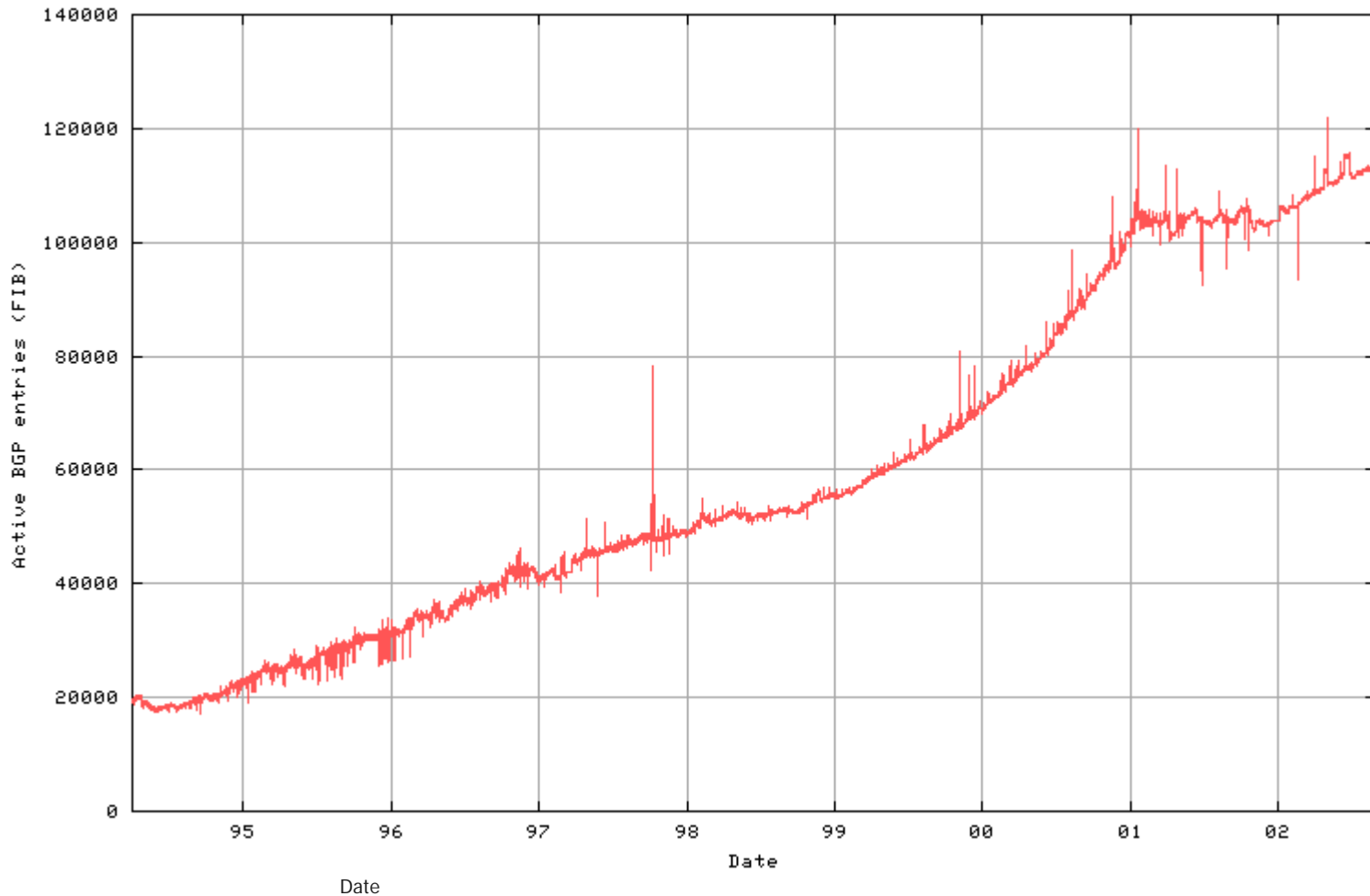




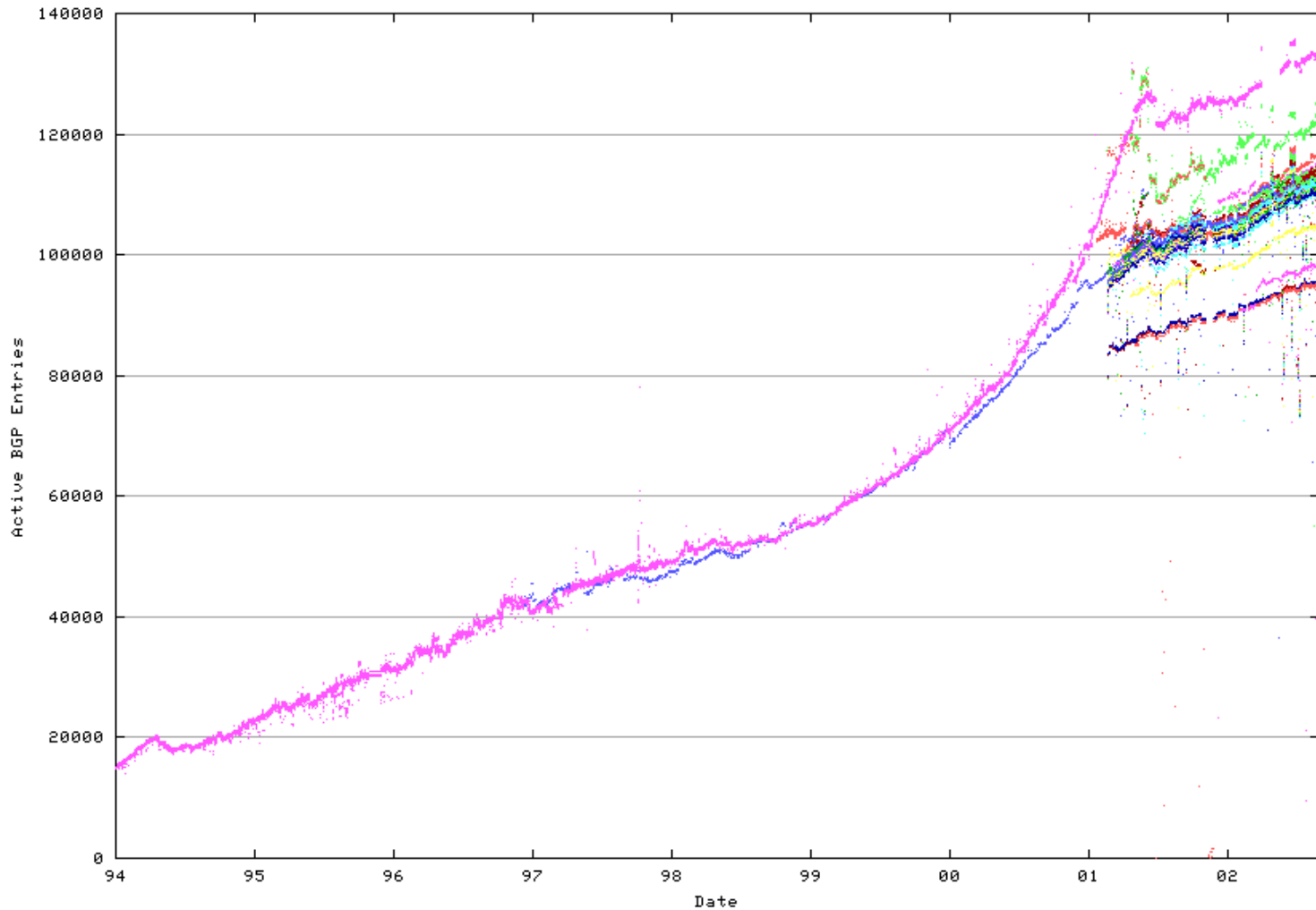
BGP Status Update

