonoma
65004	PRIVATE	200.4.3.0/24	28477	Universidad Autonoma
65004	PRIVATE	200.4.4.0/24	28477	Universidad Autonoma
65004	PRIVATE	200.4.5.0/24	28477	Universidad Autonoma
65004	PRIVATE	200.4.6.0/24	28477	Universidad Autonoma
65444	PRIVATE	212.25.125.0/24	8551	Bezeq International
65529	PRIVATE	216.21.199.0/24	14697	VDot.Net
65529	PRIVATE	216.152.237.0/24	14697	VDot.Net

## Number of prefixes announced by prefix length

/1:0	/2:0	/3:0	/4:0	/5:0	/6:0
/7:0	/8:19	/9:3	/10:8	/11:15	/12:68
/13:152	/14:309	/15:589	/16:8383	/17:2531	/18:4362
/19:10157	/20:11015	/21:8904	/22:12210	/23:13243	/24:87715
/25:281	/26:260	/27:135	/28:75	/29:37	/30:66
/31:0	/32:29				

April 2005 ↑

April 2004 ↓

## Number of prefixes announced by prefix length

/1:0	/2:0	/3:0	/4:0	/5:0	/6:0
/7:0	/8:18	/9:3	/10:6	/11:15	/12:58
/13:112	/14:294	/15:509	/16:7745	/17:1997	/18:3556
/19:9314	/20:9721	/21:7042	/22:9935	/23:11393	/24:74607
/25:204	/26:249	/27:136	/28:30	/29:4	/30:51
/31:0	/32:12				

