

BGP Routing Table Report

View of the routing table between 2006
- 2016



Objective

Analyse changes in global routing table between 2006 to 2016

Analysis is along:

- 1.Top 5 well connected ASNs
- 2.Growth of ASNs
- 3.Growth of Prefixes
- 4.Changes in across multihomed networks



Ranking the top connected networks



Networks with the highest adjacencies (IPv4)

Year	2006	2007	2008	2009	2010	2011
Rank 1	AS701 (2442)	AS701 (2720)	AS701 (2293)	AS3356 (2656)	AS174 (2931)	AS174 (3381)
Rank 2	AS7018 (2073)	AS7018 (2104)	AS7018 (2217)	AS174 (2476)	AS3356 (2908)	AS3356 (3205)
Rank 3	AS1239 (1765)	AS174 (1854)	AS174 (2192)	AS7018 (2294)	AS7018 (2394)	AS7018 (2446)
Rank 4	AS174 (1612)	AS1239 (1723)	AS3356 (2184)	AS701 (2090)	AS701 (1981)	AS701 (1929)
Rank 5	AS3356 (1373)	AS3356 (1746)	AS1239 (1631)	AS1239 (1449)	AS6939 (1563)	AS6939 (1871)

* Data belongs to Dec of each year



Networks with the highest adjacencies (IPv4) (cont.)

Year	2012	2013	2014	2015	2016
Rank 1	AS174 (3747)	AS174 (4135)	AS174 (4489)	AS174 (4783)	AS6939 (6029)
Rank 2	AS3356 (3480)	AS3356 (3950)	AS3356 (4150)	AS3356 (4321)	AS174 (5025)
Rank 3	AS6939 (2612)	AS6939 (3190)	AS6939 (3513)	AS6939 (4173)	AS3356 (4680)
Rank 4	AS7018 (2428)	AS7018 (2431)	AS7018 (2393)	AS7018 (2422)	AS3549 (2699)
Rank 5	AS701 (1656)	AS4323 (1715)	AS4323 (1897)	AS4323 (1895)	AS7018 (2396)

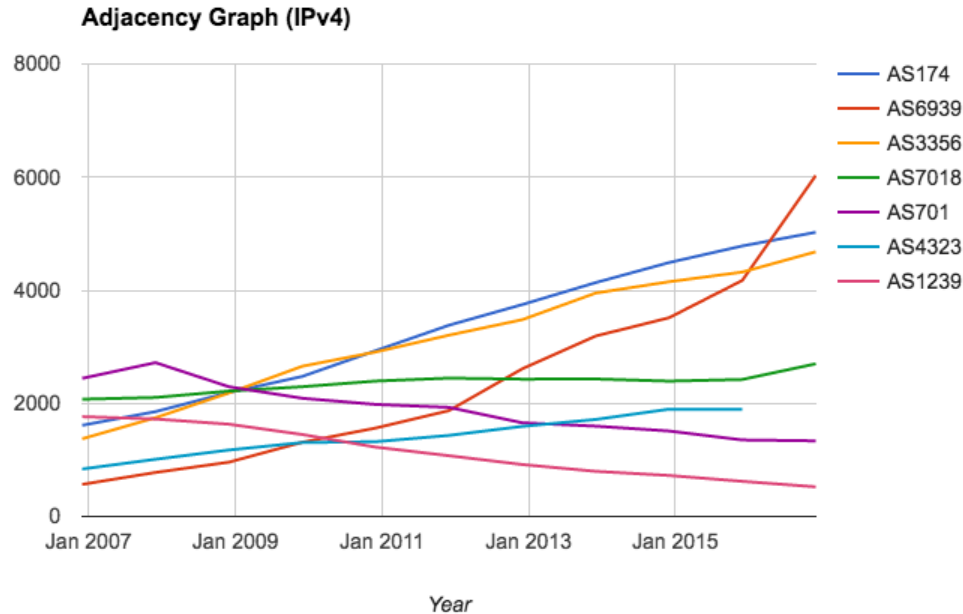
* Data belongs to Dec of each year



Year on year IPv4 peering change across the top ASNs



Year on Year peering changes between 2006 - 2016



Networks with the highest adjacencies (IPv6)

