

# Definition and problem statement for consistency in inter-domain routing and forwarding

draft-cheng-idr-conformance-forwarding-01

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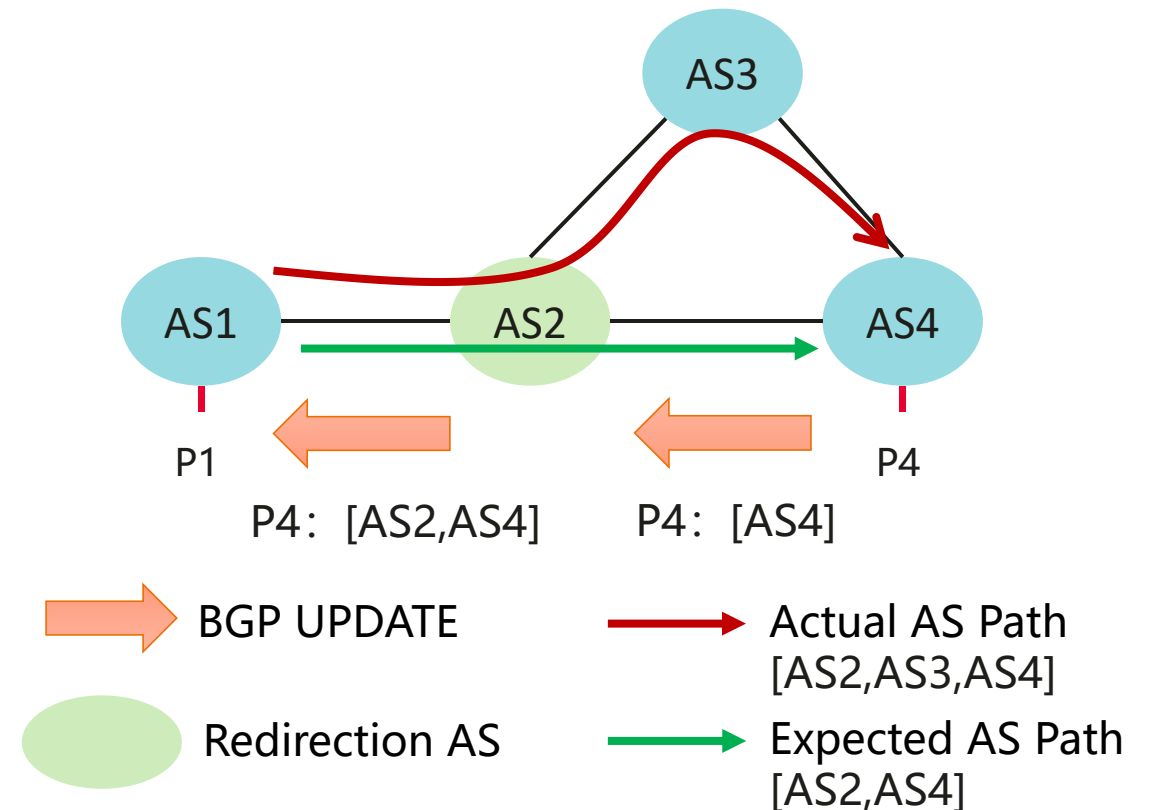
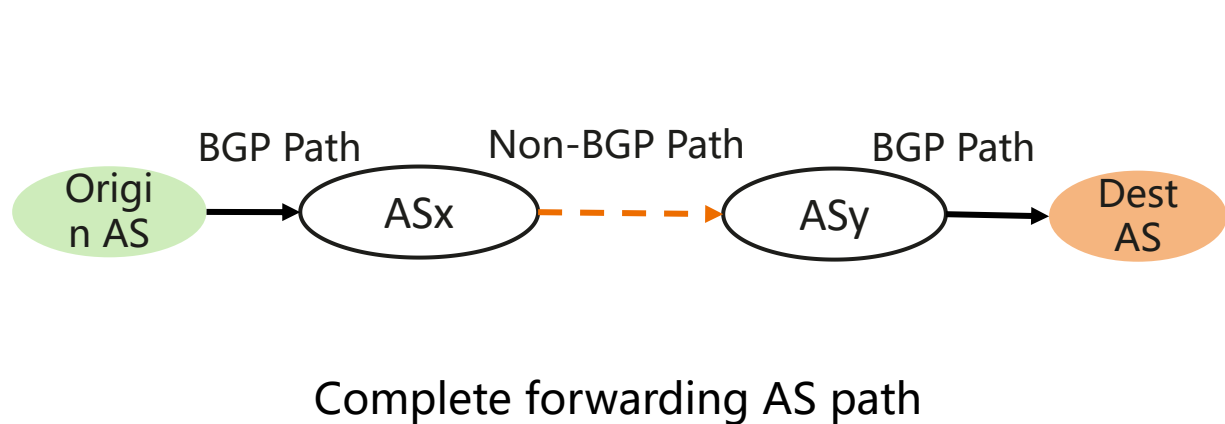
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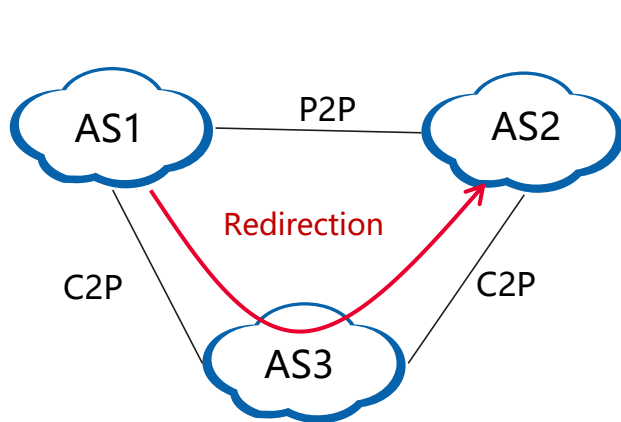
# Consistency in inter-domain routing and forwarding

