Inter-domain SAVNET Solution ——
Source Prefix Advertisement (SPA) and Source Path Discovery (SPD)

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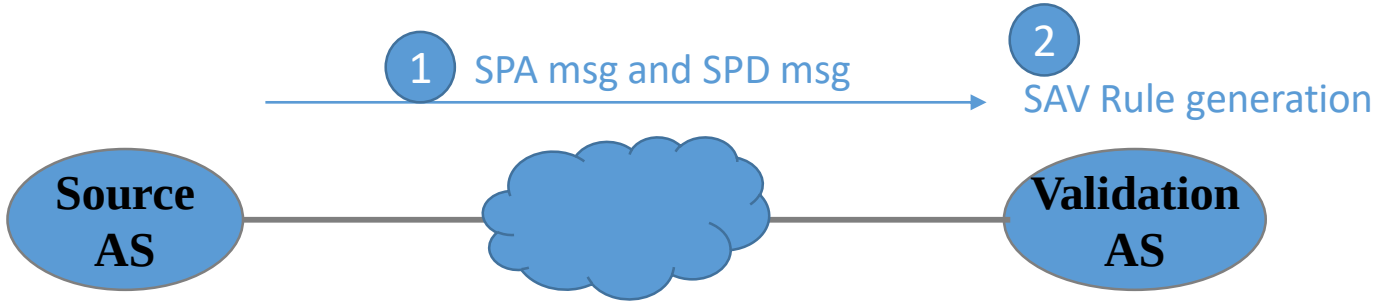
SPA and SPD for SAV-specific information

- **Source AS**: The AS whose source prefixes need to be validated at Validation AS.
- **Validation AS**: The AS that conducts SAV for the packets with the source prefixes of Source AS.
- **SPA**: Source prefix advertisement, i.e., the process for advertising the origin source addresses/prefixes of a router or an AS.
- **SPD**: Source path discovery, i.e., the process for discovering the real incoming directions of particular source addresses/prefixes.



Reduce improper block: EFP-uRPF + SPA

Case 1: SPA for advertising hidden prefixes

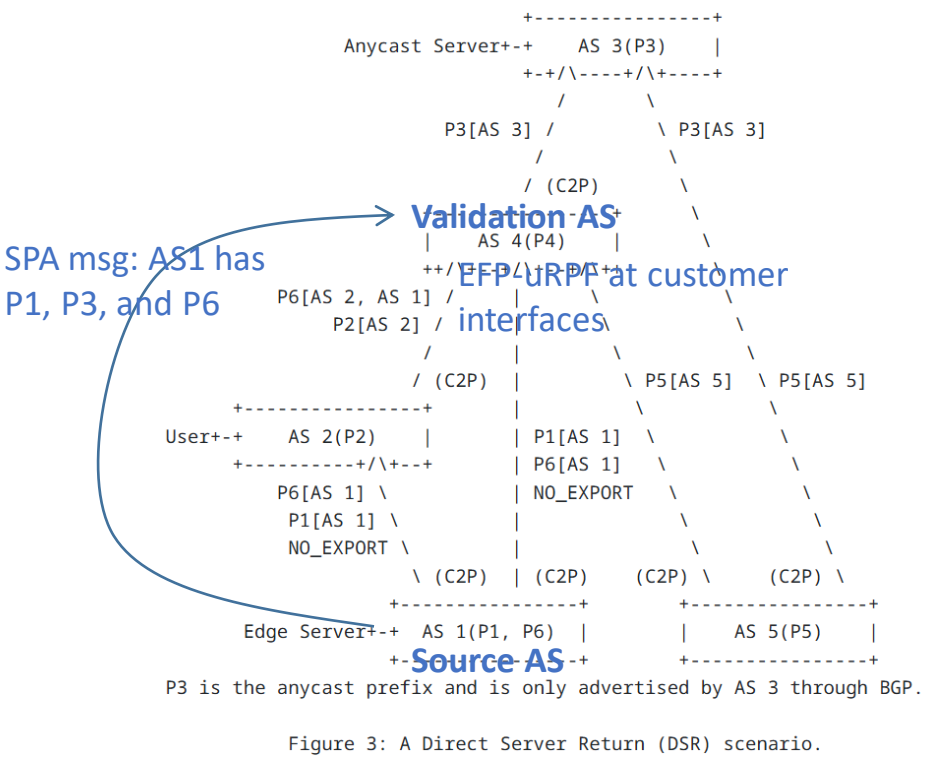


Figure 3: A Direct Server Return (DSR) scenario.