Month	2006	2007	2008	2009	2010	2011
Rank 1	AS3257 (144)	AS3257 (179)	AS6939 (335)	AS6939 (659)	AS6939 (1106)	AS6939 (1576)
Rank 2	AS2914 (115)	AS2914 (162)	AS3257 (200)	AS13030 (330)	AS3257 (423)	AS3356 (507)
Rank 3	AS30071 (83)	AS6939 (160)	AS2914 (191)	AS3257 (274)	AS13030 (357)	AS174 (505)
Rank 4	AS6175 (75)	AS30071 (117)	AS3549 (123)	AS2914 (210)	AS2914 (281)	AS13030 (461)
Rank 5	AS2497 (65)	AS6175 (94)	AS30071 (110)	AS3549 (148)	AS3549 (225)	AS3257 (412)

* Data belongs to Dec of each year



Networks with the highest adjacencies (IPv6)

Month	2012	2013	2014	2015	2016
Rank 1	AS6939 (1950)	AS6939 (2218)	AS6939 (2471)	AS6939 (2819)	AS6939 (3589)
Rank 2	AS174 (737)	AS174 (1047)	AS174 (1221)	AS174 (1341)	AS174 (1548)
Rank 3	AS3356 (732)	AS3356 (973)	AS3356 (1044)	AS3356 (1146)	AS3356 (1276)
Rank 4	AS13030 (514)	AS13030 (561)	AS2914 (673)	AS37100 (839)	AS37100 (1073)
Rank 5	AS3257 (466)	AS2914 (548)	AS1299 (602)	AS2914 (749)	AS1299 (881)

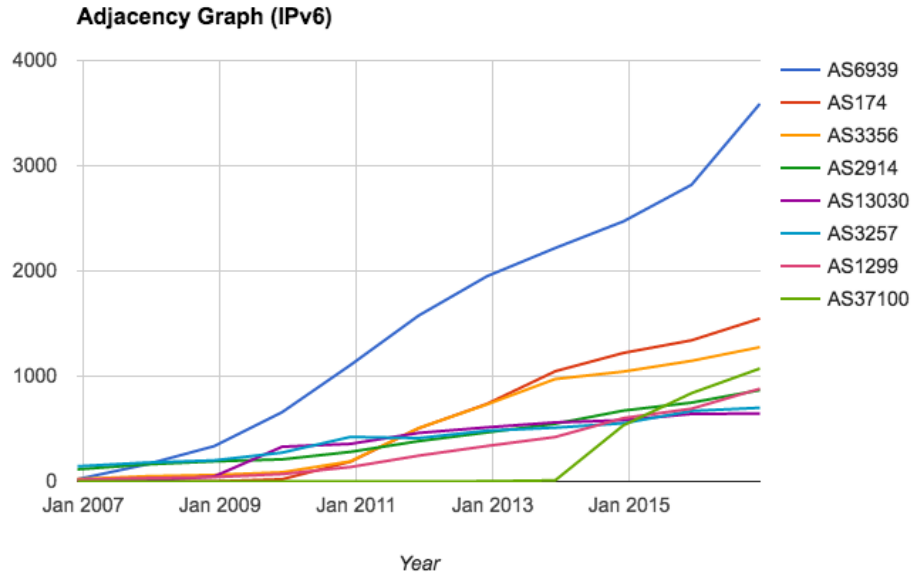
* Data belongs to Dec of each year



Year on year IPv6 peering changes across the top ASNs



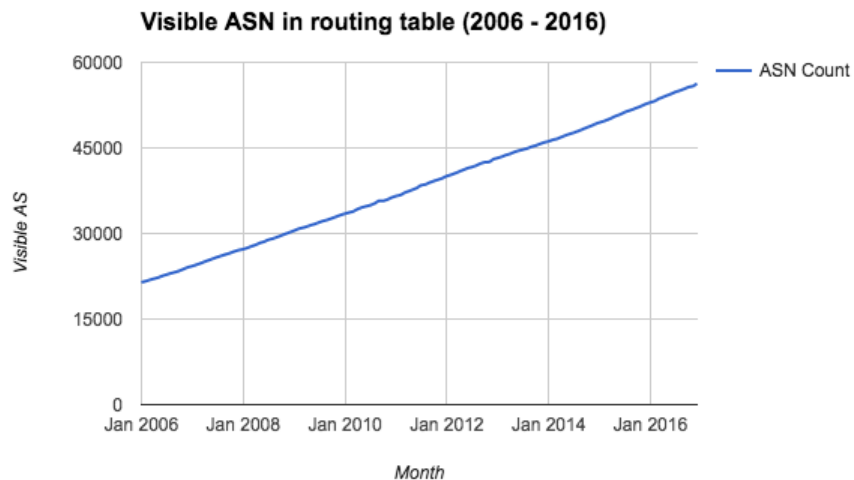
Year on Year peering changes between 2006 - 2016