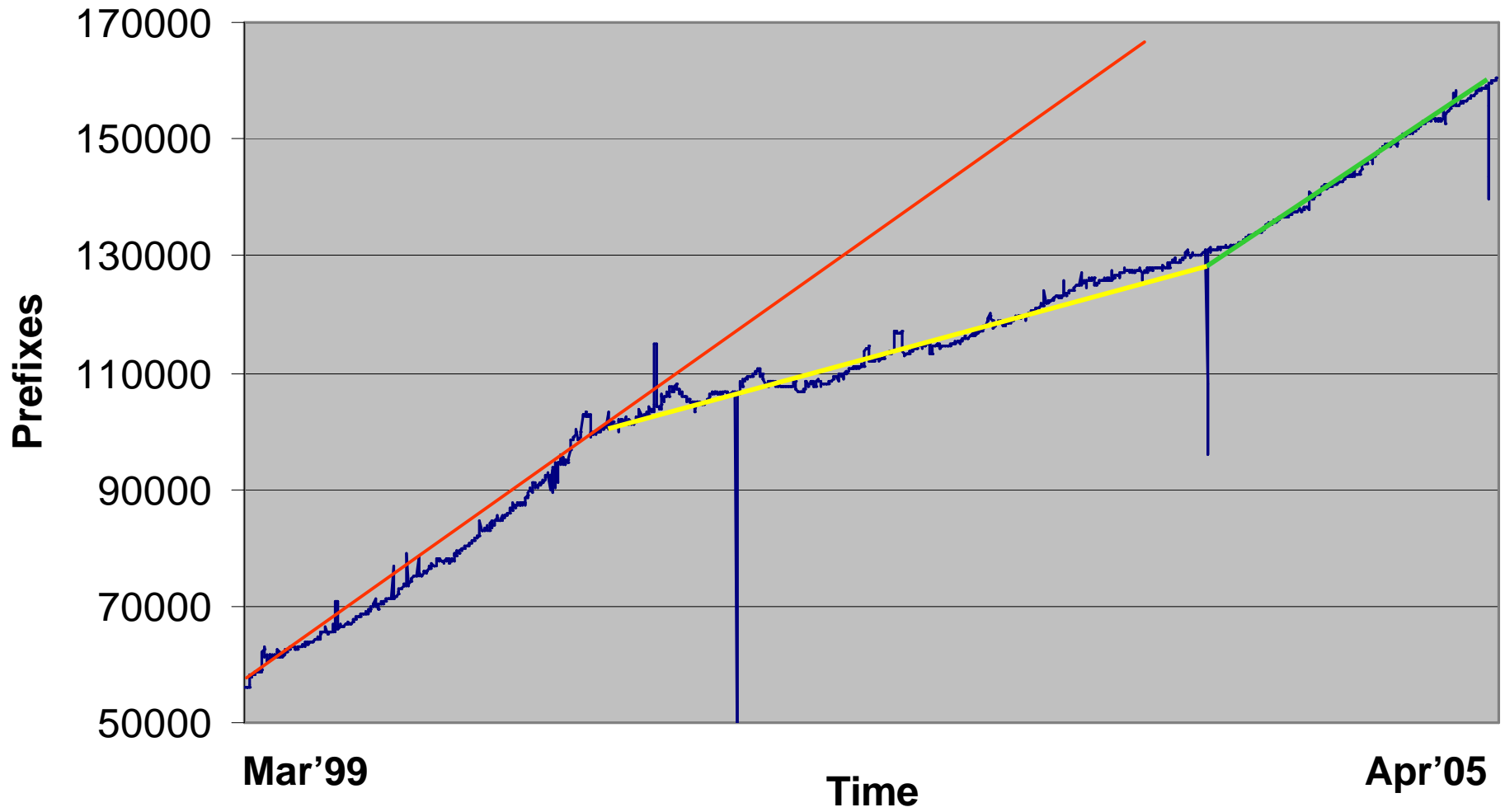
## Advertised IANA Reserved Addresses

Network	Origin AS	Description
132.0.0.0/10	721	DLA Systems Automation Center
137.0.0.0/13	721	DLA Systems Automation Center
158.0.0.0/13	721	DLA Systems Automation Center
172.32.0.0/24	7011	Citizens Utilities
172.122.28.0/24	210	Utah Education Network
192.43.230.0/24	7575	Australian Academic and Rease
192.44.0.0/24	5501	Fraunhofer Gesellschaft