- Consistency means that inter-AS traffic is forwarded along the AS\_PATH in the reverse direction.
  - AS\_PATH attribute of BGP UPDATE records the AS number that it has passed through.
  - Theoretically, inter-domain forwarding behavior depends on inter-domain routing.
- However, 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.

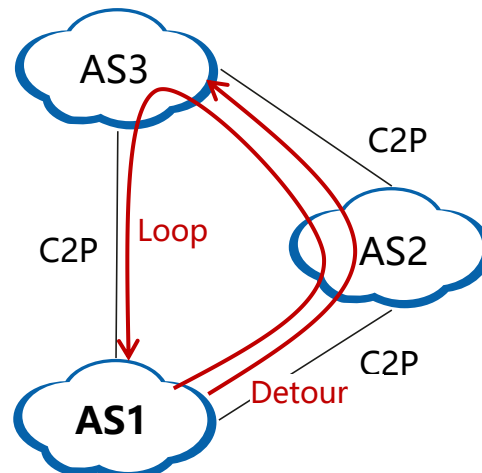


# The risk of the inconsistency

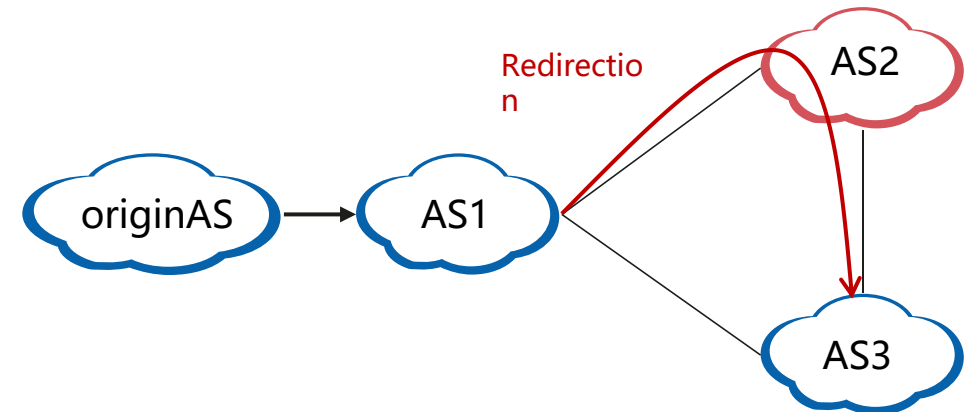
- **Traffic blackhole**: there is no corresponding route for the next-hop AS, resulting in a traffic black hole.
- **Loop**: the forwarding AS path that has not been checked by BGP may lead to loops
- **Detour**: the complete forwarding AS path is composed of multiple AS paths from different protocol, which may lead to unnecessary lengthening of AS\_PATH.
- **Malicious AS**: The actual forwarding path is not visible to the origin AS, which may cause its packets to pass through some ASes it does not expect.
- **Non-optimal route**: The AS may prefer some ASes, selecting a non-optimal route.