Growth of ASNs between 2006 - 2016



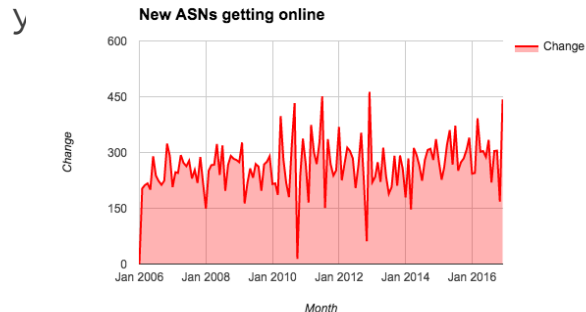
Year on Year growth of ASNs (IPv4)



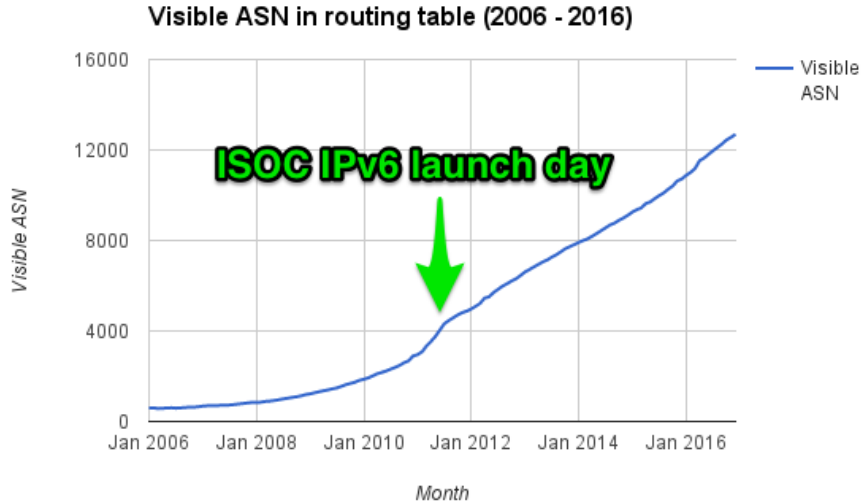
Visible ASNs in Jan 2006: 21441

Visible ASNs in Dec 2016: 56271

Average change of 14.76% (every



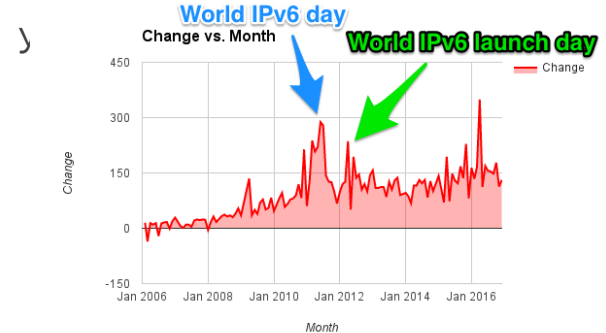
Year on Year growth of ASNs (IPv6)



