Updated BGP Operations and Security
Revisiting BCP194

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Recap: BCP194 / RFC7454

- “BGP Operations and Security”
- From Feb. 2015
- Best practices for:
  - Protecting BGP sessions (TCP layer)
  - Protecting BGP speakers (general network security)
  - Protecting BGP (or rather: What to (not) import from whom)
Issues in BCP194

- Makes some borderline normative (and problematic) recommendations on announcing IXP peering LANs
  - “In that case, any IXP member SHOULD make sure it has a route for the IXP LAN prefix or a less specific prefix on all its routers and that it announces the IXP LAN prefix or the less specific route (up to a default route) to its downstreams.”

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General sentiment: Somebody should somehow do something. Maybe.
Currently, the idea for revisiting BCP194 is:

- Edit from the original towards a version that ‘contains everything’ that could be changed
- The current version takes a very ‘maximum’ approach to many things, with the objective of providing a foundation for discussion
- It takes a wider perspective on ‘security’, i.e., also looks at reliability / operating BGP reliably, even if no one is attacking things
Terminology

Issues

- BCP194 uses some terminology with different meaning, e.g., peer (other BGP speaker to which a BGP speaker has a BGP session) and peer (other AS with which only one’s own cone is exchanged)
- Terminology has progressed a bit (see RFC9234 and the ASPA draft)
- Some things could use more exact definitions
- BCP194 codifies what a Tier-1 operator is; Which might be a bit of a thing.
Changes

- Unify terminology (BGP neighbor; Peer only for topological peers)
- Import terminology from RFC9234 and the ASPA draft (including ‘mutual upstream’)
- Add more definitions where necessary
- Remove reliance on Tier-1 notion
‘New’ Attacks

Issues

- Since 2015, a couple of attack vectors showed up;
- There are some PMTUD attacks for off-path route injection
- There is the GRT-blowup with deaggregation
‘New’ Attacks: Changes

Changes

- Discuss a few more of these attacks and associated defenses
- **Discussion Point:** Introduced a wider (per neighbor AS across all sessions with the neighbor) prefix limit
IXP LANs

Issues

- The notion of handling IXP LANs in BCP194 might be seen ‘a bit controversial’ in IXP circles
- There are new use-cases of IXPs (‘upstream’ route servers, upstream via IXPs)
- uRPF breaks things
Changes

- Clarify that IXPs decide whether their IXP LAN(s) should be advertised
- Removed BGP example in the Appendix
- Noted additional IXP Lan cases (upstream via etc.) and next-hop filtering needs
Filtering Types

Issues

- In BCP194, the main sectioning item is filtering types (prefixes, AS-path etc.)
- In the end, everything is ultimately about which NLRI gets imported (given it has a specific prefix/next-hop/AS path...)

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Filtering Types: Changes

<table>
<thead>
<tr>
<th>Changes</th>
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<tbody>
<tr>
<td>- Focus more on the general frame of importing NLRI</td>
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<td>- Split prefix filter based on source of lists (IRR vs. more ’static’ lists)</td>
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New Things to Filter

- We got many more things to filter for/with
New Things to Filter: Changes

Changes

- Add ASPA and BGP roles/OTC
- Note use of community-based filtering, also discussing leak-potential of static filters being used\(^a\)
- Emphasize outbound filtering
- Reference RFC9319
- Add large-communities/scrubbing
- Add max-prefix limits and global limits

\(^a\)Yes, been there, seen that
New Things to Filter: Changes (cont.)

Changes (that might go a bit far)

- Add note on suggested shortest prefix lengths (/8 (v4) and /16 (v6))
- Add note on ASPATH max-length filtering
- Suggest iBGP filtering
## Issues

- BCP194 lacks reflections on the algorithmic complexity of rules\(^a\)
- BCP194 does not discuss the impact of sequential processing on filter import\(^b\)
- Filter generation is not discussed in-depth (and BCP194 still recommends IRRtool)

\(^a\)Yes, got bitten by that.
\(^b\)Yep, that one too.
Rule Generation & Ordering: Changes

Changes

- Discuss impact of order on filter computation time and import caveats
- Discuss pathways for generating filters in resource constraint environments
- Recommend BGPq4 instead of IRRtool
Issues

- BCP194 lacks authoritative terminology on what one can do with harmful transitive attributes.
Terminology: Changes

Changes

- Added a MAY there
Unify terminology around route/prefix/NLRI, which is currently a bit mixed up

Use of **MUST** vs. **SHOULD**; Other contemporary drafts use stronger language; From a general standpoint I’d argue **MUST** might be better under the premise of ‘to follow best practices this **MUST** be done’ with the caveat of ‘best practices **SHOULD**’ be followed; Still, currently it still uses BCP14 **SHOULD** for all points

Putting in a point on having preparations in place to filter specific BGP options at the border in case one’s infrastructure topples when a specific option is sent

Figure out if this should be update or obsolete

Fix nits in the abstract
Comments so Far

- Add note on honoring GSHUT on IXPs
- Discuss use of lpref on IXP RS
- Add note on need for individual judgement (my network, my rules)
- Discussing MED based oscillation (RFC7964)
- Expand community filtering (scrub extended (RFC4360) and long lists (+100))
- Make attribute scrubbing more specific (only scrub what is specifically known to cause harm now)
Discussion Points

Discussion Point 1
- iBGP filtering: Is this going to far?

Discussion Point 2
- Global max prefix limits: Too unreasonable? Maybe more about monitoring?

Discussion Point 3
- What else is missing/too much/should change?

Discussion Point 4
- Should I SHOULD or should I MUST?