Geoff Huston
September 2002

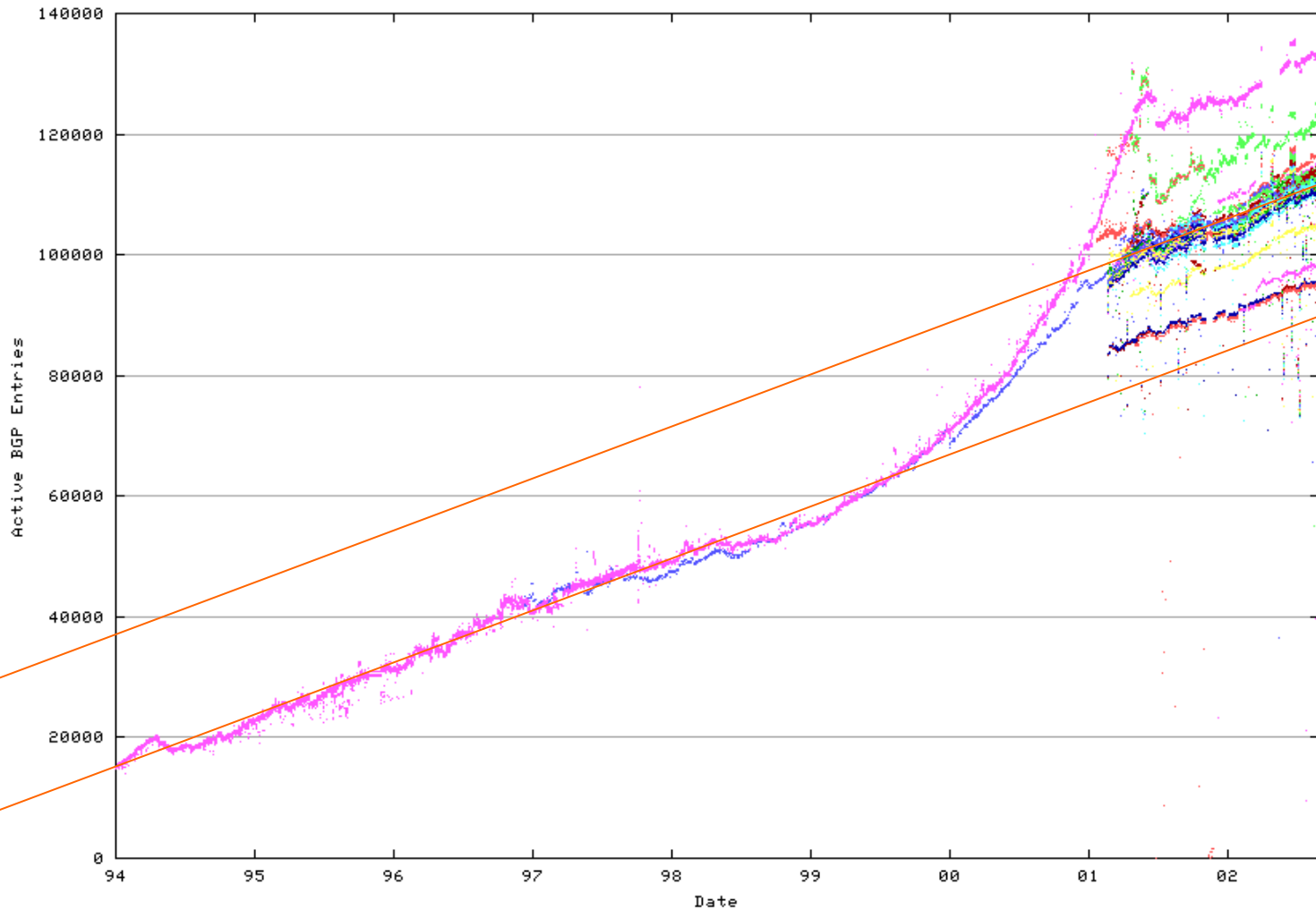
What Happening (AS4637)



