Maintain consistency of inter-domain routing and forwarding

draft-cheng-idr-inter-domain-consistency-00

Presenter: Shengnan Yue (China Mobile)

Co-author: Weiqiang Cheng (China Mobile)
Mingxing Liu (Huawei)
Mingqing Huang (Huawei)
Shengnan Yue (China Mobile)

IETF -118
Inconsistent inter-domain routing and forwarding

- AS_PATH attribute of BGP UPDATE records the AS number that it has passed through.
- The actual forwarding AS path is usually different with the AS_PATH in BGP UPDATE.
- The origin AS, maybe any AS, does not see the actual forwarding AS path from the BGP announcement.

![Diagram of AS Path](image)

BGP Path: ASx → ASy → Dest AS

Non-BGP Path: ASx → P1 → AS3 → AS4 → P4 → ASy

Complete forwarding AS path:

- P4: [AS2, AS4]
- Actual AS Path: [AS2, AS3, AS4]
- Expected AS Path: [AS2, AS4]
The risk of the inconsistency

• Traffic blackhole
• Loop/Detour
• Malicious AS
• Non-optimal route

Traffic blackhole

Loop/Detour

Malicious AS
What results in the inconsistency?

- Inter-domain traffic Redirection
  > No control plane/routing protocol awareness
What results in the inconsistency?

- Traffic engineering protocols
  - Such as MPLS, SR
What results in the inconsistency?

- **Route aggregation**
  > The ordered AS_Sequence is converted to the unordered AS_SET
How to maintain consistency of inter-domain routing and forwarding

• Obtaining deviation AS paths
• Advertising the deviation path
How to maintain consistency of inter-domain routing and forwarding

• Obtaining deviation AS paths

> Acquire the next-hop AS and the destination prefix of the redirection rule.
> Look up the AS_PATH in Adj_RIBs_In from the next-hop AS according to the destination prefix.
How to maintain consistency of inter-domain routing and forwarding

• Advertising the deviation path

> The AS that generates the deviation AS path is obliged to check and advertise it to other ASes.
> The deviation AS path and attributes of the specific flow should be included in BGP UPDATE.
Benefits

• Visualization
• Troubleshooting
• Routing security
• Inter-domain TE
Next Steps

• Any questions or comments are welcomed
• Will refine the solutions in the future