Visible ASNs in Jan 2006: 590

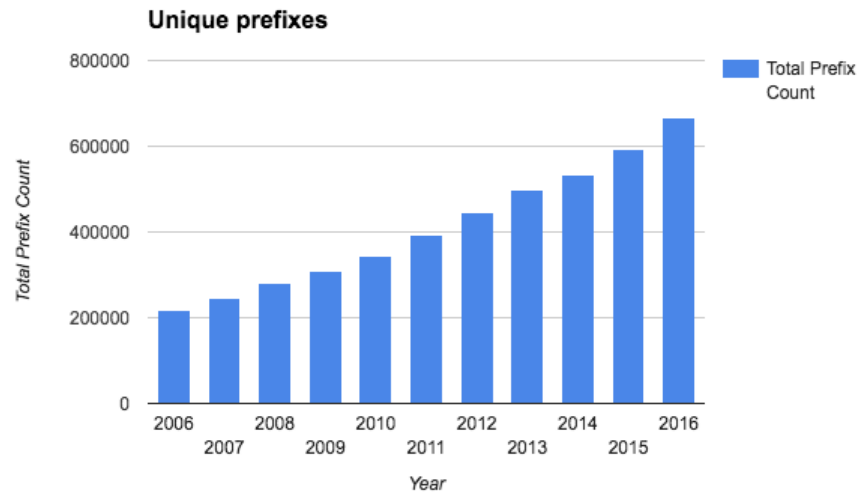
Visible ASNs in Dec 2016: 12691

Average change of 186.45% (every



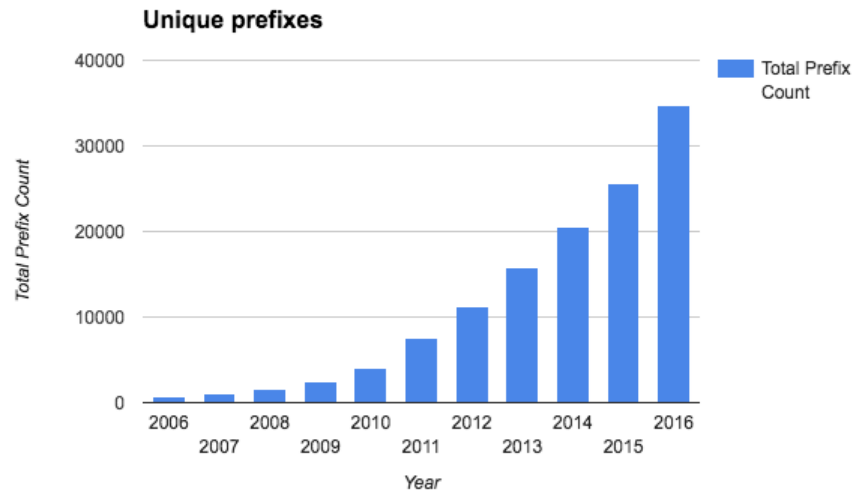
Growth of IPv4 Prefixes

Growth of unique IPv4 prefixes visible in the routing table between 2006 to 2016

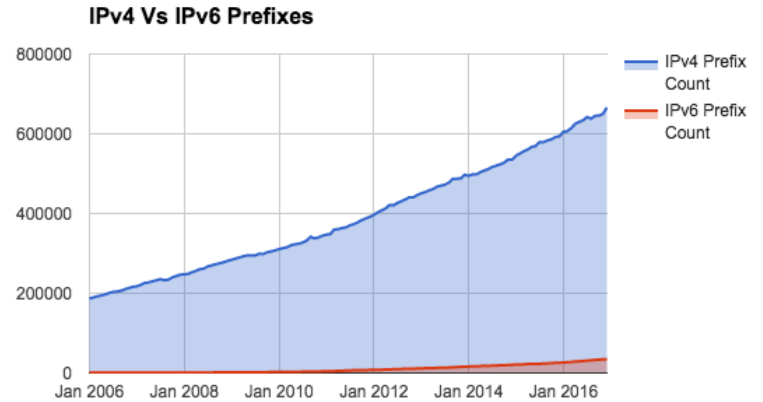
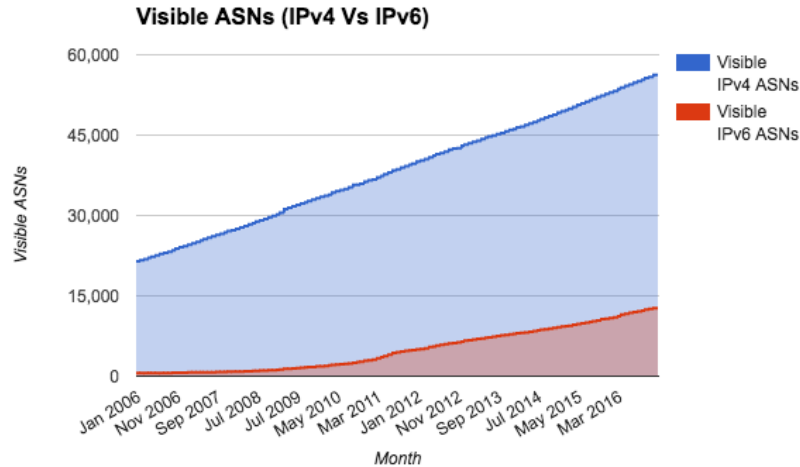