The Route Views' View



Route Views Data





BGP Trends

- Table growth appears to have resumed a linear growth rate of about 10,000 entries per year

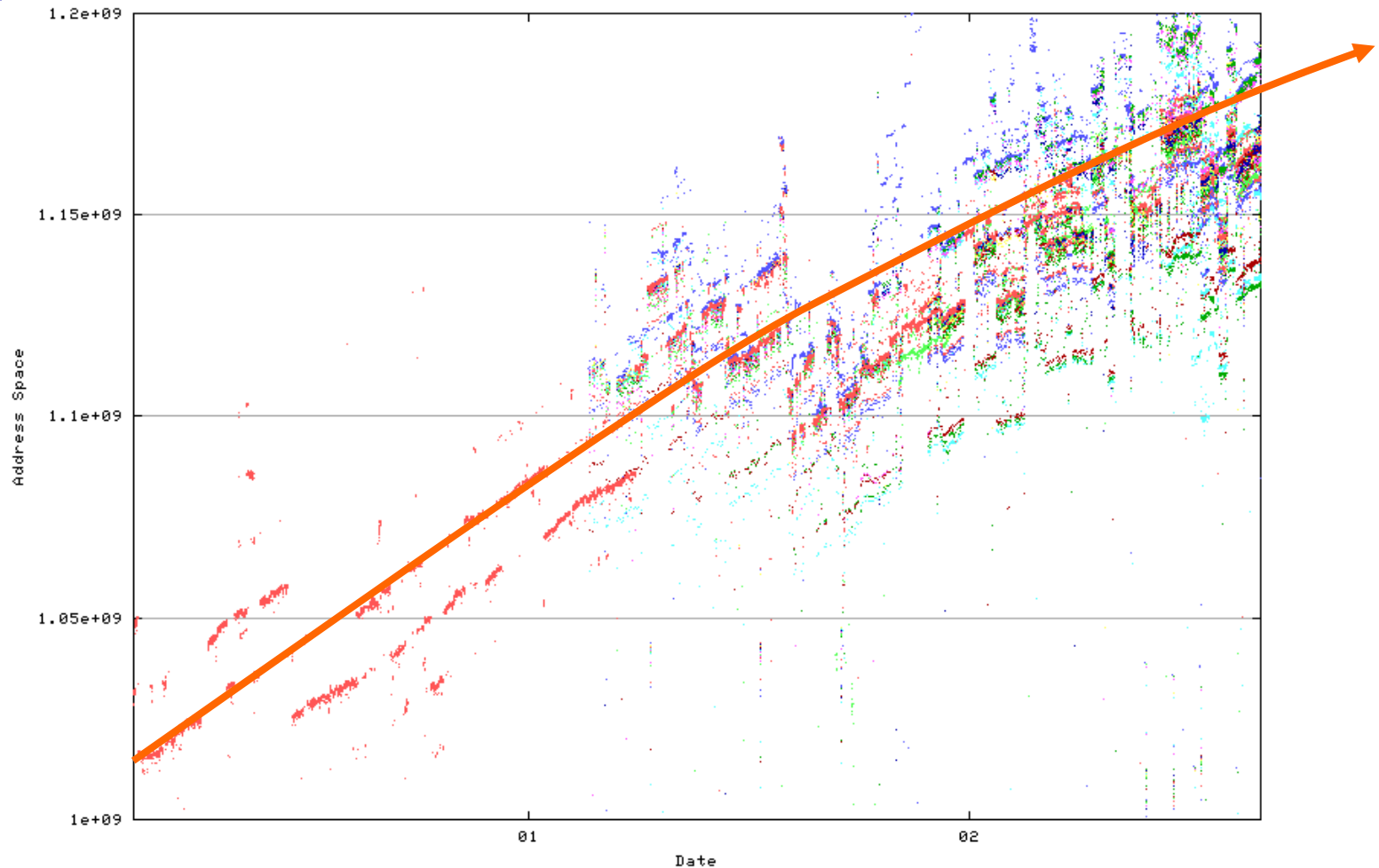
Is this a stable state?

For how long?