Traffic blackhole



Loop/Detour

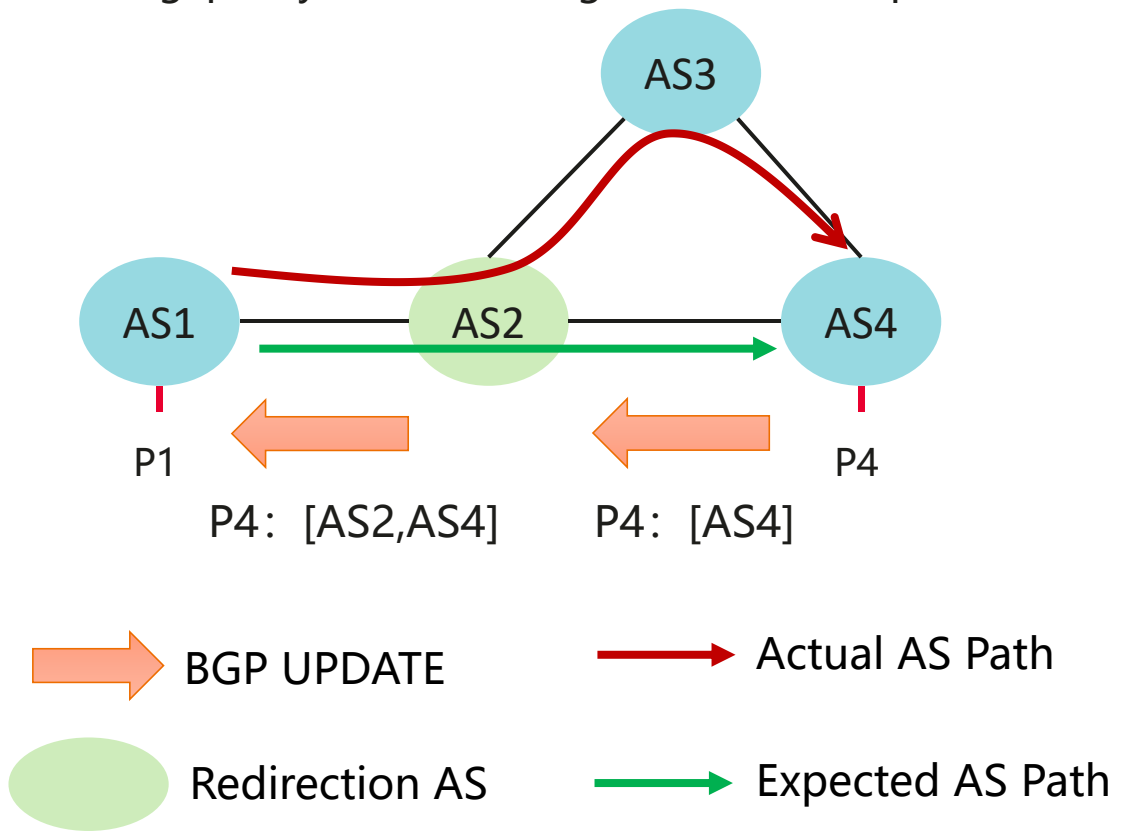


Malicious AS

# What results in the inconsistency?

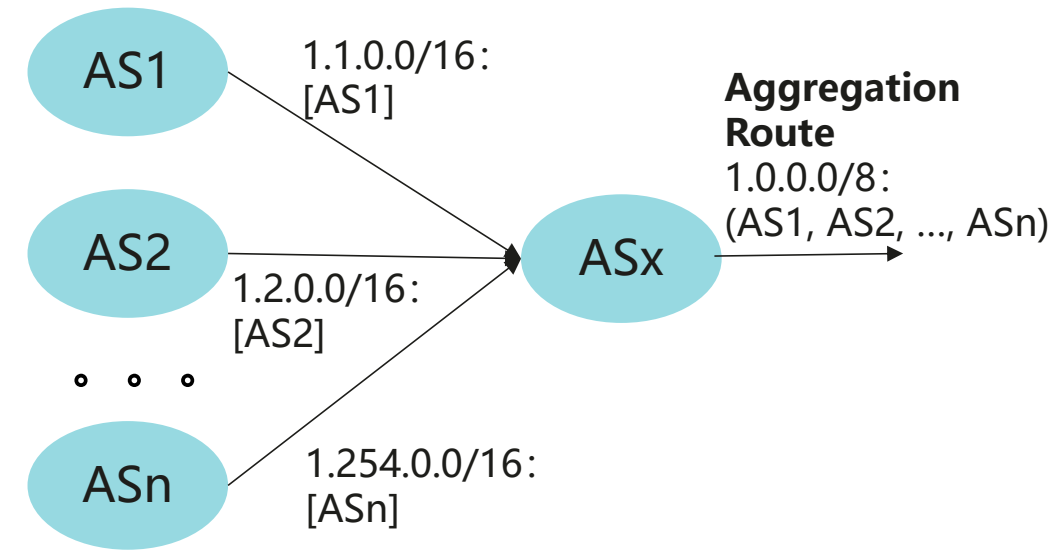
- Inter-domain traffic Redirection

- > No control plane/routing protocol awareness