Growth of IPv6 Prefixes

Growth of unique IPv6 prefixes visible in the routing table between 2006 to 2016



IPv4 vs. IPv6 ASN Comparison



Growth of multi-homing

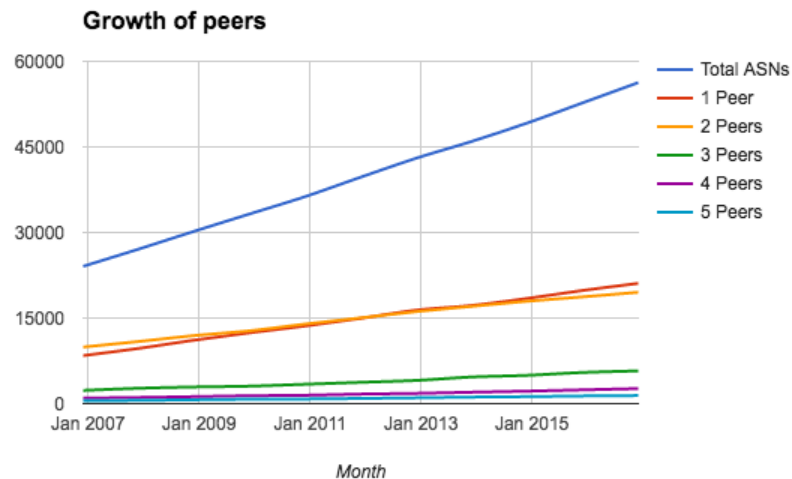


Comparison of growth of adjacencies

Month	1 Peer	2 Peers	3 Peers	4 Peers	5 Peers	Total Visible ASNs
Dec 2006	8424	9920	2319	970	498	24076
Dec 2007	9680	10894	2698	1080	575	27088
Dec 2008	11128	11931	2920	1226	680	30221
Dec 2009	12423	12767	3066	1389	781	33253
Dec 2010	13606	13948	3398	1467	814	36289
Dec 2011	14947	15028	3737	1675	913	39693
Dec 2012	16384	16134	4071	1804	1021	43022
Dec 2013	17205	17052	4670	2004	1146	45966
Dec 2014	18437	17951	4962	2187	1227	49184
Dec 2015	19839	18713	5461	2418	1347	52724
Dec 2016	21082	19520	5734	2636	1419	56271



Comparison of growth of adjacencies



How do I get my ASN in the list?



How to make the internet better?

Follow & promote an open peering policy

Peer at Internet Exchange Points (IXPs)

Start an IXP in your home region if not there already

Use peeringDB to list yourself & search for others

Share your routing table to public route collectors -



Conclusions

— — —

Peering is good! *Remember somewhere up the transit path there's peering*

More peerings = more entry & exit points in backbone gives tremendous flexibility, fewer points of failure, capacity to deal with high amounts of traffic and lot more!

A large IPv4 routing table will consume more resources, very slow BGP convergence etc resulting in direct impact on networks

Ironically unique IPv4 addresses not growing at the pace of internet points to ugly reality of NATed deployment in post IPv4 depletion stage

IPv6 deployment by global networks needs to accelerate. Remember each IPv6 route origination carries 2^{80} addresses at least



Considerations for the study

There can be large content networks which have a very high amount of peering but not visible since neither side dumps data in public route collectors

Announcements smaller than /24 in IPv4 and /48 in IPv6 are ignored

This study measures adjacencies which includes all three i.e peers, upstream & downstream



Thankyou!

Questions / Peering?

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