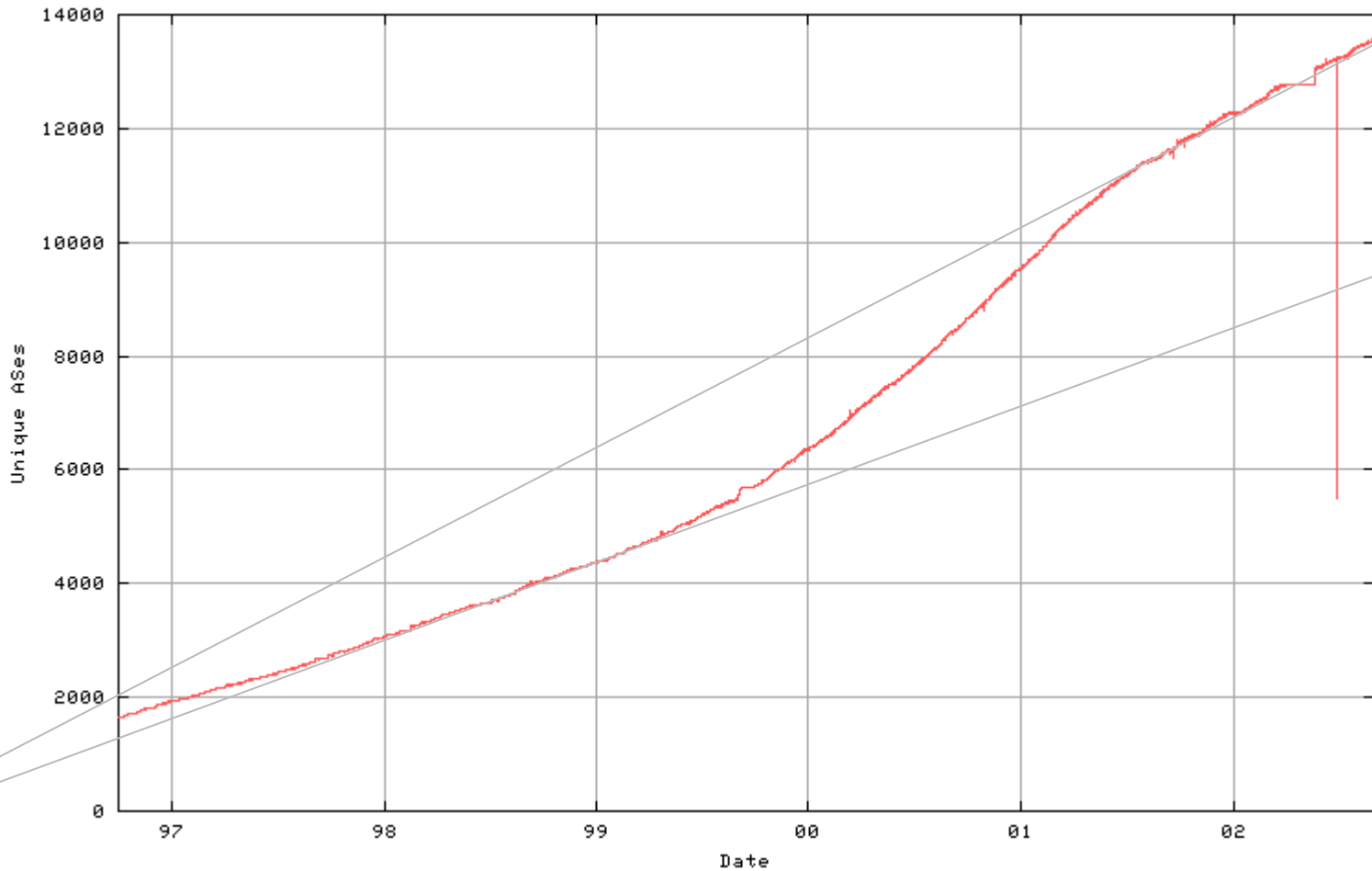
Will exponential growth resume?

If so, at what rate?