Problem and solution:

- **Improper block:** AS4 does not learn P3 from AS1 in BGP and blocks source prefix P3 coming from AS1.
- **Solution:** AS1 advertises P3 to AS 4 by a SPA message. Prefix set of AS1 = Prefix set from BGP ∪ Prefix set from SPA.

See draft-ietf-savnet-inter-domain-problem-statement for more details of the scenario

Effectiveness:

- Improper block reduced

Convergence:

- Withdraw prefixes: improper permit
- Update prefixes: Improper block which may slow down new service provisioning with new prefixes, but without impacting existing services

Security:

- SPA covered by ROA: Hijack in SPA prevented
- SPA not covered by ROA: Hijack in SPA results in improper permit, same security level as EFP-uRPF

Reduce improper block: EFP-uRPF + SPD

Case 2: SPD for discovering hidden paths

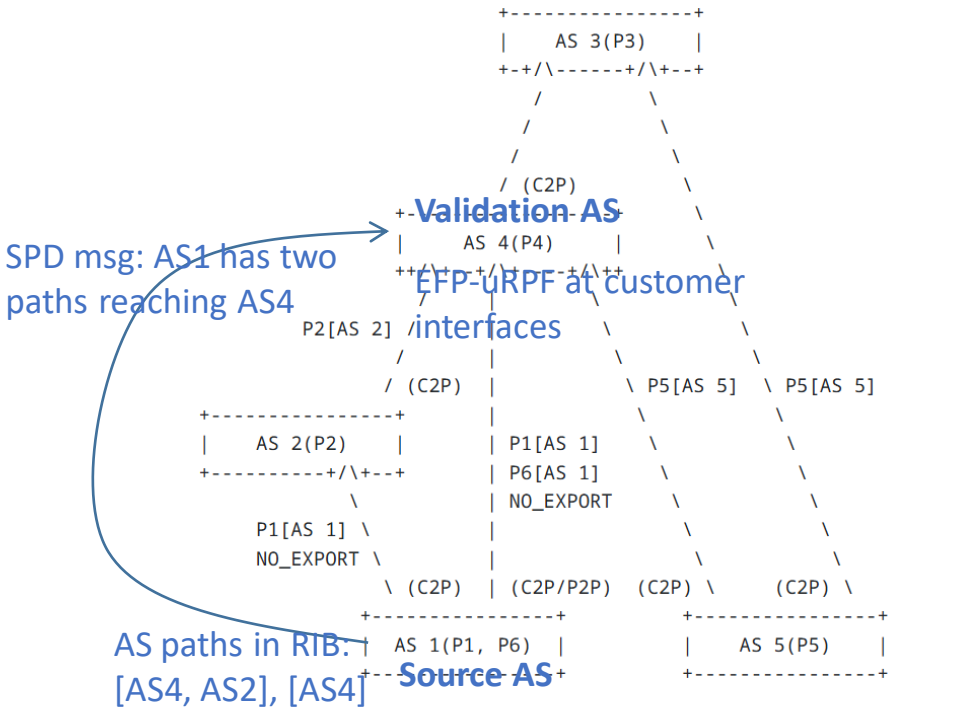


Figure 2: Limited propagation of prefixes caused by NO_EXPORT.

Problem and solution:

- **Improper block:** AS4 does not learn AS1 at customer interfaces in BGP and blocks source prefix P1 and P6 coming from AS1
- **Solution:** AS1 advertises paths reaching AS4 by a SPD message. Path set of AS1 to AS4 = Path set from BGP ∪ Path set from SPD.