192.44.0.0/19	702	UUNET - Commercial IP service
192.70.164.0/24	25689	National Research Council of
192.84.205.0/24	719	LANLINK autonomous system
192.119.135.0/24	270	NASA
192.135.50.0/24	7018	AT&T WorldNet Services
192.172.0.0/19	721	DLA Systems Automation Center
192.200.100.0/24	7018	AT&T WorldNet Services

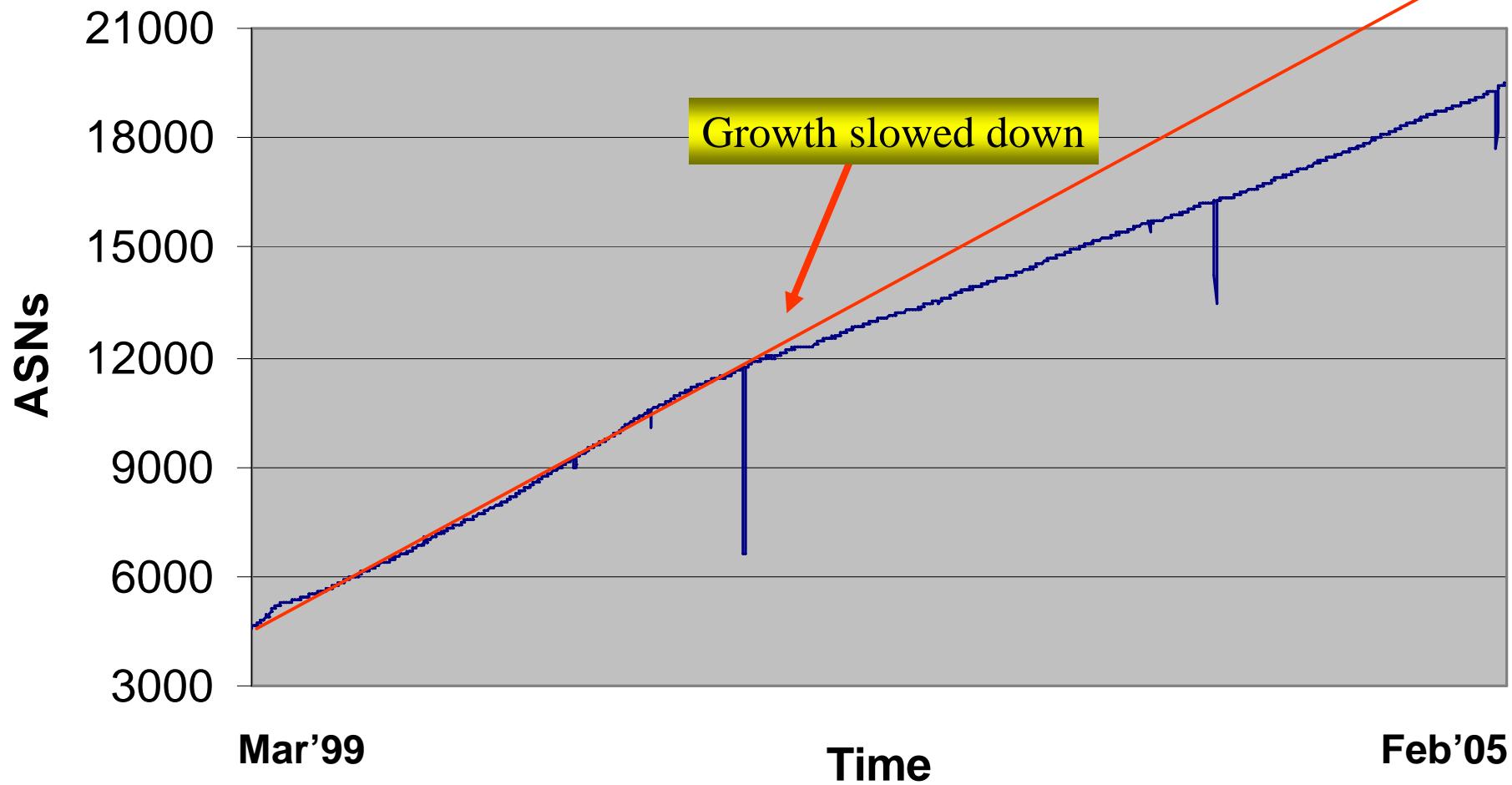
## Prefixes Smaller than Registry Allocations