Total Size of Address Space Advertised in the BGP Table



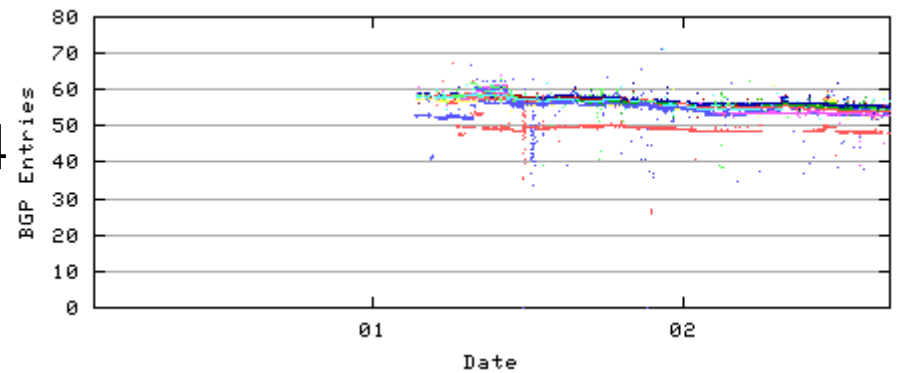
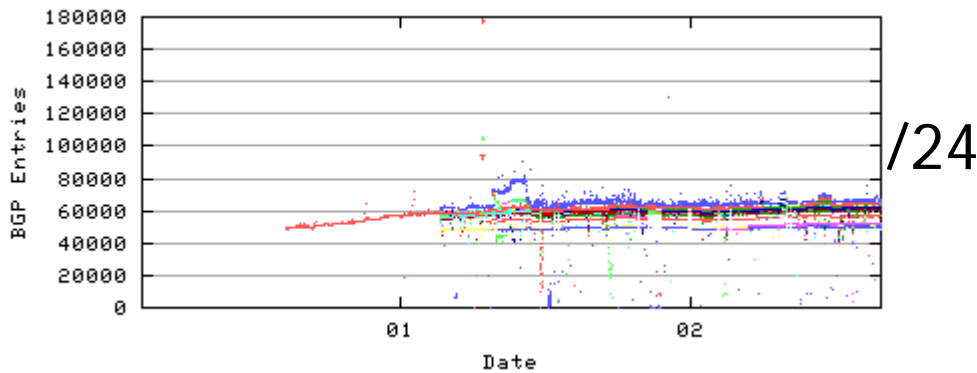
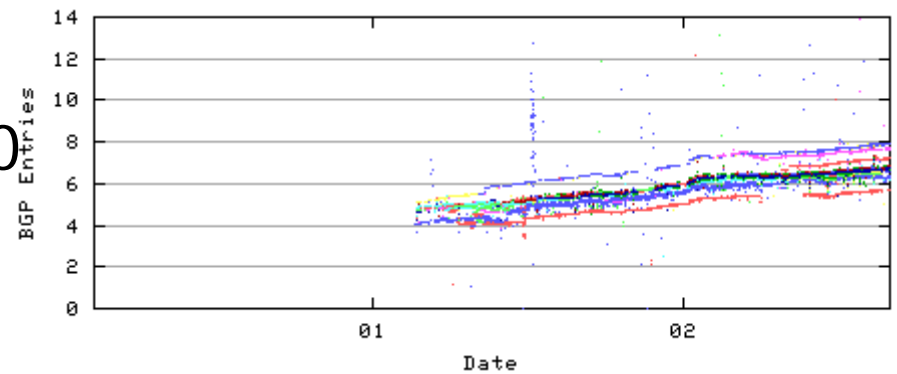
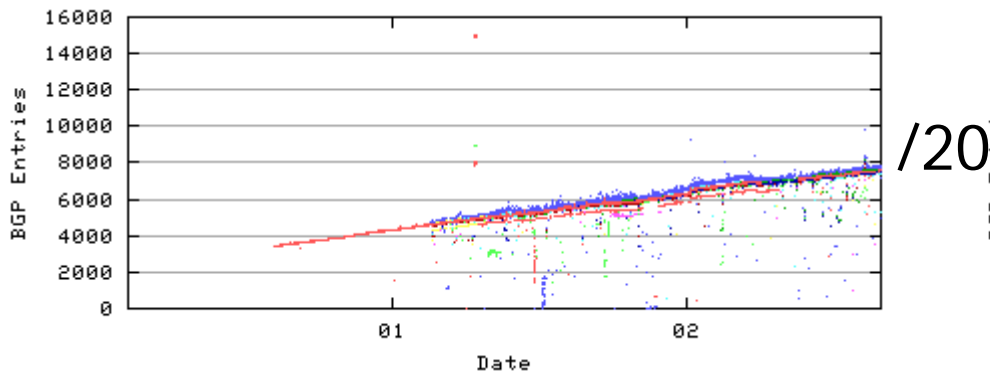
Number of AS's



Prefix Comparison /20 and /24

Number of Entries

% of BGP Table





What Happened...

- Growth rates have come down
- The routing space appeared to be better managed in 2001
 - Less routing “noise”
 - Better adherence to hierarchical aggregation in the routed address space



Changes in the Routing Table

- No major table growth from small prefixes (/24 and smaller)
- Table growth occurred using RIR allocation prefix sizes (/18 through /20)
- Growth in /18 - /20 prefix numbers even through the period

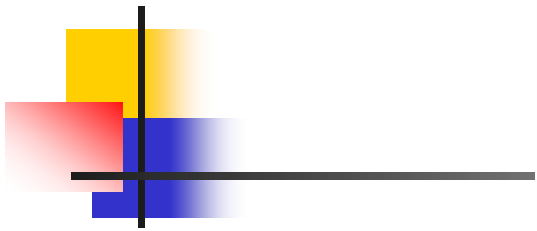


The CIDR Report

- Rewritten to use the BGP Analysis as input
<http://bgp.potaroo.net/cidr>
- **Diagnosis** not **analysis**
 - Intended to show how greater efficiency in terms of BGP table size can be obtained without loss of routing and policy information
 - Show what forms of origin AS aggregation could be performed and the potential benefit of such actions to the total table size

Status Summary

Table History



Date	Prefixes
23-08-02	123002
24-08-02	125088
25-08-02	125006
26-08-02	125147
27-08-02	121895
28-08-02	121685
29-08-02	121740
30-08-02	121472

Plot: [BGP Table Size](#)

Possible Bogus Routes

Prefix	Origin AS	AS Description
39.0.0.0/8	AS4554	EP0-BLK-ASNBLOCK-4 Exchange Point Blocks

Report: [Allocated and Reserved IPv4 address blocks](#)

AS Summary

13776	Number of ASes in routing system
5246	Number of ASes announcing only one prefix
1807	Largest number of prefixes announced by an AS AS209 : ASN-QWEST Qwest
73081088	Largest address span announced by an AS (/32s) AS568 : SUMNET-AS DISO-UNRRA

Plot: [AS count](#)

Report: [ASes ordered by originating address span](#)

Report: [Autonomous System number-to-name](#) mapping (from Registry WHOIS data)

Aggregation Summary

The algorithm used in this report proposes aggregation only when there is a precise match using AS path so as to preserve traffic transit policies. Aggregation is not proposed across non-advertised address space ('holes').