See draft-ietf-savnet-inter-domain-problem-statement for more details of the scenario

Effectiveness:

- Improper block reduced

Convergence:

- Withdraw paths: improper permit
- Update paths: Improper block which may slow down new service provisioning with new feasible paths in NO_EXPORT scenarios

Security:

- Off-path attack: improper permit
- On-path attack: improper permit and no improper block when there are multiple propagation paths of SPD

Reduce improper permit: Loose uRPF + SPA + SPD

Case 3: SPD for specifying paths

SPA msg: P1 for which AS1 specifies paths

SPD msg: AS1 specifies two paths reaching AS4

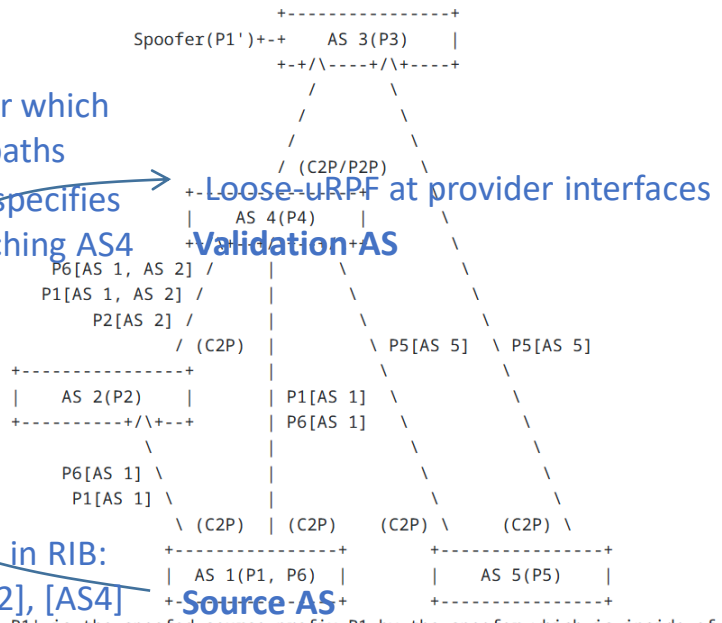


Figure 6: A scenario of source address spoofing from provider/ peer AS.

Problem and solution:

- **Improper permit:** AS4 permits P1 from AS3 even when AS3 forges P1
- **Solution:** AS1 specifies two paths reaching AS4 by a SPD message. Path set of AS1 to AS4 = Path set from SPD.

Applicable Scenarios:

- **Applicable Scenarios:** The Source AS requires that the packets from Source AS to Validation AS are forwarded over the specified paths.
- **What to do if packets from AS1 to AS4 traverses unspecified paths:** Considered invalid.

See draft-ietf-savnet-inter-domain-problem-statement for more details of the scenario

Effectiveness:

- Improper permit reduced

Convergence:

- Withdraw paths: improper permit
- Update paths: Improper block which may slow down new service provisioning with new feasible paths, but without packets diverted

Security:

- Security risks may result in improper block
- Suggest advertising SPD messages from Source AS to Validation AS directly through eBGP, i.e., not traversing other ASes

SPA and SPD working mode

- Source AS can use SPA to advertise
  - 1) its complete (or specified) origin source prefixes (*SPA-Complete Mode*)
  - 2) its selected (or additional) origin source prefixes (*SPA-Selective Mode*)
- Source AS can use SPD to advertise
  - 1) the set of all (or specified) paths to Validation AS (*SPD-Complete Mode*)
  - 2) the set of selected (or additional) paths to Validation AS (*SPD-Selective Mode*)

- Suggestions:
  - Case 1: SPA-Selective suggested
  - Case 2: SPD-Selective suggested
  - Case 3: SPA-Complete and SPD-Complete suggested
- There are more use cases of SPA and SPD … …

Next Step

- Finish the draft with collaborators
- Comments are welcome

Thanks!