ASN	No of nets	Total ann.	Description
18566	776	792	Covad Communications
6197	732	893	BellSouth Network Solutions,
7018	666	1482	AT&T WorldNet Services
2386	595	840	AT&T Data Communications Serv
9583	536	719	Sify Limited
4323	513	1100	Time Warner Telecom
27364	506	518	Armstrong Cable Services
5668	407	489	CenturyTel Internet Holdings,
4766	401	584	Korea Telecom (KIX)
1239	383	916	Sprint
702	365	593	UUNET - Commercial IP service
6198	335	460	BellSouth Network Solutions,
6467	322	442	E.Spire Communications, Inc.
10036	313	313	C&M Communication Co. Ltd.
6517	295	318	Yipes Communications, Inc.
7011	295	345	Citizens Utilities
9929	282	357	China Netcom Corp.
11456	273	314	Carolina Online, Inc.
15270	254	274	PaeTec.net -a division of Pae
3320	249	304	Deutsche Telekom AG

# BGP Routing Table

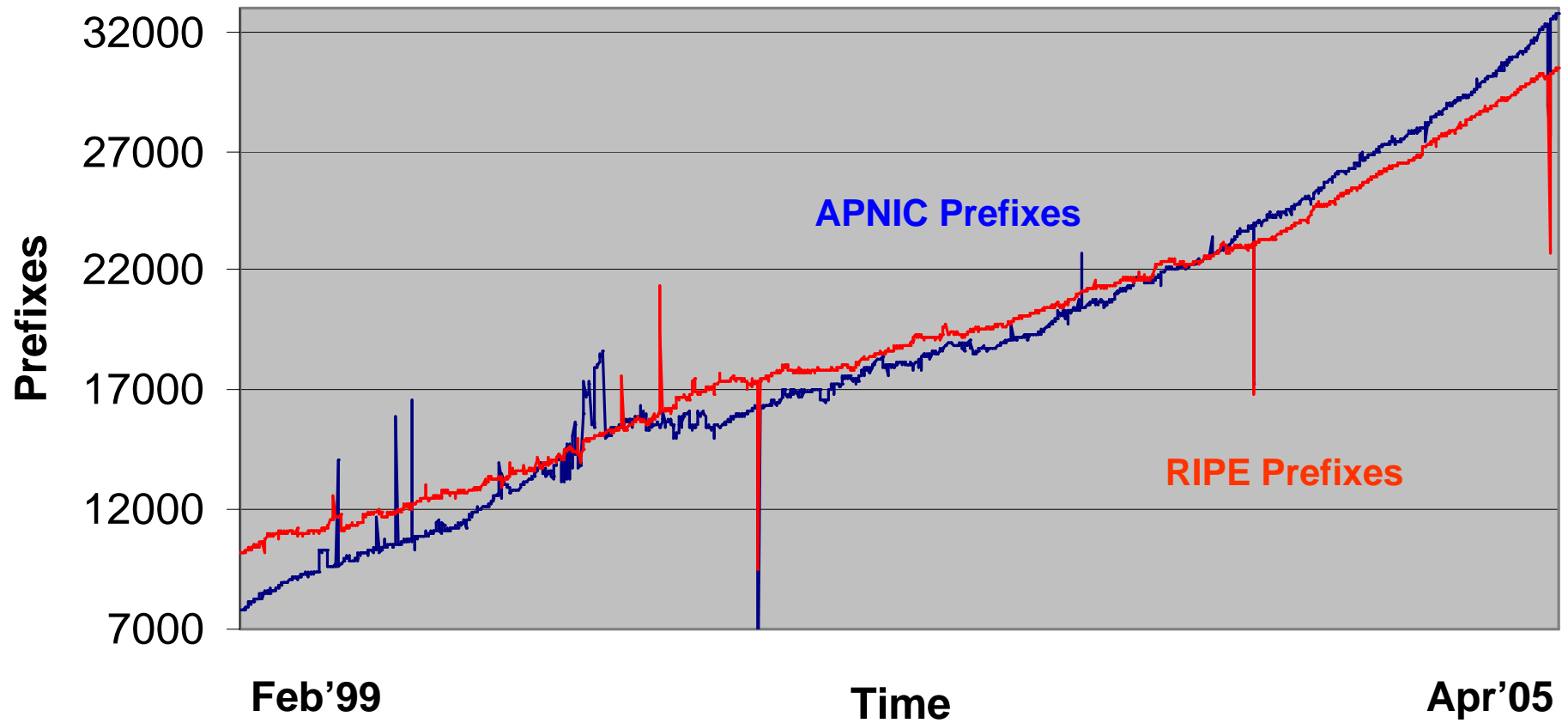


# AS Growth

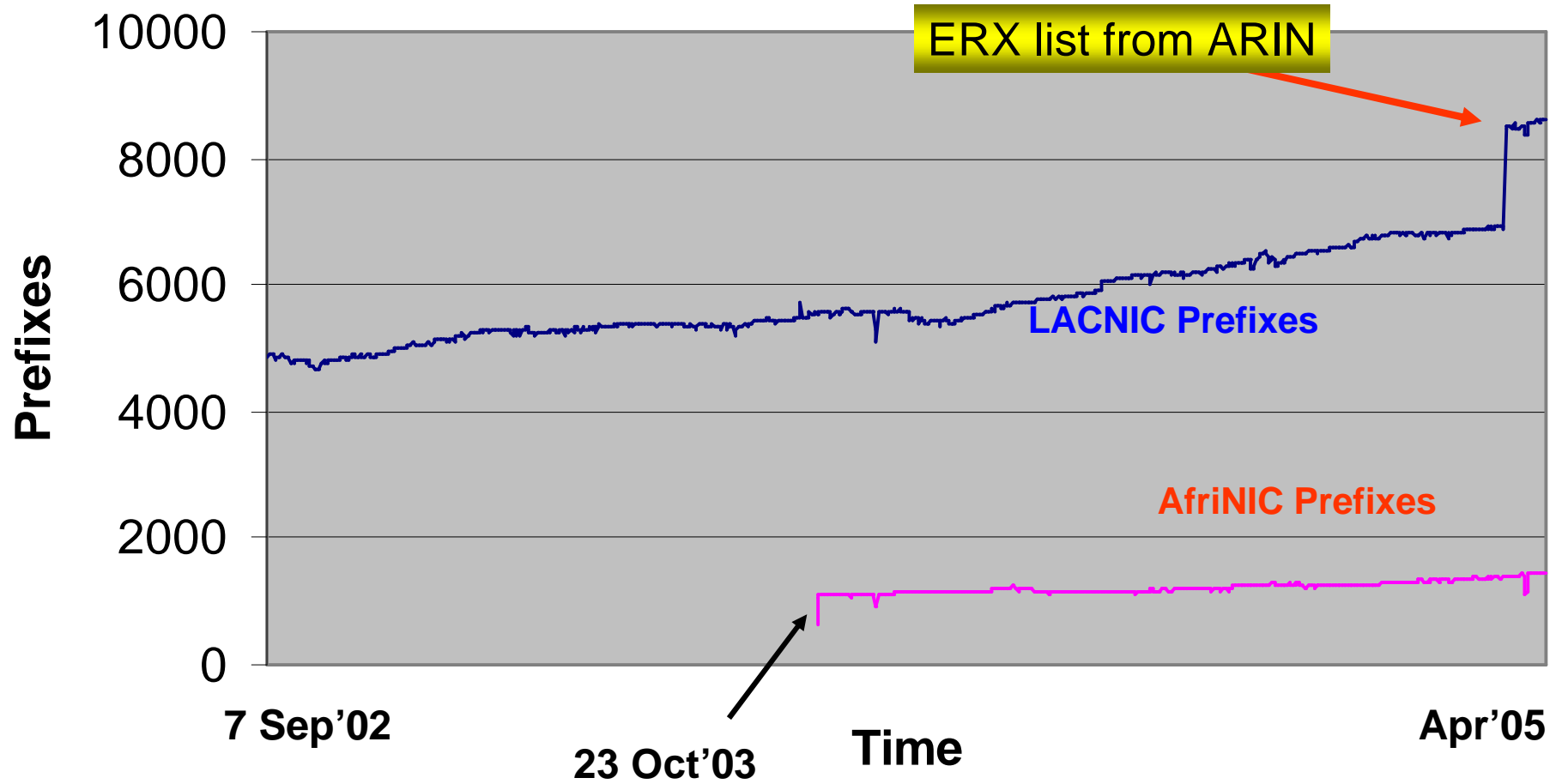