  - E. g. policy-based routing or BGP Flowspec



- Ambiguous routing specifications

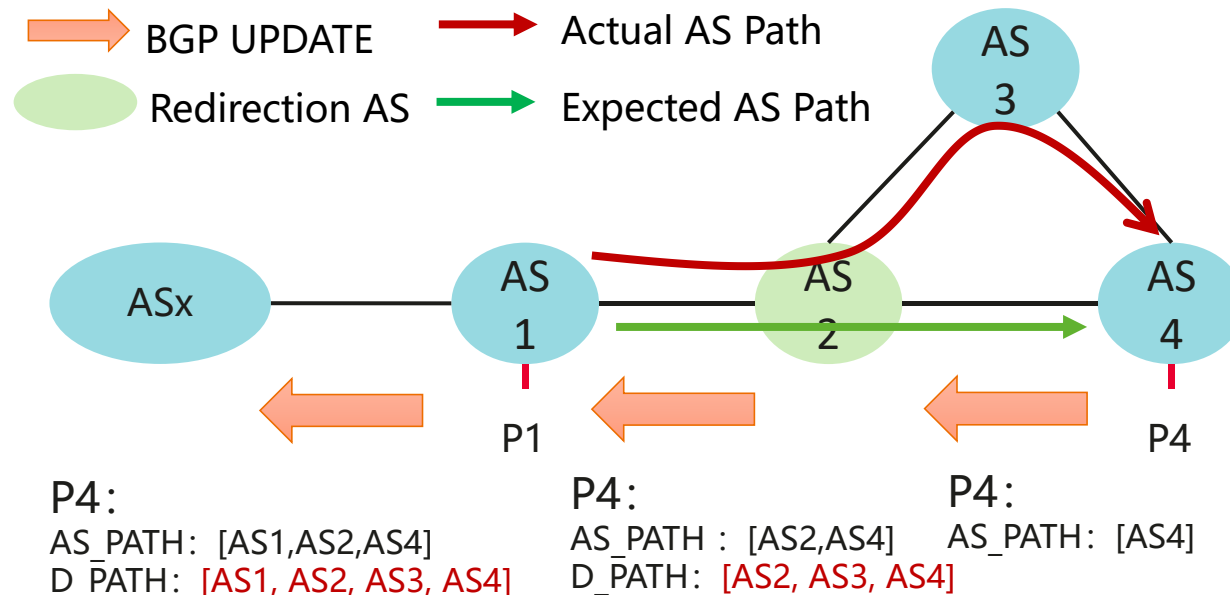
- > Route aggregation
  - The ordered AS\_Sequence is converted to the unordered AS\_SET