--- 30Aug02 ---

ASnum	HetsFlow	HetsAggr	HetGain	% Gain	Description
Table	121428	88661	32767	27.0%	All ASes
AS209	1807	1065	742	41.1%	ASN-QWEST Qwest
AS4538	580	34	546	94.1%	ERX-CERNET-BKB China Education and Research Network Center
AS2548	1604	1136	468	29.2%	ICIX-MD-AS Business Internet, Inc.
AS7132	601	144	457	76.0%	SBIS-AS Southwestern Bell Internet Services
AS701	1775	1369	406	22.9%	ALTERNET-AS UUNET Technologies, Inc.
AS7018	1320	941	379	28.7%	ATT-INTERNET4 AT&T WorldNet Services
AS3908	1118	746	372	33.3%	SUPERNETASBLK SuperNet, Inc.
AS1221	1311	940	371	28.3%	ASN-TELSTRA Telstra Pty Ltd
AS4323	642	301	341	53.1%	TVW-COMM Time Warner Communications, Inc.
AS7046	602	316	286	47.5%	UUNET-CUSTOMER UUNET Technologies, Inc.
AS852	735	456	279	38.0%	ASN852 Telus Advanced Communications
AS4151	305	33	272	89.2%	USDA-1 USDA
AS18566	264	4	260	98.5%	COVAD Covad Communications
AS1	676	439	237	35.1%	GNTY-1 Genuity
AS6347	395	174	221	55.9%	DIAMOND SAVVIS Communications Corporation
AS4814	228	32	196	86.0%	CHINANET-BEIJING-AP China Telecom (Group)Beijing Telecom CompanyBeijing China
AS690	519	326	193	37.2%	NSFNET-T3-RT-AS Merit Network Inc.
AS1239	847	657	190	22.4%	SprintLink Sprint
AS11371	193	7	186	96.4%	UUNET-AS-11371 UUNET Technologies, Inc.
AS4755	384	203	181	47.1%	VSNL-AS Videsh Sanchar Nigam Ltd. Autonomous System
AS9942	244	65	179	73.4%	COMINDICO-AP COMindico Australia
AS2386	414	239	175	42.3%	INS-AS AT&T Data Communications Services
AS376	349	175	174	49.9%	RISQ-AS Reseau Interordinateurs Scientifique Quebecois (RISQ)
AS3356	400	230	170	42.5%	LEVEL3 Level 3 Communications, LLC
AS7843	655	485	170	26.0%	ADELPHIA-AS Adelphia Corp.
AS6595	244	76	168	68.9%	DODDSEUR DoD Education Activity Network Assistance Center
AS1791	187	24	163	87.2%	SPRINTLINK3 Sprint Government Systems Division
AS6197	363	201	162	44.6%	BATI-ATL BellSouth Network Solutions, Inc
AS1580	209	56	153	73.2%	HQ, 5th Signal Command
AS6539	349	199	150	43.0%	GROUPTLCOM GT Group Telecom Services Corp.
Total	19320	11073	8247	42.7%	Top 30 total

Report: [Aggregation Top 20 summaries for last 7 days](#)

Report: [Full Aggregation Details](#)

Top 20 Added Routes this week per Originating AS



Prefixes	ASnum	AS Description
151	AS3292	TDC-TELEDANMARK TDC Tele Danmark
119	AS4761	INDOSAT1-AP INDOSATNET-ASNINDOSAT INP
56	AS4515	ERX-STAR Star Internet Services Ltd.
42	AS3216	SOVAM-AS Teleross, Moscow, Russia
40	AS2048	LANET-1 State of Louisiana
35	AS7459	THRIFTYCALL Thrifty Call, Inc.
26	AS26288	KNET-1 Keewaytinook Okimakanak
25	AS209	ASN-QWEST Qwest
21	AS1239	SprintLink Sprint
21	AS26321	TSX-GROUP The Toronto Stock Exchange
20	AS2457	FR-U-1-AIX-MARSEILLE
18	AS7482	APOL-AS Asia Pacific On-line Service Inc.
18	AS4355	ERMS-EARTHLNK EARTHLINK, INC
18	AS3908	SUPERNETASBLK SuperNet, Inc.
18	AS9466	UUNET-JP-AP UUNET Japan Limited
17	AS1202	JSC-JIN-AS NASA/Johnson Space Center
17	AS9803	JINGXUN Beijing Jingxun Public Information Technology Co., Ltd
16	AS376	RISQ-AS Reseau Interordinateurs Scientifique Quebecois (RISQ)
15	AS8668	PTC Zimbabwe
14	AS705	ASN-ALTERNET UUNET Technologies, Inc.