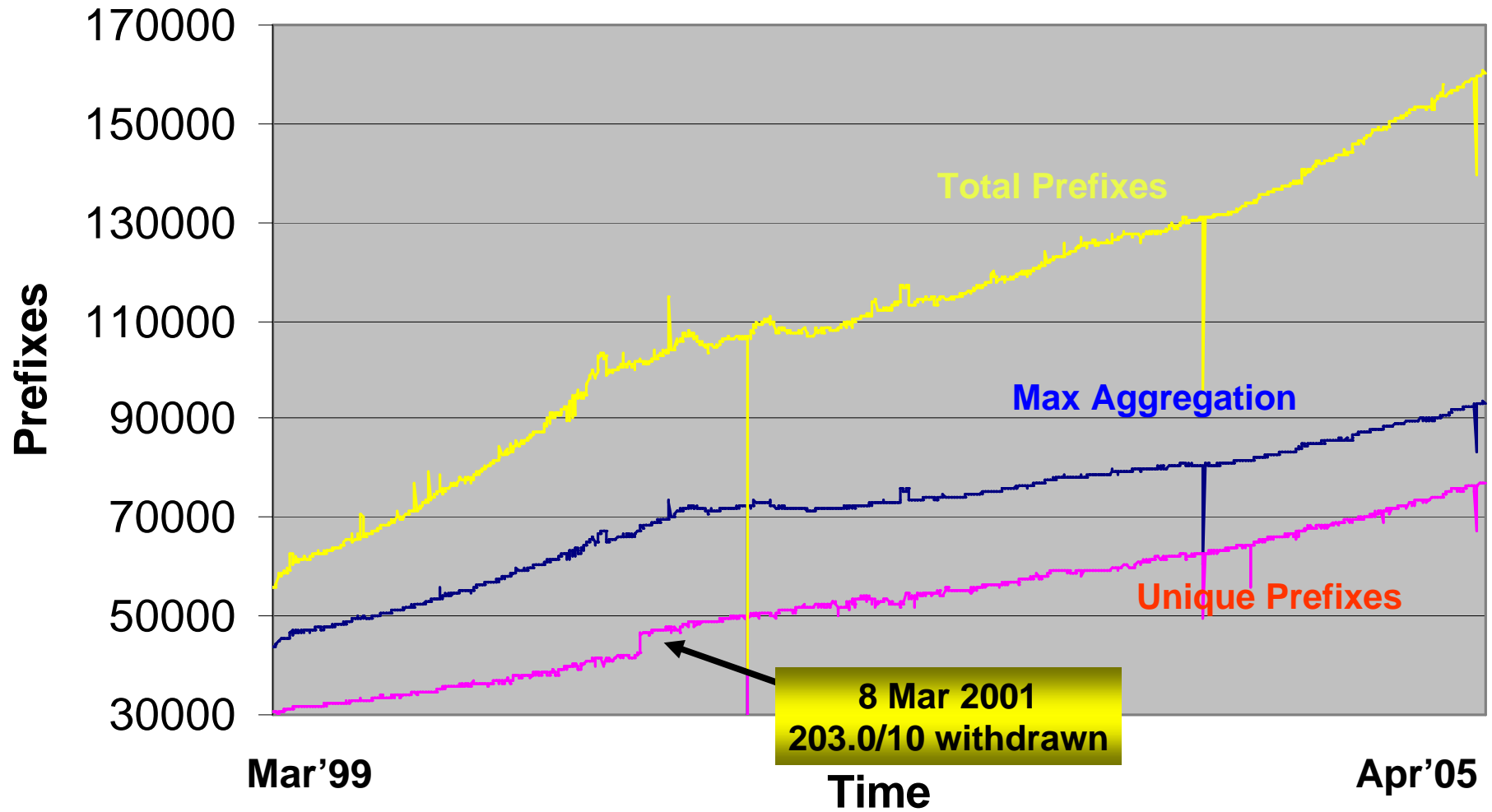
# RIPE vs APNIC Prefixes Announced



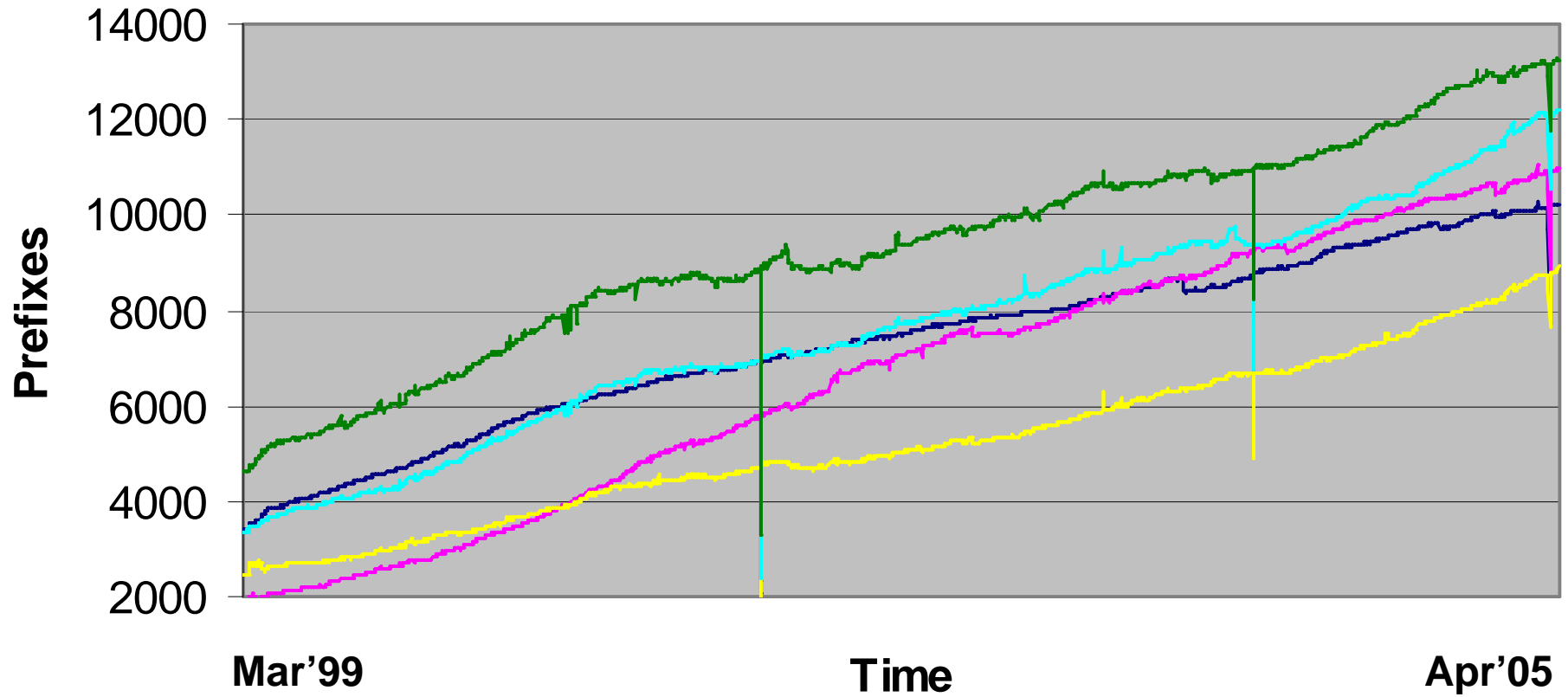
# LACNIC vs AfriNIC prefixes announced



# Max Aggregation vs Unique Prefixes

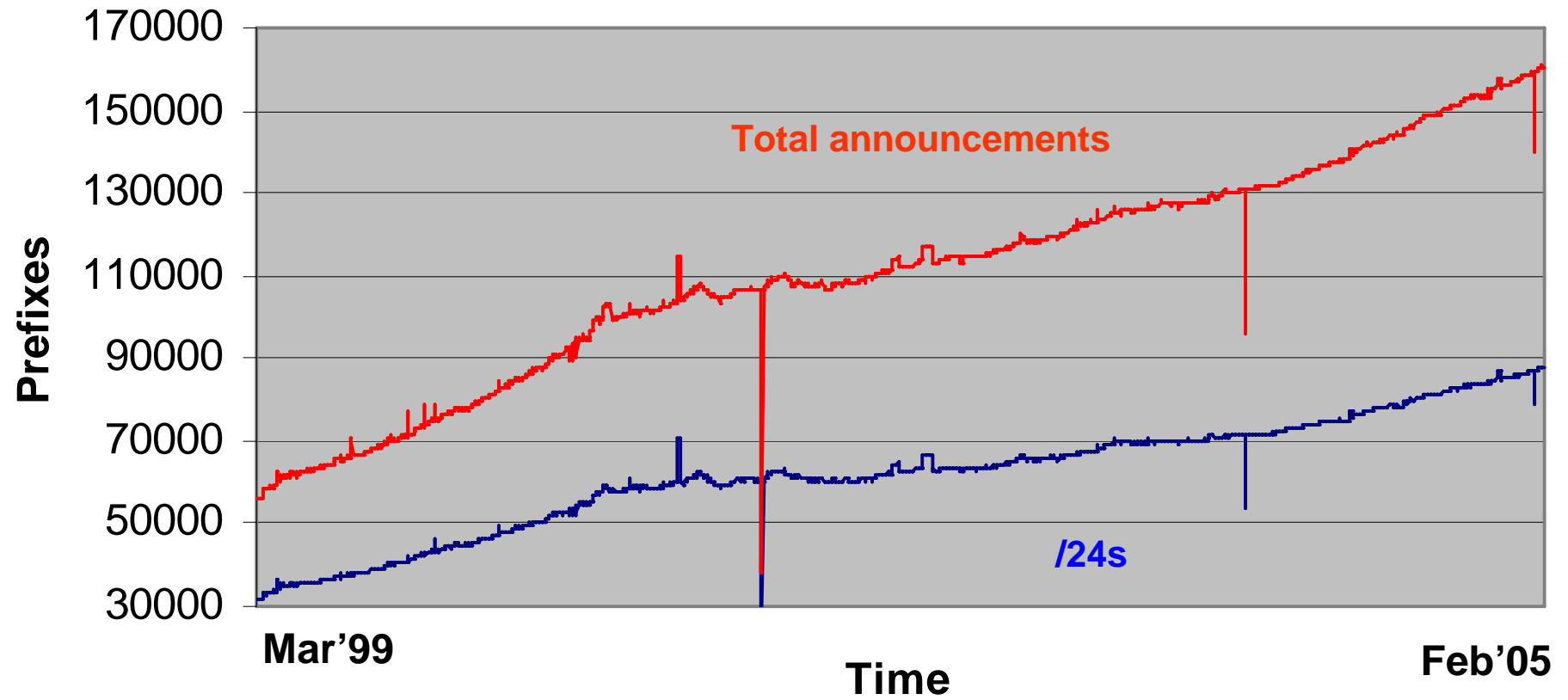


# Prefixes sizes announced

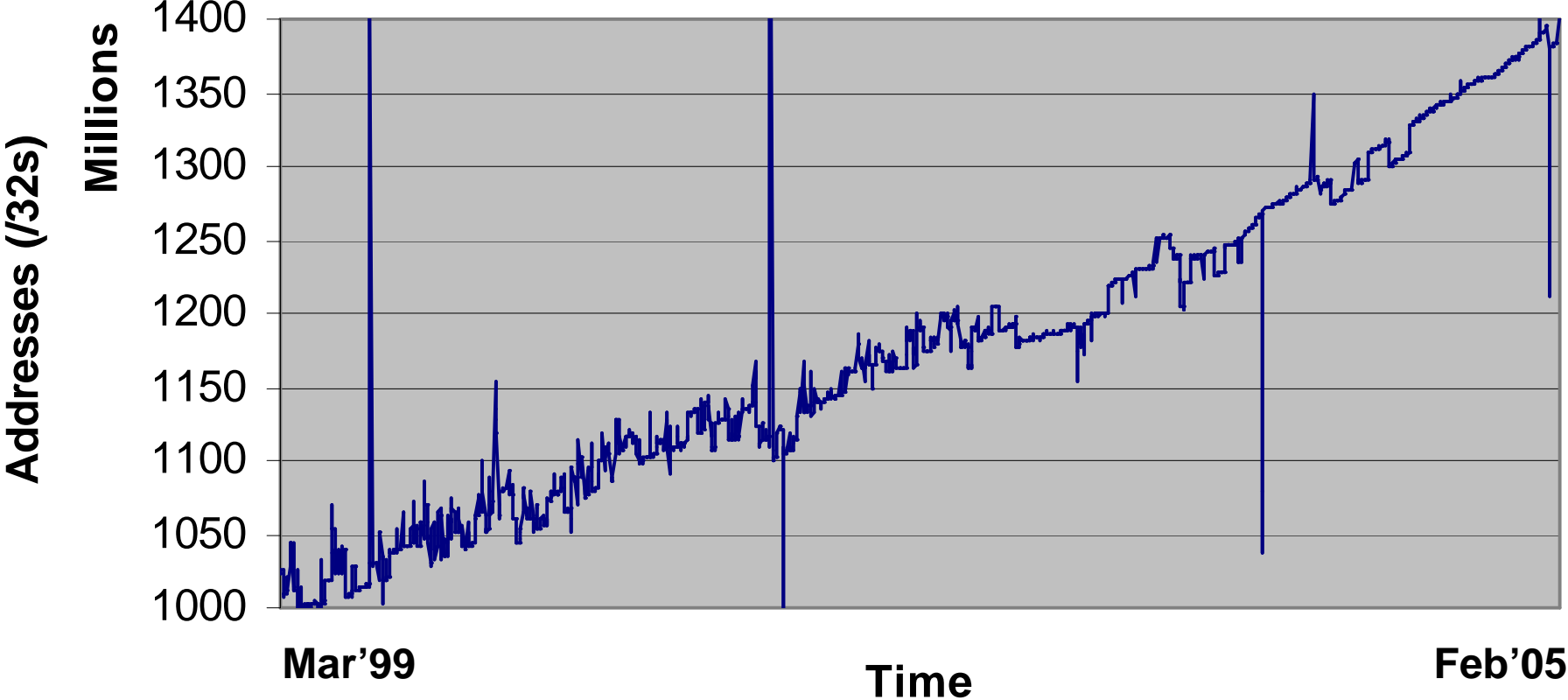