# How to keep consistency of inter-domain routing and forwarding

## • 1、 Obtaining deviation AS paths

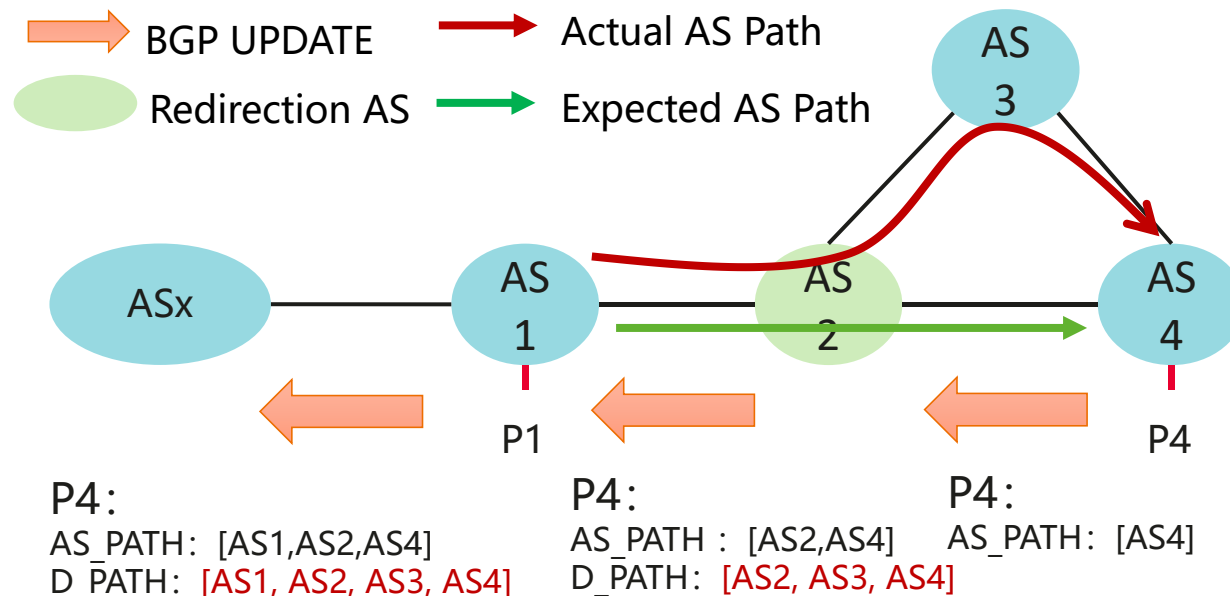
- > Acquire the next-hop AS and the destination prefix of the redirection rule.
- > Look up the AS\_PATH in Adj\_RIBs\_In from the next-hop AS according to the destination prefix.



# How to keep consistency of inter-domain routing and forwarding

## • 2、 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



# Use Cases

- **Internet Visualization**
- **Inter-domain source address validation**
- **Troubleshooting**
- **Intent-based routing**

# Next Steps

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