



HURRICANE ELECTRIC
INTERNET SERVICES

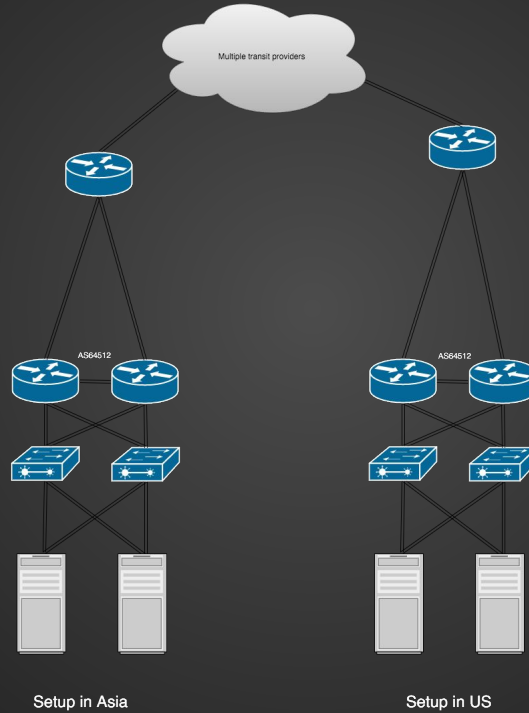
Disconnected Network Islands

Analysis of ASN repeat within AS_PATH

Multi-geography networks

1. Connected with a backbone
2. Not connected with a backbone

Not connected with a backbone



Anurag Bhatia - Hurricane Electric - SANOG 27 - Kathmandu, Nepal - Disconnected Network Islands

What are Disconnected islands?

- Independent networks belonging to same entity using same ASN
- Parts are not connected via physical point to point circuit or MPLS or any logical point to point tunneling protocol
- Routing between parts of such networks happening via other autonomous networks

Disconnected island route leak...

- Learning own route originated from own ASN but from a “*disconnected router*” and leaking it to peers/transits
- Learning own routes by disabling BGP loop prevention algorithm
- Leaks often happen because of “*prefix-based-filters*” with no AS path matching

BGP loop prevention

1. Drops incoming route if local AS is in AS_PATH
2. Default BGP behavior - Helps in preventing routing loops
3. Can be disabled using “*allowas-in*” on the peer (Cisco) or “*AS-Path loop count*” in JunOS

Impact of Disconnected Islands leak

- Shows as unexpected relationships among ASNs on various tools (*like bgp.he.net*)
- Traffic flows from unexpected paths resulting in poor performance & transit bandwidth wastage
- Can cause announcement to be considered leak resulting in filtering (*which may be undesired if setup is done intentionally in that way*)
- Causes “noise” in global routing table

Our study

- Search for cases where an ASN has repeated multiple times in AS path
- Cases of ASN repetition adjacent to itself (i.e prepends) were ignored
- Search for ASNs repeats from 2010 to 2015 in global routing table
- Daily RIPE RIS dumps were observed from multiple points

Possible reasons for AS repetition

1. Mis-typed ASN used while prepending
2. Use of “1” “2” or “3” while prepending multiple times
3. **The real disconnected island case!**
4. Single entity having multiple ASNs & using them in “mixed manner”
5. Any other misc behavior !

Results

- 227 unique ASNs found repeating in routing table from 2010 to 2015
- These ASNs belong to 60 countries across all RIRs
- 27,696 unique routes with 3321 unique prefixes

Mistyped ASNs examples

103.10.188.0/24|20562 3209 3209 55410 55470 **555470** 55470 55470 55470 55470 55470 55470 55470

103.11.61.0/24|20562 8529 8529 8529 8529 8529 8529 8529 8529 38193 38193 38193 **38913** 38193 38193 38193 9387

103.2.237.0/24|20562 9498 45194 **45195** 45194 45194 45194 45194 45194 45194 45194

103.20.90.0/24|30132 6453 7713 58514 58381 58381 58381 **5838** 58381 58381

103.247.19.0/24|15435 6939 4826 9398 **9822** 9398 18107 18107

103.255.108.0/22|1103 8529 8529 8529 8529 8529 8529 8529 8529 38193 38193 38193 38193 38193 **38913** 38193 59260

AS repeat due to bad prepend

103.30.136.0/24|29611 3356 38193 55330 132471 132471 132471 132471 132471 132471 132471 2 131211 2 132471

103.30.136.0/24|29636 2914 6762 38193 55330 132471 132471 132471 132471 132471 132471 132471 2 131211 2 132471

103.30.136.0/24|31019 38193 55330 132471 132471 132471 132471 132471 132471 132471 2 131211 2 132471

103.30.137.0/24|29636 2914 6762 38193 55330 132471 132471 132471 132471 132471 132471 132471 2 131211 2 132471

103.30.137.0/24|39202 174 3356 38193 55330 132471 132471 132471 132471 132471 132471 132471 2 131211 2 132471

103.30.137.0/24|56730 51945 1299 3356 38193 55330 132471 132471 132471 132471 132471 132471 2 131211 2 132471

The real disconnected islands!

103.7.148.0/24|25160 9583 33480 33480 33480 **132220** 24029 18101 18101 18101 **132220**

103.7.148.0/24|29611 9583 33480 33480 33480 **132220** 24029 18101 18101 18101 **132220**

103.7.148.0/24|29636 3209 55410 33480 **132220** 24029 18101 18101 18101 **132220**

103.7.150.0/24|56730 9583 33480 **132220** 24029 9498 45194 **132220**

103.7.150.0/24|8607 3209 55410 33480 **132220** 24029 9498 45194 **132220**

103.7.151.0/24|56730 9583 33480 **132220** 24029 55410 45194 **132220**

Some cases from IPv6 world!

2001:428:1805::/48|12859 286 6939 209 **3908** 209 13626

2001:428:7008::/48|1103 286 6939 209 **3908** 209 35994 35994

2001:428:7008::/48|8928 6939 209 **3908** 209 35994 35994

2001:428:7008::/48|31019 43531 6939 209 **3908** 209 35994 35994

(Note: AS209 and AS3908 both belong to same company)

Best user practices / Avoiding leaks

“Disconnected islands aren’t bad and perfectly normal. It’s leaking indirectly learnt routes which makes it bad!”

Best user practices / Avoiding leaks

1. If running disconnected island of networks and have default route installed in router towards transit networks, then don't disable BGP as-loop prevention on BGP sessions with transits and let default route to take care of flows between both end points
2. If running disconnected islands with BGP loop prevention disabled then ensure that indirectly learnt route is not "leaked" to external peers and transits

Thank you!

Questions?
Peering?

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<http://www.he.net>

<http://as6939.peeringdb.com>