Top 20 Withdrawn Routes this week per Originating AS

Prefixes	ASnum	AS Description
-1216	AS2149	PSINET-2 Performance Systems, Inc.
-1010	AS8984	Internet5 AB
-912	AS174	PSINET PSINet Inc.
-187	AS3352	Ibernet, Internet Access Network of TDE
-160	AS3257	TISCALI-BACKBONE Tiscali Intl Network
-127	AS9942	COMINDICO-AP COMIndico Australia
-113	AS4621	THAINET Consortium UUNET-TH
-97	AS4795	INDOSAT2-ID-AP INDOSATNET-ASN
-56	AS13041	CESCA Autonomous System
-35	AS3836	ASN-THAISARN National Electronics and Computer Technology Center Thai Social/Scientific, Academic and Research Network
-28	AS705	ASN-ALTERNET UUNET Technologies, Inc.
-26	AS701	ALTERNET-AS UUNET Technologies, Inc.
-24	AS15555	MATAVNET-AS MATAVnet
-21	AS6183	ASN-FTN-INTERNET Focus Technologies Networks
-21	AS5556	BT Ignite Nordics
-18	AS7491	PI-PH-AS-AP PI-PHILIPINES
-18	AS9425	I-NEXT-AS-AP InterNext (I-Next) Border AS
-17	AS4323	TW-COMM Time Warner Communications, Inc.
-16	AS8815	CUBECOM Cubecom S.p.A.
-16	AS12259	ASN-FGINET FGInet, Inc.

More Specifics

A list of route advertisements that appear to be more specific than the original Class-based prefix mask, or more specific than the registry allocation size.

Top 20 ASes advertising more specific prefixes

More Specifics	Total Prefixes	ASnum	AS Description
1582	1807	AS209	ASN-QWEST Qwest
1470	1604	AS2548	ICIX-MD-AS Business Internet, Inc.
832	1775	AS701	ALTERNET-AS UUNET Technologies, Inc.
797	1118	AS3908	SUPERNETASBLK SuperNet, Inc.
651	1320	AS7018	ATT-INTERNET4 AT&T WorldNet Services
482	519	AS690	NSFNET-T3-RT-AS Merit Network Inc.
475	642	AS4323	TV-COMM Time Warner Communications, Inc.
465	655	AS7843	ADELPHIA-AS Adelphia Corp.
443	489	AS7066	ACCESS-VIRGINIA Virginia Polytechnic Institute and State University
392	602	AS7046	UUNET-CUSTOMER UUNET Technologies, Inc.
382	847	AS1239	SprintLink Sprint
327	377	AS2149	PSINET-2 Performance Systems, Inc.
323	735	AS852	ASN852 Telus Advanced Communications
305	471	AS3549	GBLX Global Crossing
303	363	AS6197	BATI-ATL BellSouth Network Solutions, Inc
298	414	AS2386	INS-AS AT&T Data Communications Services
273	400	AS3356	LEVEL3 Level 3 Communications, LLC
269	676	AS1	GNTY-1 Genuity
267	314	AS6198	BATI-MIA BellSouth Network Solutions, Inc
260	264	AS18566	COVAD Covad Communications

Report: [More Specific prefix list](#)

Announced Prefixes

Rank	AS	Type	Originate	Addr Space (pfx)	Transit	Addr space (pfx)	Description
41	AS1221	ORG+TRN	Originate:	5368572 /9.64	Transit:	5181128 /9.70	ASN-TELSTRA Telstra Pty Ltd

Aggregation Suggestions

This report does not take into account conditions local to each origin AS in terms of policy or traffic engineering requirements, so this is an approximate guideline as to aggregation possibilities.

Rank	AS	AS Name	Current	Withdw	Aggte	Annce	Redctn	%
9	AS1221	ASN-TELSTRA Telstra Pty Ltd	1314	518	147	943	371	28.23%

AS 1221: ASN-TELSTRA Telstra Pty Ltd

Prefix (AS Path)

47.153.192.0/18 (1221)

61.9.128.0/17 (1221)

61.9.128.0/17 (9942 7474 1221)

61.9.128.0/18 (9942 7474 1221)

61.9.192.0/20 (9942 7474 1221)

61.9.208.0/20 (9942 7474 1221)

61.9.224.0/20 (9942 7474 1221)

61.9.240.0/20 (9942 7474 1221)

128.87.160.0/21 (1221)

129.223.0.0/16 (1221)

129.223.0.0/18 (1221)

129.223.64.0/19 (1221)

129.223.131.0/24 (1221)

129.223.160.0/19 (1221)

129.223.192.0/19 (1221)

129.223.224.0/19 (1221)

134.144.72.0/21 (1221)

134.159.2.0/24 (1221)

134.178.0.0/16 (1221)

136.153.0.0/16 (1221)

137.76.2.0/23 (1221)

137.76.2.0/24 (1221)

137.76.3.0/24 (1221)

137.76.6.0/24 (1221)

137.76.8.0/24 (1221)

137.76.27.0/24 (1221)

137.76.28.0/24 (1221)

137.76.31.0/24 (1221)

137.76.60.0/24 (1221)

137.76.81.0/24 (1221)

137.147.0.0/16 (1221)

138.7.32.0/21 (1221)

138.7.48.0/20 (1221)

138.7.48.0/21 (1221)

138.7.56.0/21 (1221)

138.7.64.0/21 (1221)

138.7.104.0/21 (1221)

138.7.120.0/21 (1221)

138.7.128.0/20 (1221)

138.7.128.0/21 (1221)

138.7.136.0/21 (1221)

Aggregation Action

+ Announce - aggregate of 61.9.128.0/18 (9942 7474 1221) and 61.9.192.0/20 (9942 7474 1221)

- Withdrawn - aggregated with 61.9.192.0/18 (9942 7474 1221)

- Withdrawn - aggregated with 61.9.208.0/20 (9942 7474 1221)

- Withdrawn - aggregated with 61.9.192.0/20 (9942 7474 1221)

- Withdrawn - aggregated with 61.9.240.0/20 (9942 7474 1221)

- Withdrawn - aggregated with 61.9.224.0/20 (9942 7474 1221)