— /19s — /20s — /21s — /22s — /23s

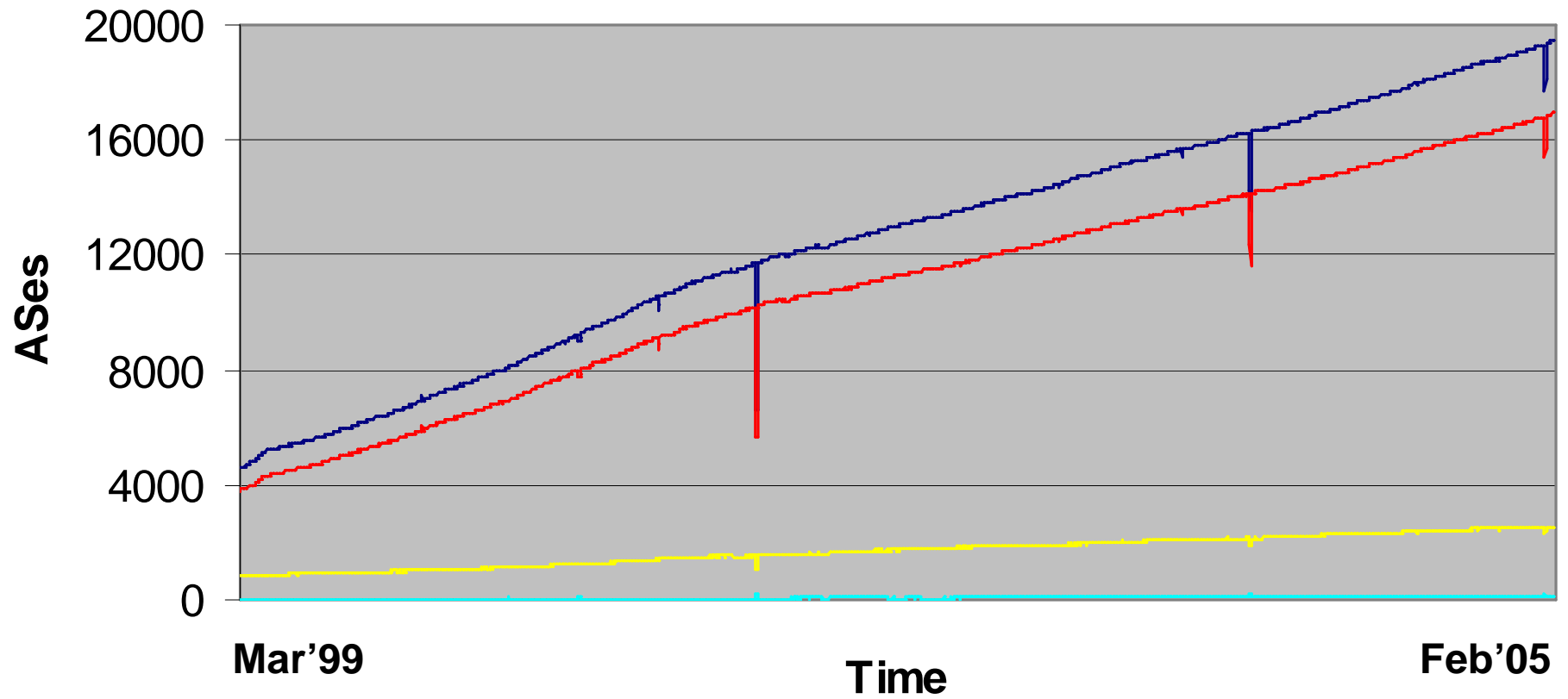
# /24s announced



# Address Space announced



# AS Announcements



— Total — Origin Only — Transit — Transit Only



# Internet Routing Table Analysis Update

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Questions?