- Withdrawn - matching aggregate 129.223.0.0/16 1221

- Withdrawn - matching aggregate 129.223.0.0/16 1221

- Withdrawn - matching aggregate 129.223.0.0/16 1221

- Withdrawn - matching aggregate 129.223.0.0/16 1221

- Withdrawn - matching aggregate 129.223.0.0/16 1221

- Withdrawn - matching aggregate 129.223.0.0/16 1221

+ Announce - aggregate of 137.76.2.0/24 (1221) and 137.76.3.0/24 (1221)

- Withdrawn - aggregated with 137.76.3.0/24 (1221)

- Withdrawn - aggregated with 137.76.2.0/24 (1221)

+ Announce - aggregate of 138.7.48.0/21 (1221) and 138.7.56.0/21 (1221)

- Withdrawn - aggregated with 138.7.56.0/21 (1221)

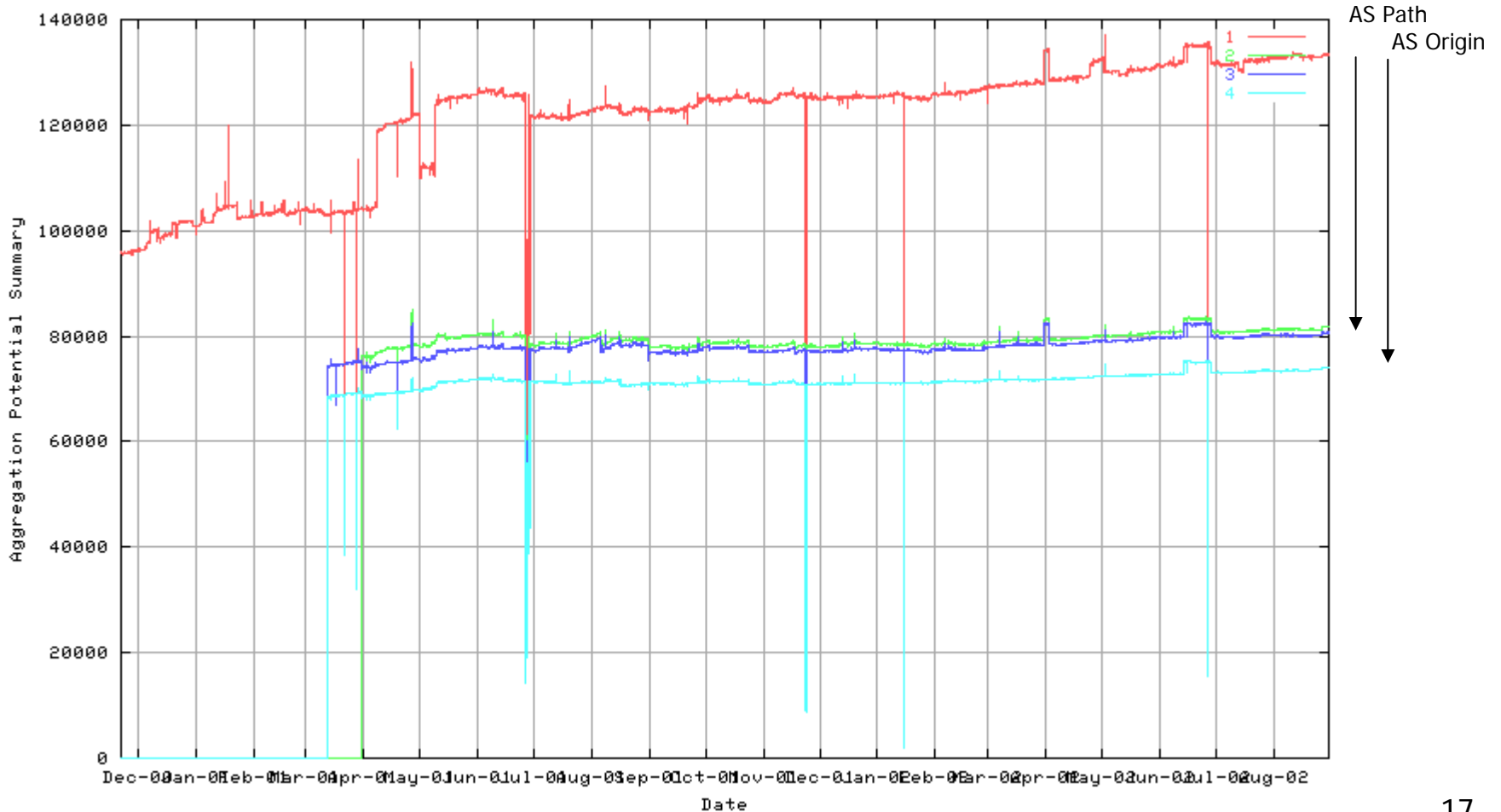
- Withdrawn - aggregated with 138.7.48.0/21 (1221)

+ Announce - aggregate of 138.7.128.0/21 (1221) and 138.7.136.0/21 (1221)

- Withdrawn - aggregated with 138.7.136.0/21 (1221)

- Withdrawn - aggregated with 138.7.128.0/21 (1221)

Aggregation Potential





Mixed News

- BGP Table growth has been slowed down considerably though the more careful use of aggregate routes in recently advertised networks.
- Despite this, it is still the case that up to 50% of the current BGP table is the outcome of inadequate control of routing information



BGP Analysis Resources

- <http://bgp.potaroo.net>